National and Regional Structural Fund Strategies in Poland: Getting the balance right

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Abstract

Poland emerged from an era of central planning after 1989 with a weak national economy and ineffective regional economic institutions and structures. Subsequent growth was spatially uneven and has left a legacy of relatively prosperous western regions and lagging eastern regions. To a greater extent than in many smaller EU member states, understanding Polish economic performance and prospects requires both national and regional perspectives.

Our paper describes the methodology and findings of a series of research projects that analysed the design and impacts of EU Structural Funds that came to Poland after accession in 2004. Uniquely among the new member states, Polish policy makers have assigned a significant fraction of funding for the period 2007-2013 to programmes designed and implemented at the regional level. The remainder of the funds are devoted to programmes designed and implemented by central government, with mainly national strategies in mind.

Analysis of Structural Funds required the development of national and regional databases to support construction of a series of new Polish economic models. Empirical insights from the regional modelling exercises are summarised, and include differences in regional production structures and technologies; varying dependency on national fiscal redistribution; and differences in regional orientation to national and international driving forces.

The Polish models have been used to examine proposals for allocation of Structural Funds between national and regional programmes, and – within each programme – between various types of public and private investment (e.g., physical infrastructure, human capital and direct assistance to firms). We summarise the main findings of this research, exploring impacts out to the year 2020, i.e. five years after the effective termination of the current Structural Fund programme.

A further objective of the project was to develop analytic tools in a way that permitted national and regional planners to use them as part of a learning exercise in strategic economic planning and analysis. We describe the challenges faced in transferring sophisticated tools and methodologies to planners who sometimes have very limited prior experience and background knowledge of their use in regional forecasting and policy analysis.

We conclude with a brief description of the complex spatial implications of national development programmes and how they are likely to interact with specifically regional programmes. There are both synergies and tensions between national and regional economic strategies. But an appropriate modelling framework, combined with rigorous training of the planners, can provide a systematic and logical methodology to promote policy dialogue and reconciliation of competing objectives.
[1] Introduction

Poland emerged from an era of central planning after 1989 with a weak national economy and ineffective regional economic institutions and structures. As the turbulent post-Communist transition of 1989-94 drew to an end, the national economy began to recover and grow (Blanchard, 1997). By 1999, the previous forty-nine regional administrative structures had been reformed and consolidated into sixteen voivodships, with populations ranging from 5.2 million (Mazowieckie) down to 1.0 million (Lubuskie). However, Polish national growth was spatially uneven and by the time of EU accession in 2004, the legacy of relatively prosperous western, but seriously lagging eastern voivodships, had not been remedied.

Poland is the largest economy of the twelve new EU member states. To a much greater extent than in many smaller EU member states, a deep understanding of Polish economic performance and prospects requires both national and regional perspectives. There are many reasons for this. First, progress in economic development often tends to be spread unevenly over a national territory, with some regions prospering more than, and earlier than others. Second, regions that get ahead tend to stay ahead, at least for long periods of time, and it is important to understand the reasons why. Third, for regions that are lagging behind others, an obvious policy question concerns how their development might be accelerated, and this requires regional as well as national policy initiatives. Finally, a more pressing reason was the challenge of designing effective policies to implement EU Cohesion Policy, in terms of investment programmes co-financed by the Structural and Cohesion Funds made available to Poland after accession in 2004.1

In general, there have been two broad approaches to regional analysis in Poland. The first might be described as the “descriptive” approach, which is based on the history of regions, their geographical features, the quality of their physical infrastructure, the characteristics and standards of their human resources (or “human capital”), the nature of their main economic activities, and their socio-demographic features. The second might be described as the “analytical” approach, which is usually based on an explicit economic framework and makes use of systematic data to examine the underlying economic mechanisms of the regions. This approach is normally referred to as regional “modelling”, and is the methodology used in this paper.

Our paper describes the methodology and findings of a series of research projects that have been carried out in WARR since 2002. The object of the projects, commissioned by the Ministry of Regional Development in Warsaw, was to analyse the design and impacts of the EU Structural Funds that would come to Poland after accession in 2004. In addition to the question of how to allocate the EU funding across different kinds of investment projects (e.g., physical infrastructure, human resources, direct aid to firms, etc.), Polish policy makers also needed to address the question of the balance between programmes designed from the centre (i.e., national programmes) and programmes designed in the regions, to address specific regional development barriers.

In Section 2 we outline the main methodological tools of the project, which involved the construction of a database for the national economy as well as a series of sixteen regional databases, linked to the national database. These were designed to permit a genuinely

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1 Prior to 2004, pre-accession EU aid had been made available to the so-called “joining” states. But these were relatively small and were focused mainly on institutional and administrative reforms.
macroeconomic perspective on the structure and performance of the Polish voivodships, and to explore internal regional mechanisms as well as national-regional economic linkages, prior to construction of formalised regional models. Some key empirical findings of the regional modelling exercises are summarised, including insights into differences in regional production structures and technologies; varying dependency on fiscal support; and differences in regional orientation and exposure to external driving forces (national and international).

In Section 3 we describe how new national and regional Polish models have been constructed using the above databases. In Section 4 we show how the models were used to examine initial proposals for allocation of Structural Funds between national and regional programmes, and – within each programme – between various types of public and private investment (e.g., physical infrastructure, human capital and direct assistance to firms). Section 5 is a case study, using the Dolnoslaskie region. We summarise the findings of this research, exploring impacts out to the year 2020, i.e. five years after the effective termination of the Structural Fund programme.

Section 6 discusses a further objective of the research project, which was to develop analytic tools in a way that permitted national and regional planners to use them as part of a learning exercise in strategic economic analysis and planning. We describe the challenges faced in transferring sophisticated tools and methodologies to planners who sometimes have very limited prior experience and background knowledge of their use in regional forecasting and policy analysis.

We conclude in Section 7 with a brief description of the present phase of the WARR research, which is exploring the complex spatial implications of national Structural Fund programmes and how they are likely to interact with specifically regional programmes. There are both synergies and tensions between national and regional economic strategies. But the modelling framework, combined with rigorous training of the planners, provides a systematic and logical methodology to promote policy dialogue and reconciliation of competing objectives.

[2] Regional structures and regional data

What are regional economies? We pose this seemingly simple question for a particular reason, since it serves to focus attention on the manner in which we should study and model regional economies. One possible way of looking at regional economies is to regard them as scaled down versions of the encompassing national economy, which have at least some local policy autonomy. If this were the case, then similar tools could be used to analyse regions as are used to analyse national economies. At the other extreme, one might regard regional economies as isolated production units (or export bases) with little or no policy autonomy. If that were the case, then the internal economics of the regions would not be of much interest. National business and policy decisions and performance would dominate, and be transmitted directly into the regions.

Regional policy autonomy normally does not extend to extensive fiscal autonomy (even in a federal state), and excludes – of course – monetary autonomy. But regions can have “soft” policy autonomy, in terms of internal development strategies and influence over the behaviour and participation of the so-called social partners.
This dilemma was stated in clear terms by Paul Krugman, when he reflected on the nature of the economy of Ireland (one of the smallest and most open EU economies, with many similarities to Polish regions: Bradley, 2008):

It would be going too far to think of Ireland as if it were purely a regional economy, its growth driven by its export base. The kinds of macroeconomic issues that matter for bigger national economies also matter for Ireland. But by moving back and forth between thinking of Ireland as a productivity-driven national economy and as an export-driven regional economy we may be able to get a fuller picture. (Krugman, 1997)

Using Ireland as an economic archetype for a Polish region, one might assume that one can analyse a region as a scaled down version of the national Polish economy. In that situation, the organisation of productive and social activities in the region becomes an important development tool. Specifically, the “region”, since it is assumed to have some policy autonomy, can consider the design and implementation of its own industrial development strategy, just as Ireland did starting in the 1960s. The basic competitiveness of the region is partially subject to internal influence. Regional welfare measures become internal policy goals, that can be influenced by regional policy instruments. In particular, the region may aim to escape dependency on outside aid, and try to generate a regional trade surplus, some of the benefits from which will stimulate the region further.

However, if we regard the region as an isolated unit of production, with very little policy autonomy, then structural development policy reverts to being the concern of the national authorities. The convergence prospects of a lagging region are limited, and depend almost completely on how national policy towards the regions is designed and executed. A lagging region risks being trapped semi-permanently in dependency, a situation that is often referred to as the Mezzogiorno problem, after the region of Southern Italy whose name has become synonymous with persistent under-development and dependency.

Our approach to developing a macro modelling framework for the Polish regions starts off with the premise that regions have different initial internal structures and the potential for some policy autonomy, even if that potential is not always realised. In other words, it creates at the regional level a similar economic and sectoral structure as is used in the national Polish model, and identifies expenditure and tax policy instruments (Zaleski et al, 2005a and b). Although these policy instruments are identified at the regional level (e.g., a “regional” rate of income tax, “regional” public investment, or a “regional” rate of social welfare transfers), they can seldom be used independently by the regional authorities. But at what might be termed the policy “margin”, there are other areas where there is a greater degree of policy freedom, such as the task of designing an EU-funded Regional Operational Programme (ROP), and allocating the EC development aid between the various permitted investment categories.

The regional accounting framework that underlies our regional model framework is illustrated in Figure 2.1. This framework attempts to replicate for each Polish region a structure similar to that of the Polish national accounts. The most important element is that we must measure regional GDP in three different ways: by output (what is produced in the region); by expenditure (what is spent in the region); and by income (what is earned in the region). We then take these three measures of GDP, and disaggregate them further. Output (or more accurately, GDP on an output basis) is disaggregated into four model sectors: manufacturing, market services, agriculture and non-market (or government) services. GDP on an expenditure basis is also disaggregated, into categories such as household consumption,
public consumption, investment, and the regional trade balance (regional exports minus regional imports). The regional trade balance is treated as a unit, and exports and imports are not separately distinguished. Indeed, they are seldom if ever available at a regional level, and are only measured by the CSO at the national level. In terms of a region, the regional trade deficit measures both the trade balance with the rest of the Polish economy, and with the rest of the world.

Finally, we need to measure regional income (or GDP on an income basis). This is usually derived by subtracting regional wage income from regional GDP on an output basis, and defining the difference as profit.

Figure 2.1: The regional accounting framework

How good are the Polish regional accounting data? A complete technical answer to this question would merit a detailed paper to itself. But the brief answer is that the Polish regional data are still in a very underdeveloped state. The output side of the accounts is reasonably well presented, but data on the expenditure and income sides are almost totally missing. As a consequence, we had to “construct” the missing data using whatever partial data, or indicators were available. This complex and elaborate exercise has been separately documented in a WARR report that is available on the WARR web site (www.warr.pl; see Zaleski, et al, 2005a). The latest version of the regional database is also reported on the Polish GUS/CSO web site (http://www.stat.gov.pl/bdr_s/app/hermin.zakres).

The WARR report presents a full description of the data construction methodology and addresses how the missing elements of the regional accounts were constructed. The fact that the regional data produced are only partially “official”, and contain many variables that are estimated on the basis of partial data and indicators, means that one cannot be as confident in their accuracy as one would if the entire database were derived on the basis of official GUS/CSO data sources and methodology. The pragmatic question is whether the data are robust enough to use for regional analysis, and to form the basis of the new regional models.
An even more pragmatic question is whether it would be possible to carry out regional analysis in the absence of regional accounts, however tentative the data may be.

The new Polish regional database contains all 16 voivodships, and are identified as shown in Table 2.1.

Table 2.1: Regional database notation for voivodships

<table>
<thead>
<tr>
<th>O.n.</th>
<th>Voivodship</th>
<th>Notation</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Dolnośląskie</td>
<td>DL</td>
</tr>
<tr>
<td>2</td>
<td>Kujawsko - pomorskie</td>
<td>KP</td>
</tr>
<tr>
<td>3</td>
<td>Lubelskie</td>
<td>LL</td>
</tr>
<tr>
<td>4</td>
<td>Lubuskie</td>
<td>LB</td>
</tr>
<tr>
<td>5</td>
<td>Łódzkie</td>
<td>LD</td>
</tr>
<tr>
<td>6</td>
<td>Małopolskie</td>
<td>ML</td>
</tr>
<tr>
<td>7</td>
<td>Mazowieckie</td>
<td>MZ</td>
</tr>
<tr>
<td>8</td>
<td>Opolskie</td>
<td>OP</td>
</tr>
<tr>
<td>9</td>
<td>Podkarpackie</td>
<td>PK</td>
</tr>
<tr>
<td>10</td>
<td>Podlaskie</td>
<td>PD</td>
</tr>
<tr>
<td>11</td>
<td>Pomorskie</td>
<td>PM</td>
</tr>
<tr>
<td>12</td>
<td>Śląskie</td>
<td>SL</td>
</tr>
<tr>
<td>13</td>
<td>Świętokrzyskie</td>
<td>SW</td>
</tr>
<tr>
<td>14</td>
<td>Warmińsko - mazurskie</td>
<td>WM</td>
</tr>
<tr>
<td>15</td>
<td>Wielkopolskie</td>
<td>WL</td>
</tr>
<tr>
<td>16</td>
<td>Zachodniopomorskie</td>
<td>ZP</td>
</tr>
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</table>

Although we cannot go into any detail in this paper, it is useful to present some summary data. In Table 2.2 we show GDP per capita for the voivodships, using the EU-15 as a base (100), and correcting for purchasing power parity.

Table 2.2: Polish voivodships – GDP per capita 2005 (PPS)

<table>
<thead>
<tr>
<th>Voivodship</th>
<th>GDP per capita</th>
<th>Voivodship</th>
<th>GDP per capita</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mazowieckie</td>
<td>68,2</td>
<td>Lubuskie</td>
<td>39,2</td>
</tr>
<tr>
<td>Śląskie</td>
<td>49,6</td>
<td>Małopolskie</td>
<td>38,7</td>
</tr>
<tr>
<td>Dolnośląskie</td>
<td>46,5</td>
<td>Opolskie</td>
<td>36,7</td>
</tr>
<tr>
<td>Wielkopolskie</td>
<td>46,2</td>
<td>Świętokrzyskie</td>
<td>35,0</td>
</tr>
<tr>
<td>Pomorskie</td>
<td>44,6</td>
<td>Podlaskie</td>
<td>34,5</td>
</tr>
<tr>
<td>Zachodniopomorskie</td>
<td>44,3</td>
<td>Warmińsko - mazurskie</td>
<td>33,5</td>
</tr>
<tr>
<td>Kujawsko - pomorskie</td>
<td>40,9</td>
<td>Podkarpackie</td>
<td>31,9</td>
</tr>
<tr>
<td>Łódzkie</td>
<td>40,5</td>
<td>Lubelskie</td>
<td>31,4</td>
</tr>
</tbody>
</table>

Of particular interest is the quantification of the regional public sector balances, based on the detailed allocation of expenditures and revenues to each region as described in the WARR report (Zaleski et al., 2005a). These are shown in Figure 2.2 for the year 2002 (see regional notation in Table 2.1 above), and were the first time efforts had been made to define and quantify Polish regional balances.
[3] National and regional modelling in Poland

3.1 Issues for regional model structure

Ability to construct regional models is heavily constrained by the availability and quality of data. For example, in the USA there are excellent data at the level of the individual states. Using these data, and drawing on a large body of existing research on regional economics, there is a flourishing US literature on regional modelling. The fact that the economic structures of the individual states are fairly stable makes it easier to develop models, and use them for regional policy analysis.

However, when tackling the challenge of modelling the Polish regional economies, the data situation places severe constraints on the ambition of the research. As noted above, there are very little data available, and even then only for the years 1998-2005 (at the time of writing). Furthermore, the available data are of relatively low quality. For example, the sample size of the Polish national Labour Force Survey (used to generate all the employment and labour force data for the national model database) is not large enough to generate reliable data at the level of voivodships. But even if one had access to more data, of higher quality, the development pattern of the Polish regional economies after the post-Communist transition requires attention to be paid to the most recent developments rather than developments in the immediate aftermath of the post-1989 contraction (Blanchard, 1997). Since structures are evolving, and change is not always predictable, the scope for econometrics (i.e., the application of statistical techniques to calibrate the behavioural equations of the models) is very limited.

In view of the data situation, and the developmental nature of the Polish regions, our modelling framework emphasises only a few important features of the economy. It selects a small number of production sectors (manufacturing, market services, agriculture, general government), which is the very minimum that is required to understand how the structure of the regional economies are evolving and changing over time. It isolates the links from the region to its “outside” world, which is simplified to consist of the rest of the Polish national
economy and Germany (as a proxy for the EU). It pays attention to the main drivers of structural change (e.g., inward investment and productivity growth). And it isolates the main demand and supply features of regional economies. The former (demand elements) are important in the short run (e.g., when Structural Funds are being implemented), while the latter (supply elements) become important for the determinants of longer-term growth (after the Structural Funds end).

How do regional models differ from national models? The first simplifying assumption we make is that the regional economies are “post-recursive” to the rest of the Polish national economy. In other words, no one region is so large or important that its behaviour will have significant impacts on the rest of the economy. Economic causality operates in the other direction, i.e., from the national economy down to the level of the regional economy.

Next, it is a feature of the Polish regional data (indeed, of regional data in most countries) that regional prices are not published separately. Only national price data are available. This does not necessarily mean that all regional prices are identical to national average prices. Indeed, it is a familiar phenomenon that many prices in underdeveloped regions are often lower than in central, metropolitan regions. But in the absence of data, there is little that one can say about regional pricing mechanisms, so we have to ignore the issue.

A related point is that regional wage rates tend to be heavily influenced by national wage norms, but that they can sometimes differ from these norms to a significant extent. In designing the regional models we take account of this phenomenon, by including a mechanism that links regional wage determination with national wage rates. So regional wage rates can differ, but the consequences affect profitability rather than prices, since the region is assumed to be a price taker.

Another way in which regional economies tend to differ from national economies is that their labour markets are usually much more open to migration flows. Labour tends to flow from regions that have high unemployment and/or low wage rates to regions that have lower rates of unemployment and/or higher wage rates (Harris and Todaro, 1970). This process can also take place even if rates of unemployment are similar across regions, since some regions generate more jobs than others, and these job opportunities can be exploited by inward migrants as well as local residents. The other possibility is that unemployment in some regions may be “hidden” or partially suppressed. Consequently, it is important that the ILO/LFS methodology is used, and not the less accurate census-based approach to recording labour market status.

Finally, we reiterate the point that the inclusion of policy instruments in regional models (such as tax rates, public sector employment, public investment, etc.) does not imply that these instruments could be used by regional policy-makers.

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3 Germany is by far Poland’s dominant trading partner. Additional data would be needed to quantify the role of other trading partners.
4 The census-based measure of regional employment tends to overstate the agricultural workforce. This distorts comparisons between eastern Polish regions, which have big agricultural sectors, and western regions, which have small sectors.
3.2 Behavioural relations in regional models

There are usually only a small number of relationships in the regional models that dominate their response to policy and other shocks. The first set consists of the equations that determine sectoral output. In the case of manufacturing, the driving forces are local (regional) demand and external demand (from the rest of the Polish national economy and from the rest of the EU, proxied initially by Germany). In addition, local competitiveness matters, and this can be measured by real regional unit labour costs relative to the national average. In the case of market services, the main driving force is local (regional) demand, since this sector produces mainly for the local market. We simplify the determination of agricultural output, and drive it by solving the trend productivity relationship for output. Finally, output in the general government sector is driven by employment inputs, which are policy determined.

The inputs to the production process are capital and labour. In the cases of manufacturing and market services, we impose a production function constraint, and select the CES version as giving a sufficient flexibility to capture the spectrum of values of the elasticity of substitution (Zaleski, et al, 2005b). Most models impose a simpler Cobb-Douglas production function, but this can be unnecessarily restrictive (with its unit elasticity of substitution). Factor inputs in agriculture are determined in a simpler way, since labour is likely to continue to be released from this sector to the rest of the economy for the foreseeable future.

We include two variants of the equation determining wage rates in manufacturing. The first is similar to the national mechanism, but operates at the regional level. The determinants are prices, productivity and unemployment, in a region-specific bargaining model (see Layard, Nickell and Jackman, 1991). The second approach links regional wage rates to the national rate, and models the possible convergence process. Wage inflation in the other three “sheltered” sectors (market services, agriculture and general government) has always been similar to the rate in manufacturing (the so-called Scandinavian model of Lindbeck, 1979), and we use this stylised fact to link wage rates in these sectors to manufacturing (the exposed sector).

The regional labour supply is linked to regional working age population and migration through a “participation” rate. The regional rate of participation (defined as the fraction of the working age population that is either at work, or actively seeking work) tends to be fairly stable over time, but can be influenced by the rate of unemployment (the so-called discouraged worker effect).

The equation that determines regional household consumption is very important in the short term, since demand-side influences work through this mechanism, and it determines the size of the so-called Keynesian policy multiplier. A simple model is used in the initial versions of the Polish regional models, where consumers are assumed to be liquidity constrained. Hence consumption is driven purely by real personal disposable income. In future refinements of the regional models we will investigate the role of household wealth and how the ability to borrow from the banking system (at a given interest rate) can be used to smooth consumption over the income life-cycle (Bradley and Whelan, 1997).

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5 Concerning agriculture, we took the view that “satellite” sub-models can be added later, if required.
Since no regional data on exports and imports are available, we cannot include such equations in regional models. Instead, we determine the net trade balance (NTS, or regional exports minus regional imports) residually as follows:

\[ \text{NTS} = \text{GDPM} - (\text{CONS} + \text{I} + \text{G}) \]

where GDPM is total GDP at market prices (determined on the production side of the model), CONS is household consumption, I is total investment and G is consumption by general government. The sum of CONS, I and G is usually referred to as regional “absorption”.

Finally, we want to include a degree of detail into the regional general government (or non-market) sector. Tax revenues are considered under a wide variety of types (income tax, expenditure taxes, corporation taxes, etc.), and are determined by linking revenue to an appropriate tax rate and a tax base. Public expenditure is made up mainly of policy instruments, such as public sector numbers employed, transfer income paid to households, public investment, etc. Once again, we stress that the inclusion of a policy instrument in the regional model does not imply that the instrument is always, or ever, under the control of the regional authorities. For example, rates of social insurance contribution are set nationally, and imposed on regional authorities.

### 3.3 Calibrating regional models

Each regional model is a stylised, compact system of equations. Although each model contains about two hundred equations, many of these are merely included to increase the model’s transparency and facilitate simulation and policy analysis exercises.\(^6\) The essential core of the model consists of a smaller number of equations, of which less than twenty are behavioural in a strictly economic sense (i.e., empirical versions derived from an underlying theoretical specifications, containing parameters that must be assigned numerical values). These are the equations that we discussed above.

A few qualifying remarks concerning our approach to calibration of the numerical parameters in the behavioural equations are appropriate. As will be apparent from the descriptive material on data presented earlier, the data constraints enable us to work only with about eight annual data observations for the period 1998-2005 at best (at the time of writing), since the regional data prior to 1998 are incomplete and not very reliable. The very small number of observations available prevented us from undertaking the sophisticated econometric estimation and hypothesis testing techniques commonly used to calibrate macro models.

Three different approaches to model calibration (or estimation) are used in the wider literature of modelling in the transition economies of the CEE region:

(i) *Extending the data sample over different economic regimes*

For the Polish national W8-2000 model, data for the period 1960-1998 are used (Welfe, Welfe, Florczak and Sabanty, 2002). The advantage is that this provides 39 annual observations and facilitates econometric hypothesis testing and estimation. The disadvantage

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\(^6\) For example, the wage in manufacturing (WT) is determined in a behavioural equation. But the inflation rate (WTDOT) is determined in an identity, merely to facilitate the examination of simulation output.
is that the extended data sample covers three very different economic regimes: the era of Polish Communist economic planning; the years immediately following the collapse of the Communist economic system; and the era of rapid recovery and growth that followed the post-Communist collapse. In any case, the present 16 voivodships (or Polish regions) only came into existence in 1999, so the data sample cannot be extended backwards much beyond that year.

(ii) The Panel data approach

This is the approach used, for example, within the national CEE models contained in the NiGEM model of the world economy developed by the London-based NIESR (Barrell and Holland, 2002). A series of CEE economic data bases are assembled for the post Communist era, a generalised model is posited that is appropriate to each of the constituent economies, and cross-economy constraints are imposed. For example, a common marginal propensity to consume might be imposed on all models. This has the advantage of increasing the degrees of freedom and obtaining more precise parameter estimates. A possible disadvantage is that the cross-economy restrictions are difficult to test, and this would apply to regions as well as national economies.

(iii) Simple curve-fitting to post 1998 data

This is the approach used in the Polish national and regional models. Each regional economy is studied in isolation. The limitation of about eight annual observations excludes econometrics, in the sense of hypothesis testing. By keeping the behavioural equations very simple, and ignoring lags, the number of behavioural parameters is kept to a minimum. Using ordinary least squares, a form of “curve-fitting” is used, where the derived parameters are examined and related to a range of estimates from other EU models, where longer data sets are available. In its extreme form, this effectively reduces to the way in which computable general equilibrium (CGE) models are calibrated, by imposing all important parameters, and using one year’s data to force congruence between the model equation and the historical data for that year. Advantages include the tight theoretical control imposed on the model, the use of the most recent and consequently, most relevant data sample, and the use of judgement to ensure the relevance of the parameters. Disadvantages are numerous, including a complete lack of formal hypothesis testing.

The curve-fitting approach to calibrating the Polish national and regional models relies on judgement, aided by single equation estimation using “ordinary least squares” (OLS). We look to the OLS output to give us some usable curve-fitting information on the values of model parameters that appear to make the behavioural equation roughly congruent with the data. However, we sometimes have to modify these calibrated parameters in the light of the underlying theoretical implications for the range of values as well as the empirical experience from other modelling exercises in the “older” EU cohesion countries (such as Greece, Ireland and Portugal). Sometimes we impose a particular parameter value for which we have some prior (extra-model) knowledge in order to be able to estimate the remainder of the parameters. On almost all occasions we have therefore run several regressions with modified structure, from which we picked up the one fitting best the underlying assumptions. In a few equations, we are simply unable to calibrate the parameters using OLS, and in those cases we impose values that are plausible in the light of the any known characteristics of the Polish regional economies. This is not a very satisfactory situation, but is somewhat better than the technique
used in computable general equilibrium (CGE) models of calibration using a single observation.

In Table 3.1 we summarise some of the stylised findings from the calibration exercise for the regional models. We describe the sample of five regions in terms of “leading” (or advanced), average and “lagging (or less advanced), although these terms are not very precise. See Table 2.2 earlier for the relative stage of development of these five regions.

Table 3.1: Stylised calibration results for a sample of regions

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<thead>
<tr>
<th>Region</th>
<th>TP Man</th>
<th>TP Mkt Servs</th>
<th>Prod Ag</th>
<th>Empl AG</th>
<th>MPC</th>
</tr>
</thead>
<tbody>
<tr>
<td>Leading</td>
<td>DL</td>
<td>16.2</td>
<td>7.5</td>
<td>-4.9</td>
<td>-4.9</td>
</tr>
<tr>
<td>Leading</td>
<td>WL</td>
<td>6.9</td>
<td>3.2</td>
<td>2.7</td>
<td>-0.4</td>
</tr>
<tr>
<td>Average</td>
<td>ML</td>
<td>8.1</td>
<td>3.8</td>
<td>-10.0</td>
<td>1.0</td>
</tr>
<tr>
<td>Average</td>
<td>OP</td>
<td>8.5</td>
<td>4.6</td>
<td>1.0</td>
<td>-1.3</td>
</tr>
<tr>
<td>Lagging</td>
<td>LL</td>
<td>8.3</td>
<td>3.8</td>
<td>-10.0</td>
<td>1.0</td>
</tr>
</tbody>
</table>

Thus, Table 3.1 suggests that Dolnoslaskie displays a very high rate of technical progress in its manufacturing sector (TP Man, which is over 16 per cent per year, although this is heavily influence by a series of large-scale inward investment activities in the post 2000 period). Other regions display lower rates. Technical progress in market services (TP Mkt Servs) tends to be uniformly lower than in manufacturing. In agriculture, trend productivity growth (Prod Ag) ranges from almost 5 per cent per year (Dolnoslaskie) to -10 per cent in Lubelskie. Employment growth in agriculture (Empl Ag) also displays great variation, from a decline of almost 5 per cent per year in Dolnoslaskie to a modest positive growth in some other regions (i.e., 1.4 per cent in Malopolskie). Due to the small sample size, and the instability of the data on regional disposable income, we imposed a common marginal propensity to consume (MPC) on all models (0.8).

The initial versions of the regional models have been carefully documented, and the WARR website contains reports for each voivodship containing an overview of data, an explanation of the theoretical underpinnings of the models, the detailed calibration results, and a description of how the models were tested to explore their reactions to policy and other shocks (www.warr.pl: Zaleski, et al, 2005a and 2005b).

[4] EU cohesion policy and Polish regions

4.1 The EU Cohesion Programmes in Poland

The structure of the public investment programmes that are funded through EU Cohesion Policy tend to be described in different ways by different groups involved with the programmes. The first level of description is one where either administrative or economic categories are used. The second level of description classifies the components of the programmes in a highly disaggregated way (e.g., into its constituent projects or measures) or, at the other end of the scale, describes them in terms of their more aggregate Operational Programmes (OPs). Finally, the programmes can be described spatially, in terms of its geographical spread, or nationally, in terms of the aggregate of all its spatial parts.

Taking the first – administrative versus economic – description, since the programmes have to be designed and implemented by specific government ministries and other agencies, it is
natural to classify them into groupings that reflect the administration oversight and responsibility issues. The economic classification, on the other hand, uses categories that are useful for economists who are charged with impact analysis. The three most commonly used economic categories are physical infrastructure (roads, railways, telecommunications, etc.), human resources (education and training schemes, a wide range of other labour market interventions), and direct aid to businesses (investment grants, marketing subsidies, etc.). Just as the administrative classification cuts across more than one economic category, so too do the economic categories cut across more than one administrative grouping.

Turning to the second – the level of detail – description, this has important implications for the manner in which the programmes are evaluated. The issues are illustrated in Table 4.1. The apparent gulf between micro and macro policy analysis deserves special attention: It commonly arises because it is never possible in practise to derive the aggregate impact of any large-scale, complex, public investment programme from simply adding together all the individual micro impacts of its constituent projects. A major reason for this is the presence of complex substitution and externality effects in the overall programme, and their likely absence from micro (or project-specific) analysis. On the other hand, the aggregative top-down approach is designed to explore overall macro effects, but cannot make detailed judgements about the efficiency of individual projects embedded within the overall investment programme. In moving between the micro and macro perspectives, there are different benefits and costs, and these are summarised in Table 4.1. However, by combining these two - usually isolated - evaluation approaches, one can avoid the loss of important information in the process of evaluation and thus maximize effectiveness, efficiency and thus desirable policy impacts (see Bradley, Mitze, Morgenroth and Untiedt, 2006).

<table>
<thead>
<tr>
<th>General structure</th>
<th>Micro (bottom-up)</th>
<th>Macro (top-down)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Level of disaggregation</td>
<td>High (individual projects)</td>
<td>Low (aggregated)</td>
</tr>
<tr>
<td>Use of theory</td>
<td>Weak (judgemental)</td>
<td>Strong (macroeconomics)</td>
</tr>
<tr>
<td>Model calibration</td>
<td>Judgemental</td>
<td>Scientific/econometrics</td>
</tr>
<tr>
<td>Policy impacts</td>
<td>Implicit/ranking</td>
<td>Explicit/quantified</td>
</tr>
<tr>
<td>Treatment of externalities</td>
<td>Usually ignored</td>
<td>Usually explicitly modelled</td>
</tr>
</tbody>
</table>

Finally, the third, spatial, description is very important in the case of a large EU member state like Poland. One element of the EU programmes is designed at the “centre”, and consists of those national and sectoral Operational Programmes (henceforth, NOPs) that address national development priorities and do not have specific regional goals. An example might be a system of national motorways that serve to link the main cities of Poland, or training schemes that set national norms for skill formation. However, the Polish EU programmes also contain a large element that will be used to implement Regional Operational Programmes (henceforth, ROPs) that are designed and implemented at the voivodship level. The totality of the NOPs and the ROPs makes up the entire Polish Structural Fund programme. At the level of spatial aspects, the challenge is to be able to combine and integrate national and regional impact evaluation.

Three important questions need to be addressed. First, why did the Polish government make the decision to split the 2007-2013 EU funding between centrally implemented, NOPs and the
16 regional ROPs? This decision was the implementation of a basic political commitment to continue further decentralisation in the area of implementation of EU cohesion policy within Poland. There had been an expectation on the part of the Polish regional administrations that the first, 2004-2006, EU programme would be fully regionalised. But due in part to EC reluctance to embark on a complex regionalised system, in the event there was just a single, centrally designed, Integrated Regional Operational Programme (IROP). However, from the earliest planning stages for the 2007-2013 programme, a fully regionalised system was proposed.

Second, having decided on a regional approach, how did the planners arrive at the funding allocation, as between NOPs and the 16 ROPs? The starting point for the funding allocation for the years 2007-2013 was the earlier share of the IROP in the 2004-2006 programme (see above). The IROP share of the funds had been about one-third of the total allocation from Structural Funds for Poland for the years 2004-2006. But this was considered by the regions to be too small a share for the much larger funding available during the 2007-2013 programming period. The determination of the share then became a political decision, with the Minister responsible for regional development at the time - Mr Hausner - initially proposing a 2/3 NOP versus 1/3 ROP distribution. After further, mainly political debate, and the exclusion of the ESF element from the regional operational programmes, the ROP share was finally decided as about one-fourth of the total EU allocations for Poland for the years 2007-2013. In the final 2007-2013 Polish programme proposals, there were only three national NOPs, and 16 regional ROPS. In addition, it was decided to add a special, extra OP to address the specific problems of the five poorest Eastern Polish regions.

Third, in the case of the 16 ROPs, what was the allocation rule used, as between one region and another? The rule used to distribute the ROP allocation across regions was rather simple and, effectively, a continuation of the rule applied within the earlier IROP 2004-2006. Namely, 80% of the total ROP allocation was divided proportionally according to regional population; 10% was divided proportionally according to the population among regions where the level of GDP per capita was lower than 80% of an average for Poland; and the final 10% was distributed proportionally to Poviats within the regions (i.e., the local administrative level below the Voivodship level) where the unemployment rate in each of three previous years was more that 50% higher than the national average.

4.2 Evaluating ROP impacts

The Polish national and regional models were designed with their use in the analysis of EU cohesion policy in mind, although they could also be used for the analysis of a wide range of EU and other programmes and for the analysis of the consequences of regional industrial strategies.

We give a very brief overview of the results of the analysis of a Regional Operational Programme, selecting the Dolnoslaskie region as an example. The actual model-based ROP impact analysis methodology, together with its spillover mechanisms, is described in detail elsewhere (Bradley, Zaleski, Tomaszewski, Zembaty, 2006). The following is a brief outline of the five stages involved in an ROP impact analysis:
i. Restate the administrative ROP measures in “economic” categories (i.e., in terms of investment in physical infrastructure (PI), human resources or human “capital” (HC), and direct aid to producing sectors (aid to productive sectors, or APS).

ii. Make sure that the key ROP expenditure and spillover mechanisms have been incorporated correctly into the models (see above).

iii. Derive the data inputs from the basic ROP data input (a policy shock over 2007-2015, with long-tailed effects).

iv. Using the models, carry out “without ROP” (or baseline) and “with ROP” simulations.

v. Quantify the ROP impacts by comparing the “without ROP” and “with ROP” simulations.

The impacts on the level of GDP are shown in Figure 4.1. This shows that the ROP is likely to increase GDP in the Dolnoslaskie region by almost 1.8 per cent by 2013, falling to an increase of about 1.4 per cent by 2015. Remember that the ROP expenditures end in the year 2015.

Figure 4.1: Dolnoslaskie: Impact of ROP on level of GDP

Figure 4.2 illustrates the ROP impacts on four macroeconomic variables (aggregate GDP; the level of aggregate productivity (LPROD); total numbers employed (L); and the unemployment rate (UR). We need not go into detail, since in this paper we merely wish to illustrate patterns of behaviour due to the ROP, and not the exact detail. What this set of graphs shows is that the ROP increases the level of regional GDP during implementation, but afterwards the sustained increase in the level of regional GDP is smaller. The improved regional stock of physical infrastructure and human capital generates spillover benefits that drive up output (as in the first graph), but also increases productivity. Consequently, the increase in total employment (as a percentage deviation from the baseline (without ROP) scenario) is lower than the percentage increase in GDP. The rate of regional unemployment falls during implementation, but returns to its “without ROP” level after the programme is terminated.
Figures 4.3 and 4.4 show sectoral impacts (for manufacturing and market services). The output effects in manufacturing are quite large (peaking at a level increase of 2.5 percent, while the increases in market services output are smaller. Furthermore, while the boost to the level of manufacturing output endures after the ROP terminates, the boost to market services output in more transitory, since the main element is the building and construction activities that are a major part of the ROP implementation.
Finally, Figure 4.5 shows the ROP impacts for five typical Polish regions, compared to each other. The selected regions are: DL: Dolnośląskie; LL: Lubelskie; ML: Małopolskie; OP: Opolskie; and WL: Wielkopolskie. It is seen that the impacts on the level of GDP are broadly similar for all five sample regions, with the effect on the poorest region (Lubelskie) being largest.

4.3 Evaluating the combined NOP and ROP impacts on regions

The complexity of the task of analysing the impacts of the NOPs and ROPs at the regional levels requires that we set up a careful system and terminology that describes exactly what is
being examined in any given situation. The working definitions that we found to be useful are the following:

TYPE 1 impact evaluation (ROP): Here the objective is to evaluate the ROP impacts on a specific region, ignoring all inter-regional and national-regional spillovers. The region is treated as an entirely separate economy, detached from the national economy, of which it is a part, and detached from its neighbouring regions.

TYPE 2 impact evaluation (RNOP1): This type of evaluation attempts to quantify the spillover impacts of the NOPs on a specific region. These spillovers operate through the knock-on impacts of the changed national economy (GDP, employment, unemployment, etc.) on the specific regional economy, since Polish national performance is a key driving force for its constituent regions. Thus, Type 2 evaluation looks at the impacts of the improved national economy on a specific region, but ignores all national and inter-regional spillovers.

TYPE 3 impact evaluation (RNOP2): This is a more refined and focused version of Type 2 evaluation, where we now assume that the NOP data are available in a form that has been disaggregated into the allocations across the regions. In other words, the NOP activities in the areas of investment in physical infrastructure, human resources and direct aid to firms can be assigned to specific regions of the national territory, where these activities will actually be implemented. Type 3 evaluation looks at the impacts of these allocations on a specific region, but ignores all national and inter-regional spillovers.

TYPE 4 impact evaluation (IRSO): This type of evaluation attempts to quantify the inter-regional spillovers of the NOPs as well as the inter-regional spillover impacts of the ROPs implemented in adjoining regions, on a specific region. Such evaluations are the most difficult to carry out, since the spillover mechanisms are complex and ill-defined.

TYPE 5 total regional impact evaluation (TNOP+ROP): Here an attempt is made to evaluate the complete impact of the Structural Funds on a specific region. It can be considered as a combination of Type 1, Type 2 and Type 4 impacts, in the case where we do not have the regional allocation of the NOP expenditures. Or, if the division of the NOP expenditures by region is available, it can also be considered as a combination of Type 1, Type 3 and Type 4.

Type 1 evaluation (ROP)

This is a standard regional level evaluation, and makes use of the regional HERMIN model, HPO4XX, where XX is the two-letter identifier of each of the 16 voivodships. First, a baseline “without-ROP” simulation is carried out, where the model is simulated from the year prior to the implementation of the ROP, to the year 2020, i.e., five years after the final termination of all expenditures from the 2007-2013 programming period, and after the invocation of the so-called “n+2” rule. Then the ROP expenditure profile is imposed on the model, and a new “with-ROP” simulation carried out. The comparison of the “with-ROP” and the “without-ROP” simulations permits the quantification of the direct ROP impacts on the regional economy in question (in terms of difference and/or percentage differences from the baseline.
Type 2 evaluation (RNOP1)

The first stage of this type of evaluation requires one to evaluate the impacts of the national NOPs on the national economy. This is carried out as follows. First, a baseline “without-NOP” simulation is carried out, where the national Polish HERMIN model, HPO4, is simulated from the year prior to the implementation of the NOPs, to the year 2020, i.e., five years after the final termination of all expenditures from the 2007-2013 programming period, and the invocation of the so-called “n+2” rule. Then the NOP expenditure profile is imposed on the model, and a new “with-NOP” simulation carried out. The comparison of the “with-NOP” and the “without-NOP” simulations permits the quantification of the direct NOP impacts on the national economy (in terms of difference and/or percentage differences from the baseline).

At that stage, we take the new profile for the “with-NOP” national variables and insert them into the regional HERMIN model being studied. The boost to the national variables gives a boost to the regional economy, and this is taken as an indirect measure of the spill-over national NOP impacts on the region. This is carried out operationally as follows. First, a baseline “without-ROP” simulation is carried out, where the regional HERMIN model, HPO4XX, is simulated from the year prior to the implementation of the national NSRF SOPs, to the year 2020, i.e., five years after the final termination of all expenditures from the 2007-2013 programming period, and the invocation of the so-called “n+2” rule. Then the new national Polish variables (GDP, etc.) are imposed on the model, and a new simulation carried out. The comparison of the “with-national-effects” and the “without-national-effects” simulations permits the quantification of the indirect national NOP impacts on the regional economy in question (in terms of difference and/or percentage differences from the baseline).

Type 3 evaluation (RNOP2)

Operationally, this is rather similar to a Type 2 evaluation. The only change is that instead of inserting the new Polish national variables (that were boosted by the national NOP programmes), one inserts the spatial distribution of the national NOP programme expenditures directly into the regional models. Hence, it is a direct evaluation of the regional consequences of the national NSRF SOPs, rather than an indirect evaluation, via the indirect national impacts on the regions.

Type 4 evaluation (IRSO)

This is the most complex type of impact evaluation. The following example will explain why. Consider (say) the Lubelskie voivodship. The Type 1 (ROP) evaluation looks only at the direct ROP impacts on Lubelskie, in isolation from all other regional and national impacts. The Type 2 (RSOP1) and Type 3 (RSOP2) evaluations look at the indirect and direct impacts of the national NOPs on Lubelskie, in isolation from all other regional and national impacts.

In the Type 4 (IRSO) evaluation we try to pick up all the remaining impacts of the Structural Funds (NOPs and ROPs) in so far as they affect any given region. These are mainly the inter-regional spillovers from adjoining regions, or from large regions whose behaviour can influence other smaller regions, even if they are not geographically close.

Ideally these “residual” effects would be simulated in an integrated modelling system that contained all 16 regions linked together. But that would be a very challenging task, and is
almost impossible in view of the simple and preliminary nature of the Polish regional models. But an estimate of the national total – across all 16 regions – of these effects might be obtained by comparing the national impact of the entire Structural Fund programme (NOPs and ROPs) as simulated using the national Polish HERMIN model (HPO4), and the sum of the Type 1 and Type 2 (or, alternatively, Type 1 and Type 3) impacts. One would expect the latter two totals to be smaller than the national impact obtained from the national model, and this might be taken as a rough estimate of the Type 4 effects.

**Type 5 evaluation (TNOP+ROP)**

In view of the difficulty in carrying out a Type 4 impact analysis, it would be equally difficult to carry out a Type 5 impact analysis for a specific region. The sum of the Type 1 and Type 2 (or alternatively, of the Type 1 and Type 3) impacts can be taken as a lower bound for the Type 5 total. An ad-hoc distribution of the Type 4 impacts – derived as explained above – could be made, but would only be approximate. For example, one could distribute the Type 4 impacts total across regions, proportionally to their level of GDP.

[5] **An evaluation case study: Dolnośląskie voivodship**

In this section we illustrate some of the evaluation methodology using the region of Dolnośląskie as an example. Figure 5.1 illustrates the Type 1 impacts of the Dolnośląskie ROP on GDP. What is illustrated is the percentage increase in the level of GDP relative to the “without-ROP” baseline simulation. This should not be confused with the impact on the growth rate of GDP. Whereas the impact on the level endures into the long term, any impact on the growth rate would be only transitory.

The impact starts off very small, since the ROP expenditure is phased in gradually after 2007. The Type 1 impact on the level of GDP builds up to just under 2 per cent by the year 2013, and begins to decline thereafter. What this means is that the ROP has the ability to increase the level of regional GDP by almost 2 per cent relative to the case of “no ROP”.

Figure 5.1: Type 1 evaluation ROP: Impacts on Dolnośląskie economy

GDP % change from base level
In order to move to Type 2 evaluation (NROP1) analysis for Dolnośląskie, we first have to know the impacts of the NOPs on (say) Polish GDP. This is illustrated in Figure 5.2, which was derived from the simulation of the NOP programmes on the Polish national economy, using the national Polish model.

Figure 5.2: Structural Fund NOP impacts on Polish national economy
GDP % change from base level

![GDP Change Graph]

Once again, the impacts on the level of GDP relative to the “no-SF NOP” baseline are shown. The impacts build up slowly, and peak at over 4.5 per cent in 2013 (i.e., the national SF NOPs within NSRF are likely to raise the level of Polish GDP by over 4.5 per cent relative to the baseline). The impacts on all the other relevant national variables can be similarly evaluated, but are not shown.

At the time of writing we did not have the regional allocations of the NOP expenditures. So we can only carry out only a Type 2 impact analysis. A Type 3 impact analysis would require such a regional allocation. The logic of combining the Type 1 and Type 2 analysis for Dolnośląskie is shown in Figure 5.3, and impact results are shown in Figure 5.4.

Figure 5.3: The logic of combining Type 1 and Type 2 impacts on Dolnośląskie economy

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7 National Strategic Reference Framework: a complex national strategy co-financed by EU Structural Funds consisting both of NOPs and ROPs.
The Type 1 impacts on Dolnośląskie GDP are shown in Figure 5.4, together with the combined impacts of Type 1 and Type 2 impacts. The isolated Type 1 impacts are shown as GDPMT1. The combined Type 1 and Type 2 impacts are shown as GDPMT1p2. Adding in the Type 2 impacts raises the effect on the level of GDP from just under 2 per cent to just over 3 per cent. In other words, the regional spillover impacts of the national NSRF NOP programmes increases the Type 1 ROP impacts by about 50 per cent. But it should be stressed that this is an experimental simulation, and is presented for illustrative purposes only.

As the regional allocations of the NSRF NOP funding becomes available, we will be in a position to move to the more reliable Type 3 impact analysis. And further investigation of the Type 4 (inter-regional) impacts is still at the research stage.

[6] Regional training experiences

There are two ways in which the Polish regional models could be used operationally. In the first approach, the regional models could be managed by a centralised team, who would liaise with the regional planners in order to obtain ROP expenditure data, carry out the model simulations using the supplied data, and pass the results back to the regional planners. In the second approach, an effort could be made to train the regional planners to operate their own regional models, and to internalise the model-based research and application.

In a situation where all, or at the very least, some of the regional planning departments were sufficiently experienced, it might be considered desirable to design and build the models in the regions. However, there is a danger here. If the characteristics of the regional models are very heterogeneous, and there are no common features, then the policy analysis will be compromised. One would not know if the differences between regional impacts of a specific policy were due to the different policy shocks or merely to the different properties of the model designs. Consequently, there are considerable benefits to designing the regional models in a central team, and to ensure that the regional and national models are compatible in terms of behavioural characteristics.

In the Polish case, the national and regional models, and their accompanying databases were designed, implemented and tested by the WARR team, on behalf of the Polish Ministry for
Regional Development in Warsaw. The models were carefully documented, and the software standardised. The econometric package TSP was used to construct the model databases, and the simulation package WINSOLVE was used to test and operate the models. At that stage, each of the sixteen regions were given the complete national and regional databases, as well as the software for their own specific model.

A series of training sessions were held in Warsaw, where two analysts attended from each region, plus analysts from the Ministry for Regional Development. In a few cases, the regional analysts had training in economics, even up to doctoral level. In most cases, the analysts had no formal training in economic theory, econometrics or applied economics. In only two regions did the analysts have previous modelling experience. So the initial challenges for WARR team in the initial training sessions were to convey to the regional analysts full information on the structure and content of the national and regional databases, to use the databases to examine the structure and evolution of the regions since 1998 and the relationship to the national economy, to give a feeling for the properties of the models as well as some understanding of the theories upon which the models were based, and to teach the analysts how to carry out model simulations.

One might think that all one really had to do was the last item: i.e., teach the analysts how to carry out model simulations. But it is well known that economic models are very complicated tools, and that they require considerable knowledge if one is to be able to understand and defend conclusions and recommendations that are based directly on model simulations. For example, the derivation of Structural Fund impacts by means of model simulations is merely the first stage of the analysis. An explanation of the logic of the results, and an informal account of why one might have confidence in the results, is the second vital stage that is even more important than the initial mechanical simulation exercise.

In the event, the experience of some four training sessions of two-three days each suggested that one probably needed to combine the “devolved” approach with the “centralised” approach. Of the sixteen regions, some made very rapid progress and quickly mastered many aspects of the database and model use. In most cases, the analysts involved had previous economics education and experience. At the other extreme, some teams had difficulty even understanding the database, and never mastered even the execution of routine policy simulations. In these cases, the analysts had no training in economics, and the model training sessions were too short to be able to fill this training gap. For those regions, the WARR central team usually carried out any simulations that were required as part of the design, monitoring and impact analysis of the ROP process.

[7] Summary and conclusions

What our paper tries to show is that the construction of suitable national and regional economy models is just the first stage in a process of analysing and evaluating the impacts of Structural Funds on the individual Polish regional economies. The second stage requires the design of a process where the models can be systematically used to trace out all the likely direct and indirect impacts of the Structural Funds.

The easiest stage in the evaluation – at least from a conceptual viewpoint – is the analysis of the impacts of a single ROP on the region for which is was designed and where it is implemented. We referred to this as a Type 1 analysis. But the regions will, of course, be
beneficiaries of the nationally designed and implemented NOPs. The tracing through to a specific region of these impacts was called Type 2 and Type 3 analysis, depending on whether one has the full allocation details of the NOP programmes across the regions of Poland, where they will actually be implemented. This is only slightly more complex than the analysis of ROPs.

The real difficulty came when one tried to quantify the indirect spillover impacts of ROPs on other regions, particularly regions that share borders with each other, where we would expect inter-regional effects to be particularly important. These inter-regional spillovers will arise both in the case of ROPs and in the case of the regional allocation of the national NOP programmes. We do not yet have the tools for this kind of sophisticated analysis. An approximation to the spillover impacts can be derived by first calculating the national impacts of the entire Structural Fund programme (i.e., NOPs plus ROPs), evaluated using the national HERMIN model, HPO4, as if it were an integrated national programme. Then one can sum the 16 separate impacts of the Type 1 and 2 outcomes on all the individual voivodships. The difference between the national aggregate result and the sum of the regional results may give a rough approximation to the total spillover impacts that would be obtained from a Type 4 analysis, if the latter could actually be carried out.

As time passes, and new and improved national and regional data become available, it will be possible to improve the accuracy and reliability of the national and regional models. The new data, the improved models, and more detailed information on the NOP and the ROPs will lead to more robust and reliable results. However, the difficulties inherent in the Type 4 impact evaluation (i.e., the inter-regional spillovers) are likely to persist, and a complete impact analysis at a regional level may only become feasible in the light of future research on how the Polish regions interact with each other, in addition to how they interact with the rest of the national economy and other international trading partners.

In addition to using the Polish national and regional models for the analysis of the impacts of Structural Funds, they could also be adapted to assist with the analysis of a much wider range of policy shocks. Of most importance is the manner in which the progressive integration of the Polish economy into the EU Single Market will affect development prospects. In the case of the four so-called “cohesion” countries of the “older” EU (i.e., Greece, Ireland, Portugal and Spain), a combined examination of the impacts of the Single Market reforms and the Structural Funds suggested that these policies can interact and reinforce each other (ERSI, 1997). A similar analysis for Poland is required, since the impacts of the Structural Funds in isolation make only a modest contribution to the convergence objective.

It should be obvious to the reader that the analysis of ROP impacts, based on the new Polish regional models, is still at a very exploratory and experimental stage. The obvious question to pose is the following. Can we use the models to give confidence intervals for ROP impacts? Unfortunately, it is not yet feasible to address the more demanding question: can we give precise values to the likely ROP impacts.

In the figures above, we have shown the results of a specific simulation (where the spillover parameters in the ROP supply-side mechanisms are assigned specific values derived from the international literature, and deemed appropriate for Poland). By varying these spillover parameters we could carry out a sensitivity analysis. This could be accompanied by a more searching analysis of the ROP at a micro level, i.e., at the level of individual ROP measures. Techniques for doing this are quite new, and have been described in Bradley et al, 2006.
Based on this micro analysis, one is in a better position to evaluate the “quality” of the ROP policy interventions, and to gauge whether the ROP spillover parameters (which determine the long-run supply-side impacts) are likely to be big or small.

Perhaps as important as the task of refining the ROP impact analysis is the daunting task of obtaining regional economic data of higher quality, since the entire modelling and policy evaluation exercise can only be as good as the underlying data. This points to the urgent need for the Polish Central Statistics Office (GUS) to mount a serious effort to improve their publications in this area.

Bibliography


