



PFR Group

Key findings
about pro-innovation
measures addressed
to SMEs in
Poland - Evaluation study
using the interbranch
flows model

1. EXECUTIVE SUMMARY

The purpose of the evaluation was to determine the effects of measures under the Innovative Economy Operational Programme which supports businesses directly. The analysed measures were implemented by the Polish Agency for Enterprise Development (PARP) in 2007–2016.

To start off, it is important to emphasise that this evaluation relies on an innovative approach to the analysis of the effects of intervention. Evaluations typically focus directly on changes experienced by the beneficiaries that are triggered by public programmes. However, this analysis goes considerably beyond this impact, as we were trying to estimate the values of the following effects:

1. **Direct and indirect effect** – resulting from the potential increase in production/services provided by the beneficiaries and the associated benefits for businesses not covered by intervention measures but included in the supply chain;
2. **Induced effect** – resulting from the increase in demand for goods/services of all sectors thanks to rising salaries at businesses which benefited from the intervention directly or indirectly;
3. **Fiscal effect** – resulting from the changes in public levies resulting from greater activity or economic performance thanks to the intervention.

Macroeconomic modelling (DSGE-class VESPA model¹) that captures the structure of the Polish economy, the mutual dependencies between the sectors, regions and markets was used to arrive at the results of the analysis.

1. Model containing 1 region (Poland) and 19 sectors of the economy;
2. Model containing 7 regions (corresponding to the NUTS1 division) and 3 sectors of the economy.

To capture the outcome of the intervention as accurately as possible, the support received by the beneficiaries was divided into three groups. Depending on the type (and the intervention logic behind it), we are dealing with various impacts on the economy and their durations. The following types of support were established:

1. Direct support of the innovation sector (**R+D+I**)² – funds allocated under the IE OP to R&D investments, which are intended to move the so-called ‘technological frontier’ forward (e.g. creating inventions or new industrial designs) and lead to the implementation of breakthrough innovations – Measures 1.4, 4.1, partially 4.2 and 5.4.1;
2. Direct support of the production sector (**Production sector**) – this category involves funds allocated to the deployment of well-established technological solutions and business concepts in the business (e.g. assembly of a new production line or implementing an innovative operational model to increase effectiveness) – Measures 3.3.2, 8.1, 8.2, partially 4.2 and 4.4;
3. Support for export (**Export**) – IE OP funds allocated to the direct development of economic activity on foreign markets. It is important to note that in the analysed group of interventions, this category of support was recorded only in one Measure (6.1), and the support logic was not making investments or creating innovative ideas but initiating and maintaining business relationships with foreign partners.

It is also important to note that we used the macroeconomic model (and set its parameters) based on insights from professional literature and qualitative research conducted with experts (macroeconomists) and beneficiaries. This allowed us to more precisely identify the possible impact channels of individual measures in the macroeconomic model (e.g., the impact of the intervention on the different markets, sectors, etc.). The

¹ VESPA (*Verifiable European Structural Policy Assessment*) is WiseEuropa’s proprietary tool developed for multidimensional evaluation of the impact of EU interventions, using the *Dynamic Stochastic General Equilibrium* (DSGE) model.

² Given the specific nature of R+D+I activities, the additional VESPA module (created for the purpose of this analysis) was a valuable addition to the macroeconomic model, as it takes into account the so-called spillovers of knowledge and know-how as a result of intervention. Three different scenarios were taken into account in the case of this support category, reflecting the different intensities of these effects.

purpose of these initiatives that involved experts was to improve the accuracy of determining the values of the parameters of the model (theoretical assumptions).

The total value of public funds (subsidies) invested by the entrepreneurs, that were allocated to the analysed measures, totalled PLN 14,288.6 million. Comparing this value to total GDP in 2008–2016 (over PLN 14 trillion), it is clear that the value of support was small (0.1%). The highest expense to GDP ratio was recorded in 2015 – 0.3% of GDP.

The vast majority of funds (87%) were classified as direct support for the production sector (**Production sector**), 10% as support for the innovation sector (**R+D+I**) and 3% as support for export. Half of the support (49%) was channelled to 3 sub-sectors, namely light industry (20%), ICT (15%) and heavy industry (14%). The geographic distribution of the intervention was also diverse. The most funds were received by businesses from the central region (PLN 3,874 million) and the least reached those from the north-eastern ones (PLN 661.8 million). We noted co-variance between the region's economic development and the volume as well as the type of support in selected sectors. The more economically developed the region is, the greater the share of the services sector among the subsidized businesses. Also, support for the R+D+I activity was also much higher in the richer regions, in nominal terms and as a percentage.

The SME segment (small and medium enterprises) was the leading beneficiary, having received 83% of all funding, out of which micro-enterprises received 54%.

Before the most important conclusions offered by the macroeconomic analyses are discussed, it is important to consider a few important issues to fully understand their impact.

- Results of the IE OP measures implemented by PARP were analysed in 2007–2025; (explain why this specific period)
- Injecting additional funds into the economy (intervention) creates the so-called “shock”, which causes deviation of the indicator values from the baseline scenario (growth scenario where there is no intervention);
- The extent of change in the values of indicators and its distribution depends on the type of intervention, e.g., indicators behave differently when influenced by impulses created by supporting R+D+I initiatives and when the production sector is supported directly;
- The intervention (“shock”) leads to a shift in the investment cycle – entrepreneurs make investments sooner than they would if there was no intervention, and the scale of investments is also higher;
- After the investment cycle is completed, the scale of investments drops, which temporarily brings down the values of the indicators. This is a natural process, and the values of indicators will move towards equilibrium in the long term (the effects of intervention subside);
- Modelling macroeconomic indicators, in accordance with the assumptions of this evaluation, takes only focused interventions under the IE OP into account (extracted effects of PARP actions as part of IE OP) and doesn't take other external effects generated in the economy into account (e.g. new interventions promoting innovations, financed under the SG OP after 2015), which means that we are not dealing with an actual drop in the values of macroeconomic indicators but rather with a naturally diminishing impact of IE OP in the long term.

The above is aptly illustrated by the change in GDP (GDP added value), which occurred following the introduction by PARP of measures financed under IE OP. As already mentioned, the value of the analysed intervention was quite low (PLN 14 billion). Nevertheless, the results of modelling show that injection of the funds into the economy generated an additional PLN 92 billion in 2007–2017. In subsequent years, as a result of decreasing demand for investments (but also other phenomena, such as increasing salaries), the impact of the intervention is expected to weaken. Nevertheless, the overall result of the intervention in 2007-2025 is positive at an estimated PLN 49 billion. The diminishing accumulated impact of the measures can be explained with the specific nature of support and the used model. Two effects overlap: the permanent change effect (positive throughout)

and the temporary effect, which subsides (initially positive and turning negative). Following the initially dynamically increasing indicator values, caused by the triggered “shock” (i.e. high investment associated with the intervention), they gradually decrease as the economy heads towards balance. That is why in subsequent years of the period in question a temporary negative effect of intervention on most of the analysed indicators is expected, causing gradually diminishing accumulated result. Nevertheless, the impact of intervention on economic growth in the long term has undoubtedly been positive. It is important to remember about that while interpreting the results.

The additional GDP was generated primarily thanks to the positive impact of the intervention on investments. By 2017, they have increased by nearly PLN 69 billion. In accordance with the forecasts based on the model, it is expected that the additional growth in investments for the entire period (2007–2025) amounted to PLN 34.5 billion.

The implemented measures also affected foreign trade. In the initial period, i.e. when projects co-financed under the IE OP were being executed, import has been increasing rapidly. This is a natural phenomenon as entrepreneurs seek the most advanced solutions (also foreign ones) when buying new machines, services or components. The model allows to predict that by 2018 the impact of the intervention on import will significantly decrease. The situation is different in the case of export. In the first two years of implementing IE OP measures (by PARP), export increased only minimally. However, since 2011 we have seen export picking up significantly. By 2017 the total value of exports was higher by PLN 38 million compared to the baseline scenario, while by 2025 the total value of exports is expected to reach PLN 120 million (as a result of IE OP measures implemented by PARP). Although this is not much, compared to the entire value of exports in the Polish economy, it is important to note that the impact of the measures on exports has been positive, although in their logic they were not designed as initiatives boosting export activity.

Another area the Programme has impact on was the labour market. PARP activity associated with IE OP increased employment – the number of the employed has been increasing as a result of the intervention by 0.16% annually on average in the period in question (2007–2025). In 2007–2017, there were 45,000 more employed persons every year compared to the baseline scenario without intervention. The number of employees increased the most in the last two years of the intervention as well as in 2016 and 2017. In the coming years, a slightly negative deviation from the baseline scenario is expected. PARP interventions have also caused a minor increase in work productivity (+0.03% on average for the entire period) and salaries (+0.08% on average for the entire period). The simultaneous increase in the values of the two indicators suggests reorientation of the economy towards greater technological advancement.

The State Treasury also benefited from the IE OP funds that were spent. In 2007–2017 it received an additional PLN 15 billion, mainly thanks to higher social insurance contributions and personal income tax, associated with higher employment and slightly higher salaries.

Overall, IE OP funds increased work productivity, income generated by businesses and salaries. The main reason is better technical infrastructure (improving capital productivity at subsidized businesses as well as in the entire economy), which also creates jobs that require more qualifications and provide an additional stimulus for human and organizational capital accumulation (modern know-how).

In the case of all of the above-mentioned indicators, support for the production sector proved the most significant (mainly in view of the highest pool of funds), yet the impact was temporary and the positive effects ceased or diminished significantly following the period of intervention.

Direct support for the innovation sector offered less spectacular effects but proved more stable over time. The support for R+D+I initiatives increased the productivity of Polish businesses in the long term (as a result of sharing knowledge and the so-called *industrial commons*)³.

Looking at the types of effects triggered by the intervention (direct, indirect and induced), the direct and indirect effects proved the most important, namely higher work and capital productivity of businesses receiving support, their suppliers and contractors. Induced effects (stimulated by additional consumer demand in the economy caused by increasing salaries) were much lower. This is because the scale of the intervention was limited, considering the size of the labour market and the salaries. Although employment increased as a result of implementing the Programme, the new employees were a relatively small group compared to the entire labour force (16 million employees).

Focusing on the sectors, the following sub-sectors have shown the best results: ICT, creative industry and the automotive sector. As forecast, the gross added value will be higher in these sectors by around 1.6% on average in 2007–2025 (compared to other sub-sectors). Construction and transport also benefited indirectly from the intervention, and proved to be the biggest beneficiaries of the implemented measures).

A regional analysis offers the conclusion that support was the most effective in the regions located in the east of Poland, which suggest that the intervention contributed to convergence between the poorest and the wealthiest ones. The excelling performance of eastern Poland results both from the so-called low base effect as well as the structure of demand. High investments in industry activated the construction and transport sectors, which are dominated by employees from the poorest regions. That is why employment increased as a result of intervention more in the eastern part of the country, while the opposite is true about productivity. Increasing work productivity in western regions results from the fact that new employees are mostly highly qualified employees from the innovation sector. Nevertheless, it appears that Eastern Poland has benefited more from the implemented measures and the rest of the country. The average impact on gross added value and global production was higher by 0.3 pp and 0.8 pp, respectively, in the eastern regions.

An analysis of the effectiveness of support shows it is effective when looking at the additional gross domestic product. Additional GDP generated by the intervention is 3.5 times higher than the expenses on the analysed IE OP measures in the entire period and 6.4 times higher in 2007–2017. Out of all of the considered support categories, aid for the innovation sector proved the most effective, making benefits significantly outweigh the expenses. PLN 1 million allocated to the support of the R+D+I activity allowed to generate an additional PLN 14.2 million of GDP. Support for the production sector turned out to be less effective, where PLN 1 million generated an additional PLN 2.2 million of GDP. In accordance with the results of modelling, support for exports proved the least effective. In this case expenses were higher than the generated GDP – PLN 1 million of subsidy increased GDP by PLN 800,000. Please note that the immediate objectives of the export-related measures did not include increasing production of good and services in the short term, so the unfavourable ratio between the expenses and the generated GDP in the case of the support for export activity does not necessarily mean it was less effective. The high effectiveness of the support for the innovation sector presumably results from leveraging the outcomes of the projects to create new innovative solutions and strengthening cooperation between businesses and other entities, which allows to multiply the extent of impact of the innovations in the economy (the so-called *spillover effect*). Measure 1.4 (“Support for goal-oriented projects”), 4.2 (“Stimulation of R&D activity of enterprises and support in the scope of industrial design”) and 5.4.1 (“Support for gaining/realisation of the protection of industrial property”) proved to be the most effective out of all of the analysed ones. Qualitative analyses suggest that these measures proved successful because of the aforementioned *spillover effects*, achieved thanks to the interventions associated with R+D+I, stimulating entrepreneurs to engage in regular

³ Essential knowledge and capabilities (technical, design and operational) common for the entire industrial sector, including know-how, R&D, advanced skills in process development and engineering, or production competence associated with the specific technology.

cooperation with other entities (especially in the R&D sector) and reaching specific groups of recipients. Measures 6.1 (“Passport to export”), 8.1 (“Support for economic activity as regards electronic economy”) and 8.2 (“Support for implementation of electronic business – B2B”) proved the least effective in terms of the ratio between expenses and the generated GDP. This results, to some extent, from the specific nature of the beneficiaries – subsidies were received mostly by start-ups as well as young, inexperienced and high-risk businesses. Also, in the case of Measure 6.1, the small subsidies were insufficient to create a comprehensive development strategy. Support was the most effective in the eastern regions of Poland, which results from their economic underdevelopment (low base effect) and the relatively high amount of support. As regards sub-sectors, the most effective ones included construction, light industry, creative industries, transport and ICT.

The model shows that the following factors have a major impact on the effectiveness of programmes such as IE OP (programmes focused on R+D+I and modernisation of businesses):

- Minimising the substitution effect, i.e. channelling support to businesses which will substitute their own capital (or loans from the financial sector) with the subsidy received under the Programme in a limited extent.
- Supporting extensive modernisation of production capital resources at enterprises, i.e. resources that significantly increase work productivity, by enhancing technical infrastructure.
- Addressing the issue of the mutual complementarity of the various parts of the Programme (support is more effective if the directly and indirectly supported businesses not only become more productive but also boost the productivity of their suppliers and contractors).
- Focusing on *industrial commons* that already function in the economy and strengthening their development to maximise the external effect of the provided support, and consequently its indirect impact on as many businesses as possible.

The evaluation for PARP was prepared by the WiseEuropa and OPI consortium.



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