SUMMARY

The goal, tasks and object of evaluation

The main goal of evaluation was to assess the impact of 2007–2013 Operational Programmes funded by EU Structural Funds on employment and other macroeconomic indicators in Lithuania. Two evaluation tasks were implemented in the course of evaluation: 1) the impact of EU structural assistance on macroeconomic indicators was estimated; 2) the effect of EU structural assistance on creation of new jobs was assessed.

Evaluation analysis was carried out on both macro and micro levels. On a macro level, the effect of EU structural assistance on national, sectoral, and county-wide macroeconomic indicators was assessed. The object of this analysis was the Lithuanian Strategy for the Use of EU Structural Assistance for 2007-2013 and four Operational Programmes (OPs) that were designed to implement it. The primary method employed in macro level evaluation was econometric modeling.

Micro–level analysis was used for estimating the direct effect of EU structural assistance on creation and preservation of jobs. The object of this analysis involved selected measures of the four OPs. 34 OP measures with job creation and (or) preservation indicators and 13 measures with indicators measuring the improvement of the quality of jobs were selected. Micro–level evaluation methods included counterfactual impact evaluation, multiple criteria analysis, cost-effectiveness analysis, analysis of secondary sources, interviews and expert evaluation.

Evaluating the impact of EU structural assistance on macroeconomic indicators

Significant positive impact of EU structural assistance on many of the country's macroeconomic indicators was identified after performing econometric modeling. It was estimated that factual economic development in the period of 2007-2015 has benefited from on average 22% higher nominal GDP growth thanks to EU structural assistance. This finding was arrived to after comparing the factual situation with hypothetical scenario where EU structural funds did not reach Lithuania's economy. The effect of EU structural assistance on GDP growth was mainly felt through capital investment increases and stimulation of domestic consumption. Comparison of the contributions that different forms of EU structural support made to additional GDP growth revealed that financial engineering measures (i.e., preferential loans, guarantees, and risk capital) were slightly more effective than the assistance rendered in the form of subsidies.

Evaluation concluded that due to 2007–2013 EU structural support expenditure on capital formation (material investment) was higher by 17%, foreign direct investment – by 16.5 %, household expenditure on consumption – by 3.2%, productivity – by 2%, import – by 4%, and export – by 1%. Evaluation results indicate that the effect of EU structural assistance on prices was marginal. According to econometric modeling, secondary effects generated by the EU structural assistance caused only a minor increase (0,1 percentage points) in the GDP deflator and consumer price index (CPI).

The positive effect that EU structural assistance had on the GDP growth as well as its neutral impact on inflation spurred Lithuania's economic convergence with the EU average. According to EUROSTAT data, in 2014 Lithuania's GDP per capita based on purchasing power parity (PPP) amounted to 75 % of the EU-28 average. Without EU structural assistance the latter figure would have been 3.8 percentage points lower and would have made for 71 %. However, EU structural assistance had no positive effect on county-wide economic convergence within the country itself as the largest amounts of additional GDP were created in economically leading counties of Vilnius, Kaunas and Klaipėda.

At the level of economic sectors, the main long-term beneficiaries (measured according to investment payoffs) were industrial and private services sectors. Econometric modeling revealed that the gains

associated with growth in value–added, preservation of jobs, attraction of investment and export of goods and services have been most significant in these sectors. In 2007–2015, EU structural funds investment payoffs in both industrial and private services sectors as measured by the effectiveness coefficient were twice as high as investments made. In the short run (so long as the largest infrastructural projects were financed), construction sector was the biggest beneficiary of the EU structural assistance. In the period of 2012-2015, around 15-17 % of all jobs in construction sector were indirectly created or preserved by EU Structural Funds. Furthermore, in 2014 the average wage in construction sector rose by 14 % (90.5 EUR) as a result of EU structural support.

The impact of EU structural support on employment

Based on the findings of econometric modeling, the net impact of EU structural support on job creation in 2015 amounted to 33 thousand additional jobs. As a result, employment level in 15-64 age group was higher by around 1.4 percentage points in 2015 while the unemployment level was lower by on average 2.3 percentage points.

Based on the monitoring data, almost 266,000 jobs were created due to the projects financed from EU Structural Funds in 2007–2015. Most jobs (almost 246,000) were created by the interventions funded from ESF under the Human Resources Development Operational Programme. Substantial achievements in the creation of new jobs were largely influenced by the increase of unemployment level in Lithuania in 2009-2010 and the subsequent reallocation of ESF funds. As part of this reallocation, active labour market policies received 2.5 times higher funding than originally planned. Around 18,000 jobs were created due to implementation of the measures financed from ERDF under the Economic Growth Operational Programme. 65 per cent of those jobs were created in firms attributed to high and medium-high technology sectors. The smallest number of jobs (1,800) were created under the measures financed from Cohesion Promotion Operational Programme.

Differences between the findings of econometric modeling and monitoring data in terms of jobs created can be explained by two factors. First, more than half (53 per cent) of all created jobs were temporary – they were in place during the implementation of a project only. Second, the shortage of qualified workforce meant that the creation of jobs in individual firms has hardly increased the total number of people employed in the economy as new jobs often substituted or displaced other jobs in the economy.

In consideration of Lithuania's demographic tendencies and labour market needs, it is recommended to ensure that the implementation of promotion of quality employment and participation in the labour market priority set at Operational Programme for the European Union Funds' Investments in 2014-2020 is linked with National human resources monitoring system, which is implemented according to Lithuanian government decision No. 162 in February 18, 2016.

Cost analysis of jobs created by EU Structural Funds

Cost analysis of jobs created by EU Structural Funds in 2007-2013 shows that the costs of creating a new job vary from 1,317 EUR in the case of active labour market policies to 500,945 EUR estimated for the measures aimed at adjusting public cultural heritage objects for touristic purposes. The mean price of creating one permanent job with EU funding stood at 66,204 EUR, while the average price of creating a temporary job was 13,840 EUR.

The lowest costs associated with creating permanent jobs were shown by the measures which were aimed at allowing better opportunities for employment (active labour market policies) and promotion of highly qualified workforce (actions supporting entrepreneurship, productivity and Scientific Research and Experimental Development (SR&ED)). Compared to other EU countries, Lithuania achieved very good results in the creation of low–cost jobs in the following areas: (1) stimulating self–employment with the help of preferential loans and wage subsidies; (2) awarding support for FDI and domestic investment aimed at launching or developing high value-added services and production, thus creating new highly qualified long-

term jobs; (3) better employment of researchers in both private and public sectors – via support for SR&ED activities.

The quality of created jobs

One of the main goals set for the use of 2007-2013 EU structural assistance was to create more and better jobs in Lithuania. According to the logic of the programming documents, "better job" is perceived as a job that requires higher qualification and creates more value-added. In the course of this evaluation the quality of 32,500 jobs that were created by virtue of EU Structural Funds was assessed. It was estimated that more than half of created jobs (61 per cent) are of high or very high quality. Most high quality jobs were created under the following measures: "Reconciliation of Work and Family Life", "Intellect LT", "Intellect LT+", "Invest LT+", "Development of Institutions Providing Services to the Disabled (Including Occupational Rehabilitation Services)". Only 3 per cent of newly created jobs that were analyzed in this evaluation were of the low quality. These low quality jobs were created under measures "Promoting Entrepreneurship" and "E-business LT".

Counterfactual analysis of the impact of EU structural assistance on research jobs

The aim of counterfactual impact evaluation was to evaluate the effect of EU structural support measures "Intellect LT" and "Intellect LT+" on the number of people employed as researchers and SR&ED employees as well as their salaries after the end of project implementation period. Propensity score matching was used for comparing treatment and control groups according to various impact parameters. The treatment group was composed of companies that received financial assistance under the measure(s) "Intellect LT" and/or "Intellect LT+". Due to small sample size, evaluators were unable to estimate the impact of "Intellect LT" and "Intellect LT+" separately. Control group was comprised of companies that did not receive EU funding under the measures "Intellect LT" and "Intellect LT+", but were similar to the treatment group according to their economic activity, number of employees, turnover, export volume, and duration of operation.

Counterfactual analysis showed that after EU–funded projects came to an end, recipient companies had on average 7.1 researchers – that is 2.5 times more than they would have had in a hypothetical scenario without the EU assistance. However, it was estimated that participation in the projects implemented under measures "Intellect LT" and "Intellect LT+" had no impact on the total number of SR&ED employees (this figure includes researchers too) in recipient companies. This finding led to the conclusion that a share of beneficiary companies augmented the number of research jobs in two ways: (1) by re-employing people who were already employees at that certain company and enjoyed SR&ED status (substitution effect); or (2) by reducing the number of other SR&ED employees so as to counter rising labour costs related to the arrival of additional researchers (displacement effect). Counterfactual impact analysis also showed that EU programme measures had a statistically significant effect on the annual salary per full–time SR&ED employee. Beneficiary companies paid SR&ED employee on average 13,080 EUR a year more than they would have paid in case EU assistance was absent. This result confirmed the assumption that wages are higher in companies which receive EU financial support and employ more researchers.

It is recommended to put more emphasis on creating permanent research jobs during the 2014-2020 programming period. Building on best practice from other countries, the rise in the number of researchers in private sector could be stimulated once industrial PhD is legalized and supported by 2014-2020 EU Structural Funds. Evaluation recommends responsible institutions to consider the opportunity of forming an industrial PhD measure which would promote applied business–oriented R&D as well as strengthen the cooperation between scientific and educational institutions and private enterprises.

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Description of methods

A mix of quantitative (econometric modeling, counterfactual impact evaluation, cost–effectiveness analysis) and theory–based evaluation methods was used in this evaluation. Interviews, cause and effect analysis, expert assessment, analysis of secondary sources and case studies were all among the methods used in the evaluation. Cost–effectiveness analysis was used to estimate the costs of creating one permanent or temporary job under different measures of EU structural support. The findings were then compared with similar data from other countries. Furthermore, multi–criteria analysis was used for assessing the quality of created jobs with qualification, economic sector and endurance of jobs used as assessment criteria. The most demanding methods used in this evaluation – macro–econometric modeling and counterfactual impact evaluation – are described below.

In view of the task of this evaluation, a small scale **macro–econometric model** of Lithuania was designed. The model used in this evaluation was a simplified small open economy aggregate demand - supply (AD-AS) model. The model can be described as a dynamic system of equations where equations are specified in error correction model. The use of error correction model means that both long–term (partial equilibrium) relationships between economic indicators and short–term deviations from them are taken into consideration.

Macro–econometric model can be based on different theoretical grounds. In those cases when the model is orientated towards the analysis of short–term processes, Keynesian theoretical foundations are generally used (Danish MONA, South Korean BOK macroeconomic models). However, when the model is designed for long or medium–term outcome analysis classical theory is usually preferred. An intermediate way was chosen for the development of macro–econometric model used in this evaluation as neoclassical synthesis was used. The use of neoclassical synthesis meant that the long-term properties of the model were based on the supply while the short-term analysis was based on demand. In terms of the modeling of economic structures, application of theories and analysis, this method is the most flexible.

Macro–econometric model consisted of endogenous and exogenous variables. Endogenous variables are dependent variables generated within a model. Their values are changed (determined) by one of the functional relationships in that model. Exogenous variables are assumed to be determined by factors outside of the model. Macro–econometric model consisted of several blocks, each of them reflecting different economic sectors (agriculture, industry, construction, energy, private and public services). Each block can be regarded as a set of equations describing one class of endogenous variables. The most important role was played by the block of general labour and goods market and total expenditure, which included estimates of GDP using expenditure approach. The entry of EU structural support into the country's economy and its effects were modelled through the sectoral aid flows, cross-sectoral relationships and their overall impact on the Lithuanian national economy.

Quarterly data covering the period from the start of 2005 until the end of the second quarter of 2015 were used in the analysis. Long–term impact of EU structural support was assessed by stretching the period of analysis until 2020. In order to provide a sound assessment of the long–term impact of EU funds, assumptions on the future values of the key exogenous variables were made. These assumptions were informed by the studies and estimations performed by other institutions.

The impact of EU structural assistance and co-financing funds paid to the beneficiaries during the entire period of implementation of the OPs was assessed. It is worth noting that due to specific character of financial engineering as a form of support, actual payments made to the final beneficiaries of financial engineering measures (as opposed to eligible expenditure) were included in macro–econometric model. Real influx of EU financial support to the economy was therefore reflected in the model.

In agricultural, industrial, construction, energy, private and public service sectors significant positive effects of EU structural support were identified. These effects were channeled through material investment and overall output within the sectors. These primary impulses create secondary effects via inter–relationships described by the model. The final impact of EU structural support was calculated by analyzing two types of scenarios. In the first scenario EU structural support is included in the model while the second scenario is a

hypothetical situation where EU structural support is absent. Impact sizes are calculated by looking at the differences between the two scenarios.

In order to assess the net effect of EU structural support measures "Intellect LT" and "Intellect LT+", **counterfactual impact evaluation** was carried out. Propensity score matching was used for comparing treatment and control groups according to various impact parameters. Treatment group was composed of enterprises that received financial assistance under the measure(s) "Intellect LT" and/or "Intellect LT+". Due to small sample size, evaluators were unable to estimate the impact of "Intellect LT" and "Intellect LT+" separately. Control group was comprised of companies that did not receive EU funding under the measures "Intellect LT" and "Intellect LT+", but were similar to the treatment group according to their economic activity, number of employees, turnover, export volume, and duration of operation. These characteristics were selected for controls because they influence both enterprises' participation in the intervention (through their effect on motivation to participate as well as the chances of enterprises to satisfy selection criteria) and impact parameters. Based on the values of the five variables, propensity scores were generated for each enterprise included in the analysis. Propensity score marks the possibility for an enterprise to participate in the intervention. Treatment and control group enterprises with similar propensity scores were then compared.

Data of 2016 March on R&D enterprises were provided by Lithuanian Department of Statistics. This data was then processed with STATA software as propensity score matching was conducted. The aim of the analysis was to evaluate the effect of EU structural support measures "Intellect LT" and "Intellect LT+" on the following impact parameters: the number of researchers, the number of researchers in full–time equivalent, the number of R&D employees, the number of R&D employees in full–time equivalent, average yearly wage of one full–time equivalent researcher and average yearly wage of one full–time equivalent R&D employee. The average treatment effect on the treated (ATET) was estimated as a result of propensity score matching. The matching technique used in this evaluation was nearest neighbor matching.

Since the newest data on impact parameters in enterprises available to evaluators were 2014, this year was considered a post–intervention year. In total, data on the impact parameters in 330–350 enterprises were obtained (depending on the particular impact parameter). However, enterprises that were still implementing EU–funded projects in 2015 were not included in the analysis. Furthermore, for some enterprises information on at least one control characteristic (economic activity, number of employees, turnover, export volume or duration of operation) was missing. Those enterprises were also omitted. As a result, the final number of cases used in the analysis was 167–180 (depending on the impact parameter). The size of the treatment group was equal to 42–46 enterprises. Finally, the assumption was made by the evaluators that participation in the implementation of other EU–funded measures does not influence the impact parameters in enterprises.

Difference–in–differences method was also used in this evaluation. However, application of this method was complicated by the small amount of pre–intervention data. Due to small number of cases, difference–in–differences estimation was used only as a secondary method.

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