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Metody analizy wpływu interwencji publicznych na poziom ubóstwa

Streszczenie

W związku z dużą skalą zjawiska ubóstwa, które nieodłącznie towarzyszy życiu społecznemu oraz gospodarczemu, bardzo ważnym elementem polityki publicznej na wszystkich szczeblach (międzynarodowym, krajowym i regionalnym) jest podejmowanie działań mających na celu jego ograniczanie. Działania te mają charakter interwencji publicznych i docelowo powinny prowadzić do pozytywnej zmiany strukturalnej. Nie zawsze jednak tak się dzieje-zatem przed realizacją konkretnego działania wskazane jest dokonanie dogłębnej analizy efektów jego wdrożenia – zarówno krótko, jak i długookresowych. W praktyce, skutki realizacji interwencji publicznych są najczęściej ocenianie *ex-post* w drodze tzw. ewaluacji, która jest trudnym procesem, realizowanym przy zastosowaniu różnorodnych metod. Istotą procesu ewaluacji nie powinna być jednak wyłącznie konstatacja zdarzeń minionych, ale przede wszystkim znajomość skutków planowanych działań, dlatego niniejszy artykuł koncentruje się głównie na analizie *ex-ante* wpływu interwencji publicznych na poziom ubóstwa, a jego celem jest przegląd metod, które mogą być w niej zastosowane, ze szczególnym uwzględnieniem różnego rodzaju modeli.

Słowa kluczowe: ubóstwo, analiza wpływu interwencji publicznych

Analyzing the impact of public interventions on poverty

Abstract

Due to the large scale of poverty, a very important element of public policy at all levels (international, national and regional) is to undertake activities aimed at limiting this problem. These activities should ultimately lead to a positive structural change. However, it does not always happen – so before the realization of a particular public intervention, it is advisable to make a thorough analysis of the effects of its implementation – both short and long term. In practice, the results of public intervention are mostly evaluated ex-post with the use of different methods. However, the essence of the evaluation process should not only be observation of past events, but also an acquaintance with the effects of public intervention on levels of poverty, and its purpose is to review the methods that can be used in such analyses, with particular emphasis on various types of models.

Keywords: poverty, ex-ante analysis of public interventions

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Introduction

Poverty, understood as a lack of material resources to satisfy the basic life needs of an individual or a family (Bukowski and Magda 2013, p. 14), still concerns a large number of people both in the European Union (EU) and in Poland. Based on European Statistical Office data, the number of people at risk of poverty in the EU in 2014 was 17.2%, i.e. over 85 million, and 17%, i.e. 6.4 million, in Poland alone. The survey of household budgets conducted by GUS (Polish Central Statistical Office) found that, in 2014, there were around 2.8 million people living in households whose expenditure was below the extreme poverty threshold (i.e. below the subsistence minimum). The number of people living below the statutory poverty threshold, i.e. below the threshold of social intervention, is estimated at around 4.6 million (GUS 2015, pp. 1-2).

Given the large scale of this problem, a very important element of public policy at all levels (international, national and regional) is to undertake activities aimed at limiting this problem. Guidelines in this respect are formulated in strategic documents at various levels. For example, at EU level, the document "Europe 2020 Strategy" (EC 2010) can be mentioned, whereas at national level there is *KPPUiWS2014* (Polish National Program for Counteracting Poverty and Social Exclusion 2020 - New Dimension of Active Integration). At regional level, meanwhile, the problem of combating poverty appears can be found, among others, in the documents of the Polish "Regional Operational Program" (PUE 2014). For more see this study (Łatuszyńska, Fate 2016).

Activities aimed at reducing poverty involve public interventions. They can be described as logical sequences of events and decisions (Figure 1). Under this approach, public interventions arise from a specific need. Correct identification of that need is the basis for working out the right way to solve a given problem. Then, certain expenditures are involved (including public funds), which are then converted into products and services in the implementation process. In principle, these products and services should satisfy the needs and resolve the problem that necessitates the intervention in the first place. Ultimately, the intervention should result in a certain positive structural change (Kościelecki, Warzybok 2011, p. 10).





Source: Hatry 2007; Keehley and Abercrombie 2008, p. 32.

However, public interventions do not always lead to the expected improvement. Therefore, before carrying out a specific action, it is advisable to perform an in-depth analysis of the effects of its implementation - both short- and long-term. In practice, the effects of public interventions are often evaluated *ex-post*, which is a difficult process involving a number of methods. The essence of the evaluation process should not be only the observation of past events, but most importantly the knowledge of the effects of planned activities. This is why this article focuses mainly on the *ex-ante* analysis of the impact of public interventions on poverty, with a view to reviewing the methods that can be applied, with particular emphasis on various types of models.

Dilemmas of the analysis of the impact of public intervention on poverty

Referring to the logical sequence of intervention, as shown in Figure 1, it can be assumed for the purposes of this article that the procedure of *ex-ante* analysis of the impact of public interventions on poverty, in general, consists of the following stages (Figure 2):

- problem definition - including preliminary defining of objectives, preliminary determination of the expected effects of interventions and their measures, specification of selection criteria between variants and definition of selection restrictions,

- research including the development and study of intervention variants and the anticipation of consequences caused by the proposed action systems,
- evaluation consisting in comparing and ranking variants according to pre-established criteria.



Figure 2. The cycle of analyzing the impact of public interventions on poverty

Source: own study based on (Findeisen and Quade 1996, p. 94).

Problem formulation stage

The starting point at the stage of formulating the problem is to set out the goals that are to be achieved as a result of the implementation of the planned public intervention. Currently in Poland the overarching objective of counteracting poverty, as outlined in *KPPUiWS2014*, is to reduce the number of people at risk of poverty and social exclusion by 1.5 million and increase social coherence by 2020 (KPPUiWS 2014). This is to achieved through the successful pursuit of operational goals (Figure 3), which relate to specific results and specific public interactions (KPPUiWS 2014, pp. 41-52).

Another important element of the problem formulation stage is the setting of indicators that allow for the measurement of the effects of public intervention. Different indicators make it possible to properly determine the degree of achievement of the intended results and, consequently, to evaluate the program as a whole (Górniak, Keler 2008, p. 113). The most simple indicators are absolute measures of results, e.g. in the case of operational goal no. 1 it can be the number of families who use the services of family assistants. It is also possible to use, as indicators, measures resulting, for example, from the summation or averaging of certain numerical characteristics, or calculated as percentages, e.g.: the percentage of economically independent after social employment (in relation to goal no. 3). The most complex type of indicators are aggregate poverty indices. These are statistical formulas that aggregate individual indicators in order to assess the phenomenon of poverty at national level, in regional and local cross-sections, or at the level of households. Examples of such indicators include: poverty rate, income gap index or poverty severity index. Formulas of these indicators can be found in numerous studies, e.g. (Panek 2011, 2014) and (Łatuszyńska, Fate 2016).

Figure 3. Operational goals

Operational Goal 1:

Activation and prevention services - Limiting the exclusion of children and adolescents

Operational Goal 2:

Guarantees for the future of young people – Creating opportunities for young people to enter the labor market and start families

Operational Goal 3:

Active person and integrated family – responsible local environment Providing families with children access to high-quality social services that will increase the chances of activating parents and enable comprehensive prevention against poverty

Developing a system of educational, social and professional activities enabling young people to prepare for entering the labor market and acquire the necessary qualifications and skills to facilitate social inclusion, economic activity and family development.

Developing an active inclusion system for active participation in social and professional life of people, families and communities at risk of exclusion, enabling combining professional, family and social roles and increasing the role of the local community based on the principle of public-social partnership.

Operational Goal 4: Preventing housing insecurity

Providing access to affordable housing for the purpose of family stability and economic "activation" of families as well as preventing loss of housing and homelessness resulting in social exclusion.

Operational Goal 5:

 $Seniors-secure, active \ and$

needed

Providing accessible forms of care and active leisure to senior, disabled and dependent persons, and active inclusion of elderly people in public and professional life.

Source: KPPUiWS 2014, p. 45.

At the stage of formulating the problem, in addition to defining the objectives of the analysis and establishing indicators that allow measuring the results of public interventions, separate criteria should be defined that will enable the evaluation of a given activity. Table 1 presents the *ex-ante* evaluation criteria of public interventions most frequently mentioned in the literature.

Criterium	Description
Relevance	Evaluates the adequacy of the planned objectives and methods of imple- menting interventions in relation to the problems and socio-economic challenges that the intervention is to resolve.
Effectiveness	Evaluates the degree of implementation of the assumed objectives, the effectiveness of the methods used and the impact of external factors on the final results.
Efficiency	Evaluates the relationship between expenditures, costs, resources (finan- cial, human, administrative) and the achieved effects of intervention.

Table 1.	Ex-ante	evaluation	criteria	of 1	public	interventions
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Source: own study based on: Olejniczak 2008, p. 93.

Another important issue to be considered at problem formulation stage is the limitations that may occur in the planning process and then in the implementation of public interventions. In the literature, particular attention is paid to the following limitations (Sternik 2008, p. 504): (1) access to reliable data; (2) lack of uniform indicators to evaluate the phenomenon; (3) budget constraints; (4) mental limitations occurring in the environment in which the intervention is implemented; (5) legislative limitations.

The number of limitations may be significant and they can be permanent or short-term; they may also be subject to modification over time or as a result of new legislative decisions (Dudzińska 2015, pp. 161-167).

Research stage

The main goal of the research stage is to estimate the effects of planned public action variants, both short- and long-term. A number of qualitative and quantitative methods can be used for estimation. In the case of the first group, the estimation is based largely on qualitative data. The most popular methods of this type used in *ex-ante* analysis are: personal in-depth interviews and focused group interviews (Bienias, Strzęboszewski and Opałka 2012, pp. 99-100). They are used, among others, in (Stronkowski and Zych 2014) and (*Ewaluacja...*, 2014). In addition, the literature recommends qualitative methods such as expert panels (Płoszaj 2008, p. 300, Zybała 2012, p. 331, Bienias, Strzęboszewski and Opałka 2012, p. 106), as well as experimental and quasi-experimental methods (Haughton and Shahidur 2009, p. 259).

Data derived from quality sources complements - but does not replace - quantitative evaluations. In order to quantify the consequences caused by the proposed public activity, different types of models are normally used, but it is important that the model allows determining the values of indicators defined at the stage of formulating the problem.

The literature contains many examples of models used in *ex-ante* analysis, but they mainly concern the impact of public policies financed e.g. from EU funds. These are primarily economic models, among which several classes can be distinguished, including: real business cycle (RBC) models, regional models, partial equilibrium models, computational general equilibrium (CGE) models, or dynamic stochastic general equilibrium (DSGE) models. For more see e.g. (Piech 2008, pp. 179-194; Haughton and Shahidur 2009; Bienias, Strzęboszewski and Opałka 2012). It is not always possible to estimate on their basis the effects of specific public actions undertaken on a scale smaller scale than the macro scale. Some of the models mentioned in the literature have been discussed further in this article in terms of their suitability for the analysis of interventions aimed at counteracting poverty.

Evaluation stage

In the evaluation phase, the best variant of intervention should be selected against the predefined goals expressed as a set of accepted selection criteria, depending on the evaluation method used.

Various methods of evaluating public activities can be found in the literature, among them cost-benefit analysis, cost-effectiveness analysis, economic impact analysis or multi-criteria analysis (Zybała 2012; Bienias, Strzęboszewski and Opałka 2012). It is also possible to abandon the conventional evaluation of variants. In such cases, the results obtained in the previous phase of the analytical procedure are summarized in the form of a comparative table. Qualitative methods, e.g. expert panels, may prove a helpful decision-making tool in this regard.

Models in evaluating the effects of activities aimed at combating poverty

Economic models are normally used to quantify the consequences caused by the proposed public actions. Table 2 lists the models most frequently mentioned in the literature. Those models were not developed specifically to study the impact of public actions on poverty, but they can nevertheless, to a smaller or larger extent, be used to determine certain indicators in

this respect. The table indicates: type of model (static/dynamic), selected indicators calculated by the model, level to which the model refers (local, regional, national, international), availability of model documentation, IT support, and usefulness to study the impact of public intervention on poverty prevention. A brief characterization of the models included in the list was made below

EDUMOD is a DSGE model of the Polish economy developed in 2015. It allows to simulate the socio-economic effects of quantifiable elements of public policies, with particular emphasis on policies related to the formation and development of human capital, educational choices and labor market policies. The model was developed by the Polish Institute for Structural Research (IBS) and the task itself was commissioned by the Polish Institute for Educational Research. It can be used for both short- and long-term forecasts (up to 30 years) (Ramsza, Kowal and Lis 2015).

EU-ImpactMod is a DSGE model developed in 2008 by the Polish Institute for Structural Research (IBS). Its structure comprises six sectors containing demographic and labor-market modules. It allows to simulate the impact of demographic changes and the most important events on the labor market on the economy. It was also used to study the impact of cohesion policy implementation on the main indicators of the Polish "National Development Plan 2004-2006" and "National Cohesion Strategy 2007-2013" (Bukowski 2008, Bukowki, Dyrda and Kowal 2010, Bukowski and Wierus 2011).

EUROMOD is a model originally developed in 1996 by the Institute for Social and Economic Research, operating at the University of Essex (UK) and still developed to this day. The results generated by the model are available at www.euromod.ac.uk. The model allows us to study the effects of tax policy changes both at EU and national level (Sutherland and Figari 2013). The model has its own website: www.euromod.ac.uk.

HERMIN is a macroeconomic model to assess the impact of cohesion policy on socioeconomic development. The model relies on historical data from the agricultural, industrial and market service sectors. It was developed in 1982 by the Economic and Social Research Institute in Ireland, but it was also used in other countries, such as Greece, Spain, Ireland, Portugal, as well as in transition countries (e.g. Hungary, Poland, Slovakia, Latvia, Estonia) for medium-term forecasts (up to 10 years) (Piech 2008, p. 189, Bradley, Zaleski and Tomaszewski 2005, pp. 21-22). The model has its own website: www.hermin.pl.

INES is a model developed in 1998 by the *Institut National De La Statistique Et Des Études Économiques* and used in the French Ministry of Social Affairs. It is based on data from households. It covers issues such as redistribution system, labor market, taxes and social benefits. It also allows short-term forecasting (up to 3 years) (David, Lhommeau and Starzec 1999, Fontaine and Sicsic 2016).

MaMoR2 is a CGE model developed in 2006 by the Polish Institute for Market Economics (IBNGR). It allows analysis of some economic aspects in a regional and national perspective, e.g.: supply of goods, investments, private consumption, domestic demand and exports, production factors, the public sector, prices and wages. It relies on annual data (Kaczor 2006, Kaczor i Socha 2008, Piech 2008, pp. 193-194).

The tax-and-benefits model of the Polish Ministry of Finance was developed in 2012. It can be used to analyze changes in the scope of taxation and personal income tax regulations, family benefits and carer's allowance, social benefits in various socio-economic cross-sections. It relies of GUS data derived from the study of household budgets in Poland (Konopczak and Skibicki 2012).

The theoretical model of the Polish economy developed in 2002 by the Polish Institute for Market, Consumption and Business Cycles Research (IBRKK) is a hybrid model that combines neoclassical theory with New-Keynesian theory based on changes in demand. It was commissioned by Polish Ministry of Economy and is used in Poland for medium-term macroeconomic forecasts (up to 10 years), in particular in the field of foreign trade (Piech 2008, p. 193; Karpińska-Mizielińska et al. 2006, pp. 104-105).

MYRIADE is a model developed in 2001 by the French National Agency for Family Allowances (*La Caisse Nationale Des Allocations Familiales*), used to evaluate social policy. It allows analysis of the consequences of changes in social contributions, taxes, credit concessions, social and family benefits in the long-term time horizon (up to 2060). It is also used by the French Central Statistical Office (Legendre 2001, pp. 33-50, Blanchet 2014, pp. 69-73).

NECMOD is an econometric model used by the National Bank of Poland (NBP) for inflation and GDP projections. It is based mainly on labor market data from BAEL (Polish Labor Force Survey), public finance sector data, prices of consumer goods according to CPI basket and NBP financial data (Greszta et al. 2012, Piech 2008, p. 186). The time range of forecasts generated by the model is up to 12 quarters (Przybylska-Kapuścińska and Szyszko 2009, p. 122).

SIMPL is a tax-and-benefits model developed in 2003 by the independent research and development foundation *CenEA* (Center for Economic Analysis in Szczecin, Poland). It is used to estimate the impact of changes in the tax system on the budget of individuals, families and households. The model makes it possible to examine how the existing tax-benefit system affects social inequalities, poverty and income distribution (Domitrz et al., 2013, pp. 261-286, Myck, Kundera and Oczkowska 2013, pp. 2-3; Bargain et al. 2007).

SWITCH is a model, developed in 1987 by the Economic and Social Research Institute (Ireland). It can be used to determine the income of each family depending on the current tax system and social policies. Used annually to evaluate the impact of proposed reforms on the family budget in the long-term time horizon. It relies on statistical office data regarding income and living conditions (Callan et al. 2001, Callan et al. 2010).

SYSIFF is a model of the French redistribution system used to evaluate *ex-ante* political reforms and modeling direct taxes, social security contributions, indirect taxes, local taxes and family benefits. It also allows to study the impact of money reimbursements on poverty. Developed in 2006 by the Paris School of Economics (Piccoli, Canova and Spadaro 2009, Canova, Piccoli and Spadaro 2015).

TÁRSZIM is a Hungarian tax-and-benefits model developed in 1995 by the Information Center for Social Research (TARKI) in Budapest. It is used for analyses in the area of income tax, indirect taxes and financial regulations of social benefits. It mainly uses household data (Szivós, Rudas and Tóth 1998, Benedek, Scharle and Szabó 2007).

TAXBEN (IFS) is a model developed in 1983 by the Institute for Fiscal Studies (United Kingdom) to conduct distribution analyses of profits and losses resulting from tax reforms. It also allows to study poverty among children and single mothers until 2020. It relies on data from households (Giles and McCrae 1995, Brewer et al. 2009).

Model name	Model type	Selected indicators	Documentation	Level	IT support (software tools)	Usefulness for analyzing the effects of counteracting poverty
EDUMOD	Dynamic	employment rate of the population aged 15-64 (%); education of people aged 15 and over (%)	Yes	National, Regional	Application EduMod C, C#	Indirect
EU– ImpactMod	Dynamic	total employment rate (percentage points); at-risk-of-poverty rate relative to total social transfers (percentage points).	Limited	National	_	Direct

Table 2. Models used in estimating the effects of public activities

Model name	Model type	Selected indicators	Documentation	Level	IT support (software tools)	Usefulness for analyzing the effects of counteracting poverty
EUROMOD	Static	poverty risk rate in %, risk of poverty among children in %	Yes	International (EU coun- tries)	MS Excel	Direct
HERMIN	Static and dynamic	Number of new jobs, change in GDP.	Yes	National, Regional	WINSOLVE	Indirect
INES	Static	poverty rate, inequality rates	Limited	National, Regional	_	Direct
MaMoR2	Static	employment rate of people aged 15-64 (%), unemployment rate of people aged 15-64 (%).	Limited	National, Regional	_	Indirect
Tax-and- benefits model of the Polish Ministry of Finance	Static	average per capita income (in PLN), change in per capita income relative to baseline scenario (in PLN and in %), relief cost (in PLN million).	Limited	National	MS Excel	Direct
Theoretical model of the Polish econ- omy	Statyczny	GDP growth rate in %, employ- ment of people aged 15-64 in %.	Limited	National	_	Indirect
MYRIADE	Static and dynamic	unemployment rate in%, demo- graphic indicators, incl. migration rate (in people).	Limited	National	Application in C++	Indirect
NECMOD	Dynamic	GDP (percentage points), ex- change rate (%), CPI inflation (percentage points)	Yes	National	_	Indirect
SIMPL	Static	poverty rate	Limited	National	MS Excel, Access, Visual Studio	Direct
SWITCH	Static	poverty and social exclusion indicators	Limited	National	_	Direct
SYSIFF	Static	poverty indicators	Limited	National, Regional, Local	MS Excel	Direct

Model name	Model type	Selected indicators	Documentation	Level	IT support (software tools)	Usefulness for analyzing the effects of counteracting poverty
TÁRSZIM	Static	average tax per household, average household tax rate by number of children	Limited	National	MS Access	Indirect
TAXBEN	Static	child poverty rate (%), material deprivation rate (%).	Limited	National, Regional	Application in Delphi	Direct

Source: own study.

When discussing the contents of Table 2, it should be emphasized that it is very difficult to find a complete documentation for any of the presented models. The available literature lacks detailed descriptions of their assumptions, structure and functioning, whereas available data tends to be general and selective, which results in most of these models being "black boxes". It is therefore difficult to fully evaluate their suitability for analyzing the impact of public interventions on poverty. Nevertheless, the analysis of the available data allows to put forward certain basic conclusions.

Most of the analyzed models are static and so they can provide only point-based forecasts for a definite moment in time (year), which does not allow taking into account the secondary effects of public actions resulting from the internal structure of the studied effects system, especially when the analysis concerns a long-term time horizon. With dynamic models, only one, i.e. EU-ImpactMod, allows direct determination of indicators related to poverty, but it is possible to apply it at national level only, while many public interventions for reducing poverty are regional, or even local, and it would be advisable to rely on tools developed for carrying out analyses at these levels.

Some of the presented models use IT tools, mainly MS Excel spreadsheet. The advantage of this solution is fairly simple functionality although cause-and-effect relationships defined in analytical models created using spreadsheet are unidirectional, which does not fully reflect the mechanisms of public intervention effects that result from multilateral feedbacks, time delays and non-linearity of relationships between the basic elements of a complex socio-economic reality.

In summary, it can be stated that there is an evident need to develop a model that would be dedicated directly to the impact of public activities on poverty and would allow *ex-ante* evaluation not only at international or national level, but especially at regional and/or local level. It is also important for that model not to be one-off so that it can be used to anticipate the effects of various public interventions for poverty reduction.

Conclusions

Implementation of public interventions aimed at reducing poverty requires the involvement of significant public-financial, human and material resources. It is obvious that it should be preceded by a reliable analysis of the expected effects, which is not easy given that poverty is a highly complex phenomenon. Both the reasons and the effects of occurrence are interrelated and together form a network of dependencies, often non-linear of feedback nature. In addition, the effects of the activities undertaken can be observed only after a relatively long time, the reason for which analyzing a system that complex requires the use of a method that can cope with the complexity of this phenomenon in dynamic terms.

In order to quantify the consequences caused by the proposed public actions, different types of models tend to be used. However, these models are mainly static, based on an analyt-

ical approach to problem-solving, in which a finite mathematical form giving a specific pointbased forecast is a preferred way of model formalization. The issue of the usefulness of analytical methods to solve complex problems has been discussed many times in the literature. H. Simon (1982, p. 92), for example, argues that in analytical methods we deal with a phenomenon called "mathematical aphasia", consisting in a tendency to over-simplify the model

until theoretical problems disappear, and with them any relationship with reality. J. Forrester (1971, p. 88), on the other hand, expresses the view that an effective study of a complex problem lies outside the boundaries of traditional analytical methods and he suggests instead using a method based on a heuristic approach - a computer simulation.

Work is currently underway regarding the assumptions for the construction of a tool to analyze the impact of public interventions on poverty that will be based on a computer simulation model.

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