András Svraka

The Effect of Labour Cost Reduction on Employment of Vulnerable Groups

Evaluation of the Hungarian Job Protection Act

Summary: In 2013 Hungary introduced large scale targeted employers' social security contribution cuts for the young, old, low-skilled, and other marginally attached workforce, called the Job Protection Act. In this paper I estimate the employment effects of the programme for the main target groups using the discontinuities in the JPA's design in a differences in differences framework on administrative datasources. My estimates show robust and economically significant employment effects for the Job Protection Act, a total 1.2 point increase in employment rate three years after the introduction. The Job Protection Act was highly effective in the young and low-skilled target groups, with high self-financing ratios, while it was only marginally effective in the old target group. The results suggests that targeted tax incentives can be a cost-efficient way of increasing employment in vulnerable groups.[1]

Keywords: Job Protection Act, targeted tax incentives, differences in differences
JEL codes: H24, J21, J23

Historically, Hungarian employment and participation rates were low compared to other member states of the European Union. These differences can largely be attributed the low participation of certain groups in the labour market. For the pre-crisis period Kátay (2009) identified four main groups that can explain most of the difference between Hungarian and EU15 participation rates: employees with primary education only, the cohorts below 25, above 50, and women of childbearing age.

In recent years several policy measures were aimed at increasing the employment rates in these groups. The retirement age was gradually raised and early retirement schemes were abolished. Significant tax reforms were also enacted. The progressive tax schedule on labour income was repealed and replaced with a flat rate system in several steps between 2011 and 2013, supplemented by a child tax allowance. In 2013 an additional new measure was introduced, called the Job Protection Act (JPA) with the aim to boost employment for certain vulnerable groups.

The JPA is a tax credit that reduces employers' social security contributions in groups where the Hungarian participation and em-

E-mail address: andras.svraka@pm.gov.hu

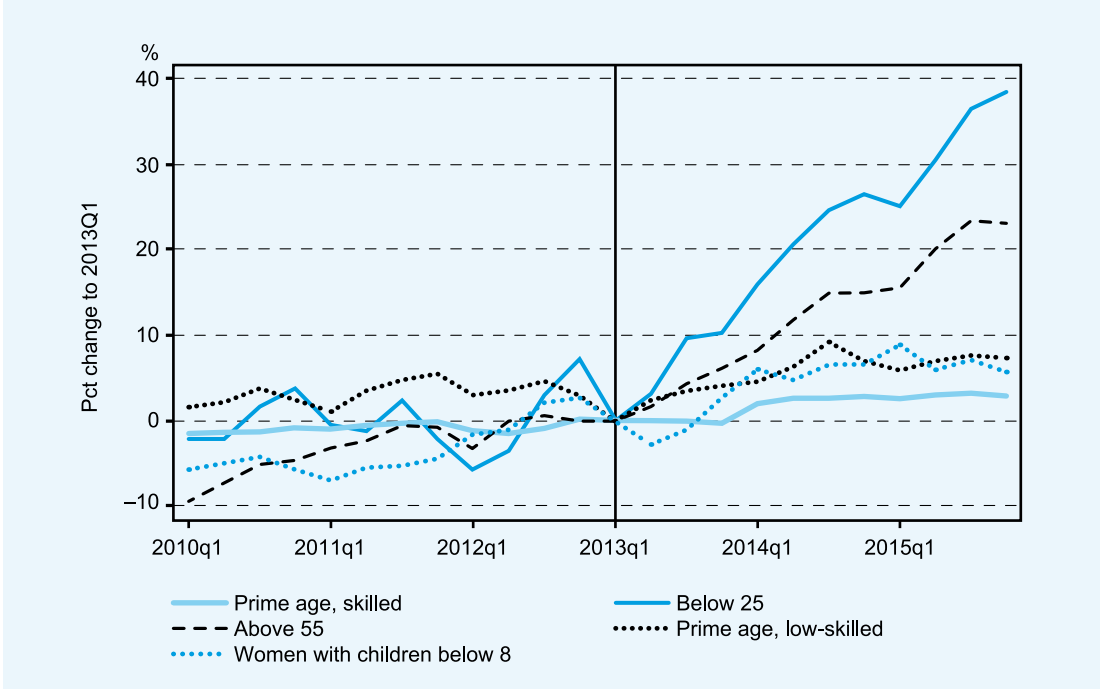
ployment rates are low: permanently for all employees aged below 25, or above 55; employees working in low-skilled jobs that don't require any vocational training; and temporarily (for three years) for employees returning to work after a child-care leave, and newly hired long term unemployed and career starters. The target groups cover around 900 thousand and in 2015 the programme's annual fiscal cost was HUF 130 bn (0.4% of GDP).

In the recent years a strong labour market recovery started during which employment among these vulnerable groups also increased. *Figure 1* shows changes in the employment rates for the major JPA target groups on the primary[2], domestic[3] labour market in the recent years based on the Hungarian Labour Force Survey.[4]

We can see a large increase in employment rates of younger and older cohorts, while employment rates of low-skilled prime age workers and mothers with young children also increased slightly after the introduction of the JPA in 2013. The employment rate for prime age skilled workers also started increasing in 2014 with the recovery. However, besides the pension and tax reforms, and factors related to the business cycle, several other trends could be driving these. In 2014 the child care benefits were made more flexible, which could help mothers with young children return to the labour market, while the technological changes

Figure 1

CHANGES IN EMPLOYMENT RATE IN THE MAIN JPA TARGET GROUPS



Note: HCSO LFS, own calculations. Note: Employment in this figure is defined as the standard ILO definition in the LFS but without people employed in the public works programmes and without people working abroad. Low-skilled is defined as employees without a high school diploma.

Source: HCSO LFS, own calculations

in the economy and changing skill composition of the labour force could influence the demand for low-skilled labour.

In this paper I will estimate the causal employment effects of the JPA using a quasi-experimental setup. The JPA was introduced in a single step for all target groups. The eligibility is defined using simple rules, which will result in some groups covered by the JPA, while others – who are similar to the treated group in many regards – not covered. These discontinuities can be used to construct counterfactuals to identify the true effects of the JPA. In order to separate most confounding factors, like the expansion of the public works schemes, I will use administrative micro data to identify the treated and control groups of the JPA target groups and use a differences in differences estimator to get a causal estimate for the employment effects for the JPA.

My results show robust, statistically and economically significant employment effects for the programme. The JPA increased employment by around 1.2 percentage points three years after its introduction. The effects were heterogeneous across the target groups, the employment rate in the below 25 group increased by 2.6 percentage points, in the low-skilled group by 2.2 percentage points but only by 0.8 percentage points in the above 55 group, and the JPA increased exits to employment from long term unemployment by around 0.7 percentage points. Due to limitations in the available data, I was not able to estimate the effects of the JPA among mothers with young children. The results suggest, the JPA led to some substitution between eligible and non-eligible low-skilled workers but the overall substitution effect was small.

Based on these results I will do a rough cost-benefit analysis that shows an overall self-financing ratio (the amount of tax collected from the higher employment divided by the total tax expenditure of the JPA) of around 40%. For the low-skilled it was as high as 70% but for the above 55 groups as low as 14%. This partial equilibrium analysis ignores potential second round, or wage effects, therefore they can be considered as a lower bound but they should capture the main channel of adjustment.

These results show that targeted tax incentives can be a cost-effective way for boosting employment of vulnerable groups in Hungary.

Ex post studies of the JPA were not done previously. Benedek, Kátay, and Kiss (2013) used ex ante simulations, based on a dynamic labour supply microsimulation model embedded in a general equilibrium macro model to predict the JPA's labour market and macroeconomic effects. According to their results, the programme was expected to increase the employment rate by 1 percentage point in the long run, after adjustments in the supply of labour and capital. My ex-post analysis suggests slightly higher employment effects.

The JPA is quite unique with its broad coverage. It was not only novel in Hungary, but there aren't many examples for similar tax incentives form other countries either. Temporary hiring credits for long term unemployed, child care returnees, or career starters are common in many countries. However, large scale targeted tax incentives for vulnerable groups – which are general and unconditional in the sense that eligibility doesn't depend on the level of income – using some form of tagging are rare. Sweden introduced similar schemes in 2007 in employers' social security contributions for young (below 25) and old (above 65) employees but unlike the JPA, these tax credits were not capped. The tax cut for young workers was analysed by Egebark and Kaunitz (2017) who found small positive employment effects and no wage effects using a quasi-experimental differences in differences method. Low Hungarian youth participation rate might explain why the JPA was much

more effective than the Swedish tax incentive. The tax cut for older workers was analysed by Laun (2012) who found some positive effects on employment of men, with effects higher than for the JPA. The two programmes are also different, the Swedish tax credit targeted employees close to the official retirement age, while the JPA targeted a broader group. My analysis is not able to identify the effects of the JPA for older workers but it is possible that the JPA was also more effective in raising employment among workers closer to retirement. However, the pension reforms introduced around the same time make the identification of these effects difficult.

Targeted tax incentives for long term unemployed and other inactive groups existed in Hungary before the JPA. These voucher based system called Start had mostly narrow target groups but offered higher subsidies than the JPA. Several Start programmes were studied using quasi-experimental methods. Cseres-Gergely, Scharle, and Földessy (2015) analysed programmes targeting low-skilled, older workers and found significant effects for older men with vocational training. According to their analysis, the programme was cost-effective even though it was only effective in raising the employment of men. Szabó-Morvai (2015) analysed the Start programme for mothers returning after a child care leave. The programme had an overall small employment effect but it significantly raised employment among skilled mothers with multiple children. My analysis showed high effects on exits to a job from long term unemployment under the JPA. However, it is uncertain how permanent these effects were.

THE JOB PROTECTION ACT

Taxation of labour changed significantly in Hungary since 2010. The progressive personal income tax was replaced with a flat rate system and a family tax allowance. In 2013 a large scale employers' tax incentive, called Job Protection Act (JPA) was introduced with the aim of boosting labour force participation of certain disadvantaged groups whose participation rates were low in Hungary compared to either the European average, or to regional peers.

The JPA consists of six different types of tax credits in the employers' social security contributions (27% at the time of the introduction[5]) and payroll taxes (1.5%). There are two major types of credits. The permanent cuts, which cover the largest target groups can be claimed by employers as long the as the employees fall under the following categories, regardless of when the job started. The amount of the JPA in these categories is 14% of the gross wage[6] capped at HUF 100,000 in each month.[7]

Below 25

Employees below the age of 25 are entitled for the tax credit until and including the month of their 25th birthday.

Above 55

Employees above the age of 55 are entitled for the tax credit beginning in the month of their 55th birthday.

Elementary occupations

Any employee working in an elementary occupation defined as main category 9 according to the Hungarian Central Statistical Office's HSCO–08 classification system[8] is eligible for the JPA. These occupations don't require formal qualifications and consist of simple tasks. This group includes basic service

sector jobs like cleaning and fast food workers, simple industry jobs like warehouse workers and some assembly line workers. Category 9 of the HSCO covers some elementary agricultural jobs but not the majority. Employees are eligible as long as their occupation is in category 9 of the HSCO.

The other major types of tax cuts are temporary. Only employees starting a job after the introduction of the JPA are eligible, and in general, the cuts expire after three years. The amount of the JPA in these categories is 28.5 percentage points of the gross wage (which means a full exemption from social security tax and the vocational contribution) during the first two years after hiring, and 14% in the third year. The amount is capped at HUF 100,000 in each month. The following categories were introduced.

Long term unemployed

Unemployed people, who registered as unemployed at a local employment agency, and find a job after a long spell of unemployment are eligible for this SSC cut if at the start of the job they had been unemployed for at least 6 months in the previous 9 months. For the calculation of the unemployment spells certain atypical work arrangements are not considered as employment (e.g. simplified employment, which is a form of temporary work) while the time of participation in the government financed public works programmes is not counted in either the 6 month, or the 9 month period. That is, for people enrolled in the public works scheme, the eligibility has to be determined by adding up multiple spells of non-employed periods.[9] In order to claim the credit, the newly hired employees have to provide their employers a certificate issued by the employment agency about their eligibility.

Childcare returnees

The JPA credit is available for employees who start working (either by returning to their previous job, or starting a new job) after they stop receiving childcare benefits, or employees who start working while still receiving childcare benefits.

Career starters

In addition to the permanent SSC reduction for the below 25 group, a higher SSC cut is available for career starters. Employees below the age of 25 with a maximum of 180 days of paid work earlier in their lives are eligible for a temporary SSC reduction.

Employers can choose which SSC cuts they claim if an employee is eligible for several JPA types. However, only one type can by claimed at once. For all categories, the JPA is available only for private sector employers and only for employees in standard employment contracts (it is not available for atypical forms, e.g. temporary, or public works, and self-employment).

DATA

I use two anonymous administrative data sources for the analysis. Tax returns from the National Tax and Customs Agency (NTCA) cover the entire population of individual taxpayers and the dataset from the Central Office for Administrative and Electronic Public Services (COAEPS) covers the entire population of people who were registered as job-seekers by the National Employment Agency.[10]

The main data source is a panel covering the period between 2009 and 2015, built from linked, anonymous datasets of employ-

ers' monthly social security and tax filings, and individuals' annual tax returns. The monthly filings contain detailed data on employment but they are only available for the month of May in each year. Linking these datasets across the years gives a fully balanced panel of the population of Hungarian taxpayers: those who were employed, or received some form of taxable benefit at least once during the month of May in these years, or filed a tax return between 2009 and 2015. The final dataset covers around 6.2 million people in the 20 to 59 age bracket. The outcome variable of interest in this dataset is an indicator of employment, showing whether an individual had at least one day of paid work during the month at an employer who is eligible for the JPA (i.e. excluding the public sector) in a regular labour contract. Participation in the public works programmes was considered as non-employment for the same reason. Finally, the data was extended with age, gender and occupation, and linked with information about the employers. Data for 2009 was only used to construct a lagged employment variable, otherwise observations for 2009 were omitted.

The JPA credit for the long-term unemployed is conditional on the length of unemployment and non-employment at the time of starting a new job. As the tax returns have only one observation per individual and per year about the type and length of employment, they are not sufficient to identify those who are eligible for the long-term unemployed tax credit. A second data source, the unemployment registry is used for this target group. The registry covers around 2 million people, who were unemployed at least once between January 2011 and June 2015. This data source was used to construct a fully balanced panel of all jobseekers and their eligibility for the long-term unemployed JPA credit, based on the length of their spells in unemployment, or public works participation. The outcome variables of interest in the dataset are the probabilities of a successful exit to a private sector job not in the public works programmes, and not subsidised in an active labour market programme (ALPM). Three and twelve month survival rates are used as additional outcome variables to measure long term impact but data on employment survival is fairly unreliable.

EMPIRICAL STRATEGY

As described in the previous sections, the JPA has clear eligibility criteria for all target groups which is observable in the data. Therefore, it is possible to find different sets of individuals who are similar to individuals in each JPA target group but who are not eligible for JPA tax credits. These groups can be used as controls to construct counterfactuals and identify the employment effect of the JPA tax cuts.

The JPA was introduced in one step, in January 2013. This lends itself to a differences in differences estimator, in which the employment probabilities of treated (JPA) and non-treated (non-JPA) individuals is compared pre-treatment and post-treatment.

In general, the following equation is estimated for each JPA target group:

$$y_{it}=\beta_1+\beta_2 JPA_i+\beta_{3t}+\beta_{4t} JPA_{it}+\gamma X_i+\varepsilon_{it} \qquad (1)$$

where y_{it} shows is whether individual i is employed in period t at an employer who is eligible for the JPA, and in a labour contract that is also eligible for the JPA. JPA_i indicates whether the individual is in the JPA target group, β_{3t} are time fixed effects for several periods before and after the introduction of the JPA, and JPA_{it} is the interaction between treatment and period. Therefore β_{4t} are the variables of interest in the estimation, showing the changes in employment probabilities due to the JPA in each period after

introduction. The JPA was announced in August 2012. As the final data cover only May in each year, possible anticipatory effects can be ruled out, and all years after that are considered as post-JPA.

The differences in differences method requires a common pre-treatment trend in employment between the treated and control groups. This might not hold but using further control variables X_i, including age, gender and lagged labour market status[11] can increase the reliability of the estimates by reducing the heterogeneity of the treated and control groups. The estimates can still suffer from omitted variable bias, as many other individual specific factors can influence the probability of working. A possible solution would be to use a fix effects estimator. The drawback of this approach is that defining treatment and control groups based on age will omit some individuals in some years (see Subsection: Defining treatment and control groups), which itself can introduce bias in the estimations. Instead, I will use past employment as a control variable which correlates highly with current employment.

I will estimate Equation (1) for the three major JPA groups using linear probability models (LPM). The goal is to estimate the marginal effects of β_{4t} for all periods. These tend to be very similar for LPMs and for non-linear functional forms, like the logistic, or probit regressions in case of outcome probabilities that are not close to zero, or one. Here, the less strict conditions and easier interpretation of LPMs offer an advantage. However, in case of the low average exit rates for the long term unemployed the marginal rates can differ between LPMs and non-linear models, therefore in these cases I will estimate logistic regressions.

This differences in differences method can have several potential drawbacks. In order to get internally valid estimates, the treated and control groups have to be similar to each other. Since the target groups are quite broad, entire target groups might not be usable as treated groups in the estimations. However, a narrower treatment group used in the analysis could lead to a loss in external validity, as estimates will be valid only for a subgroup of the eligible population.

Additionally, this method measures changes in employment probabilities of the JPA target groups relative to similar groups. At the same time, the JPA also changed the relative wages of employees in these groups. Holding everything else constant, this could lead to a decreased demand for workers who are not eligible for the JPA credits relative to those who are eligible. If employers do such substitution in their hiring, the employment gains from these estimations would be upward biased.

Defining treatment and control groups

The heterogeneous effects of the JPA across the various target groups are in themselves of interest when evaluating the programme but the different labour market situation in the target groups also require separate analyses, as different considerations have to made when selecting the population to identify the JPA's effects.

In general, I will analyse intention of treatment. Eligibility for the JPA doesn't necessary mean an employer will also claim the credit. If take-up rate is low and the JPA has an effect on employment, the estimated parameter will be biased downward, as it will include all the potential gains in employment in the treated population. For the purposes of estimating the extra employment due to the JPA, and calculating the tax cut's cost efficiency this it is not a limitation. The take-up was already fairly high in May 2013 – five months after introduction – and it increased by next year in all major target groups. The take-up is highest

among the young employees, while in the older and low-skilled groups it is somewhat lower. The long term unemployed and child care returnee target groups are much smaller. The number of eligible employees is not available directly for last two categories but estimates based on other data sources suggest a take-up rate of around 40 and 20 percent respectively.

Below 25

Similarly to Egebark and Kaunitz (2017), using the age of 25 as a cut-off value is a straightforward approach for this target group. The choice of the control group is limited, people several years older than 25 have different employment prospects, therefore I will use the 25–27 year old cohorts as control group. All cohorts below 25 are eligible for the JPA but the individual cohorts face different labour market conditions that could violate the parallel trends condition. A narrower age bracket sacrifices some external validity but using only the 22–24 year old cohorts as treatment group can increase the reliability of the estimates. Nevertheless, the effects of the JPA on the younger cohorts is relevant from a policy perspective. Employment rate of university graduates in Hungary is close to the EU average but the employment rate of those without a tertiary degree is significantly lower. One can expect the JPA to have a positive effect on employment prospects in the 19–23 year old cohorts among those who left school by this age, either by dropping out, or never attending university but this analysis will not provide separate estimates for this group.

In this analysis I will not estimate the effect of the separate JPA credit for career starters because the available data sources don't have information of total days worked. Since only few employers claim this JPA credit, and the main effect of the programme can be expected from the general credit targeting young people, this is not a major limitation when evaluating the JPA.

Above 55

Age-based cut-offs can be used here similar to the below 25 target group with similar trade-offs. In this case a wider age bracket could identify the JPA's effect on early retirements (see e.g. Laun 2012). However, there were major changes in the Hungarian pension system since 2012 that aimed at raising labour force participation in cohorts, where there is a lot of overlap with the JPA. The eligibility for the various early retirement schemes is not observable in the available data, which limits the list of cohorts for possible treatment groups. In general, people below 57 are not eligible for early retirement, therefore I will use the 55–57 year old cohorts as the treated group and the 52–54 year old cohorts as the controls. The regular retirement age was at least 62 during the years relevant for this analysis. However, since 2012 women are eligible for retirement after 40 years of service which lowers the effective retirement age for some women (high school degree, or less; while continuously employed, or cared for children) but in general this shouldn't affect the cohorts selected for the analysis. Previous early retirement schemes usually were not effective in these age brackets either.

Low-skilled

Unlike the previous two groups, eligibility in this case is not observable for the non-employed. Occupations in category 9 of the HSCO–08 consist of low-skilled jobs in a variety of economic sectors (industry, services, agriculture) and there are other occupations

in all these sectors that employ mainly low-skilled workers without an upper secondary degree. The share of these is particularly high in agriculture but it is also high in food processing and construction, while many retail occupations – which employ a large number of people – don't require post-secondary degrees. Low wages, which are close to the wages attainable in the least skilled category 9 occupations also reflect on the low productivity of these workers.

Past occupations are observable in the available data which allows the construction of a proxy measure of skill-level. People change occupations across these categories (which shows that these jobs are substitutes in some sense) but switching rates are not high. Therefore people who held a job in category 9 can be considered as treated in the JPA and people who held a job in an occupation similar to category 9 but didn't hold in category 9 can be considered as controls.[12]

Employers are free to choose which JPA credit they take for the young, or old low-skilled workers, and the amount of the credit is the same for all three groups. To keep the estimates of the different groups easily interpretable, estimations of the low-skilled target group will only cover the 25–54 age group, while estimations for the below 25 and above 55 groups will include all skill levels.

Long term unemployed

People who had been unemployed since the same date can have different eligibility status for the long term unemployed JPA credit if they participated in the public works scheme during their unemployment spell. An unemployed person, who registered as unemployed six months before hiring was only eligible if she didn't participate in the public works schemes. This can be used as the identification strategy because people who are identical in every other regard but who were not employed in the primary labour market for the same amount of time have different eligibility status.

Data on unemployment spells is available from the unemployment registry. A successful outcome will be an exit to a non-subsidized job in Equation (1), with the JPA status based on eligibility described in the previous paragraph, controlling for the length of the unemployment spell, including time spent in the public works scheme.

Participation in the public works programme is observable in the data but other active labour market programmes (ALMPs) are not. Ideally the analysis should control for the participation in ALMPs, as these, along with the public works programme could influence the probability of successfully leaving unemployment, as unemployed people can gain skills, or experience in these.

The changes in the tax system during the period covered in this analysis could affect the work or hiring incentives in either the JPA target groups, or the control groups. For the three major target groups these changes didn't have different effects on the treated and control groups. However, for the long term unemployed there could be an issue due to certain employers' tax incentives that were in place before the JPA. Until 2013 there were several narrowly targeted, voucher-based tax incentives called Start. Under the Start programmes employers could claim tax credits when hiring long term unemployed. The Start eligibility criteria were slightly different than the JPA criteria. One Start programme – Bónusz – was in force in 2012 and 2013. This programme was available for people who were unemployed continuously for at least six months. There were other, smaller scale programmes for career starters, low-skilled, or old unemployed, and mothers with young chil-

dren. Therefore, I will estimate a model where only jobseekers outside the target group of the major Start programmes are included:men aged between 30 and 50 with at least a lower secondary degree.

Data is only available for one year in the pre-treatment period, which makes the estimations more uncertain. However, this is not a major issue for this target group, as the method of identification uses the different treatment of participation in the public works programmes, where treatment status didn't change for the whole target group at once. Therefore we can use the variance between individuals over time.

Mothers with young children

A possible approach for identification is to compare the employment probabilities of mothers of children of different age, similarly to Szabó-Morvai (2015). The potential effects of the Start programmes have to be considered in the selection of the treated and control groups in this case too. Some data on the number and age of children is available in the tax returns through the family allowance, and the duration of childcare leave can also be identified. However, neither of these are sufficient to create treated and control groups without major biases, or omissions. Therefore, I will not estimate the effect of the JPA in this target group. Further work and additional data is needed to extend this research.

REGRESSION RESULTS

The results for the three major target groups are shown in *Appendix 1* with the differences in differences (DiD) coefficients from the full models including demographic controls and lagged employment. The employment probabilities of the treated groups increased relative to the control groups, as the DiD coefficients are significant at the conventional levels. The demographic controls and the lagged dependent variables are also significant, the coefficient of lagged employment is large, and their inclusion decreases the DiD coefficients for all three target groups. The estimated effects are increasing in time, which is expected, as both employers and employees need time to adjust to the tax incentive. The JPA already had economically significant effect on the employment probabilities of these three target groups even in the first year, five months after the introduction.[13]

Appendix 2 shows the results for the long term unemployed. Although the average exit probabilities are decreasing in time, the estimated DiD effects with individual-specific factors are increasing. Translating the logit-coefficients into probabilities, the JPA increased one month exit rates by 0.7 percentage points to an observed 1.6%. As the data spans to exits in June 2015, three and twelve month exit rates are only available for 2013 and 2014. The JPA's effect on three and twelve month survival rates are not significant. While this could indicate that the credit had no long term effect, the data available after leaving the unemployment registry is limited, which makes the measurement of these outcomes more uncertain.

Substitution effects

The design of the JPA limits the incentive to substitution within target groups, because employees in the three major target groups are eligible regardless when they were hired. However employers could still substitute employees not in the JPA target groups for those who are eligible. To check whether such substitution occurred, Equation (1) with the full set of controls can be estimated with the

control groups from the previous section as 'treated' groups (i.e. whose relative labour cost went up compared to the JPA target groups) and groups completely outside the scope of the JPA as controls. This means people in their early 30s for the young control group, people in their late 40s for the old control group and the those prime age manual workers who were not selected in either the treated, or control groups for the low-skilled regressions.

Appendix 3 shows the results. There are no signs of substitution for the non-eligible younger and older cohorts, the DiD coefficients are non-significant. The employment probabilities for the low-skilled but non-JPA workers decreased compared to other prime age blue collar employees (categories 5–8 in HSCO–08) using both the main and the alternative control group specifications. However, as discussed in Subsection (Employment effects), the overall effects of this substitution on employment levels is low.

DISCUSSION AND POLICY ANALYSIS

The results described in Section (Regression results) show the effects attributed to the JPA but due to the methodological limitations discussed in Subsection (Defining treatment and control groups) only for the treated and control groups used in the regression analysis which are narrower than the entire JPA target groups. To analyse the overall effect of the programme, and to do a cost-benefit analysis, these results have to be extrapolated for the whole treated population.

Employment effects

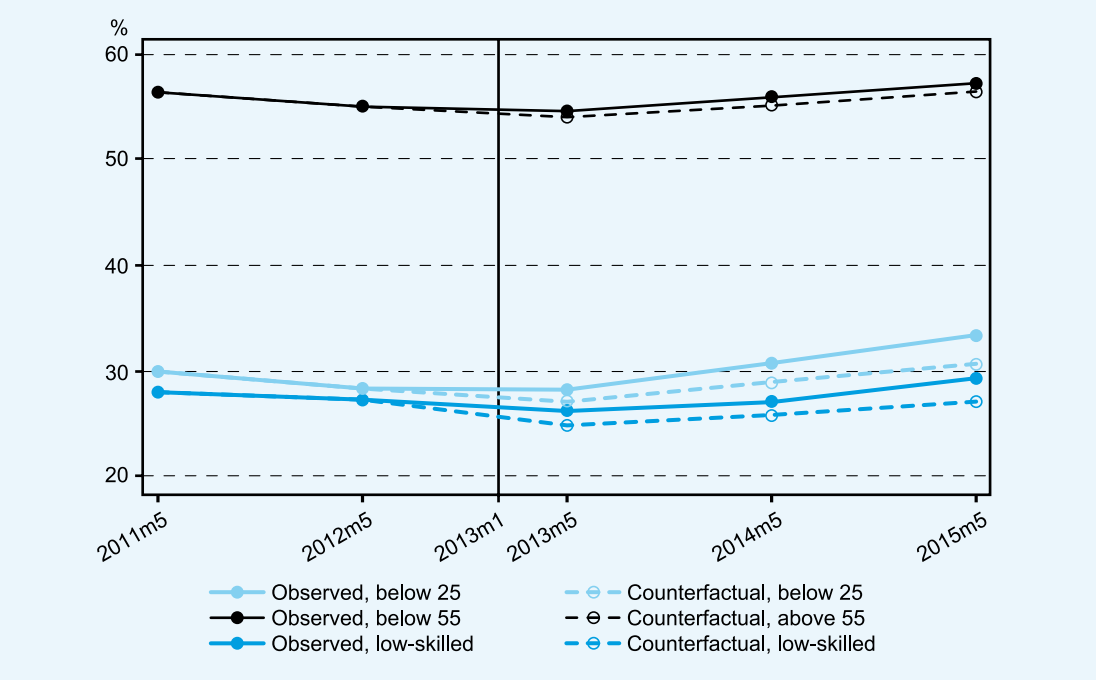
Figure 2 shows the JPA's impact in the three major target groups, extrapolating the regression results to the broader target groups. As discussed earlier, a tax subsidy for the youngest cohort – just after leaving school – and the oldest cohorts – close to retirement – could have very different effects than the estimates identified here comparing the cohorts around the JPA's age cutoff. Therefore, the below 25 groups consist of the 20–24 cohorts, the above 55 of the 55–59 cohorts, and the low-skilled group consist of everyone identified as low-skilled according the proxy measure for skill in the estimation control groups. Employment ratios are calculated for the whole labour market, including the public sector, where the JPA is not available.

The counterfactuals are calculated as a percentage point difference of the regression results for each year in Appendex 1 from the observed employment ratios. The counterfactual lines show that the employment rates of all three target groups would have increased even without the JPA during the labour market recovery starting in 2013, but the JPA significantly increased employment rates for the young (from 30.8% to 33.4% by 2015) and the low-skilled (from 27.2% to 29.4% by 2015).

Figure 3 translates these results into number of jobs gained due to the JPA, and also corrects for the substitution effect found for the low-skilled target group. The JPA significantly increased the employment probabilities of the low-skilled workers, and due to the relatively large size of this target group, most of the gains in employment levels – approximately 30 thousand by 2015 – came from the low-skilled workforce. The young employees' relatively small target group leads to only a 16 thousand increase in employment, despite the JPA's strong effects in this group. Employees above 55 form the largest target group, which means even with the JPA's low impact on their employment probabilities, the JPA raised employment levels by around 5,000.[14] The substitution effect amounts to only 2,600 in the low-skilled group control group, which

Figure 2

OBSERVED AND COUNTERFACTUAL EMPLOYMENT RATES FOR THE MAIN JPA TARGET GROUPS



Note: The vertical line shows the introduction of the JPA in January 2013. Counterfactuals calculated from Appendix 1

Source: own edited

was subtracted from the low-skilled figures in the chart. Due to the small size of the target group and the uncertainties surrounding 6 and 12 month survival rates, the estimates for the long-term unemployed were omitted.

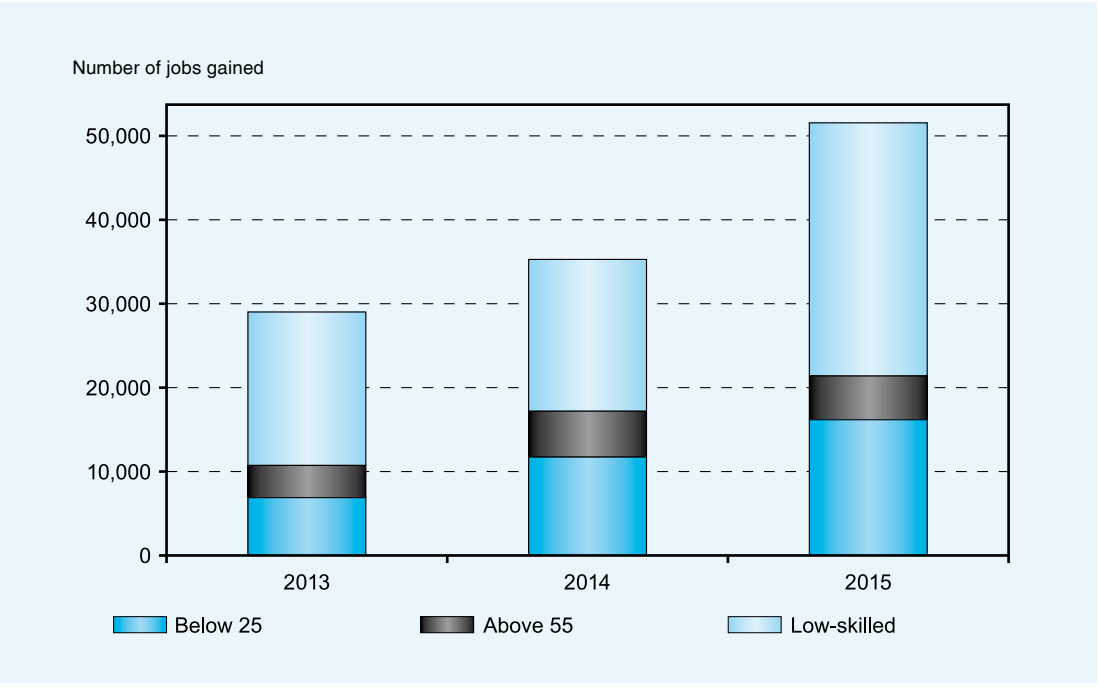
Budgetary effects

These net employment gains are also associated with general equilibrium effects, e.g. more consumption by the newly hired employees, which could increase output by more than just the higher employment through the JPA. Potential savings can also come from lower expenditure on unemployment benefits, pensions, or on labour market programmes, including employment in the public works programmes, which were not estimated in this papers. Simulations by Benedek, Kátay, and Kiss (2013) based on the general equilibrium microsimulation model by Benczúr, Kátay, and Kiss (2012) showed that the main effects, in particular the extra budgetary revenues of labour taxation reforms come from the direct behavioural changes in labour supply and labour demand. Therefore I will focus on the higher taxes and social security contributions coming from the net employment gains while noting, these should be considered as a lower bound.

To calculate the budgetary effect, a few assumptions have to be made. Tax rates stayed constant during the period of the analysis. Hungary has a completely flat PIT system with a statutory rate of 16%. The only major

Figure 3

NET EMPLOYMENT GAINS CAUSED BY JPA IN THE MAIN TARGET GROUPS



Note: Employment effects calculated from Appendix 1.

Source: own edited

deduction is the family allowance for dependent children, claimed by around a quarter of the taxpayers. According to figures by the NTCA, the average effective tax rate was 14%. Social security contributions are also flat, except for the JPA credits. Employees pay 18.5% SSCs, and employers pay 28.5% SSC. All new employees are eligible for the standard JPA tax credit, which amounts to HUF 14,500/month.[15] Due to the flat tax system, these rates can be applied to the average private sector wages excluding public works programme participants for each year and each target group.

The estimated employment effects refer to monthly gains for the month of May in each year. The methodology cannot identify whether this led to permanent employment for the newly hired. Considering that May tends to be an 'average' month in terms of employment levels, we can assume the same effect for all year, and multiply the May budgetary estimate by 12 for an annual estimate.

Finally, we can calculate self-financing ratios, by dividing the above estimates for the budgetary gains with the total budgetary expenditure on the JPA. The results are shown in *Table 1.*

The uncertainty in calculating the employment effects of the long term unemployed credit makes the estimation of budgetary effects also difficult. The amount of tax revenue gained through entering employment heavily depends on how long the newly hired could stay in their jobs but the data sources used in the paper don't provide sufficient guidance for this.

Table 1

ESTIMATED BUDGETARY EFFECT OF THE JPA

		Estimated fiscal cost (HUF bn)	Tax revenues from behavirourals effects (HUF bn)	Self-financing ratio (%)
2013	Below 25	22	5	24
2014	Below 25	29	9	31
2015	Below 25	32	14	42
2013	Above 55	41	5	12
2014	Above 55	47	7	16
2015	Above 55	50	7	14
2013	Low-skilled	25	12	50
2014	Low-skilled	31	13	41
2015	Low-skilled	32	23	70
2013	Total	87	23	26
2014	Total	108	29	27
2015	Total	115	43	38

Note: Budgetary expenditures are only available in aggregated form, for each target group. Some employers claim the low-skilled tax credit for some of their young, or old employees, while these groups were separated for the regression analysis (see Subsection: Defining treatment and control groups). Using the unadjusted budgetary figures would lead to upward biased self-financing ratios for the below 25 and above 55 groups, and a downward biased ratio for the low-skilled group. The total costs were adjusted by re-weighting the amount of tax expenditure claimed with the enrolment figures for the months of May from the micro data for each target group. After the re-weighting the cost for the career starters' tax credit was added to the below 25 group's cost.

Source: own edited

CONCLUSIONS

I estimated the employment effects of a recent Hungarian targeted tax incentive scheme called the Job Protection Act (JPA) of 2013. It reduced employers' social security contributions of several groups that had low labour market participation, like the young, the old, the low-skilled, and long term unemployed. I used a quasi-experimental setup, exploiting the discontinuities of the JPA eligibility criteria with a differences in differences estimator using administrative micro data sources to identify the effects of the tax cuts.

The estimates show robust, statistically and economically significant effects for the programme. Employers already adjusted their labour demand in the first year of the introduction of the JPA, and by 2015 – after being in force for three years – the programme had significant positive effects on employment. It contributed significantly to the higher employment rates of young and low-skilled workers but it only marginally increased employment for older workers. Employment rates for the young increased by 2.6 percentage points, for the low-skilled by 2.2 percentage points, and for the old only by 0.8 percentage points. The change in the employment rate among the old was driven by the higher employment of women. There were no gender differences among the other groups. I found some evi-

dence of employment churn, where employers substituted employees eligible under the JPA for similar but not eligible workforce. However, the magnitude of this effect was small, it reduced the net employment gains by less than 3,000 among the low-skilled. Overall the JPA led to a net employment gain of around 50,000 which amounts to 1.2% of the labour force. Higher employment increased tax and social security revenues as well. Self-financing ratios – the ratio of the extra revenue from newly hired employees and the total fiscal cost of the programme – were as high as 70% in the low-skilled target group and 40% in the young target group, but only 14% in the old target group.

The JPA credit for the long term unemployed increased exit rates from unemployment by around 0.7 percentage points. It is a substantial increase but due to the low take-up rate and small target groups this raised employment by 3,500 at most. The JPA also reduced the employers' social security contributions of employees returning after a child-care leave but due to the limitations of the available data I couldn't analyse the programme's effect in this target group.

Employment effects are not the only possible channels through which employers and employees can react to the JPA. Some of the estimated increase in (legal) employment may be attributed to employers reporting previously undeclared workers. The administrative data sources used in this analysis only covers declared work and the lack of recent figures on undeclared work in Hungary makes it difficult address this issue. Strong growth in self-reported employment the Labour Force Survey (see Figure 1) suggests this 'whitening' was modest.

A possible extension of this analysis could look at effects on wages, or employer performance, like sales, or profits. Saez, Schoefer, and Seim (2017) showed that a Swedish tax incentive targeting young employees similar to the JPA increased the employment for the targeted population but it had no direct effect on young employees' wages (as previously showed for this reform by Egebark and Kaunitz 2017). However, firms that had a high share of young employees prior the tax reform increased their sales, profits and wages for all of their workers relative to other firms. This suggests that firm level wage rigidities – perhaps equity concerns – limit the pass-through of the tax cuts in wages. The high estimated labour demand elasticities (around for the below 25 and low-skilled target groups and for the above 55 target group) suggest the overall wage effects could be low but analysing these adjustments can be a potential extension of this paper.

The results in this paper show that the targeted tax cuts of the Job Protection Act successfully contributed to the labour market recovery in Hungary at a relatively low fiscal cost. However, there might be some scope to refine the programme by focusing on those groups, where the labour demand elasticity is higher.

Another interesting finding is the low take-up rate for the long-term unemployed in child-care returnee groups. This might be explained by the complex administration required from both the job-seekers and the employers. Take-up in the three major target groups – below 24, above 55, low-skilled – is higher, and employers can easily claim the tax credit on their monthly tax filings without any need for further proof, as eligibility can be checked using available data. According to my results the JPA substantially raised the chances of exiting unemployment, therefore encouraging participation could be a cost effective way of helping the long-term unemployed. This could be achieved by providing better information about the JPA to employers, or by easing the administrative burden of the programme in this target group.

Appendix 1

REGRESSION RESULTS FOR THE MAIN JPA TARGET GROUPS

	Below 25	Above 55	Low-skilled
JPA	–0.016 ***	0.002	–0.284 ***
	(0.002)	(0.002)	(0.001)
2010	0.037 ***	0.033 ***	
	(0.001)	(0.001)	
2011	0.023 ***	0.011 ***	0.066 ***
	(0.001)	(0.001)	(0.001)
2013	–0.007 ***	–0.002 *	–0.032 ***
	(0.001)	(0.001)	(0.001)
2014	0.006 ***	0.013 ***	–0.025 ***
	(0.001)	(0.001)	(0.001)
2015	0.010 ***	0.016 ***	–0.032 ***
	(0.001)	(0.001)	(0.001)
JPA 2010	–0.001	0.002	
	(0.002)	(0.002)	
JPA 2011	0.004 *	–0.002	–0.029 ***
	(0.002)	(0.001)	(0.001)
JPA 2013	0.011 ***	0.005 ***	0.013 ***
	(0.002)	(0.001)	(0.001)
JPA 2014	0.019 ***	0.008 ***	0.013 ***
	(0.002)	(0.002)	(0.001)
JPA 2015	0.026 ***	0.008 ***	0.022 ***
	(0.002)	(0.002)	(0.001)
Employment (lagged)	0.443 ***	0.488 ***	0.201 ***
	(0.001)	(0.001)	(0.000)
Female	–0.057 ***	–0.101 ***	0.002 ***
	(0.001)	(0.001)	(0.000)
Age	0.012 ***	–0.007 ***	–0.001 ***
	(0.000)	(0.000)	(0.000)
Constant	–0.075 ***	0.523 ***	0.230 ***
	(0.012)	(0.017)	(0.002)
Last occupation			Yes
Observations	2,988,244	3,282,580	8,323,472

Note: * if p<0.05, ** if p<0.01, *** if p<0.001. Standard errors in parentheses are adjusted for clustering at the individual level.

Source: Own edited

Appendix 2

LOGIT ESTIMATES FOR THE LONG TERM UNEMPLOYED TARGET GROUP, ONLY JOBSEEKERS NOT ELIGIBLE FOR THE MAJOR START PROGRAMMES

	Exit to job (1 month survival)	Exit to job (6 month survival)	Exit to job (12 month survival)
JPA	–0.308 ***	–0.319 ***	–0.181 ***
	(0.043)	(0.044)	(0.054)
2013	–0.237 ***	–0.254 ***	–0.183 **
	(0.054)	(0.056)	(0.065)
2014	–0.278 ***	–0.295 ***	–0.233 **
	(0.064)	(0.064)	(0.074)
2015	–0.733 ***		
	(0.070)		
JPA 2013	0.016	0.020	–0.033
	(0.063)	(0.066)	(0.078)
JPA 2014	0.206 **	0.198 *	0.164
	(0.075)	(0.077)	(0.091)
JPA 2015	0.448 ***		
	(0.080)		
Unemployment spell length	–0.044 ***	–0.050 ***	–0.055 ***
	(0.001)	(0.002)	(0.002)
Age	–0.018 ***	–0.017 ***	–0.020 ***
	(0.002)	(0.003)	(0.003)
Educational attainment (ref. Lower secondary)			
Upper secondary	–0.017	–0.011	0.169 ***
	(0.032)	(0.033)	(0.036)
Tertiary	–0.102 *	–0.075	0.189 **
	(0.051)	(0.056)	(0.068)
Constant	– 1.417 ***	– 1.444 ***	– 1.899 ***
	(0.097)	(0.112)	(0.118)
N	236,149	186,598	186,598

Note: * if p<0.05, ** if p<0.01, *** if p<0.001. Standard errors in parentheses are adjusted for clustering at the district level.

Source: Own edited

Appendix 3

REGRESSION RESULTS FOR SUBSTITUTION EFFECTS IN THE MAIN TARGET GROUPS

	26–27 vs. 28–30	50–51 vs. 52–53	Low-skilled excl. retail vs. Manual workers
JPA	–0.000	0.000	–0.037 ***
	(0.001)	(0.001)	(0.001)
2010	0.035 ***	0.036 ***	
	(0.001)	(0.001)	
2011	0.018 ***	0.012 ***	0.061 ***
	(0.001)	(0.001)	(0.000)
2013	–0.006 ***	–0.004 ***	–0.031 ***
	(0.001)	(0.001)	(0.000)
2014	0.003 *	0.013 ***	–0.035 ***
	(0.001)	(0.001)	(0.000)
2015	0.005 ***	0.017 ***	–0.039 ***
	(0.001)	(0.001)	(0.001)
JPA 2010	0.003	–0.003	
	(0.002)	(0.002)	
JPA 2011	0.005 *	–0.001	0.035 ***
	(0.002)	(0.002)	(0.001)
JPA 2013	–0.001	0.002	–0.009 ***
	(0.002)	(0.002)	(0.001)
JPA 2014	0.004 *	–0.001	–0.005 ***
	(0.002)	(0.002)	(0.001)
JPA 2015	0.005 **	–0.001	–0.012 ***
	(0.002)	(0.002)	(0.001)
Employment (lagged)	0.463 ***	0.488 ***	0.194 ***
	(0.001)	(0.001)	(0.001)
Female	–0.084 ***	–0.103 ***	0.017 ***
	(0.001)	(0.001)	(0.001)
Age	–0.004 ***	–0.004 ***	–0.001 ***
	(0.000)	(0.000)	(0.000)
Constant	0.331 ***	0.337 ***	–0.152 ***
	(0.008)	(0.018)	(0.001)
Last occupation			Yes
N	3,010,064	2,951,425	5,689,057

Note: * if p<0.05, ** if p<0.01, *** if p<0.001. Standard errors in parentheses are adjusted for clustering at the individual level.

Source: Own edited

Notes

[1] I am grateful to Viktor Hudecz, Tibor Keresztély, Endre Morvay, Benedek Nobilis, Dóra Novák, Péter Tóth and the participants of the 2017/2018 Korea-Hungary Knowledge Sharing Program for their comments and suggestions, and to the staff at COAEPS and NTCA for providing access to the unemployment and tax databases and for their help in preparing the data for analysis. Endre Morvay also shared his code for cleaning the unemployment data with me. All remaining errors are the author's. The views expressed herein are those of the author and do not necessarily reflect the views of the Ministry of Finance.

[2] The public works programmes were significantly expanded after the crisis. Standard statistical definitions count these government supported jobs as regular employment. Here, I will focus on employment in the primary labour market, where the JPA available. Therefore I excluded participation in the public works programmes, which would distort the employment rates for the low-skilled. Between 2013 and 2015 the monthly participation in the public works programmes was 150–250 thousand.

[3] Migration of Hungarian workers to other EU countries increased in the recent years. The LFS covers households in Hungary but nevertheless, many of these workers can be found in the LFS sample. Some of them commute daily for their jobs across the border (e.g. to Austria, or Slovakia), but the LFS can also include those who work more or less permanently abroad but still have family in Hungary (see Blaskó and Fazekas 2016).

[4] Career starters and long term unemployed according to the JPA eligibility criteria cannot be identified separately in the data. Career starters are included in the below 25 group.

[5] Beginning in 2017 the employers' SSC was cut several times and the amount of the JPA credit was adjusted. The target groups were also expanded with low-skilled agricultural occupations and the length of the tax credit for mothers with at least three children was extended to five years in 2015. The period covered by this analysis is not affect by these changes.

[6] At the time of the introduction of the JPA the average tax wedge was 49% according to the OECD methodology. However, this this figure doesn't include targeted tax cuts like the JPA at any income level (OECD 2017).

[7] HUF 100,000 was 102 percent of the full time minimum wage at the time of the introduction of the JPA. Due to minimum wage raises the ratio decreased to 98.5 percent in 2014 and to 95.2 percent in 2015.

[8] See https://www.ksh.hu/feor_eng_menu. The classification is broadly comparable to the ILO's ISCO-08 classification, although there are small differences.

[9] The rule was changed in 2016, and since that public works spells count as non-employment for the purposes of the JPA.

[10] The full description of the data cleaning process and summary statistics for both datasets can be found in Svraka (2018).

[11] I will use a broader definition of employment for the lagged variable that includes self-employment, temporary work and employment in the public sector but still excludes participation in the public works programmes. The aim is to control for past labour market status in general, while the outcome variable should only count employment in the JPA.

[12] Similarity between occupations is based on the average wages. Occupations where educational

levels are higher were excluded from the control groups. The detailed description of the construction of control occupations and additional robustness checks are available in Svraka (2018).

[13] See Svraka (2018) for robustness checks with different specifications further discussion related to gender differences in the estimated effect.

[14] Note, that in this paper the low-skilled group always refers to prime age employees only, low-skilled young and old workers are counted in young and old target groups respectively.

[15] The JPA cap is reduced for part time employees. Due to the low share of part time employment, I will ignore this rule.

References

Benczúr, P., Kátay, G., Kiss, Á. (2012). 'Assessing Changes of the Hungarian Tax and Transfer System: A General-Equilibrium Microsimulation Approach.' *MNB Working Paper* 2012/7. Magyar Nemzeti Bank (the central bank of Hungary). https://ideas.repec.org/p/mnb/wpaper/2012–7.html

Benedek, D., Kátay, G., Kiss, Á. (2013). 'Microsimulation as a Tool for Assessing the Impact of Tax Changes.' In *The Hungarian Labour Market 2013*, edited by Károly Fazekas, Péter Benczúr, and Álmos Telegdy. Centre for Economic; Regional Studies, Hungarian Academy of Sciences & National Employment Non-profit Public Company Ltd. http://econ.core.hu/file/download/HLM2013/TheHungarianLabourMarket_2013_onefile.pdf

Blaskó, Zs., Fazekas, K., eds. (2016). *The Hungarian Labour Market 2016*. Centre for Economic; Regional Studies, Hungarian Academy of Sciences & National Employment Non-profit Public Company Ltd. http://www.econ.core.hu/file/download/HLM2016/TheHungarianLabourMarket_2016_onefile.pdf

Cseres-Gergely, Zs., Scharle Á., Földessy, Á. (2015). 'Evaluating the Impact of a Well-Targeted Wage Subsidy Using Administrative Data.' Budapest Working Papers on the Labour Market 1503. Institute of Economics, Centre for Economic; Regional Studies, Hungarian Academy of Sciences. https://ideas.repec.org/p/has/bworkp/1503.html.

Egebark, J., Kaunitz, N. (2017). 'Do Payroll Tax Cuts Raise Youth Employment?' *Working Paper Series* 1001. Research Institute of Industrial Economics. https://www.ifn.se/eng/publications/wp/2014/1001

Kátay, G. (2009). 'Az Alacsony Aktivitás és Foglalkoztatottság Okai és Következményei Magyarországon.' MNB-tanulmányok 79. Magyar Nemzeti Bank. https://www.mnb.hu/letoltes/mt–79.pdf

Laun, L. (2012). 'The Effect of Age-Targeted Tax Credits on Retirement Behavior.' *Working Paper Series* 2012:18. IFAU – Institute for Evaluation of Labour Market; Education Policy. https://ideas.repec.org/p/hhs/ifauwp/2012_018.html

Saez, E., Schoefer, B., Seim, D. (2017). 'Payroll Taxes, Firm Behavior, and Rent Sharing: Evidence from a Young Workers' Tax Cut in Sweden.' *Working Paper* 23976. Working Paper Series. National Bureau of Economic Research. https://doi.org/10.3386/w23976

Svraka, A. (2018). 'The Effect of Labour Cost Reduction on Employment of Vulnerable Groups – Evaluation of the Hungarian Job Protection Act.'

MPRA Paper 88234. University Library of Munich, Germany. https://mpra.ub.uni-muenchen.de/id/eprint/88234

Szobonyáné Szabó-Morvai, Á. (2015). 'Essays on Maternal Employment Policies.' PhD thesis, Central European University. https://doi.org/10.14754/CEU.2015.05

OECD (2017). *Taxing Wages 2017*. OECD Publishing. https://doi.org/10.1787/tax_wages–2017-en