

Dr. Zbigniew Matkowski

Załącznik 2b
(Appendix 2b)

**SUMMARY
OF SCIENTIFIC RESEARCH ACCOMPLISHMENTS**

Warsaw, November 2018

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1. Introduction

This summary presentation of my research accomplishments is related to my application for granting a habilitation degree in economic sciences.

Until recently, I have even not imagined that I would try to apply for that degree any time. After all, I am 77 years old, being retired and no more employed at any university. I finished my professional work in 2010, though I am still active scientifically, but in a limited scope and in the forms more suitable for my age. There are, therefore, no material reasons on my part to initiate this troublesome and sophisticated procedure, and to undertake the effort and risk connected with it (not to say about absorbing the attention and time of other persons). I got a doctoral degree long ago (in 1971), but during my professional career I did not apply for a higher scientific degree, this being mainly due to a constant work engagement and many duties, but also because of my somewhat ambivalent attitude to formal procedures required for academic promotion. Now, that I have finally decided, moved by an internal impulse, to take up this challenge, it is because this issue has also for me a significant ethical dimension.

My lifelong research accomplishments can be divided into three thematic series, representing three main stages of my scientific work:

- 1) Economic aspects of armaments and disarmament (1965-1985);
- 2) Composite indicators of business activity for Poland (1990-2005);
- 3) Comparative analyses and forecasts of macroeconomic performance and dynamics in Poland and other post-socialist countries including their convergence with Western Europe (2005-2016).

Dating of these three stages is tentative because the above mentioned research series were partly overlapping.

Now, when applying for habilitation on the basis of a selected publication series, I would prefer to present series (2), which is more cohesive thematically (in fact, monothematic) and, in my opinion, not less fruitful in terms of publication numbers and their scientific value. However, since that research cycle has been completed a long time ago, I will present here for evaluation purposes series (3), which represents my newer research accomplishments, done during the last 15 years, with the still existing possibility of continuation. In the main part of this report I will present therefore a selected set of works which belong to the thematically interconnected publication series (3), and my research accomplishments made in the two earlier stages will be described briefly at the end.

This Summary is composed of 12 parts. Part 2 contains some personal information and a synthetic description of my scientific and professional career. The chosen set of publications belonging to the interrelated publication series (3) is extensively discussed in part 3 while the earlier research accomplishments are presented briefly in part 4. The next parts present other elements of my scientific works, such as: research projects, participation in scientific conferences, membership in scientific organizations, societies and editorial committees, editorial

and reviewing works, popularization and expertise activity (including translations), foreign university internships, and the obtained prizes and awards. The presentation is completed with the aggregate statistics of my published and unpublished works. My didactic and organizational accomplishments are presented separately in Appendix 3, which also includes a wider description of my accomplishments in popularization and expertise fields, as well as research and teaching cooperation with abroad.

Because of a very long time covered by this report and a considerable size and extent of my scientific achievements, the total volume of this presentation is necessarily a little bigger as compared with the reports presented by much younger applicants. I tried to reduce the size of this Summary i.a. by a synthetic presentation of some information elements and editorial cuts made in the descriptive parts, but any further reductions could be detrimental to its completeness.

2. Personal information

2.1. Personal data

Name: Zbigniew Matkowski

Born: 1. 10. 1941 in Jacowce

(contact data are given in Appendix 7)

2.2. Education

1955-59 Secondary school in Trzcianka (Wielkopolskie Voivodeship)
Graduated in 1959 with excellent grades and top position.

1959-64 Central School of Planning and Statistics in Warsaw
(current name: SGH Warsaw School of Economics)
Faculty of Foreign Trade; field of study: foreign trade economics
Stationary studies completed in 1964, M.A. (Econ.),
with excellent grades and top position, and 1st Prize

2.3. Scientific degree

1971 Ph. D. (Econ.)
Central School of Planning and Statistics in Warsaw
(current name: SGH Warsaw School of Economics)
Faculty of Foreign Trade
Doctoral thesis “Some Economic Problems of Disarmament
in a Capitalist Economy (Case Study of the United States)” [in Polish]
Supervisor: Professor Dymitr Sokołow

2.4. Professional career

Employment

- 1964-06 SGH Warsaw School of Economics (former name: CSPA)
Position:
Till 1966 assistant, then senior assistant, from 1971 assistant professor (adiunkt)
- 1964-91 Faculty of Foreign Trade
1964-68 Chair of Political Economy
1968-72 Chair of Foreign Market Analysis
1972-91 Chair of Political Economy
1991-06 College of World Economy
1991-06 Chair of Economics II
- Organizational functions:
1964-68 Sc. Sec., Chair of Political Economy
1977-81 Sc. Sec., Institute of Political Economy
(from 1980, acting Deputy Director)
1991-92 Acting Chairman, Chair of Economics II
- 1974-75 Institute of Foreign Trade
Consultant (Sc. Advisor)
- 1988-92 Foreign Trade Enterprise Universal
Advisor
- 1993-08 Bogdan Jański School in Warsaw
(former name: School of Management and Enterprise)
Faculty of Management
Lecturer; since 1997 Professor, Chairman of Economics
- 2008-10 Academy of Finance in Warsaw
Faculty of Finance and Accounting
Professor, Chairman of Economics

Other activities

- 1971-72 Harvard University, Department of Economics
Honorary Research Fellow
- 1992-96 Polish University in Vilnius (Lithuania)
Lecturer, Chairman of Economics
(Program “Academic Initiative East”)
- 1997-98 School of Social Psychology in Warsaw
Lecturer, Coordinator of Economics
- 1995-02 National School of Public Administration
Lecturer

- 2001-08 Ministry of Environment
Lecturer
- 1996-98 Polish-American MBA Program at WSE (WEMBA)
Lecturer
- 1996-02 Polish-Canadian MBA Program at WSE (CEMBA)
Lecturer
- 2001-02 Helsinki School of Economics and Business Administration
Visiting Professor (two lecture series in MBA program)
- 1974-91 “Oeconomica Polona”
Member of the editorial staff, then Managing Editor
- 1975- “Ekonomista”
Member of the editorial staff and of the Editorial Committee (since 1988)
Managing Editor (since 2010)

3. Scientific accomplishment presented for assessment

3.1. Thematically interrelated publication series

As a scientific achievement after obtaining a doctoral degree, I submit for evaluation the thematically interrelated publication series entitled:

***Comparative analyses of macroeconomic performance and dynamics
in Poland and other post-socialist countries
including their convergence with Western Europe***

This publication series consists of the following works listed chronologically:

- [1] Z. Matkowski (2004), *Growth Cycles in Poland*, in: ***Composite Indicators of Business Activity for Macroeconomic Analysis***, ed. Z. Matkowski, “Prace i Materiały IRG”, vol. 74, Research Institute of Economic Development, Warsaw School of Economics, Warsaw 2004, p. 187-207.
- [2] Z. Matkowski (2004), *Postsocialist Countries: Macroeconomic Performance, Growth Prospects, and Social Welfare*, “**Eastern European Economics**”, 2004, no. 3, p. 44-80.
- [3] Z. Matkowski (2004), *Gospodarka Polski na tle Europy Środkowo-Wschodniej [Polish Economy within Central Eastern Europe]*, „**Bank i Kredyt**”, 2004, no. 11-12 (Supplement), 31 pp.
- [4] Z. Matkowski, M. Próchniak (2005), *Zbieżność rozwoju gospodarczego w krajach Europy Środkowo-Wschodniej i w stosunku do Unii Europejskiej [Economic Convergence within CEE and towards the EU]*, „**Ekonomista**”, 2005, no. 5, p. 293-320.
- [5] Z. Matkowski, M. Próchniak (2006), *Zbieżność rozwoju gospodarczego krajów Europy Środkowowschodniej w stosunku do Unii Europejskiej [Economic Convergence of CEE Countries with European Union]*, in: ***Integracja a konkurencyjność przedsiębiorstw***

- [*Integration and Enterprise Competitiveness*], ed. M. Stawicka, B. Jański School, Warsaw 2006, p. 73-88.
- [6] Z. Matkowski, M. Próchniak (2007), *Economic Convergence Between the CEE-8 and the European Union*, “**Eastern European Economics**”, 2007, no. 1, p. 59-76.
- [7] Z. Matkowski, M. Próchniak, R. Rapacki (2007), *The Economic Situation and the Progress of Market Reforms*, in: ***New Europe. Report on Transformation***, ed. D. Rosati, XVII Economic Forum, Krynica-Zdrój, 5-8 Sept. 2007, Eastern Institute, Warsaw 2007, p. 67-82, 100-107 [selected fragments only].
- [8] Z. Matkowski (2009), *Cyclical Fluctuations in Central and Eastern Europe and Their Conformity with the Euro Area*, “**Zarządzanie Ryzykiem**”, 2009, no. 29, p. 17-36.
- [9] Z. Matkowski, M. Próchniak (2009), *Zbieżność rozwoju gospodarczego Polski i innych krajów Europy Środkowo-Wschodniej w stosunku do Unii Europejskiej* [*Economic Convergence of Poland and Other CEE Countries with European Union*], „**Zarządzanie Ryzykiem**”, 2009, no. 30, p. 53-97.
- [10] Z. Matkowski, M. Próchniak (2009), *Czynniki wzrostu gospodarczego w krajach transformacji – analiza ekonometryczna* [*Factors of Economic Growth in Transition Countries: An Econometric Analysis*], in: ***Wzrost gospodarczy w krajach transformacji: konwergencja czy dywergencja?*** [*Economic Growth in Transition Countries: Convergence or Divergence?*], ed. R. Rapacki, PWE, Warsaw 2009, p. 108-136.
- [11] Z. Matkowski (2010), *Perspektywy wzrostu gospodarczego Polski w latach 2010-2020 i docelowy poziom PKB per capita* [*Prospects of Poland’s Economic Growth in 2010-2020 and the Target Level of GDP per capita*], in: ***Innowacyjna Polska w Europie 2020. Szanse i zagrożenia trwałego rozwoju*** [*Innovative Poland in Europe 2020. Chances and Threats to Sustainable Development*], ed. U. Płowiec, PWE, Warsaw 2010, p. 62-120.
- [12] Z. Matkowski (2010), *Perspektywy zmniejszania luki dochodowej między Polską i innymi krajami Europy Środkowo-Wschodniej a Europą Zachodnią* [*Prospects for Diminishing the Income Gap between Poland and Other CEE Countries and Western Europe*], „**Zarządzanie Ryzykiem**”, 2010, no. 35-36, p. 31-57.
- [13] Z. Matkowski (2010) *Wpływ kryzysu globalnego na ogólną kondycję polskiej gospodarki* [*The Impact of Global Crisis on General Performance of the Polish Economy*], „**Biuletyn Analityczny**”, no. 4, Academy of Finance, Warsaw 2010, p. 7-37.
- [14] Z. Matkowski, M. Próchniak, R. Rapacki (2013), *Nowe i stare kraje Unii Europejskiej: konwergencja czy dywergencja?* [*The New and Old EU Countries: Convergence or Divergence?*], in: ***Badania koniunktury – zwierciadło gospodarki, cz. II*** [*Research on Business Activity: A Mirror of the Economy*], ed. K. Walczyk, “**Prace i Materiały IRG**”, vol. 91, Research Institute of Economic Development, Warsaw School of Economics, Warsaw 2013, p. 63-98.
- [15] Z. Matkowski, M. Próchniak, R. Rapacki (2014), *Scenariusze realnej konwergencji w Unii Europejskiej – kraje Europy Środkowo-Wschodniej a UE-15* [*Some Scenarios of Real Convergence within the European Union: CEE Countries and EU-15*], in: ***Polska w Unii Europejskiej i globalnej gospodarce*** [*Poland in the European Union and Global Economy*], ed. M. Gorynia, S. Rudolf, The IX Congress of Polish Economists, Polish Economic Society, Warsaw 2014, p. 201-222.

- [16] Z. Matkowski, M. Próchniak, R. Rapacki (2015), *Transition Countries: Economic Situation and the Progress of Market Reforms*, “**Working Papers**”, no. 324, **World Economy Research Institute**, Warsaw School of Economics, Warsaw 2015, p. 1-77, 104-109 [selected fragments only].
- [17] Z. Matkowski, M. Próchniak, R. Rapacki (2016), *Porównanie wyników gospodarczych: Polska na tle Unii Europejskiej* [*Comparative Economic Performance: Poland and the European Union*], in: *Polska. Raport o konkurencyjności 2016. Znaczenie polityki gospodarczej i czynników instytucjonalnych* [*Poland. Competitiveness Report 2016. The Role of Economic Policy and Institutions*], ed. M.A. Weresa, World Economy Research Institute, SGH Warsaw School of Economics, Warsaw 2016, p. 11-37. [This work is also available in the English edition of the same report, listed as item B83 in the publication list given in Appendix 4].
- [18] Z. Matkowski, M. Próchniak, R. Rapacki (2016), *Procesy konwergencji dochodów w Polsce na tle Unii Europejskiej – najważniejsze tendencje i perspektywy* [*Income Convergence in Poland vis-a-vis the EU: Major Trends and Prospects*], in: *Polska. Raport o konkurencyjności 2016. Znaczenie polityki gospodarczej i czynników instytucjonalnych* [*Poland. Competitiveness Report 2016. The Role of Economic Policy and Institutions*], ed. M.A. Weresa, World Economy Research Institute, SGH Warsaw School of Economics, Warsaw 2016, p. 39-59. [This work is also available in the English edition of the same report, listed as item B84 in the publication list given in Appendix 4].
- [19] Z. Matkowski, M. Próchniak, R. Rapacki (2016), *Real Income Convergence between Central Eastern and Western Europe*, “**Ekonomista**”, 2016, nr 6, p. 853-892.

Within the above indicated general theme of the selected publication sample, one can distinguish four interconnected subthemes (research areas):

- 1) comparative analyses of current economic performance – [2], [3], [7], [16], [17];
- 2) analyses of cyclical fluctuations and their synchronization – [1], [4], [5], [6], [7], [8], [9], [13], [16];
- 3) analyses and forecasts of economic growth – [2], [7], [10], [11];
- 4) analyses and forecasts of income convergence – [4], [5], [6], [7], [9], [11], [12], [14], [15], [18], [19].

Most works included in the presented publication series consider various aspects of this theme. Therefore, my research accomplishments included in those publications will be presented below in a thematic order, according with the problem areas (subthemes) above specified. In each of these research areas, my scientific accomplishments are much broader, so the selected works included in the presented set of publications can be treated as examples that illustrate and confirm those accomplishments.

The current condition of the considered economies was analyzed mostly with help of main macroeconomic indicators and some sensitive indicators of business activity. My research covered the two interrelated elements of economic dynamics: economic growth and business cycles, but for a greater clarity, these two aspects of dynamics will be discussed separately. My works on income convergence, crowning the research on economic growth, will be

presented separately, but the international conformity of cyclical fluctuations will be discussed together with the analyses of cyclical changes.

Most works included in the presented publication series contain comparative analyses and forecasts for Poland's economy and the economies of other CEE countries, but some works comprise a broader group of post-socialist countries undergoing a transformation of their political and economic systems, a part of which is the subgroup of CEE countries.

The term 'post-socialist countries'¹ is a conventional notion used here to denote the analyzed group of transition countries undergoing systemic change from the centrally planned economy, based mainly on state and collective property, towards an open market economy, based predominantly on private property. This group is composed of the states located in Central Eastern and South Eastern Europe and on the territory of the former Soviet Union, which have become sovereign after the breakdown of the USSR and dissolution of the Warsaw Pact and as the result of the division of the former Yugoslavia. The adjective 'post-socialist' has no evaluative meaning. It does not mean, in particular, that the socio-political and economic system that existed in those countries till their independence fulfilled the ideals of socialism and matched any specific definition of that system. Likewise, the alternative term 'transition countries' does not imply that all those countries have been changing their economic systems in the same direction and are equally advanced in the process of restructuring their economies. In my works on the economies concerned, I did not examine the features of their former and current economic systems, focusing on a comparative analysis of the current state of the individual economies and their development trends in the light of some objective, measurable criteria of macroeconomic performance. The progress of system reforms, whenever necessary, was assessed separately by the co-operating coauthors.

The concept of Central Eastern Europe (CEE) as a geopolitical area has no uniform definition accepted in the literature and data bases. This name is usually used to denote a more or less numerous group of post-socialist countries situated in Europe, except of the countries that belong (or belonged) to the so-called Commonwealth of Independent States (CIS). In my studies this term was used in a narrower or broader specification, depending on the needs of a concrete analysis and/or on the definition adopted in a collective monograph that included my study.

All my works covered by the selected publication series include a more or less significant amount of comparative analysis. Comparative in character are analyses concerning the current economic conditions and growth of the CEE and other post-socialist countries, analyses of the synchronization of cyclical fluctuations and analyses and forecasts of income convergence between Central Eastern and Western Europe. Poland's economic situation was usually also considered in a broader international context: against the background of European Union, Central Eastern Europe, or the whole group of post-socialist countries. Thus, most of the reported research was comparative. The scheme of the analysis and some research methods proposed there constitute my own contribution to the methodology of international economic comparisons, irrespective of the cognitive value of those studies.

¹ This footnote concerned the way of expressing this term in the Polish language and it will not be translated.

The series of publications presented for evaluation includes 19 works, out of which 7 were written by myself and 12 were written together with M. Próchniak and R. Rapacki, with whom I cooperated for many years in our joint research on these problems. In case of the works written together with one or two coauthors, my own percentage share and the division of research tasks are specified in the enclosed statement, signed by all the authors (Appendix 6). In two cases ([7] and [16]), due to a large size of the whole joint publication, I present here only the parts written exclusively by myself (together with the title page and a brief introduction and conclusion), which has been also certified in the enclosed statement.

3.2. Comparative analyses of current economic performance

Introductory remarks

My works in this subject scope, created in 2003-2016, include altogether 24 items² which belong to the following editorial series:

- a) a series of analyses of the current economic situation in Poland (and its development prospects) against a background of other member states of European Union, contained in the reports *Poland – Competitiveness Report*, published by the World Economy Research Institute;
- b) a series of comparative analyses of post-socialist economies (and their development prospects), contained in the reports *New Europe – Report on Transformation*, published by the Eastern Institute and presented at the yearly Economic Forum in Krynica, supplemented later by the separate reports *Transition Countries: Economic Situation and the Progress of Market Reforms*, published by the World Economy Research Institute in its “Working Papers”;
- c) numerous single works (articles, papers, chapters in monographs) containing additional analyses on this topic.

In the set of publications presented for evaluation these works are represented by items: [2], [3], [7], [16], [17], which are treated as examples illustrating the research accomplishments contained in the above publication series. The relevant studies belonging to this subsubject will be presented in three parts: 1) analyses of the current economic situation in Poland against the background of European Union, 2) comparative analyses of the CEE economies, 3) comparative analyses of all post-socialist economies.

Economic situation in Poland and its position in the EU

My analyses of the current economic situation in Poland and its position in the European Union, prepared in the period 2006-2016 (except of 2008 and 2009), were contained in the first chapter of the report on the competitiveness of the Polish economy (written together with

² In my publication list (Appendix 4) these works appear as items: B52, B53, B61, B62, B64, B66, B67 [7], B68, B69, B71, B73, B75, B79, B81, B83, [17], C25, C27 [2], C28 [3], D6, D7, D8, D9, D10 [16]; numbers of the selected works included in the series presented for evaluation are given in square brackets.

R. Rapacki and M. Próchniak). The example [17] presented here is the relevant chapter of the 2016 report (the last one in which I took part as coauthor). These reports, published annually by the World Economy Research Institute, are one of the basic sources of information about the current state of the Polish economy and its competitive position in the EU.

My analyses included in these reports included the following sections: 1) size of the economy, 2) income level and standard of living, 3) general condition of the economy, 4) economic situation in the last year, 5) future prospects (short- and long-range). All the elements of the analysis were conducted on a comparative basis – against the background of the situation seen in the European Union and in the selected EU countries. The uniform scheme of this chapter in the successive editions of the report made it easier to compare the information and assessments contained in the consecutive editions, regarding the evolution of the economic situation in Poland and its position in the EU.

Due to the informative function of the report and a limited size of the chapter earmarked for my analysis, I focused there on giving a solid assessment of the current state of the economy, its position in the EU and future prospects, avoiding superfluous theoretical deliberations. Nevertheless, the very concept and contents of that chapter can be a good model for similar analyses prepared by other authors in the next editions of the same report or in some other similar studies. Irrespective of their informative and cognitive value, these analyses and assessments have created a methodological framework for this kind of research and have also shown how to use some analytical tools helpful in such research. Some methodological innovations introduced in this research are described below.

Comparing the size of the individual economies and their income levels per inhabitant, I usually gave two alternative estimates of the total and per capita GDP for a given country: at purchasing power parity (PPP) and at current exchange rates (CER). Certainly, a PPP valuation of the domestic product or national income constitutes in general a better basis for broad international comparisons covering countries of various development levels, since it takes into account cost and price differences and is also less susceptible to exchange rate fluctuation. Nevertheless, since the PPP conversion factors adopted by various data sources are not precise, and the resulting GDP estimates differ and seem to be over-evaluated for some CEE and other post-socialist countries (e.g. Bulgaria, Lithuania and Russia)), in my studies concerning countries of that region I usually gave both GDP estimates. The first one (at PPP) was treated as the basic indicator while the second one (at CER) served as a control variable. (This remark applies to all my comparative studies concerning the CEE and other post-socialist countries, not only to the research discussed in this section).

In comparative analyses of the current economic conditions in Poland and other EU countries given in the competitiveness reports on Poland's economy, as well as in my studies on CEE and other post-socialist countries presented in the next sections, I focused on five macroeconomic indicators: 1) economic growth rate (the growth rate of real GDP), 2) inflation rate (on an inverted scale), 3) unemployment rate (on an inverted scale), 4) state budget balance³ (% of GDP), 5) current account balance (% of GDP). The pentagons showing

³ More precisely: public finance balance, or general government balance.

the numerical values of these indicators (on a properly chosen scale) can facilitate comparisons of macroeconomic results noted by individual economies and their evolution over time. I have called that figure ‘pentagon of macroeconomic performance’ (instead of a misleading label ‘pentagon of economic stabilization’ used by other authors), modifying also a little its spatial orientation. However, unlike some other researchers who ascribed some intrinsic exploration properties to this instrument, I treated it solely as a useful presentation tool, helping to compare the results achieved by various countries in the same year or changes observed in a given economy over time. I emphasized that, in interpreting such graphs, we should be careful to avoid the illusion that the best result would be a maximization of all the five indicators (which is besides impossible); the point is rather how to find the best combination of these indicators, optimal in the given conditions, as to assure a stable and sustainable development. There is also a need to consider certain interrelations existing between those indicators (i.e. positive and negative feedbacks), such as the trade-off occurring between unemployment and inflation, the impact of budgetary deficits on inflation, the influence of inflation on the general government balance and current foreign accounts, or the effect of inflation on the dynamics of demand and output. I also warned against too rash conclusions being drawn from the analysis of such graphs, which reflect the situation existing in the given period only, and are insufficient for forecasting purposes (though current situation has some influence on the results that can be attained in the next year).

In spite of the constraints imposed by the limited volume of the respective chapter, my analyses of the current situation of the Polish economy and its position in the EU, included in the quoted competition reports, seem to be quite thorough and insightful. I tried to give there not only a true and clear description of the actual situation existing in the individual sectors and branches of the economy, but also to determine the phase of the business cycle and to assess its durability or the probable direction of change. In order to do so, I analyzed various sensitive indicators of business activity on the demand and supply side, taken from the newest economic statistics and business surveys. In evaluating the stability of economic growth and its durability, I examined changes in various demand components and their contribution to the observed changes in the GDP volume (in quarterly intervals). Since the respective data compiled by the Central Statistical Office contain some gaps that make it difficult to utilize them when assessing demand and output changes (no specification of some autonomous demand components and no data on changes in stocks), I have also shown⁴ how to estimate the missing data and how to interpret them correctly.

A thorough analysis of business activity during the past year and in the first months of the current year, both from the demand and supply side, created a basis for economic forecasts for the current and next year, discussed at the end of this chapter. The last section of the chapter presented development outlooks for the Polish economy in a short, medium and long term. Out of foreign sources, the most recent forecasts were discussed, published by the World

⁴ In the 2016 edition of the report, from which the presented example [17] has been taken, due to a cut in the volume of the report, this part of my analysis has been significantly reduced, and the table showing the contribution of various demand components to the growth of GDP, which was included in the previous editions of this report, has been dropped.

Bank, International Monetary Fund, OECD, and the Economic Commission. From domestic sources, the assumptions concerning the expected GDP growth adopted in the state budget plan were quoted and evaluated, together with growth forecasts made by the National Bank of Poland and the Institute of Market Research. All those forecasts were interpreted in the context of global economic forecasts and the expected evolution of business activity in the euro area and in the European Union as a whole.

After my resignation from the participation in elaborating those reports, the analysis of the current economic situation in Poland given in the next editions of this report (since 2017) has been reduced mainly to the presentation of the five macroeconomic indicators in the form similar to that applied previously. Forecasts of further economic developments are not included. One can hope that this narrowing of the subject scope of those analyses is temporary.

Comparative analyses of CEE economies

Several countries of Central Eastern Europe (CEE) that belong to the European Union were considered in my analyses of the economic situation in Poland, against the background of the EU, which were included in the reports on the competitiveness of the Polish economy, presented in the preceding section, and in my analyses and forecasts of income convergence and cyclical concordance, discussed in the further parts of this presentation. All the CEE countries were also included in comparative analyses of the whole group of post-socialist countries discussed in the next paragraph.

A separate comparative analysis of CEE economies was made in the study [3] included in the selected publication set. This is an article published in 2004 in the journal “Bank i Kredyt”, reprinted later as a chapter of the monograph (B52) published by the National Bank of Poland. The analyzed group comprised 15 countries of broadly defined CEE, divided into three subgroups: a) countries of the Vyshehrad Group, b) Baltic republics, c) countries of South Eastern Europe (SEE). The analysis was conducted according to the scheme adopted in my comparative studies of the whole group of post-socialist countries, presented in the next paragraph.

The comparative assessment of the general condition of the economies concerned was made using the pentagons of macroeconomic performance already discussed. Since the period covered by the quoted study is already quite remote, I shall not describe here the concrete assessments concerning the state of the individual economies of this group at that time. Let us only recall that the years 2002 and 2003 were marked by an economic stagnation in Western Europe, which influenced adversely the economic situation seen in the analyzed group.

When analyzing various indicators of the standard of living in this group, I pointed out that a social balance of the effects of transformation of the political and economic system in this region is not unambiguous. In the four countries of the Vyshehrad Group and in the three Baltic republics there was a considerable increase in real incomes despite their fall in the initial phase of transformation, but the income rise was very unevenly distributed between municipal and rural areas and among different social groups. The SEE countries, on the other hand, except of Slovenia and Croatia, have not yet revealed any significant improvement in

this respect; the average income level in the least developed countries of this region has rather declined as compared with the period before the independence proclamation and the beginning of the transformation process. In spite of the big progress made in many areas of social life, notably as regards democracy, protection of private property, and plenty of goods and services available in the markets, many families still suffer privation while many young, well-educated people emigrate to Western Europe, looking for better job and better living conditions.

As regards the outlooks for the nearest future, I pointed out that those CEE and SEE countries, which have already entered European Union or would be soon admitted to the Community, have quite good development prospects. But the remaining SEE countries, located mainly on the territory of the former Yugoslavia, must first heal the wounds sustained during arms conflicts and cope with difficult tasks related to privatization, restructuring of their industries and establishing new market institutions. Yet the latter countries can also attain a satisfactory growth if they speed up the reform process.

Comparative analyses of post-socialist economies

In the selected publication sample presented here, my studies in this subject scope, accomplished in the period 2003-2015, are represented by the works: [2], [7] and [16], though the full set of my works on this subject is much more comprehensive.

The study [2] is my article published in 2004 in “Eastern European Economics”, which was a revised English version of the paper published earlier in “*Ekonomista*”. This paper was based on my contribution to the chapter included in the first edition of the report *New Europe...*, prepared for the Economic Forum in Krynica. In this report, and in its successive editions, including the last one issued in 2007 from where a fragment was taken presented here as work [7], I was responsible for giving a comparative analysis of the economic situation of post-socialist countries, along with an assessment of their development prospects, while two other coauthors (R. Rapacki and M. Próchniak) discussed and evaluated the progress of system reforms. A similar labor division was maintained in our further works on the same topic, published later in “Working Papers” of the World Economy Research Institute, exemplified by a part of the report *Transition Countries...* written in 2015, which is presented here as work [16].

Whereas in my analyses of the current situation of the Polish economy and its international position, included in the reports on the competitiveness of Poland’s economy, the main reference frame were other EU member countries, here the position and condition of the Polish economy and its development prospects were considered within a wide group of post-socialist countries, coping with similar problems related to the transformation of their political and economic systems. But the main aim of these studies (in the parts written by myself) – apart from a comparative assessment of the state and perspectives of the economies concerned – consisted in giving a thorough analysis of the common development problems faced by this country group and comparing the way in which these problems are dealt with in various countries and their subgroups.

The analyzed group comprised initially 27, and afterwards 29 post-socialist countries situated in Europe and Asia, for which comparable statistical data could be found. Due to a great diversity of this sample, we have split it into two regions: (a) Central Eastern Europe (CEE) and South Eastern Europe (SEE), including altogether 15 or 17 states, which are oriented politically and economically rather towards Western Europe, and (b) 12 states of the so-called Commonwealth of Independent States, created after the breakdown of the former USSR, with Russia as a leader, which are formally sovereign, but still much dependent on Russia as the leader in both political and economic sense⁵. These two areas were further subdivided into smaller and more coherent subgroups whose specification was somewhat modified in the successive studies.

My analyses included always the following parts: 1) size of the economy and income level, 2) structure of the economy, 3) economic growth, 4) inflation and unemployment, 5) deficits and debts, 6) foreign trade and FDI inflow, 7) general macroeconomic performance, 8) future development prospects, 9) social well-being. The last study belonging to this publication series included an additional element: 10) competitiveness and attractiveness of the economy. A uniform arrangement and coverage of the analysis facilitated a comparison of the information contained in the successive editions of those studies, helping to assess the evolution of economic in the individual countries and their subgroups and their development trends.

The analyzed group is extremely differentiated as regards the size of individual economies, their structure (property structure and composition of output and demand), the available resources, development level, and the degree of openness of the economy. These differences make it difficult to draw uniform conclusions from the analysis of the whole sample, but splitting it into two regions and more homogeneous subgroups helped to discover some regularities and to draw certain conclusions.

When analyzing the trends of economic growth in this country group, we see that the effects of the economic collapse at the end of the so-called planned economy, along with a deep crisis at the beginning of the transformation, have remained not overcome very long. In several countries the situation was aggravated by the destructions and losses caused by wars and arms conflicts that accompanied the establishment of new states. According to my estimates given in [7], in 2006 total output in 10 countries of this group was still below its 1990 level. A similar calculus made in [16] showed that, following a deep production drop during the global crisis, in 2013 the volume of real GDP in 7 countries of the group was lower as compared with its level in 1990. The consequences for the average income level and living standards in those countries are disastrous. Nevertheless, in most post-socialist countries the current output and income level is much higher than it was under the former system. Fortunately enough, in terms of the output rise since the beginning of the transformation, Poland has achieved a very good result, having doubled its initial production level.

In the studies on post-socialist countries I devoted much attention to the analysis of inflation and unemployment, as the two most important economic problems besetting many countries undergoing transformation towards a market economy. The heavy inflation that

⁵ The withdrawal of Georgia from the CIS and the new situation of Ukraine have not liquidated this dependence.

occurred in those countries after price and exchange rate liberalization was initially caused by an excess demand. But in the further development, cost pressures have also emerged, along with inflationary impulses generated by budget deficits, increases in administered prices and arbitrary price hikes imposed by producers with a strong market position. Restrictive monetary policy, which was effective in liquidating the excess demand, has lost its power against a new constellation of inflationary factors. Moreover, in many countries it has contributed to a slowdown of economic growth and a rise in unemployment. Nowadays, in most CEE and SEE countries inflation is no more a big problem, but some CIS countries still have a high inflation.

When analyzing the situation in labor markets, I pointed at the fact that unemployment in transition countries is mainly of structural character. It reflects a mismatch between labor supply and demand structures – a difference between the structure and distribution of idle labor resources and the structure of the available jobs. Theoretical neoclassical concepts that attempt to explain unemployment by too high wages do not have a direct relevance to the situation existing in post-socialist countries because they largely disregard structural unemployment, relying on a fictitious assumption of perfect labor mobility. But one of the causes of unemployment is also a big discrepancy between net earnings received by the employees and gross salaries paid by employers, which is the result of high income taxes and social insurance contributions. This phenomenon (the tax wedge), coupled with a relatively generous system of social security benefits and social assistance, weakens the willingness to undertake regular employment, at the same time hampering the creation of new jobs. The actual level of unemployment in many countries of this group (especially in the CIS) is not exactly known; official data on the registered unemployment are incomplete and often understated. With the end of the global crisis, unemployment levels in CEE and SEE began to decrease, but several countries of this region still note a high unemployment of 10% or more. In the last years, as a result of population decline and population aging, coupled with a massive emigration of young people, several CEE countries, including Poland, have been faced with a new phenomenon of labor shortage: especially as regards heavy manual works, but also in some high-skill professions. This problem is mitigated so far by the inflow of foreign workers from poorer countries, mainly from the CIS area.

Much attention was also devoted in those studies to the analysis of state budget and current account deficits. Most post-socialist countries have permanent difficulties in achieving equilibrium in their state budgets and foreign trade. This results in a rise of public debts and a relatively high foreign indebtedness. Both factors have a negative impact on the long-run economic growth, even if their short-time effects are sometimes favorable.

There is also a big differentiation within this large group as regards the degree of openness of the individual economies, export and import dynamics, and the commodity and geographical structure of foreign trade. In the largely defined CEE almost a half of foreign trade is represented by trade flows to and from Western Europe, and a third of the total trade is realized in the mutual exchange within the same group. In the CIS region, most important is a mutual exchange and trade with non-European countries, mainly of Asia. The trade between

CEE and CIS – very intensive in the past – is now generally small: it constitutes only about 10% of total foreign trade of both groups.

Much space in my studies was also devoted to the examination of FDI inflows to transition countries and their impact on economic growth, particularly in the difficult transformation period. My analysis of growth factors in post-socialist countries (reported further in section 3.4) has shown that FDI inflows, along with rising exports, are the two most important factors responsible for growth rate differentials in this group of countries. The inflow of foreign capital stimulated economic growth not only by increasing the investment rate and activating thereby the idle production capacities or creating new ones, but also by introducing modern technology and efficient management systems, launching new production lines and boosting exports. Of course, foreign investments have also some negative aspects and may impose certain threats on the recipient economies and societies, but the net result of those opposite effects is usually positive. This is why most countries of that group constantly seek new foreign investors (notably for greenfield investments), and often strongly compete among themselves in their attempts to attract some particular foreign firms. In the study [16] I have shown that the greatest amount of FDI inflows within this group till 2012 was absorbed by Poland, though the relative intensity of FDI inflows (per inhabitant or as % of GDP) is usually higher in smaller countries.

The comparative assessment of macroeconomic performance for all post-socialist countries was made in the same way as the comparative assessment of the performance of the Polish economy against other EU countries, which was included in the reports on the competitiveness of the Polish economy already discussed. My analysis focused on the same set of five macroeconomic indicators, presented in the form of pentagons. Again, I warned the readers to be careful in drawing false conclusions from a superficial examination of such graphs, the more so because the shape of the pentagons drawn for the countries representing different development levels and different economic structures may not be directly comparable.

In evaluating the development prospects of post-socialist countries, I pointed at the fact that the gross accumulation rate derived from national accounts is a weak and sometimes misleading indicator of the growth potential of a given economy (notably in a heterogeneous group of countries), which may give false signals as to the further growth rate. Better indications could be provided by the estimates of net adjusted savings (NAS), by deducting the wear and tear of fixed capital (depreciation) and the depletion of the irreplaceable natural resources, and adding the education expenditure which represents investment in human capital. Unfortunately, the NAS estimates given by the World Bank are very imprecise and they seem rather to be unreliable for this group of countries.

Similarly to my comparative analyses of Poland and other CEE countries, the comparative analyses of all post-socialist economies included a separate part devoted to the evaluation of social well-being and living standards. I tried to find out there how the observed macroeconomic results translate into the living standard and satisfaction of the citizens. In order to do so, I quoted, compared and assessed various indicators of the living standard and quality of education, living conditions, etc. I also analyzed various composite indicators of living standard and quality of life compiled by international organizations and research institutes, as well

as the results of opinion polls and surveys concerning subjective opinions expressed by the inhabitants of a given country regarding their own living standard and life satisfaction. By examining these indicators I tried to determine the net balance of social gains and costs related to the systemic changes, which is of fundamental importance for our understanding of people's attitudes against the ensuing changes and the whole transformation process.

Our reports on post-socialist countries, in which I took part as coauthor, have been one of the few sources of a systematic, compact information on the economic conditions and the progress of system reforms in transition countries. Unlike the yearly *Transition Reports* issued by the European Bank of Reconstruction and Development (EBRD), which contained only a brief description of the current economic situation in each transition country considered separately, our studies gave a thorough comparative analysis of the current state of individual economies and their subgroups, evaluation of the progress of system reforms, and an assessment of development prospects. Each part of those analyses was illustrated by comprehensive tables and lucid graphs, which contained basic statistical data on the economies of those countries, taken from the reliable international sources, with all information carefully checked and verified, and most data processed. My comparative analyses of current economic conditions in post-socialist countries and their development prospects presented not only a substantial informative value, but also served to explore and explain the development patterns observed in this broad group of countries. These studies also indicated analytical tools and methods useful in such research.

3.3. Analyses of cyclical fluctuations and their synchronization

Introductory remarks

My analyses in this subject scope, accomplished in the period 2003-2015, are included in 9 studies presented in the selected publication series: [1], [4], [5], [6], [7], [8], [9], [13], [16]. These studies concern three interrelated topics: 1) business cycles in Poland, 2) the impact of global crisis on the Polish economy and on the economies of other post-socialist countries, 3) synchronization of cyclical fluctuations. The whole set of my works in this research area is much broader and it includes at least 11 other publications⁶, apart from my studies devoted to the methodology of business cycle research and forecasting and to the design of leading and other composite indicators of economic activity, which represent a separate research area, discussed in section 4.2.

Business cycles in Poland

One example of my extensive, long-standing research on business cycles in Poland is given by the work [1], in which I have shown and interpreted the pattern of cyclical fluctuations of economic activity in Poland in the years 1975-2012. These issues belonged to another area of my research distinguished here, which was accomplished in an earlier stage of my scientific

⁶ In my publication list (Appendix 4) these are items: B27, B32, B35, B50, B54, B63, B65, B66, B71, C17, C29.

activity, but this single study from that stage has been included in the presented publication series because it illustrated and explained the concept of growth cycle, used also in my comparative analysis of the reaction of Poland's economy and other CEE economies to the global crisis, discussed in the next paragraph, and in the analyses of the conformity of cyclical fluctuations between CEE countries and Western Europe, discussed later.

The difference between the growth cycle and the classical business cycle consists in the fact that the concept of growth cycle does not imply the necessity of recession, understood as an absolute decline in the aggregate economic activity. The slump phase of the growth cycle manifests itself by a considerable slowdown of economic growth, which can be, but has not necessarily to be followed by an absolute output drop. Because of the less restrictive definition of the downward phase, this concept is especially useful in the research on cyclical fluctuations in the dynamically growing economies. I have discussed this concept more widely in my earlier works on the methods of business cycle research (A2, A3, H4) and proposed there a scheme for the identification and classification of the phases of growth cycles.

Growth cycles can be analyzed in terms of cyclical changes in the growth rates of the indicators of business activity or their cyclical components represented by trend deviations of seasonally adjusted and smoothed time series. In my research on growth cycles in Poland I applied usually the second method, but in comparative analyses covering various countries I preferred using growth rates of the respective indicators.

A new element in my research on growth cycles in Poland was an original concept of the reference indicator used to identify economic cycles. Since my research covered the period dating back to 1975, while the regular quarterly GDP statistics started in mid-1990's only, I have constructed my own indicator of aggregate economic activity, called GCI (general coincident index), computed in monthly intervals, which approximated the dynamics of aggregate production activity in the economy. This was a weighted average of output or turnover indicators in five major sectors: industry, construction, agriculture, transport and trade.

The cyclical component of the GCI, obtained from the decomposition of the time series of this indicator, has been used to reconstruct cyclical fluctuations of economic growth in Poland and to examine their morphology. The period covered by the analysis was long enough to capture also the fluctuations observed in the period of centrally planned economy. The analysis was repeated several times with updated time series of the reference index and its component parts and new calculation of their cyclical components. The GCI served also as a reference frame for analyzing cyclical changes of various micro- and macroeconomic variables that are important in the mechanism of the business cycle. The study [1] was my last analysis in this research project. It was published in 2004 as a chapter of the monograph A10, which closed my research on composite indicators of economic activity for Poland (discussed more widely in section 4.2).

The quoted study revealed two large cycles in the economic development of Poland in the period 1975-2002, both 9-10 years long, with deep recessions occurring in 1980-81 and 1989-91. The first recession was linked with the collapse of the former political and economic system and the attempt to change it undertaken by the 'Solidarity', which was followed by the

introduction of the marital law. The second recession was linked with a deep transformation crisis, connected with the change of the political and economic system, reorientation of external links, and a radical anti-inflationary therapy. At the end of the examined period, in 1998-99, an additional minor cycle occurred, connected with the Russian crisis. These observations have been confirmed by a spectral analysis of the reference index and its component parts (B49)⁷.

My analysis has confirmed that cyclical fluctuations of economic activity and its dynamics occurred in Poland also in the period of the so-called planned economy. Even if the internal and external shocks launching those cycles were different, the adjustment mechanism leading to overcome those disturbances was similar to that existing in business cycles. With the transition to a market system and a wider opening of national economy for international cooperation (notably after Poland's accession to European Union), the probability of cyclical fluctuations in the economic dynamics or even in the absolute levels of aggregate economic activity has increased. This however does not mean that the scale (amplitude) of fluctuations must be larger than before. As a matter of fact, Poland's economy has demonstrated a high resistance to external shocks, as evidenced by the lack of recession in the period of the global financial and economic crisis of 2008/09.

The impact of global crisis

The impact of global crisis on Poland's economy and on the economies of other CEE countries and the remaining post-socialist countries was analyzed in several of my works: first of all in two studies discussed below ([13] and [16], but also in my studies included in the reports on the competitiveness of the Polish economy (notably in B71) and in the works on income convergence, discussed later in section 3.5⁸

Towards the end of 2009, at the conference 'Consequences of Global Financial Crisis' in the Academy of Finance in Warsaw, I presented a comprehensive paper (introductory lecture), in which I gave my assessment of the impact of the global financial and economic crisis of 2008-09 on Poland's economy and its influence on other EU countries, particularly from CEE. An extended version of that paper was published later as article [13].

In this article I described briefly the course of the crisis and its repercussions in various regions of the world. Then I showed the mechanism of transmission of its impulses to the CEE region, mainly through a reduction of imports and an abrupt cut in capital and credit

⁷ Some newer analyses of cyclical fluctuations in Poland in the period 2000-2015, based on quarterly GDP data, have revealed the occurrence of much shorter cycles, of the length between 2 and 6 years. These findings are not directly comparable with my observations presented in [1] because of different period covered by those analyses, different reference index used, and different filters applied in isolating cyclical components. Nevertheless, it is very probable that after Poland's accession to the European Union, the length of economic cycles in this country has shortened, in line with the rhythm of cyclical fluctuations seen in Western Europe where business cycles have also become shorter and more frequent during the last 20 years. In my own analysis (C32) of the fluctuation observed in the GDP dynamics in Poland in the period 1994-2007, done on quarterly time series, I have found several quite short cycles of the length ranging between 3 and 5 years. This is a norm close to the present length of growth cycles seen in the European Union.

⁸ The impact of global crisis on the Polish economy was also discussed in my press publications (e.g. G10, G11, G12, G14, G15, G16, G18).

flows. I also explained why Poland – as the only country in the EU – has succeeded to avoid a recession, understood as a decrease in real GDP lasting at least two successive quarters. I have indicated several factors making Poland's economy quite resistant to external shocks, which also made it relatively immune to the extremely strong negative impulse provided by the deep financial and economic crisis in USA and in Western Europe.

The most important factor is a considerable size of the domestic market and its high absorbency (especially as regards the volume and dynamics of consumption). Closely connected with this is a moderate degree of openness of the Polish economy, as measured by the share of foreign trade in GDP, and a differentiated commodity structure of production and exports. The third factor was a solid basis of the internal demand, which increased mainly as the result of income rise and was not boosted excessively by credits; self-restraint and moderation in borrowing money, both on the part of households and enterprises, with the simultaneous cautiousness and circumspection on the part of banks, has protected the country from the emergence and explosion of a credit bubble. The fourth factor was a better financial standing of Polish banks as compared with other countries of the same region and a lower share of foreign banks in total assets of the banking sector. The fifth factor was a flexible exchange rate, which cushioned external shocks and made it possible to get a positive foreign trade balance despite the deep fall in both imports and exports. An additional, sixth factor was a high elasticity and adaptability of Polish enterprises, notably small and medium-size firms, and the resourcefulness of working people who, having lost jobs due to closing of their factories or reduction of their activity, managed to find quickly another job or some other source of income. In enumerating the factors that saved Poland from recession during the global crisis, I did not mention the alleged credits deserved by the government for its helpful economic policy because there was in fact no discretionary anticrisis fiscal policy performed at that time by the government; there have been only some stabilizing actions taken by monetary organs (reduction of interest rates and minimum reserves, extension of deposit guarantees), which helped to stabilize the situation in the money market, but their effects in the real sphere of the economy were not too big.

Presenting Poland as the only 'green island' within Europe plunged into crisis was an evident exaggeration because Poland has avoided recession in a miraculous way, thanks to a deeper fall in imports than in exports only. I have evidenced that by analyzing changes in final demand components and their impact on GDP dynamics during the crisis (using i.a. Lundberg coefficients applied to quarterly GDP data). The lack of recession did not mean however that the Polish economy was completely immune to the adverse effect of the crisis. The price for the participation in the Common Market and for the related dependence on the level of business activity in Western Europe was high enough despite the non-occurrence of recession: it was reflected by a temporary stop of economic growth, combined with a rise in unemployment, a sharp drop in investments and exports, a break in the rise of people's income, and an increase in public debt and foreign indebtedness. Thus, there is no doubt that Poland has also suffered losses connected with the crisis, though not so big as in the case of some other CEE countries (e.g. three Baltic states) which have experienced a deep and prolonged decline in total output and real national income.

The impact of global crisis on the whole group of post-socialist countries has been assessed in my study [16]. I have shown there that all transition countries in Europe and Asia for which comparable GDP data exist – altogether 29 states, with no single exception – have felt more or less acutely the adverse effect of the global crisis. 18 countries of this group (13 in CEE and 5 in CIS) experienced a recession, and the remaining 11 countries saw a considerable slowdown of economic growth. Noteworthy is the fact (largely overlooked by the observers) that the decrease in output in those transition countries which have experienced a recession during the global crisis was as a rule bigger than in the developed Western countries. According to my estimates, the combined GDP volume of all transition countries fell by 5.3% in 2009 while the combined real GDP of all highly developed countries decreased by 3.4% only. This means that, paradoxically, the adverse effect of the global crisis (at least in terms of GDP dynamics) has been more keenly felt outside than inside the birth place of the crisis.

The recovery in the world economy that appeared in the years 2010-11 has also improved the economic situation in post-socialist countries. Most of them have seen again some economic growth, though not so vigorous as before the recession. But in 2012-13 many countries of this group noted once more a slowdown, and some of them fell again into a recession. This was the result of a new slowdown of economic growth in the highly developed countries, notably in Western Europe, connected with public finance perturbations in the euro area, and a slower growth of international trade. This was a new proof supporting the thesis that the globalization process and the progress of integration within the European Union is linked not only with benefits to be drawn by the countries participating in these processes, but also with the need to share temporary difficulties and related costs.

My analysis of the impact of global crisis on post-socialist economies contained in the quoted study significantly augmented the findings made in the fragmentary analysis of the same question contained in the EBRD reports (*Transition Report*) issued in 2009-2011.

Synchronization of cyclical fluctuations

My research on cyclical fluctuations of economic activity in Poland and other CEE countries included also synchronization of the fluctuations observed in the individual countries and their conformity with the changes of economic activity in Western Europe. This question is important from the cognitive viewpoint in the context of discussion about the impact of integration on the formation of a uniform pattern of cyclical fluctuation within European Union, as well as in the context of discussion about the impact of globalization processes on a formation of a uniform pattern of business cycles on the global scale. But this question has also a significant practical dimension because it influences the decisions taken by the EU member countries as regards their accession to the Economic and Monetary Union (EMU). There is a justified fear that a country which, due to its location, size and structure of the economy, has a specific own rhythm of cyclical fluctuations, distinctly different from the pattern of business cycles seen in the common monetary area, may face serious difficulties in the attempts to stabilize its economy after entering the euro zone because of the uniform anti-cyclical policy performed within this area (especially as regards monetary policy performed

by the European Central Bank). At the same time, a good synchronization of the domestic fluctuations with those observed in the euro area reduces the risk that the common stabilization policy would be inadequate to the needs of the given country, but it also implies that the economy of this country would be exposed to the negative impact of the slow economic growth typical of that area and the pronounced cyclical fluctuation observed there.

In the period 2002-2010 I conducted continuous research on the degree of synchronization of cyclical fluctuations among CEE countries and their conformity with the pattern of business cycles seen in Western Europe, and in particular in the euro zone. This research was usually carried out in the framework of my analyses concerning economic convergence. This is because a conformity of cyclical fluctuation patterns represents, along with the tendency to income equalization, an important aspect of real economic convergence between the new and old member states of the European Union. In the publication series presented here my research on this subject is discussed in the works [4] – [9], but similar analyses were also included in other works on convergence, recorded on my publication list as items: B50, B54, B57, B63, B65, B66, C29, F20, and F24. The outline of these analyses and the methods applied there were always the same or very similar, which makes it easier to compare the results obtained in the successive studies and to delineate typical tendencies. The successive analyses differed as to the period covered and the country sample considered. Initially, the research included 8 CEE states which accessed the EU in 2004 (Poland, Hungary, Czech Republic, Slovakia, Slovenia, Estonia, Lithuania, and Latvia), later 10 states (with Bulgaria and Romania that joined the EU in 2007). The first analysis (done in 2004) covered the period of 1995-2003, and the last one (carried out in 2009) – the period of 1995-2009.

At the beginning of this period there was no complete set of statistical data for all the CEE countries on the dynamics of GDP at quarterly intervals. Therefore, my analysis has been based on two indicators of business activity in industry, both available on a monthly basis: 1) growth rate of industrial production (from the official statistics), 2) industrial confidence indicators (from business surveys). The dynamics of industrial production was treated as the main indicator while the industrial confidence indicator served as an auxiliary and control index. Though cyclical swings of industrial production were not identical with those displayed by the GDP index as regards the distribution of their turning points, I assumed that the observations made concerning the conformity of cyclical changes in industry would be helpful in assessing the degree of synchronization of business cycles seen in the whole economy, the more so because changes in the volume of industrial output are crucially important in the mechanism of business cycles in the countries representing a medium or high development level⁹.

In the form used in this research, the growth rates of industrial production (against the analogous month of the preceding year) were free of seasonal changes and they corresponded well with the changes displayed by the industrial confidence indicators. The time series of the

⁹ In C32 I have proved a high correlation existing between the dynamics of industrial production in Poland and the dynamics of GDP, and in the work [9] I have shown that the most important conclusions drawn from the analysis of cyclical changes in industrial production for CEE countries as regards their synchronization are confirmed by the analysis of GDP dynamics at yearly intervals.

latter are as a rule stationary due to their formula. The time series of both indicators were smoothed using a moving average and normalized against their long-run averages in order to assure their comparability by eliminating differences in the amplitude of cyclical fluctuations (the research focused on time distribution of cyclical swings, not on their amplitudes).

The main instrument used in these analyses, apart from the graphs showing cyclical fluctuations of both indicators, were correlation coefficients measuring the conformity in the changes of the two indicators in the individual CEE countries and in the euro area taken as a reference point in assessing the convergence of cyclical movements between CEE countries and Western Europe (because of the lack of aggregate data on industrial confidence for the latter area).

Most of my analyses tested the conformity of cyclical fluctuations both between the individual CEE countries and between each of them and the euro area (which approximated cyclical fluctuations in Western Europe). In my last two works of this series, I examined the conformity of fluctuations both for the whole period starting in 1995 and for the subperiod starting in 2004, in order to check the impact of European integration on the synchronization of cyclical fluctuations. Each of those analyses was supplemented by statistical tables showing the geographical structure of exports of CEE countries and the relative volume of the FDI inflows (compiled from the rough data of international statistics), as the main factors that determine the susceptibility of a given economy to external shocks and the degree of conformance of cyclical fluctuations.

My research has shown that a high conformity of cyclical movements within the CEE region exists between the neighboring and economically interdependent countries (e.g. Czech Republic and Slovakia, or Lithuania, Latvia and Estonia). The correlation between the remaining countries is lower. Poland reveals quite a high cyclical conformance with the Czech Republic, Hungary and Slovakia, e.i. with the countries that represent a considerable share in our foreign trade turnovers. The mutual correlations of cyclical fluctuations among the CEE countries may also be a result of their common dependence on business activity levels in Western Europe and their changes. Over the whole period covered by these analyses, the highest correlation of cyclical changes with the euro area was observed for the Czech Republic, Poland and Estonia. As expected, in all the CEE countries covered by this research the degree of cyclical conformity with the euro area has increased distinctly after their accession to European Union. The findings concerning the mutual synchronization of cyclical changes in the CEE countries and their conformity with cyclical fluctuations in Western Europe have been in line with the scale and structure of their trade and capital links as the main transmission channels of external cyclical impulses.

The subsequent research carried out by other authors, using quarterly GDP data already available, have confirmed a significant and increasing synchronization of cyclical changes observed in the CEE countries belonging to the EU with cyclical fluctuations seen in the euro-zone and in Western Europe. One can expect that, with the progress of European integration, the degree of conformity of cyclical fluctuations within the European Union will increase, and this in turn will also strengthen the conformity of cyclical patterns seen in the CEE region. My studies on the synchronization of cyclical changes in the CEE countries and their con-

formity with business cycles in Western Europe belonged to the earliest empirical analyses concerning the synchronization of cyclical fluctuations between the new and old member countries of the extended EU.

3.4. Analyses and forecasts of economic growth

Introductory remarks

Current analyses and short-term and medium-term forecasts of economic growth for all the group of post-socialist countries contained in the reports on transformation have been discussed in section 3.2. The analyses and forecasts of economic growth in Poland against the background of European Union, included in the reports on the competitiveness of the Polish economy, have been presented in section 3.1. The past trends and hypothetical trajectories of the future economic growth in Poland and other CEE countries were also outlined and evaluated in my research on income convergence, presented below in section 3.5.

At this place I shall present two other important elements of my research accomplishments concerning economic growth: 1) an analysis of the prospects of economic growth in Poland and other CEE countries till 2020 (prepared in 2010), 2) an econometric analysis of economic growth factors in post-socialist countries (carried out in three steps in the years 2003-2005). In the presented publication series, the first analysis is given by the work [11], and the results of the second analysis are presented and discussed in the works [2], [7], and [10], but various elements of economic growth analyses and forecasts are present in almost all my publications included in the selected series. The full set of my works connected with this topic includes 25 items¹⁰.

Prospects of economic growth for Poland and other CEE countries

A comprehensive, multifaceted analysis of the perspectives of economic development in Poland and other CEE countries, in a 10-year time horizon covering the period between 2010 and 2020, was given in my work [11], which was a chapter of the book *Innovative Poland in Europe 2020...*(in Polish), ed. by U. Płowiec, published in 2010. This book crowned a collective research project on the subject, in which I took part as contributing author. My study elaborated in this project and included in the above book was composed of three parts. Part one discussed the main factors that determine the GDP growth rate, in the light of economic theory and empirical research, with the consideration of my own research on the growth factors in post-socialist countries (discussed in the next paragraph); I also discussed theoretical premises of the income convergence process and the results of my own research on income convergence between the CEE region and Western Europe, as well as the impact of European integration on this process. Part two included an analysis of the current economic situation in Poland and a discussion of the main determinants of its future economic growth in the next 10 years, conducted on a comparative basis, including other CEE countries and some

¹⁰ In my publication list, these are items: B56, B58, B61, B62, B64, B66, B67, B69, B71, B73, B75, B77, B79, B81, B83, C25, C27, C28, D6, D7, D8, D9, D10, J19.

selected countries of Western Europe. Part three presented several scenarios of future economic growth in Poland and other CEE countries (derived from the previous analysis) against the assumed growth in Western Europe, with an estimation of the initial and final income gap between the two areas and the time required to close the gap if the convergence process is continued; the conditions necessary for implementing the assumed economic growth were also specified, along with the related tasks of economic policy.

My assessments of development prospects for Poland's economy till 2020 and the applied scenarios of income convergence between Poland and other CEE countries with Western Europe were based on a comparative analysis of various growth factors, such as: accumulation rate, FDI inflow, education expenditure, R&D spending, competitiveness and innovativeness of the economy, labor participation rates and productivity, system reforms, institutional conditions (efficiency of governmental institutions, law and order, economic freedom, etc.). I emphasized that Poland could maintain until 2020 a satisfactory GDP growth rate of about 4% a year, or even more, but this would require some improvement in the conditions conducive to enterprise development and innovativeness. Above all, a coherent strategy of social and economic development must be elaborated and the government should ensure its consequent implementation. Economic policy performed by the government cannot be reduced to the current tasks connected with the functioning of the state and economy; it should play an active role in steering and boosting economic growth, according to the long-range development strategy.

The actual economic development of Poland and other CEE countries belonging to the EU in the period covered by that forecast (at least until now) has confirmed a considerable accuracy of my previsions as regards the growth rate of the individual CEE countries and their income convergence with the more developed countries of Western Europe.

Econometric analysis of the factors of economic growth

An important element of my comparative analyses of economic dynamics was a complex econometric study of the determinants of economic growth in post-socialist countries. The aim of this study was to identify the most important factors that determined the rate of economic growth in this country group in the period of transformation of their political and economic systems. In particular, I wished to check whether (and to what extent) the theoretical models of economic growth, based mainly on the experience of the highly developed capitalist countries, correspond to the conditions existing in this group of countries and are able to explain the differences and changes of growth rates observed in this group.

The research has been carried out in three steps in the years 2003-2005, and the results were presented in [2], [7] and [10], as well as in some other works omitted in the chosen publication series. The analysis comprised all post-socialist countries, for which separate and comparable data were available at the time of the study (initially 25, then 27 countries). At the beginning, it covered the period 1990-2001, then 1990-2003, and eventually 1993-2003, for which all the required data could be collected. The analysis was conducted both on a cross-section sample and a panel sample. The cross-section analysis served to identify and examine

the factors responsible for long-run growth rate differentials between countries, whereas the panel analysis tried to find out the factors responsible for short-run changes of the growth rate observed from year to year. The set of explanatory variables used to explain the GDP growth rates in the long run and short run was modified and extended at the successive stages of research.

Statistical data used in this research were taken from three basic sources: World Bank, International Monetary Fund (IMF), and the European Bank of Reconstruction and Development (EBRD), supplemented by some additional indicators taken from other international sources, such as: the Heritage Foundation, Freedom House, and UNDP. The data bank created for this research included more than 600 variables; after preselection, about 100 variables have been chosen as potentially helpful in explaining the GDP growth rates. This set was then reduced to several variables as the result of correlation and colinearity tests. The chosen variables were introduced into alternative regression equations, and the estimated equations best fitted and substantiated were subject to interpretation. In the last stage of the research, three sets of regression equations were tested, with three alternative estimates of the average GDP growth rate for each country (based on different data sources). As a result, the scale of computation done in the final stage of the research was really large, which is not reflected by the synthetic presentation of the results given in [10]¹¹.

In two earlier cross-section analyses presented in [2] and [7], the best explanation of the differences observed in the long-run GDP growth rates of the individual countries was given by the model with five explanatory variables: (a) initial per capita income, (b) export growth, (c) cumulative FDI inflow (per capita), (d) accumulation rate, (e) progress in system reforms (average from seven scores given by the EBRD). This model explained over 60% of the differences observed in the growth rates of all post-socialist economies; after splitting this broad group into two more homogenous subgroups (CEE & SEE and CIS), the same model explained 70-90% of the total variance. The stimulating effect of exports and FDI inflows was in line with expectations. But parameters showing the impact of the remaining variables assumed rather unexpected signs. The initial development level, as measured by GDP or GNI per capita, turned to be positively (and not negatively) correlated with the long-run GDP growth rate, contrary to the basic assumption of the neoclassical growth model, according to which poorer countries, *ceteris paribus*, should develop more rapidly than the richer ones (which is in fact the necessary condition for income convergence between them). It appears however that such a relationship rather does not exist in such a wide and diversified country group. The accumulation rate, which is treated in many growth models as the basic variable responsible for economic growth, turned to be negatively correlated with the long-run growth rate. The lack of a positive relation between accumulation and the GDP growth is probably caused by big differences between the individual countries of this group in the structure of investments, their technological level and efficiency, as well as by a different share of replacement investments (the explanatory variable was gross accumulation rate). Paradoxically, the progress of system transformation (e.i. the intensity of market reforms) appeared to be

¹¹ The full set of numerical results is included in the unpublished study J19.

weakly correlated with the long-run growth, getting a negative sign in the regression equation. This finding could suggest that a rapid course of system reforms (as it was in Poland) acted rather as a factor hampering economic growth instead of stimulating it.

In an extended research carried out later within a research project directed by R. Rapacki, the results of which have been summarized in a chapter included in the book edited by himself *Economic Growth in Transition Countries...* (in Polish), I have analyzed once more the relationship between the GDP growth rate and some hypothetical growth factors in 27 post-socialist countries in the period 1993-2003. This research included both cross-section and time series analysis, with an augmented set of explanatory variables and with three alternative estimates of the average GDP growth rate for the individual countries, calculated from the data taken from different sources.

In the cross-section analysis, which aimed at explaining long-run growth differentials between countries, the best fit was given by a regression equation with two explanatory variables: (a) growth rate of accumulation, (b) growth rate of exports, which explained 67% of the observed GDP growth rate differences. A better fit can be obtained by adding a third explanatory variable well correlated with the GDP growth (e.g. the growth rate of government expenditure). The demand-type character of the model can be justified by the fact that, in the period considered, all the countries of that group had substantial reserves of idle production resources which could be utilized in case of a rise in some relatively autonomous demand components, such as private and public investments (boosted by the inflow of foreign capital), exports, or current government spending¹².

Noteworthy are also the results of the analysis done on a panel sample, the aim of which was to explain short-term changes occurring in the dynamics of GDP (more precisely, per capita GDP because of the needs of the parallel research on income convergence). In the regression done on panel data the best fit (66% of variance explained) has been provided by a regression model with five explanatory variables: (a) growth rate of exports, (b) growth rate of government spending, (c) growth rate of consumption, (d) interest rate, (e) foreign aid; after excluding consumption which is not autonomous, the model explained 50% of the observed variation in GDP growth rates. Presumably, after splitting this wide group into two more uniform subgroups we would obtain a better fit for the same or some other models describing economic growth of post-socialist countries.

Summing up, my empirical research on the factors that determine economic growth in post-socialist countries has brought important new elements to the explanation of economic growth in transition economies. This research has shown that the traditional theoretical models of economic growth are not well suited to the reality of this specific and highly diversified group of countries, representing different development levels and different economic structures. In particular, two basic assumptions taken in those models, namely the

¹² It should be added that the disposable set of statistical data for this group of countries included relatively few supply variables. The Cobb-Douglas production function could not be directly estimated due to the lack of data on the fixed production capital and imprecise data on employment and labor resources. Nevertheless, M. Próchniak, who cooperated with me in this research (mainly as regards the data set and computations), has tried to do that in a separate study included in the same book on the basis of growth accounting, using some own estimates.

assumption about a negative relationship between the initial income level and long-run growth and the assumption about the crucial role of the accumulation rate in determining the output growth, have not been confirmed by the results of my research. A scrupulous analysis of various factors affecting the rate of economic growth in this country group has confirmed the importance of three determinants of economic dynamics: a) growth of exports, b) foreign investment inflow, c) active budgetary policy.

In this study I have proposed a methodological framework which can be used in the further empirical research on economic growth in this group of countries. I also emphasized the need for a careful verification of the statistical data used in such studies because the data for several countries of this group are marked by a low quality; these data must be checked and compared with other data sources and they often require some supplementary estimates. It should be noted that my research on the factors of economic growth in post-socialist countries was one of the first such empirical research in the subject literature regarding this particular group of countries.

3.5. Analyses and forecasts of income convergence

Introductory remarks

My studies of long-run trends of economic growth in Poland and in other post-socialist countries, particularly in Central and Eastern Europe, have laid the ground for assessing their growth prospects from the point of view of their income convergence with more developed countries of Western Europe. Analyses and forecasts of income convergence between Poland and other CEE countries belonging to the EU and Western Europe constituted one of the most important elements of a collective research on economic development of this country group, carried out with my active participation in the Chair of Economics II at WSE in the years 2004-2016; despite my retirement from there in 2006, our research cooperation in this field was continued over the next 10 years.

These analyses, carried out usually in 2-3-persons research team (Z. Matkowski, M. Próchniak, R. Rapacki), were initially prepared under statutory research program of the College of World Economy at WSE, designed for the annual reports *New Europe – Report on Transformation* and *Poland – Competitiveness Report*. Yet this topic has become soon one of the main directions of our research interests and it started to yield many papers presented at scientific conferences and numerous publications – both of a strict scientific character and addressed to the general public (due to a wide public interest in these issues).

In the presented publication series my analyses and forecasts of income convergence within the European Union, notably between Poland and other CEE countries and Western Europe, are included in 11 works: [4], [5], [6], [7], [9], [11], [12], [14], [15], [18], and [19]. The whole set of my works on this topic is wider and it includes moreover 14 other publications¹³ (i.a. 11 conference papers which were published later as articles or chapters of

¹³ In my publication list, these are items: B50, B54, B57, B63, B65, B66, B70, B72, B74, B76, B78, B80, B82, and C29.

collective books). Each convergence analysis covered another period and contained new empirical results concerning the course of the convergence process; likewise, each next convergence forecast had another starting point and brought new estimates concerning the length of the catching-up period, and sometimes presented entirely new or modified scenarios of the further course of convergence. In spite of a similar presentation form and some repeatable elements in the text (e.g. in the literature review or in the explanation of methods and instruments used), each of those works represented a separate analytical study, based on entirely new calculations and bringing new numerical results¹⁴.

My own publications on this subject concerned the prospects for a further convergence. In the collective works written with coauthors, the past convergence process was usually analyzed collectively while the convergence forecasts were elaborated by myself (with computation assistance provided by M. Próchniak). The exact division of labor in the joint publications is specified in the statement signed by all the coauthors (Appendix 6).

The period covered by our convergence analyses grew longer with the flow of time and with the appearance of new data: the first analysis [4] covered the years 1993-2003, the last one [19] – the years 1993-2015; accordingly, there was a change in the starting point of my forecasts: in [9] it was the year 2008, in [19] – the year 2015. The set of the CEE countries considered in the research was also extended as new countries of this region entered the European Union: initially, this group consisted of 8 countries which accessed the EU in 2004 (Czech Republic, Estonia, Hungary, Latvia, Lithuania, Poland, Slovakia, and Slovenia), then 10 countries (since 2007 with Bulgaria and Romania), and ultimately 11 countries (since 2013 with Croatia); the total number of the EU countries considered in these analyses was also changed respectively.

Theoretical foundations and empirical evidence

Income convergence is the main aspect of real economic convergence between countries and regions representing various development levels. The convergence hypothesis assumes that the less developed countries, with lower per capita income, tend to grow faster than do the more developed ones, with higher per capita income. As a result, the income gap between these countries will narrow over time, and income levels in both groups will tend to equalize.

Such a conclusion is directly implied by neoclassical growth models which suggest that, *ceteris paribus*, the less developed countries, with lower income and lower capital per worker, grow faster because they offer higher returns to capital, which attracts foreign investments, assuring thereby a higher accumulation rate and a faster output growth. Another explanation of income convergence is linked with the fact that many developing countries, taking advantage of know-how spillover or copying foreign technologies, save funds allotted by the developed countries for R&D, and thanks to this they can allocate more resources directly for production purposes; as the result, they develop more quickly. However, most endogenous

¹⁴ In income convergence analyses and forecasts, all computations must be done again even if the analyzed country sample and the considered forecast scenario remain the same, and the only change is updating of time series and shifting the starting point of the forecast even by one year. But our own computation program enabled us to carry out all necessary calculations pretty quickly.

growth theories question the negative relationship between the initial income level and the growth rate, which underlies the convergence hypothesis.

The views on the impact of globalization and regional integration on income convergence differ as well. The traditional trade theory argued that trade liberalization and international cooperation would diminish differences in income levels, but newer development theories warn that integration and globalization may also petrify the existing production structures and traditional specialization, leading to rising income disparities. A similar suggestion is embodied in some newer theories of economic growth, which point at the hermetic nature of modern technologies and negative effects of the 'brain-drain', or a massive outflow of well educated and skilled manpower from less developed countries.

Empirical analyses carried out on large and diversified country samples do not confirm rather an existence of income convergence; most well-known analyses suggest that income dispersion in the world tends to increase and the distance between the highly developed and less developed countries has not been visibly reduced¹⁵. In smaller and more homogenous groups, representing a more comparable development level and bound by integration links, a more or less pronounced tendency towards income equalization is often observed. The results of the empirical analyses that tested income convergence within the European Union, notably between Central Eastern and Western Europe, differ depending on the period covered, the kind and source of the data used, and the method employed. The literature on the subject is quite abundant, but it has not brought unambiguous conclusions as yet. This was an additional reason for undertaking an attempt to examine this issue carefully.

Summing up, there are different views about the existence or non-existence of income convergence in a broad international context and the impact of globalization and integration on it. As regards European Union, there are many factors conducive to income convergence, but also many factors that may hamper the catching-up process between the new and old member countries. In my works on income convergence between Central Eastern and Western Europe I emphasized that real income convergence and economic convergence in general, even in the areas highly integrated like as the EU, should be viewed as a potential chance, and not taken as granted.

Income convergence analyses

Our own research on income convergence (carried out together with M. Próchniak and R. Rapacki) has shown the existence of a moderate tendency towards income levels equalization within the current European Union, as measured by GDP per capita calculated at purchasing power parity. This tendency is noticeable both within the whole group of the current EU member states and in the aggregate data for two regions covering the new member states from the CEE and old member states of Western Europe, as confirmed by β - and σ -convergence tests. The β -convergence test shows a negative relation between the initial GDP per capita level in the individual countries or regions and the growth rate of this indicator over the

¹⁵ My own analysis [10] of growth patterns of 27 post-socialist countries has not confirmed the existence of income convergence within this broad group, which presumes a negative dependence between the initial income level and the long-run growth rate.

analyzed period while the σ -convergence test shows the decrease in income differences (measured by standard deviation of log of per capita GDP). The estimated regression equations describing β -convergence allow us to assess the convergence speed and its changes over time.

Our analyses of income convergence within the European Union, especially between Central Eastern and Western Europe, covered the period since 1993, i.e. after the first phase of the deep transformation crisis when the CEE countries began to develop quite rapidly, more rapidly than did most countries of Western Europe, this being the cause of a gradual reduction of the income gap between these two country groups. But the convergence process in this relation was not continuous, and its intensity was changing significantly over time.

Our recent analysis of income convergence between Central Eastern and Western Europe presented in [19] has confirmed the existence in the period 1993-2015 of a moderate tendency towards a decrease in income differences between the 11 CEE countries now belonging to the EU (EU11) and 15 countries of Western Europe (EU15) which belong to the EU much longer. This tendency is confirmed by the value of coefficient β , which measures the speed of convergence (1.86% for the whole EU26¹⁶ and 2.32% for the two regions) and a substantial value of the determination coefficient (0.60) in the regression equation describing the negative relation between the initial income level and its further growth. But a more thorough analysis revealed that the most intensive convergence between the two country groups occurred in 2000-2007, a weaker one in 2007-2015, while the first subperiod 1993-2000 was marked by the weakest and rather doubtful convergence. This means that the EU-extension and the progress of European integration had a positive effect on the growth of CEE countries, reducing their income distance from Western Europe. Yet the global economic and financial crisis, followed by financial and economic perturbations in the euro area, has brought about a deep recession in most countries of this group, hampering the convergence process. The only exception was Poland, which noted the biggest reduction of its income gap towards Western Europe in the last subperiod.

A detailed analysis of the process of income convergence between Central Eastern and Western Europe has shown that all the CEE countries considered in this research have also experienced some episodes of real income divergence against Western Europe, which constituted a considerable part of the whole period covered by this analysis (28% on the average). This means that the catching-up process was not continuous anyway. However, even in the countries with most unstable growth patterns, income divergence in bad years has been more than outweighed by income convergence in good years. As a result, the net balance of the convergence process over the period between 1993 and 2015 has been positive. This is reflected in a significant reduction of the income gap between the CEE countries and Western Europe. The biggest progress in this respect has been achieved by Estonia while the smallest one was noted by Bulgaria.

¹⁶ Cyprus and Malta have been excluded from the sample as to facilitate a division of the European Union into two regions, comprising CEE countries and Western European countries (EU-11 and EU-15).

The reference point in our analyses and forecasts of income convergence for CEE was the average income level (GDP per capita) in 15 more developed countries of Western Europe (EU15), and not the average income level in the European Union (EU28). This is because the convergence process consists in catching up with richer countries by poorer ones. In the official reports on income convergence published by the government circles, the average income level in all the EU is usually taken as the reference point because this improves the indicators of the relative income level already reached. However, this is not correct from the methodological point of view since this average is also influenced by the income levels noted in poorer countries, which do not need to be caught up. Therefore, in our analyses and forecasts of income convergence within the EU, we took always the average level of GDP per capita in the EU15 as the reference point, although this required additional calculations because such a figure is not readily available in the data sources.

Income convergence forecasts

My forecasts of income convergence between Poland and other CEE countries and Western Europe were usually elaborated as supplements to the analysis of the past course of convergence which was carried out collectively (with the mentioned coauthors), but sometimes these forecasts were presented separately (e.g. [11] and [12]). But even in the works written collectively, convergence forecasts were always elaborated by myself, with only a technical (invaluable) assistance provided by M. Próchniak in quite complicated calculations.

I wish to point out that the term ‘forecasts’, used here to denote my analyses and assessments concerning the possible future course of income convergence, is a mental shortcut. These have been always conditional forecasts (or simulations), which showed the probable future course of the catching-up process if the two regions concerned would develop according to the assumed growth trajectories (the assumptions about the future growth of both parties were exactly specified and explained).

While most other income convergence forecasts presented in the literature are based on a simple extrapolation of past trends or arbitrary assumptions as to the future growth, I worked out not only extrapolative forecasts, based on the average yearly growth rates noted in various past periods, but also analytical forecasts, based on more realistic assumptions concerning the future growth in the individual CEE countries and in Western Europe. In formulating these assumptions, I used the economic and demographic forecasts given by the reliable international sources as well as my own assessments of the development potential of individual economies, with the consideration of the existing growth constraints on the demand and supply sides.

All my forecasts of income convergence between the CEE countries and Western Europe were multivariant. Usually, three forecast variants (scenarios) were given: one extrapolative and two analytical. For example, in the work [12], published in 2010, three variants of the further course of income convergence were presented between 10 CEE countries that belonged then to the EU (EU10) and the group of 15 countries of Western Europe (EU15), taken as a reference frame. The first variant was purely extrapolative; it was based on the

assumption that the individual CEE countries and Western Europe as a whole will maintain the dynamics of GDP per capita recorded in the years 1994-2010, i.e. that they will develop at the same average yearly growth rates as before (a supplementary projection was based on the trends observed in the period 2000-2010). The two remaining variants were analytical in nature: based on some specific assumptions concerning the future GDP growth (derived from the available growth forecasts and own analyses) and demographic forecasts needed to calculate the respective GDP per capita growth rates. With given current income gaps between the individual CEE countries and Western Europe, my forecasts indicated the length of the period (the number of years) needed to close these gaps, i.e. to attain GDP per capita equal to its average level seen in the EU15.

Another special (and even unique) feature of my income convergence forecasts was the fact that in estimating the length of the period needed to close the existing income gap towards Western Europe, I usually gave for each CEE country two estimates, corresponding to the two alternative estimates of the initial (current) GDP per capita ratio against its average value in the EU15: according to the purchasing power parity (PPP) and according to the current exchange rate (CER). In the income convergence research, the comparison of income levels is usually based on GDP per capita measured at PPP, and so we did in analyzing the previous course of the convergence process. Yet in forecasting, sometimes over a very long horizon, such an approach may be too risky. First, PPP conversion factors and the estimates of GDP per capita based on them, given by various statistical sources (including the estimates given by IMF and Eurostat, used in our research), are imprecise and data on GDP per capita at PPP for some CEE countries seem to be overestimated, which can shorten the estimated length of the catching-up period. Second, the estimated length of the catching-up period based on the current GDP per capita calculated at PPP may be understated because such estimates do not consider the future changes in the PPP conversion factor due to the continuous process of price equalization within the European Union¹⁷. Therefore, my predictions as to the future course of income convergence between the CEE and Western Europe included usually two alternative estimates of the initial income gap and of the period needed for its liquidation, based on both conversion rates. Since for all CEE countries, the GDP per capita value estimated at PPP is much higher than its value converted at CER, the initial ratio of this indicator against the EU15 average measured at CER is much lower than if measured at PPP (sometimes by a half), and the resulting length of the catching-up period is much larger (sometimes 2-3 times larger). The first set of the forecasting estimates (with the initial GDP per capita ratio calculated at PPP) was treated as the basic forecast, but with the reservation that it should be considered as a minimum estimate. The second set of estimates (based on the initial GDP per capita ratio calculated at CER) served as a control device, indicating the eventual upper limit of the length of the period needed to close the existing income gap¹⁸.

¹⁷ As a matter of fact, neither the current PPP's, nor the current exchange rates are a good tool for forecasting the further course of income convergence due to future changes in the price relationships and exchange rates, which are difficult to foresee, especially in the long run.

¹⁸ A similar approach was taken with regard to the GDP data in my comparative analyses of CEE and other post-socialist countries, discussed earlier in section 3.2.

The problem of conversion rates used in international comparisons of the GDP per capita data was separately discussed in [19] because this is a very important problem, rarely mentioned in the studies on income convergence. I also pointed out the known shortcomings of this indicator as an approximate measure of the income of an average citizen in a given country. Undoubtedly, a better approximation could be given by net national income (NNI) or gross national income (GNI) per inhabitant (nota bene, the GNI for most CEE countries is much lower than GDP due to the outflow of a substantial part of the profits earned by foreign firms functioning in those countries). Unfortunately, due to the lack of comparable data on GNI and NNI per capita calculated at PPP, in the research on income convergence within the EU we have to apply GDP per capita data.

In my forecasts of income convergence between the CEE countries and Western Europe worked out before 2012, I assumed that, within the time horizon covered by the forecasts, the CEE countries will sustain their lead over Western European countries in the growth rate of per capita GDP (though not necessarily as big as before), so that the income convergence process between the two areas could be continued. Of course, there may be some breaks of convergence or even a temporary divergence noted by the individual CEE countries or the whole CEE group, but the assumption was made that, in the period covered by the forecast, a tendency towards income convergence would prevail and, as a result, income differences between the CEE and Western Europe will diminish, up to a complete equalization of the average income level (approximated by per capita GDP). Therefore, the final element of the forecast and its ultimate aim was calculating for each CEE country the length of the period needed to close the income gap towards Western Europe, i.e. the number of years needed in order to reach the average GDP per capita level seen in the EU15. According to the convergence algorithm, the length of the catching-up period depends on the initial relative level of GDP per capita in the given country (measured against its average level in the EU15) and on the relation of the future growth rates of per capita GDP in the given country and in the EU15 group. This period will be the shorter, the higher is the relative level of per capita GDP in the poorer country already achieved and the greatest is its growth advantage over the richer countries (though these dependencies are not linear).

But in 2012, a new long-term demographic forecast for Europe was published, followed by two long-term economic forecasts issued by the European Commission and OECD. These forecasts have evidenced a growing demographic barrier connected with the low fertility and aging of population, which threatens the further economic growth in Europe. This problem is particularly serious in the CEE region where population numbers are decreasing (especially as regards the vocationally active people) due also to a massive emigration of young people, which may soon result in a labor shortage and a radical slowdown of economic growth. This danger has been confirmed by the told long-term growth forecasts, which suggest that, if the unfavorable demographic trends are not reversed, beginning about 2030 (or even earlier) economic growth in most CEE countries, including Poland, will start to decelerate. Unfavorable demographic trends will be less perceptible in Western Europe where the aging processes are compensated by a continuous inflow of young and fertile emigrants. One of the con-

sequences may be a gradual decrease in the income convergence rate, up to its total reversal and a switch to divergence (at least in some CEE countries).

For this reason, since 2012 my forecasts of income convergence between Central Eastern and Western Europe have been supplemented by a new warning scenario, which showed the possibility of a reversal of the convergence process and a new increase in the income distance between both parts of the European Union. This can be illustrated by the convergence forecasts presented in the works [14], [15], [18] and [19] where, apart from the two scenarios assuming a continuation of convergence (extrapolative and analytical variants), a third, entirely new scenario was introduced, based on the long-term economic forecast authorized by the European Commission. This scenario shows that starting about 2030, due mainly to unfavorable demographic trends in most CEE countries, the rate of income convergence with Western Europe will decrease, and after 2040 at least four CEE countries (including Poland) will switch from convergence to divergence, while most other CEE countries will stay at about the same relative income level against the EU15 already achieved, without any chance to liquidate the remaining income gap (at least not until 2060, within the period covered by that forecast). According to this forecast, no single country in the CEE group may be able to bridge its income gap towards Western Europe within the next 40 years.

Commenting on this forecast, I stressed that, in order to prevent this scenario from coming true, well coordinated multidirectional efforts must be made possibly soon by the governments of the countries concerned and in the framework of common EU policy, aimed at overcoming the emerging threats to future economic growth and ensuring continuous and healthy development. In the case of Poland, I stressed the need of a complex long-term development program and indicated some concrete actions which should be undertaken in order to maintain a satisfactory growth and to continue the convergence process.

As compared with other CEE countries, the progress made by Poland so far in reducing its income distance to Western Europe may be recognized as satisfactory. Thanks to a relatively rapid economic growth, with no recession experienced during the last 25 years, Poland has almost doubled its ratio of GDP per capita at PPP to the average level of the same indicator in the EU15, from 34 in 1993 to 63 in 2015. Only the three Baltic states (Estonia, Latvia, and Lithuania), starting from a comparable income level, have achieved similar progress in the same time. Assuming a continuation of the convergence process, all my forecasts indicate that in case of Poland, the minimum period needed for reaching the per capita GDP level at PPP equal to its average level in Western Europe (adjusted to the starting point in 2015) is 15-20 years. In this context, entirely unrealistic were the over-optimistic opinions expressed until recently according to which Poland would be able to catch up with Western Europe as regards its income level within 10 years (a couple of years have already passed meanwhile). Much worse look Poland's prospects in case of the fulfillment of the long-range economic forecast issued by the European Commission, which considers the unfavorable demographic trends. In such a case, as shown in [18] and [19], Poland could reach 84% of the average level of per capita GDP seen in the EU15 only about 2045, but after that date its income distance to Western Europe would start to increase.

The article [19], written together with M. Próchniak and R. Rapacki, published in “*Ekonomista*” in 2016, is closing the series of our joint studies on income convergence between Central Eastern and Western Europe and the whole series of thematically interrelated publications presented here for evaluation. This article was a slightly corrected version of our paper presented at the 33rd CIRET Conference in Copenhagen. This paper aroused much interest among the researchers taking studies on economic development of the CEE countries and income convergence within the European Union, which is reflected in many quotations as well as questions sent to the authors. The same study was also included on the list of readings recommended by the Library of Congress in the USA for politicians and government officials.

Summing up, our research on income convergence in the European Union, notably between the new member countries of Central Eastern Europe and elder member countries of Western Europe, have contributed significantly to the description and explanation of the income convergence processes in that area, and to the assessment of the impact of the European integration on these processes. Even if the literature on the subject is already quite large, our works occupy an important place in this literature, not only as to the number of publications, but also their contents. As regards convergence forecasting, concerning the possibility of further diminution of income differentials, my pioneering works on the subject have no equivalent counterparts as yet. Our studies have also introduced some new elements to the methodology of empirical research on international income convergence.

3.6. Summary

My most important research accomplishments presented in the selected thematically inter-related publication series, belonging to the four sub-subjects distinguished here, can be summarized as follows:

1) Comparative analyses of current economic performance

- Systematic analyses of current economic situation in Poland and its position in the European Union (with the assessment of future outlooks), contained in the reports on the competitiveness of Poland’s economy, issued by the Research Institute of World Economy at WSE;
- comparative analyses of the current state of CEE economies including their development prospects;
- systematic comparative analyses of all post-socialist economies of CEE, SEE and CIS, contained in the reports on transition countries, issued by the Eastern Institute and by the Research Institute of World Economy;
- development of a conceptual framework for analyzing current economic situation of a country in an international context and for comparative analyses of macroeconomic performance in CEE and other post-socialist countries;
- development and presentation of new methods and tools useful in comparative analyses of economic performance of different countries and showing a proper interpretation of the basic macroeconomic indicators;

- a thorough examination of major development problems of post-socialist countries in the transition period;
- proving inadequacy of some important theoretical concepts of the traditional economics (regarding unemployment, inflation and economic growth) to the conditions existing in this country group and proposing some modifications of these concepts.

2) Analyses of cyclical fluctuations and their synchronization

- Analyses of growth cycles in Poland based on an original reference indicator of own construction; reconstruction and explanation of cyclical fluctuations in the Polish economy since 1975;
- examination of the impact of global crisis on the Polish economy and on the economies of other CEE countries and all post-socialist countries; explanation of a relative resistance of the Polish economy to negative external shocks;
- reiterated examination of the synchronization of cyclical fluctuations in Poland and other CEE countries with business cycles in Western Europe, and proving an increasing conformity of cyclical patterns within European Union as a result of economic integration.

3) Analyses and forecasts of economic growth

- Analyses and forecasts of economic growth for Poland and other CEE countries as well as for all post-socialist countries prepared and commented in the framework of continuous research on the economic situation in this group of countries and income convergence;
- reconstruction and explanation of the economic growth trends for the individual countries of the analyzed group with the discrimination of the subperiods marked by a high and low dynamics;
- analysis of the perspectives of economic growth in Poland and other CEE countries in the 10-years horizon with the consideration of the main growth factors;
- econometric analysis of the factors of economic growth in post-socialist countries and the indication of main determinants of economic growth in this country group in the transition period;
- shaking the thesis about the key importance of the accumulation rate in the mechanism of economic growth for this country group and proposing a desirable redefinition of the concept of investment as the basic factor of economic growth.

4) Analyses and forecasts of income convergence

- Systematic analyses and forecasts of income convergence between Poland and other CEE countries with Western Europe;
- confirmation of the existence within the European Union of a moderate tendency towards income equalization, particularly between new EU member countries of the CEE and old EU member countries of Western Europe, and measuring the intensity of this process;

- confirmation of the positive impact of European integration on income convergence within European Union, with a simultaneous rise in the susceptibility of the CEE economies to fluctuations of business activity in Western Europe and slow economic growth in the euro area;
- a thorough examination of the continuity of the convergence processes in this relation, with the explanation of the changing intensity of these processes and an exact identification of convergence and divergence periods;
- multivariant forecasts (or simulations) of the further course of income convergence between the CEE countries and Western Europe, based on different scenarios of the future economic growth, with the estimation of the length of the period needed to close the income gap;
- examination of the effects of the increasing demographic barrier on the future course of income convergence between the CEE countries and Western Europe; showing the possibility of stopping the convergence or even a switch to divergence during the next 10-20 years; indicating actions to be undertaken in order to sustain economic growth in the CEE countries and to maintain the income equalization process within European Union;
- a significant contribution to the theoretical explanation of income convergence processes and to the methodology of convergence research.

4. Other scientific achievements

4.1. Economic aspects of armaments and disarmament

In the first stage of my research work, i.e. in the years 1965-1985, the main subject area of my research were the analyses concerning the impact of armaments on economic development and economic aspects of an arms cut or an eventual disarmament. I took an interest in these problems already during my university studies, and my M.A. thesis as well as Ph.D. thesis were devoted to this topic. In both works I have analyzed various aspects of arms reduction exemplified by the case study of Great Britain and the United States. Over 30 studies published in the first 20 years of my scientific work and more than 10 unpublished studies (accomplished in research projects) were devoted to these problems. I will focus on the most important works on this subject written after obtaining the title of doctor.

In 1976, I published the book *Capitalist Economy and Disarmament* (in Polish; item A1 on my publication list) in which I have analyzed – on the example of the U.S. economy and referring also to the experience of some other highly developed countries – the impact of armaments on the development of a free market economy and the main economic problems related to an arms cut or a partial or complete disarmament, such as: the impact of arms cut on the aggregate demand level (including multiplier effects), the impact on the output structure, conversion of the resources used in the military sector, the effect on the level and structure of employment, the impact on the volume of R&D effort and its effects. In the theoretical annex, I presented a model showing the impact of armaments on the economy from the point of view

of the demand and supply balance and the rate of economic growth, specifying the conditions that must be fulfilled in order to close the demand gap caused by the reduction of military spending. I also showed how the input-output model could be used to examine changes occurring in the industrial and spatial structure of the economy under the impact of a cut in military expenditure. Another model was developed to illustrate the influence of an arms cut on the size of R&D effort and its socio-economic effects. I have also proposed a model which can be used as a basis for preparing an optimal reconversion program in order to assure the best alternative use of the resources released by the arms cut. The mentioned book has been awarded an individual prize granted by the Minister of Science, Higher Education and Technology in 1977¹⁹.

Another important study on the impact of armaments on the economy was a comprehensive analytical report entitled: *Armaments and the Macroeconomic Performance: Empirical Examination of the Experience in Various Regions and Systems, 1960-1978* (item J27 on my publication list). This was a study prepared in the framework of activities of the international group of experts established by the UNO to examine the relationships between armaments and economic development in the world. (Formally, I was not an appointed member of that group, but a subcontractor preparing a research study ordered by the Polish Ministry of Foreign Affairs). In this report, I presented a thorough econometric analysis of the impact of armaments on economic development, distribution of national income, employment and unemployment levels and inflation rates in a large sample including 112 countries, divided into four regional groups representing various economic systems and development levels. The analysis covered the period 1960-1978 and it was made on the annual cross-section and panel data. Even if the results obtained were not unequivocal (partly because of the differentiation of this sample and inaccurate or incomplete data), the analysis has proved that the impact of armaments on the global economy was generally negative in the analyzed period – at least as regards the relation between the relative amount of military expenditure (as % of GDP) and its variability and the GDP growth rate and its stability. This conclusion stood in sharp contrast with the popular opinion about the stimulating impact of military spending on business activity and economic growth, based on the historical experience of some highly developed capitalist countries, generalized in the Keynesian theory and often taken as an axiom. In the light of this analysis, armaments (at least excessive armaments) seemed to be a brake rather than stimulus to economic development of most countries in the world. The results of the analysis indicated that the arms race may be advantageous on the economic plane only to some highly developed countries (notably USA) and to producers of strategic raw materials (mainly oil countries), whereas most of the remaining countries, regardless of their political and economic system and development level, lose rather than gain by continuous armaments.

In 1982, I published in “*Ekonomista*” the article C8 (with an English version published later in “*Oeconomica Polona*”) which contained an analysis of the alternative costs of arma-

¹⁹ Apart from this, I have also received two collective awards granted by the Minister of Foreign Affairs for my co-authorship in two collective books related to this subject (B7 and B8), published in 1980 and 1986.

ments, i.e. an assessment of the competitiveness of military spending against the civilian needs. This analysis covered a narrower group of 18 countries which offered complete and comparable data, but the sample was enough diversified and representative, with a global coverage. Regression analysis on the time series describing the shifts in national income distribution caused by the changes in military spending has shown that the rising military expenditures crowd out mainly civilian public spending and hamper the increase in the individual consumption, undermining thereby directly social well-being.

A considerable part of my research in this subject area concerned the impact of armaments and their reduction on the size and structure of employment. In the countries with a large military sector, many people feared that a significant reduction in military spending would increase unemployment because the dismissed workers in arms industry and demobilized service men would face big difficulties in their attempts to find any alternative job. In several works devoted to this subject (B5, B6, C6, D4, F40), I explained that in the long run there should be no problem with a re-employment of the dismissed workers in armaments industry because arms production is characterized by a much lower labor intensity as compared with the civilian production; thus, the reduction of employment in the military sector will be more than offset by the increase in employment in the civilian sector, if the government will close the demand gap caused by the arms cut with an increased civilian spending. The demobilized soldiers could be engaged in public civilian programs, which could be extended out of budgetary savings obtained from the reduction of military spending. However, in the short run, some perturbations in the labor market can occur, connected with the necessity to requalify and reallocate a part of labor resources.

Much attention in my studies was also devoted to the analysis of military R&D programs and the possibility of their conversion to peaceful needs. These issues have been discussed in a separate chapter of the quoted book A1 as well as in a special analytical study J26 dedicated to this subject. In the highly developed Western countries (especially in the USA), the argument was raised that a large arms reduction would cause a substantial diminution of the governmental R&D programs, which generate a broad stream of innovations applicable both to military and civilian purposes. In this context, the well known saying was cited that 'war is the mother of invention'; many epoch-making discoveries were quoted which have been launched by the R&D works conducted first in military laboratories, and without which modern life would be hardly imaginable. Without simplifying or neglecting this important problem, in discussing this issue I used to stress that money now spent on military R&D might as well be allocated to peaceful research where the civilian utility effect is the direct aim and not a side result of the research effort. Thus, even if an arms cut would cause some diminution of the total, public and private, R&D spending and of the total volume of R&D effort in a given country, this does not mean that the amount of innovation flowing from the research activity to the civilian sphere would be necessarily lower. Therefore, if the international situation allows to do so, additional funds should be allocated first of all to the research which helps to sustain, prolong and enrich human life, instead of investing them into research that destructs human life and health, and diminishes social well-being.

Summing up, my works on the impact of armaments on the economy and economic problems connected with arms reduction or disarmament contained a comprehensive analysis of the relationship between the arms race and socio-economic development, with the consideration of problems related to the conversion of a militarized economy on the track of a peaceful development. In spite of the inevitable political context of any discussion about the arms race and disarmament in a world-wide perspective, I always tried to keep my works devoted to this subject far away from political encumbrance, in the framework of a solid and objective scientific analysis. I am glad having given the chance to contribute essentially to the century-long but still topical discussion on the possibility to create a world free of wars.

4.2. Composite indicators of business activity for Poland

In the second stage of my research activity, about in the years 1990-2005, the main subject area of my research work were business cycles and, in particular, projecting and testing of composite indicators of business activity for the Polish economy as basic instruments of a monitoring system designed for diagnosing and forecasting purposes. This research was implemented in the framework of five successive collective research projects directed by myself, financed from the grants obtained from domestic and foreign sources (three grants awarded by the Committee of Scientific Research, a grant obtained from the Committee for European Integration, financed from the EU Phare Fiesta II fund, and a grant given by the CERGE-EI Foundation under the program Global Development Network). An additional financial support for those extensive and labor-consuming empirical analyses (with a large amount of computation) has been provided by statutory research programs of the Research Institute of Economic Development and of the College of World Economy at WSE.

This research included three interrelated component parts, implemented in the successive stages or simultaneously:

- 1) projecting and testing of a synthetic indicator of aggregate economic activity – as a tool necessary to reconstruct the general picture of cyclical fluctuations in the economy and a reference indicator for the construction of leading indicators;
- 2) projecting and testing of a set of composite leading indicators based on quantitative and qualitative data, with leading properties against the changes in the aggregate economic activity – as the basic tool for monitoring changes in the economic activity;
- 3) projecting and testing of a set of composite indicators based on qualitative data (taken from business surveys) – as a complementary tool useful in monitoring changes in the economic activity.

Theoretical and methodological foundations for this research have been created earlier, i.a. in my works on the methods of diagnosing and forecasting business activity, notably on the construction of leading and other composite indicators (items A2, A3, C7, C12 and H4 of the publication list). Several separate works have been devoted to the use of survey data and composite indicators based on them (B11, B45, C11, C22). The basic methodological framework of this research was the concept of growth cycle, presented in A2, A3 and H4 and

refined in my later works on the topic, and the concept of leading indicators adopted by the OECD (described in B23 and C12).

The starting point of my research on composite indicators of business activity for Poland was the creation of a large database, containing long time series of over 100 macro- and microeconomic variables filled with statistical or survey data available at monthly or quarterly intervals (interpolated to a monthly frequency), which described various economic processes significant in the mechanism of business cycle, with special consideration of the indicators with leading properties against changes in the aggregate economic activity. These variables, after isolating their cyclical components, have been carefully examined as to their cyclical changes, mutual correlation and the conformance with the economic cycles described by the reference index, with the consideration of typical leads and lags, from the point of view of their usefulness for the construction of leading indicators and explanation of cyclical fluctuations. After the initial selection, this data set has been reduced to about 50 indicators, which have been qualified as useful in the development of a monitoring system for assessing current economic activity. The results of this analysis have been presented in B24 and B34. The set of the tested variables was then modified and extended, with the appearance of new data series and with the progress in our work on composite indicators of business activity. At the end of this work, the complete database, together with the whole set of the created composite indicators, included several hundreds of variables.

The first stage of our work on synthetic indicators of business activity for the Polish economy was the development of the aggregate indicator of economic activity (general coincident index – GCI). This indicator was needed as a reference series for the construction of composite leading indicators, as a substitute for the incomplete GDP statistics, because the quarterly GDP statistics for Poland was started in 1992 only. The GCI was a weighted average of the indicators showing the production or turnover levels in five major sectors of the economy: industry, construction, agriculture, transport, and trade, with the weights reflecting their contribution to the creation of GDP (or earlier, GNI in the material sphere). The time series of this indicator has been calculated at monthly intervals for the period starting in 1975, and its cyclical component, isolated in the detrending procedure PAT (phase-average trend) coupled with the deseasonalizing and smoothing procedure X11-ARIMA²⁰, was used to reconstruct the picture of cyclical fluctuation in the Polish economy in the period covered by the research. The first results have been described in the article C15, published in “*Ekonomista*” in 1996, and in the paper presented at the CIRET Conference in Helsinki in 1997 (published later as a chapter of the monograph B32). Afterwards, several new analyses of growth cycles in Poland have been published, based on the updated series of this indicator (e.g. C16, C17, C26, F16, B46). My original reference indicator GCI aroused much interest among researchers studying business cycles because it showed how cyclical fluctuations could be identified in the countries which did not possess yet a quarterly GDP statistics²¹.

²⁰ The X11-ARIMA software (later X12-ARIMA) was already generally accessible in statistical packages; the PAT program (with a non-linear trend adjusted to data distribution) was given to me by the OECD Directorate of Economics and Statistics.

²¹ The work B46 is included as [1] in the selected publication series and it has been discussed in section 3.3.

The second stage of this research consisted in developing and testing various variants of composite leading indicators (CLI) for the Polish economy based on OECD standards. These are properly selected sets of quantitative and qualitative variables, sensitive to changes in business activity and having leading properties against the actual changes in the aggregate economic activity, and composite indicators derived from them. The choice of component variables of the CLI is based on certain economic and statistical criteria (economic significance and role in the business cycle mechanism, conformity with the fluctuation in the reference index, leading properties, regularity of cyclical changes, etc.). I have constructed and tested several dozens of various variants of CLI, with short, medium and long lead, which were modified and improved in the successive editions of my leading indicators (these works were carried out in a continuous system; a new edition of my CLI's was released each year, including the newest data and eventually new component variables).

A composite leading indicator is a tool that requires a continuous updating and verification. The developed and tested varieties of CLI could be used operationally by a specialized research center with the necessary computing and analytical capability – as it is in some other countries where current indications of the CLIs administered by various institutions are published continuously. My works on the CLIs have paved the way for the establishment in Poland of a permanent system for monitoring business activity based on leading and other composite indicators helpful in diagnosing and forecasting changes in economic activity. For this aim, however, not only proper instruments are needed, but also some funding and interest on the part of a public or private institution which could implement the developed monitoring system and run it continuously as a source of information useful for economic policy and business practice. To be sure, focusing on my R&D work, I did not make any active search in this respect, but most public institutions responsible for information policy regarding the current state of the economy have been informed about our research and the possibility of utilizing its results. However, none has shown the interest in taking over the constructed instruments along with the database and software in order to make an operational use of it. In spite of the lack of an operational utilization, this research has contributed to the dissemination of knowledge about leading indicators as a method of diagnosing and forecasting business activity and to some improvement of this method as well as to a better recognition of the patterns of cyclical fluctuations in Poland. My research on this topic has awakened much interest among the domestic and foreign researchers specializing in business cycles, as reflected i.a. by the participation of several outstanding experts in this field in my research projects. The final version of my CLI has been adopted in the development of a similar indicator for the Italian economy in the ISAE Institute in Rome.

The results of my works on composite leading indicators for the Polish economy have been presented in many publications. Most of these works have been included in four monographs edited by myself (A7, A8, A9, A10), issued as “Papers and Proceedings” of the Research Institute of Economic Development at WSE at the end of the successive research projects housed in this institute (the respective chapters written by myself or with my co-authorship are recorded in the publication list as items: B20, B21, B22, B28, B36, B37, B47). Several papers on this topic have been presented at scientific conferences (E8, F9, F10, F12, F16,

F31), and some other studies have been published as articles in scientific journals (C17, C18, C32). To mention are also unpublished reports from the research projects (items J10-J20 and J22-J25 on the publication list). Several additional papers have been devoted to the discussion of the role of survey research in assessing business activity and to the use of qualitative data taken from this source in composite leading indicators and other monitoring systems.

The third fragment of my research in this subject area are the works on the construction and testing of the composite indicators of business activity for the Polish economy based exclusively on qualitative data, taken from business surveys carried out in various sectors of the economy. In Poland, such surveys are systematically made by the Research Institute of Economic Development at WSE (RIED) and Central Statistical Office (CSO); some surveys for particular sectors are also made by other institutions. The usefulness of survey data in assessing business activity has been confirmed by many studies. Survey data augment the available statistics and make it possible to check its adequacy. Since survey answers contain also predictive information, composite indicators derived from these data have usually some leading properties against actual changes in economic activity, which is important in assessing business tendencies.

Therefore, in my works on synthetic indicators of economic activity for Poland, I have also devoted much attention to composite indicators based exclusively on survey data. Such indicators, compiled in many countries (nowadays also in Poland), are usually called economic sentiment indicators (ESI) or economic climate indicators (ECI). These indicators are calculated according to various formulas, as weighted averages of some component indicators describing business tendencies in various sectors of the economy. The algorithm adopted to calculate such an indicator in the harmonized system of business activity tests adopted in the European Union (subject to periodical modifications) raises serious doubts as regards the set of sectors considered, the choice of component variables, and arbitrary weights. For this reason, I also tested various alternative formulas of such indicator developed by myself.

In order to check the usefulness of such indicators in the assessments concerning the level of general economic activity in Poland, I compared several times various formulas of such an indicator, filled with survey data taken from the two mentioned sources (RIED and CSO). The reference index was my GCI (described above), GDP growth rate or dynamics of industrial production. The analysis covered the period since 1994 (up to 2007), for which all the necessary data were available. The results obtained have confirmed the usefulness of such indicators in monitoring business activity and signaling its changes. More realistic indications as regards changes in the GDP dynamics were given by the indicators filled with the RIED data while the indicators based on the CSO data were more consistent with the fluctuation of the cyclical component of GDP. None of the tested formulas has revealed an absolute advantage over the other ones; this does not mean however that the capacity of the indicator and logical coherence of its formula are not significant. An entirely new finding was the observation that indicators of this kind are suitable for assessing changes in economic dynamics rather than changes in the activity levels (contrary to the usual interpretation of such indicators).

The results of my research on composite indicators of business activity based on survey data, carried out in the years 1998-2008, have been published in the form of 10 chapters con-

tained in seven monographs issued in Poland and abroad and 3 articles in scientific journals (on the publication list, these are items: B29, B30, B33, B38, B39, B41, B44, B45, B48, B51, C22, C24, C32). Several analyses were earlier presented as conference papers: i.a. at CIRET conferences in Paris (2000) and Taipei (2002), and IMAEC meeting in Madrid (2002).

Finally, I wish to note three significant characteristics of all that research cycle. First, this research was really collective. Most analytical tasks related to the examination of the cyclical variability of various single and composite indicators were implemented by a small operational team (of a changing composition), which worked under my direction continuously. But my research projects financed from grants were attended by more than 30 researchers, representing various domestic and foreign research centers, including several outstanding experts and specialists. Second, the research projects implemented under my leadership have been crown with four monographs which contained 71 works, including 29 studies written by myself or with my co-authorship and 42 studies contributed by other authors, among which there were also some world-wide known scientists authoritative in the study of business cycles. Third, my research projects also served as a research school for about a dozen of young people (including students) who, taking part in those projects as research assistants, could broaden their knowledge of business cycles and become acquainted with the techniques of empirical research in this field; some of them have started later their own scientific career.

Summing up, my research on business cycles and composite indicators of business activity has contributed significantly to the state of knowledge in this subject area, especially as regards the recognition of cyclical fluctuations observed in the development of the Polish economy, and to the development of methods and tools designed for assessing and forecasting business activity. The research projects implemented under my leadership have provided a platform for a wide scientific cooperation and exchange of experience in this field, constituting an important part of economic research in Poland. My long activity in this research area has been documented by 85 scientific works, including 6 monographs written or edited by myself, 40 chapters included in the books issued by domestic and foreign publishers, 12 articles printed in scientific journals, 15 papers presented at conferences, and 12 reports presenting the results of research projects.

5. Research projects

Grants

In the period 1977-2010, I took part in 12 research projects of national and international scope, including 5 research projects implemented under grants obtained by myself from domestic and foreign sources. In five research projects I functioned as project leader, in two other as scientific secretary or acting project leader, in three as theme or subject-group leader, in the remaining two ones as ordinary participant. My research activity in these projects has resulted in 41 studies written by myself or with my co-authorship, more than 10 papers presented at scientific conferences and 4 monographs edited by myself and containing the contributions created in those projects. The research projects managed by myself (even if focused

on Poland's economy) were international in their character. These projects attracted altogether over 30 researchers from various domestic and foreign research centers who took part in the collective research program. My research projects served also as a school of scientific knowledge and research techniques for many young people (including students) who participated in our works as research assistants; some of them have started later their own scientific career.

The full list of those research projects, with the description of my function and my own research contributions (with numeration as on the publication list – Appendix 4), is given below²².

1975-78 Research project MR.III.3

“Social and economic changes and foreign policy
in capitalist and developing countries”

Institute of the Economy of Developing Countries, CSPA

Project leader: Professor Wiesław Sadzikowski

My functions: scientific secretary and theme leader (research team: 7 persons);
own works: J4, J5, J6.

1979-81 UN research project

“Relationship between disarmament and development”

My functions: participant

(subcontract through the Ministry of Foreign Affairs);

own contribution: analytical study J27.

1986-90 Research project CPBP 11.8

“External economic conditions of Poland's development”

World Economy Research Institute, CSPA

Project leader: Professor Lucjan Ciamaga

My functions: theme leader (10 researchers);

own contribution: B9.

1994-96 Research project KBN no. 1 P110 023 06

“Synthetic indicators of business activity for Poland”

Research Institute of Economic Development, WSE

Project leader: Dr. Zbigniew Matkowski

My functions: project leader and main researcher

(international research team: 15 persons);

my works: final report J22 and monograph A7 (editor),

incl. own contributions B16-B26.

1995-98 Research project KBN no. H02C 057 09

“Prospects of economic cooperation between Poland
and the Baltic states: Lithuania, Latvia and Estonia”

²² Abbreviations: CSPA – Central School of Planning and Statistics; WSE – SGH Warsaw School of Economics.

- World Economy Research Institute, WSE
 Project leader: Professor: Eufemia Teichman
 My function: subject-group leader (research team: 9 persons),
 since 1996 acting project leader (international research team: 28 persons);
 own contribution: B31.
- 1997-98 Grant from the Committee of European Integration (from UE fund Phare Fiesta II)
 “Composite indicators of business activity for the Polish economy
 consistent with the harmonized EU and OECD standards”
 Research Institute of Economic Development, WSE
 Project leader: Dr. Zbigniew Matkowski
 My functions: project leader and main researcher (research team: 13 persons);
 my works: monograph A8 (editor), incl. own contributions B26-B30.
- 1998-99 Research project KBN no. 2 H02C 00214
 “Composite leading indicators for the Polish economy”
 Research Institute of Economic Development, WSE
 Project leader: Dr. Zbigniew Matkowski
 My functions: project leader and main researcher (research team: 21 persons);
 my works: final report J18 and monograph A9 (editor),
 incl. own contributions B34-B42.
- 2000-02 Grant from the CERGE-EI Foundation under Global Development Network
 “Composite indicators of business activity for Poland Based on Survey Data”
 Research Institute of Economic Development, WSE
 Project leader: Dr. Zbigniew Matkowski
 My functions: project leader and main researcher (research team: 6 persons);
 own works: final report J24.
- 2002-04 Research project KBN no. 2 H02C 022 22
 “Composite indicators (quantitative and qualitative)
 as tools for assessing business activity”
 Research Institute of Economic Development, WSE
 Project leader: Dr. Zbigniew Matkowski
 My functions: project leader and main researcher
 (international research team: 27 persons);
 my works: final report J25 and monograph A10 (editor),
 incl. own contributions B46-B49.
- 2005-07 Research project financed by the Ministry of Science and Informatization
 “The processes of real economic convergence in post-socialist countries, 1990-
 2005; mechanism, main determinants, and scenarios of possible future changes”
 College of World Economy, WSE
 Project leader: Professor Ryszard Rapacki

My function: participant; own contributions: B56, B57 and J19.

2009-10 Research project financed by the Ministry of Science and Higher Education
“Innovative Poland in Europe 2020. Chances and threats
to sustainable development”

Institute of Risk Management, Academy of Finance

Project leader: Professor Urszula Płowiec

My function: participant; own contribution: B58.

Other research

In 1993-2008, in the framework of individual and statutory research of the College of World Economy and the Research Institute of Economic Development at WSE, I elaborated 12 studies (J9-J18 and J20-21) on synthetic indicators of business activity for the Polish economy, which supplemented and widened my research on the subject carried out in the research projects noted above.

In the years 2006-07 and 2010-16, I participated in the elaboration of the annual reports *Poland – Competitiveness Report*, published in Polish and English by the World Economy Research Institute at WSE. In each of these reports, I prepared an analysis of the current economic situation in Poland (compared with other EU countries), along with the assessment of future outlooks, and a multivariant forecast of income convergence of Poland and other CEE countries with Western Europe. These works were implemented within the statutory research of the World Economy Research Institute, resulting in 17 publications (B68-B84), each of which were edited in both language versions.

In 2003-2015, I took part in the preparation of the reports on economic situation and market reforms in post-socialist countries, published in the ‘Working Papers’ of the World Economy Research Institute at WSE, giving there a comparative analysis and assessment of the state of those economies and their development prospects. These reports (D6-D10), entitled *Transition Countries: Economic Situation and the Progress of Market Reforms*, were prepared within the statutory research of the World Economy Research Institute.

6. Scientific conferences

Organization of conferences

During my active professional work, I co-organized at least 10-20 scientific conferences and seminars, an abbreviated list of which is given below:

- Conference “The Role of Foreign Trade in the Socio-Economic Development of Poland”
CSPS, Warsaw 1974;
- Conference “The Stadium Development of Economy”
CPSP, Warsaw 1978;
- OECD Seminar “Economic Tendency Surveys in Transition Countries”
WSE and CSO, Warsaw 1992;

- Seminar “Problems of Transition in CEE and Their Reflection on Economy”
WSE, Warsaw 1996;
- Seminar “Prospects of Economic Cooperation of Baltic States”
WSE, Warsaw 1998;
- Conference “Systemic Effectiveness of Economic Enterprises”
Bogdan Jański School, Warsaw 2002;
- 27. CIRET Conference “Economic Tendency Surveys and Cyclical Indicators”
WSE, Warsaw 2004;
- Conference “Economic Growth Paths in Post-socialist Countries, 1990-2005”
WSE, Warsaw 2005;
- Conference “Integration and Competitiveness of Enterprises”
Bogdan Jański School, Warsaw 2006;
- Conference “Risk in the Financial System”
Academy of Finance, Warsaw 2008;
- Conference “Consequences of the Global Financial Crisis”
Academy of Finance, Warsaw 2009.

Active participation

I have taken an active part – by presenting own paper, participating in panel or plenary discussion, or in some other form – in more than 100 scientific congresses, meetings, conferences and seminars organized in Poland or abroad, mostly of international scope. I have presented there 44 papers noted in part F of my publication list (written individually or in co-authorship). The most important of these conferences, from the point of view of my scientific interests and intellectual gains, were the following ones:

- World Congress of Economists, Budapest 1974;
- Congresses (Meetings) of Polish Economists: 1981, 1993, 2001, 2007, 2013;
- CIRET Conferences: Helsinki 1997, Wellington 1999, Paris 2000, Taipei 2002, Warsaw 2004, Rome 2006, Santiago de Chile 2008, Vienna 2012, Copenhagen 2016;
- IMAEC Congresses on Economic Cycles in Spain: 2000, 2002, 2004;
- OECD Seminars on Leading Indicators: Paris 1996 and 2000;
- EU and OECD Seminars on Economic Surveys in Transition Countries: Munich 1991, Warsaw 1992, Poznań 1993, Tallin 1994, Budapest 1996;
- International Economic Forum in Krynica, connected with presentation of the reports *New Europe – Report on Transformation*, written with my co-authorship, 2003-2007;
- Annual conferences of the World Economy Research Institute at WSE, connected with the presentation of the reports *Poland – Competitiveness Report*, written with my co-authorship, 2006-2007 and 2010-2016;
- Selected conferences and debates organized by the National Board of the Polish Economic Society, 1974-2018.

7. Organizations & societies, scientific councils, and editorial committees

Scientific societies and organizations

- Polish Economic Society – membership since 1973;
- CIRET (Centre for International Research on Economic Tendency Surveys – membership since 1991; since 2002 member of the Scientific Council (resigned from this function in 2017).

Scientific councils, faculty boards, etc.

- Scientific Council of the Research Institute of Economic Development, WSE: 1989-1995;
- Scientific Council of the World Economy Research Institute, WSE: 1992-1996;
- Social Council of the Program ‘Academic Initiative East’, WSE: 1992-1996;
- Faculty Board, Faculty of Management, Bogdan Jański School: 1993-2008;
- Faculty Board, Faculty of Finance and Accounting, Academy of Finance: 2008-2010.

Editorial committees & program boards of scientific journals

- “Problemy Ekonomiczne” (working papers of the Institute of Political Economy, CSPS) – member of the Editorial Committee: 1979-1983;
- “Problemy Handlu Zagranicznego” (journal of the Institute of Foreign Trade) – member of the Editorial Committee and scientific editor: 1974-1975;
- “Zarządzanie i Edukacja” (journal of Bogdan Jański School) – member of the Program Board: 1997-2008;
- “Zarządzanie Ryzykiem” (journal of the Academy of Finance) – member of the Program Board: 2008-2010;
- “Oeconomica Polona” (journal of the Committee of Economic Sciences, Polish Academy of Sciences, and of the Polish Economic Society) – member of the editorial team, then also member of the Editorial Committee, managing editor, and acting editor-in-chief: 1974-1989;
- “Ekonomista” (journal of the Committee of Economic Sciences, Polish Academy of Sciences, and of the Polish Economic Society) – since 1975 member of the editorial team, since 1988 member of the Editorial Committee, since 2010 managing editor;
- “Journal of Business Cycle Research” (journal of the CIRET, former title “Journal of Business Cycle Measurement and Analysis”) – since 2004 member of the Editorial Board;
- “International Journal of Applied Econometrics and Quantitative Studies” (journal of the Euro-American Association of Economic Development) – since 2004 member of the Program Board;
- “Applied Econometrics and International Development” (journal of the Euro-American Association of Economic Development) – since 2004 member of the Program Board.

8. Editorial and reviewing works

A very significant part of my scientific activity has been related to editorial works concerning scientific publications and the review duties connected with these works. I consider these works as my own contribution to the dissemination of economic knowledge and to the development of economic sciences.

Books

My publication list (Appendix 4) includes 7 monographs (collective books) with my co-authorship and editorship. I was also scientific editor of 7 academic handbooks translated by myself and my colleagues from English into Polish and scientific consultant in the edition of 4 other books.

Scientific journals

In 1974-1975, during my work in the Foreign Trade Institute, I participated in editorial works on papers and proceedings of that institute, entitled “Problemy Handlu Zagranicznego”. In 1979-1982, I took part in editorial works on working papers of the Institute of Political Economy at CSPA, entitled “Problemy Ekonomiczne”. In 1974-1989, I was member of the editorial team of the quarterly “Oeconomica Polona” (published in English, and for some time also in Russian); I prepared there editorially many articles envisaged for publication, and later on, as managing editor and acting editor-in-chief, I managed all editorial works on that journal.

Since 1975 I have been member of the editorial team, and since 1988 also member of the editorial committee of the bimonthly “Ekonomista”. Because of my extremely long presence in the editorial office of this journal (over 40 years!), I took part in reviewing and in editorial elaboration of several hundreds of articles. In 2010, I became managing editor of this journal and since then I perform all the editorial duties connected with this function, such as: pre-selection of the texts offered, acquisition of reviews, contacts with authors and reviewers, cooperation with the publishers, preparing plans of the following issues of the journal, editorial elaboration of the accepted texts, reports on editorial activity, editorial site service, current correspondence, etc. During nine years of fulfilling this function, I have elaborated editorially about 500 articles and other scientific texts published in the journal. In the last few years, due to a difficult financial situation of the journal, I was also heavily involved in the acquisition of institutional and individual sponsoring for the journal. Another part of my concern are the continuous efforts aimed at maintaining and improving the position of the journal in the domestic and international indexation systems. At present, “Ekonomista” is indexed and abstracted i.a. in Scopus and ICI, and recently also in ESCI (as a part of the Web of Science Core Collection).

Reviews

I have made about a dozen of editorial reviews of economic books and handbooks planned for publication and many reviews of studies written within various research projects, as well as reviews of several papers offered for publication in international journals. My publication list includes also more than 10 book review written by myself and printed in scientific journals.

During my long editorial work in the journal “*Ekonomista*” I have evaluated and reviewed many articles sent to this journal. Since 2010, as managing editor of this journal, I have taken part in qualification, review procedure and post-review control of more than 500 articles and other scientific texts.

As member of the scientific council of the CIRET, I took part in the evaluation and qualification of many paper proposals submitted for the successive conferences of that organization. I have also reviewed several articles offered to the “*Journal of Business Cycle Research*” issued by this organization.

9. Popularization and expertise activity²³

Handbooks

I am author, coauthor, translator or scientific editor of 15 academic handbooks in the field of economics, finance, business cycles, and market analysis. I have also written many supplementary teaching materials introduced into public circulation in the mimeographed form or by open-access files installed in the Internet. The full register of these handbooks and teaching materials is included in my publication list (part H), and a comprehensive description thereof is given in Appendix 3.

Translations

By my translational works, many valuable books presenting the basic economic knowledge and the newest achievements of modern economics have made accessible to the Polish readers.

I took part in translating from English into Polish 11 academic handbooks of economics and related disciplines (including the successive revised editions of some of these, this figure would rise to 20), i.a. the widely known handbook *Microeconomics* and *Macroeconomics* by D. Begg, S. Fischer and R. Dornbusch, which has become the most popular handbook of economics in Poland, as documented by five successive editions and several reprints. Quite popular was also our translation of the *Managerial Economics* by W.F. Samuelson and *Economics of the Public Sector* by J.E. Stiglitz.

After closing my vocational activity, I have also translated several new books and scientific monographs devoted to various economic problems. In the years 2012-2017, in a special editorial series issued by the Polish Economic Society, I translated and edited 6 books written

²³ More information on this topic is given in Appendix 3.

by the laureates of Nobel Prize in economics: C.A. Pissarides, D.T. Mortensen, P. Diamond, J. Tirole, G. Akerlof, and R.J. Shiller, with a substantial own writing input in the form of notes and comments, and other supplements. In 2018, I also consulted the Polish translation of the new book written by R.H. Thaler, published by other editors.

These translational works – both as regards economic handbooks and scientific books - have contributed significantly to the dissemination of modern economic knowledge in the academic and wide social circles. All my translational works, particularly those regarding the books written by the Nobel Prize laureates, included a considerable amount of my own creative work in the form of introducing new terminology into the Polish economic vocabulary, explaining more difficult passages in the text, and correcting some imprecise statements and information. Some authors have sent me thanks and congratulations for a solid and careful translation of their books.

Expert reports

In 1977-1981, I prepared several expert opinions and analytical studies, ordered by various public institutions and international organizations, concerning the impact of armaments on the economy and economic aspects of the arms cut; the most important one was the comprehensive econometric analysis of the impact of armaments on the world economy (item J27 on my publication list), which has been discussed in paragraph 4.1 of this Summary.

In 1988-1992, during my supplementary work as advisor in the foreign trade enterprise Universal, I prepared for that company several expert reports and analyses concerning export markets in the field of their activity, including one comprehensive analytical study J30 concerning the market for sports and tourism equipment. In 1973-1991, I also prepared several expert reports for other foreign trade enterprises regarding their markets and the organization of market research, as a return service for financing some of my foreign study trips (under the agreement with the Faculty of Foreign Trade at the CSPA). In 1988, I took part in the preparation of an extensive analysis of individual savings in Poland on behalf of a contractor from the financial sector. All these expertises and analyses are listed in my publication list as items J27-J36.

Since 1991, I have been participating in the international expert surveying system ‘World Economic Survey’, administered by the IFO Institute in Munich, where I give my assessments of the current economic situation in Poland each quarter.

Scientific publicism

In 1978-2016, I published in newspapers and magazines 29 publicist articles on various scientific, social and economic themes (items G1-G20 on my publication list). In my press articles, I often commented critically too optimistic assessments of the current economic situation in Poland and the outlooks for next years given by government sources. Most of those articles were directly related to my own research.

10. Foreign internships

- 1971-72 9-month study stay at Harvard University (USA)
as Honorary Research Fellow at the Department of Economics
(scholarship of the Kosciuszko Foundation).
The aim was to study the methodology of economic forecasting
and modern methods of economics teaching.
I also participated in a research project implemented at Harvard Business School
on the world bibliography of old economic translations (Polish language part).
- 1982 2-month study stay in Germany (scholarship by DAAD):
Universities in Tübingen, Munich, Kiel and Bremen,
and research institutes: IAW, IFO, IWW, HHWA.
The aim was to collect source materials and to consult some methodological
questions concerning my research in two areas: 1) the impact of armaments
on socio-economic development, 2) business cycles and their synchronization.
An additional aim was to exchange experiences in modern teaching programs
and teaching methods in the field of economics.
- 1986 1-month study trip to USA linked with an expert practice
(financed by FTE Rolimpex):
Harvard University, MIT, Pennsylvania University, Columbia University.
As regards university contacts, I have held the desired meetings and talks with some
eminent economists, such as: J.K. Galbraith, J. Kornai, W. Leontief, and A. Bergson.
- 1988 1-month trip to Germany linked with an expert practice
(financed by the FTE Metalexport).
I continued methodological consultations and library studies
at Ludwig & Maximilian University and IFO-Institute in Munich
related to my research on the methods of evaluation and forecasting
of economic activity.
- 1995 1-month research and teaching study stay at Minnesota University (USA)
connected with my participation in the Polish-American MBA program
realized at WSE (WEMBA).
Apart from the didactic program at Carlson School of Management,
connected with the preparation of my author's lecture on *Business Forecasting*,
I also realized scientific tasks related to my research on business cycles
and their forecasting.
- 1996 1-month research and teaching stay at the University of Calgary (Canada)
connected with my participation in the Polish-Canadian MBA program
realized at WSE (CEMBA).
Apart from the didactic program within the Faculty of Management

connected with the preparation of my lecture on *Polish Business Environment*, I also realized my scientific program related to my research on composite leading indicators for the Polish economy; I also attended the annual conference of the Academy of International Business in Banff.

2001-02 Visiting Professor at Helsinki School of Economics and Business Administration (Finland): two cycles of my author's lectures on *Emerging Markets in CEE*.

11. Awards and distinctions

Awards for scientific achievements

- 1977 Award by the Minister of Science, Higher Education and Technology (individual) for the book *Capitalist Economy and Disarmament* [in Polish], Książka i Wiedza, Warsaw 1976.
- 1981 Award by the Minister of Foreign Affairs (collective) for the book *Détente and Disarmament* [in Polish] (ed. by W. Multan), Książka i Wiedza, Warsaw 1980.
- 1988 Award by the Minister of Foreign Affairs (collective) for the book *From Confidence to Disarmament* [in Polish and English] (ed. by D. Rotfeld), PWN, Warsaw 1986.
- 1993 Award by the Minister of National Education (collective) for the translation of the handbook by D. Begg, R. Dornbusch, S. Fischer *Economics*, vol. 2, PWE, Warsaw 1992.
- 1994 Award by the Rector of WSE (collective) for the translation of the handbook by D. Begg, R. Dornbusch, S. Fischer *Economics*, vol. 1, PWE, Warsaw 1992.
- 1994 Award by the Rector of WSE (collective) for the book *Business Activity* [in Polish] (co-authors: D. Hübner, M. Lubiński, W. Małecki, Z. Matkowski), PWE, Warsaw 1994.
- 1994 Award by the Polish Economic Society (collective) for the handbook *Business Activity* [in Polish] (co-authors: D. Hübner, M. Lubiński, W. Małecki, Z. Matkowski), PWE, Warsaw 1994.
- 2005 Award by the Rector of WSE (collective) for the report *New Europe. Report on Transformation* [in Polish and English] (ed. by D.K. Rosati), Eastern Institute, Warsaw 2004.

- 2006 Award by the Rector of WSE (collective)
for the report *New Europe. Report on Transformation* [in Polish and English]
(ed. by D.K. Rosati), Eastern Institute, Warsaw 2005.
- 2007 Award by the Rector of WSE (collective)
for the report *Poland. Competitiveness Report 2006* [in Polish and English]
(ed. by M.A. Weresa), World Economy Research Institute, WSE, Warsaw 2006.
- 2010 Award by the Rector of WSE (collective)
for the book *Economic Growth in Transition Countries: Convergence
or Divergence?* [in Polish], (ed. by R. Rapacki), PWE, Warsaw 2009.
- 2011 Award by the Rector of WSE (collective)
for the report *Poland. Competitiveness Report 2010* [in Polish and English]
(ed. by M.A. Weresa), World Economy Research Institute, WSE, Warsaw 2010.
- 2015 Award by the Rector of WSE (collective)
for the report *Poland. Competitiveness Report 2015* [in Polish and English]
(ed. by M.A. Weresa), World Economy Research Institute, WSE, Warsaw 2015.

Awards for didactic achievements

- 1975 Award by the Rector of CSPPS (individual)
for didactic achievements
- 1976 Award by the Minister of Science, Higher Education & Technology (individual)
for didactic achievements
- 1979 Award by the Minister of Science, Higher Education & Technology (individual)
for didactic achievements
- 1989 Award by the Minister of Science, Higher Education & Technology (collective)
for modern teaching programs
- 1989 Award by the Rector of CSPPS (individual)
for didactic achievements
- 1990 Award by the Rector of CSPPS (individual)
for didactic achievements
- 1991 Award by the Rector of WSE (individual)
for didactic achievements
- 1992 Award by the Rector of WSE (individual)
for didactic achievements
- 2003 Award by the Rector of Bogdan Jański School
for didactic and scientific achievements

Professional and state distinctions

- 1974 Professional distinction ‘Merits for Foreign Trade’
- 1975 Silver Cross of Merit
- 1985 Golden Cross of Merit
- 1984 Medal of the National Education Committee

Other honours

- Positive appraisals of my individual scientific works made by their reviewers;
- Congratulation and thanksgiving letters from various persons and institutions, i.a. from students and graduates of several universities and colleges as well as from some outstanding Polish and foreign economists, including Nobel Prize laureates;
- Diplomas and certificates confirming foreign university internships and participation in international congresses;
- Biographical notes in Hübner’s compendium *Who is Who in Poland* and Marquis’ *Who’s Who in the World*.

12. Aggregate statistics of scientific achievements

The table presented at the end of my publication list (Appendix 4) shows that my total scientific output includes 322 works, 311 of which have been created after obtaining doctor’s degree (in 1971). Among them, there are:

- 10 books/monographs (author, co-author, or editor),
- 84 chapters in collective books/monographs,
- 33 articles in scientific journals (domestic and foreign),
- 10 working papers,
- 25 book reviews, conference reports, and discussions,
- 44 papers presented at conferences (mostly published),
- 26 popularized scientific publications,
- 5 academic handbooks (author, co-author, or editor),
- 27 translations (some with own writing and editorial input),
- 47 unpublished works (introduced into public circulation).

The bibliometric analysis no. 2018/208 compiled by the Library of the Warsaw School of Economics (Appendix 5), covering last 20 years only (1999-2018), includes 173 items, 89 of which have been scored and 84 left unscored. The total score for these works, according to the official scoring system established by the Ministry of Science and Higher Education, amounts to 605 points, with a summary impact factor SumIF = 0.646.

The total number of quotations given in the same analysis (as of 15.05.2018) was as follows:

- in Web of Science CC 26 (without auto-quotations)
index h = 2
- in Scopus 37
index h = 2
- in Google Scholar 1532
index h = 14
- in BazEkon 297 (without auto-quotations)
index h = 8.

According to a supplementary information obtained from the WSE Library:

- in Publish or Perish 1764
index h = 14.



(Zbigniew Matkowski)

Warsaw, 9. 11. 2018