

Matkowski, Zbigniew; Prochniak, Mariusz; Rapacki, Ryszard

**Book Part — Published Version**

## Income Convergence in Poland vis-à-vis the EU: Major Trends and Prospects

*Suggested Citation:* Matkowski, Zbigniew; Prochniak, Mariusz; Rapacki, Ryszard (2016) : Income Convergence in Poland vis-à-vis the EU: Major Trends and Prospects, In: Weresa, Marzenna Anna (Ed.): Poland. Competitiveness Report 2016. The Role of Economic Policy and Institutions, SGH Warsaw School of Economics, Warsaw, pp. 37-55

This Version is available at:

<https://hdl.handle.net/10419/147257>

**Standard-Nutzungsbedingungen:**

Die Dokumente auf EconStor dürfen zu eigenen wissenschaftlichen Zwecken und zum Privatgebrauch gespeichert und kopiert werden.

Sie dürfen die Dokumente nicht für öffentliche oder kommerzielle Zwecke vervielfältigen, öffentlich ausstellen, öffentlich zugänglich machen, vertreiben oder anderweitig nutzen.

Sofern die Verfasser die Dokumente unter Open-Content-Lizenzen (insbesondere CC-Lizenzen) zur Verfügung gestellt haben sollten, gelten abweichend von diesen Nutzungsbedingungen die in der dort genannten Lizenz gewährten Nutzungsrechte.

**Terms of use:**

*Documents in EconStor may be saved and copied for your personal and scholarly purposes.*

*You are not to copy documents for public or commercial purposes, to exhibit the documents publicly, to make them publicly available on the internet, or to distribute or otherwise use the documents in public.*

*If the documents have been made available under an Open Content Licence (especially Creative Commons Licences), you may exercise further usage rights as specified in the indicated licence.*

# POLAND

## COMPETITIVENESS REPORT 2016

### THE ROLE OF ECONOMIC POLICY AND INSTITUTIONS

Edited by  
Marzenna Anna Weresa



110 1906  
2016 SGH

WORLD ECONOMY RESEARCH INSTITUTE  
SGH WARSAW SCHOOL OF ECONOMICS

# **POLAND**

## **COMPETITIVENESS REPORT 2016**

### **THE ROLE OF ECONOMIC POLICY AND INSTITUTIONS**

Edited by  
Marzenna Anna Weresa

## Income Convergence in Poland vis-à-vis the EU: Major Trends and Prospects

*Zbigniew Matkowski, Mariusz Próchniak, Ryszard Rapacki*

### Economic growth and income convergence: the empirical picture

During the last 26 years, the Polish economy has experienced a fast real convergence vis-à-vis both EU countries and all transition economies. The improvement in Poland's relative development level was primarily due to its economic growth – the fastest among the new EU members from Central and Eastern Europe (EU11), and more than twice as fast as the average for the “old core” (EU15). Poland and these two groups of countries had similar economic growth trajectories from 2004 to 2015, after Poland's EU entry. The same was true of the 2010–2015 period. Table 2.1 provides a statistical picture of the trend.

In 2010–2015 Poland's GDP grew by 17%, or around 3.2% per annum on average. This gave Poland third place, together with Estonia, among the new EU members from Central and Eastern Europe (EU11). At the same time, it exceeded the EU15's GDP growth rate by about 16 p.p. As a result (see Tables 2.2 and 2.3), Poland managed to narrow its gap in economic development with all the current EU members. In addition, Poland's income gap narrowed with regard to seven of 10 CEE economies in the EU11 group (except the Baltic states). Changes in the relative development level of the Polish economy resulted not only from its fast growth but also from diverging demographic trends and different appreciation paths for real exchange rates in individual CEE countries.<sup>1</sup>

---

<sup>1</sup> While the Polish population increased only slightly between 1989 and 2015 (to 38.446 million from 38.173 million, or 0.7%), EU15 countries experienced more sizeable demographic growth. Their overall population increased by 9.2%, from 369 million to 403 million. These demographic trends are reflected in larger GDP growth rate differentials in per capita terms. While the rate for Poland was 2.9% annually, the EU15 average for GDP per capita growth was 1.3% per annum.

Table 2.1. Growth of Gross Domestic Product, 1990–2015

Country	Real GDP growth rate (constant prices)					Real GDP index in 2015		
	Average annual % growth	Annual % growth						
	1990–2015	2010	2013	2014	2015 <sup>a</sup>	1989 = 100	2004 = 100	2010 = 100
<b>Poland</b>	<b>3.0</b>	<b>3.7</b>	<b>1.3</b>	<b>3.3</b>	<b>3.6</b>	<b>218</b>	<b>151</b>	<b>117</b>
Bulgaria	0.8	0.1	1.3	1.5	3.0	122	135	114
Croatia	0.0	−1.7	−1.1	−0.4	1.5	101	104	97
Czech Republic	1.4	2.3	−0.5	2.0	4.2	144	128	104
Estonia	1.6	2.5	1.6	2.9	1.3	152	129	117
Lithuania	0.8	1.6	3.5	3.0	1.5	122	136	123
Latvia	0.5	−3.8	3.0	2.4	2.6	115	129	118
Romania	0.9	−1.0	3.0	2.9	3.8	126	136	109
Slovakia	2.4	5.1	1.4	2.5	3.3	184	150	114
Slovenia	1.5	1.2	−1.1	3.0	2.7	146	116	99
Hungary	1.3	0.7	1.9	3.7	2.9	140	112	109
EU15 <sup>b</sup>	1.5	2.1	0.1	1.2	1.7	148	110	101

<sup>a</sup> The data for 2015 refer to the first three quarters and are calculated as the arithmetic averages of the quarterly GDP growth rates, compared with the corresponding quarter of the previous year.

<sup>b</sup> Weighted average.

Growth indices 1989 = 100 are also based on EBRD estimates that go back to 1989.

Source: Eurostat (2016); own calculations.

Table 2.2. Relative development levels in Poland and selected EU countries, 1989–2015 (GDP per capita at PPP, Poland = 100)

Country	1989	2000	2004	2006	2008	2010	2012	2014	2015 <sup>a</sup>
<b>Poland</b>	<b>100</b>	<b>100</b>	<b>100</b>	<b>100</b>	<b>100</b>	<b>100</b>	<b>100</b>	<b>100</b>	<b>100</b>
Germany	279	251	235	229	213	192	184	182	179
France	268	246	223	214	195	175	161	158	154
Italy	274	252	220	211	194	167	152	142	138
Britain	256	259	254	244	209	175	161	161	158
Spain	199	205	203	204	187	157	139	134	134
Ireland	195	279	292	291	243	210	198	198	204
Portugal	159	168	155	158	145	131	116	115	113
Greece	178	183	195	187	172	141	111	107	101
<b>EU15 average</b>	<b>262</b>	<b>247</b>	<b>231</b>	<b>224</b>	<b>204</b>	<b>178</b>	<b>164</b>	<b>160</b>	<b>157</b>
Bulgaria	122	60	70	76	82	72	69	69	68
Croatia	133	104	115	116	116	95	90	87	85
Czech Republic	197	153	160	161	150	131	123	125	125

Country	1989	2000	2004	2006	2008	2010	2012	2014	2015 <sup>a</sup>
Estonia	142	91	112	128	125	103	111	112	110
Lithuania	145	83	102	111	115	97	105	111	109
Latvia	137	77	95	110	110	85	91	94	93
Romania	89	54	68	76	89	80	81	81	81
Slovakia	155	105	115	124	131	118	112	113	113
Slovenia	194	168	174	171	164	134	122	122	120
Hungary	146	114	126	124	116	105	98	100	100

<sup>a</sup> Own estimates calculated using GDP growth rates for the first three or four quarters of 2015 and 2014 data for relative development levels.

Source: IMF (2005) for 1989; Eurostat (2016) for 2000–2015; own calculations.

As seen in Table 2.2, at the time of the EU's enlargement in 2004, the level of economic development in the EU15 was more than twice as high as in Poland on average (131%). Since its EU accession in 2004, Poland has narrowed its gap to the “old” EU countries in terms of development level by 74 percentage points, a rate of more than 6 p.p. a year. The process of real income convergence was the fastest with respect to Britain (96 p.p.), Greece (94 p.p.), and Ireland (88 p.p.). From 2010 to 2015 Poland narrowed its gap with the EU15 in the level of economic development by 21 percentage points on average; this process of convergence was fastest with respect to Greece (40 p.p.), Italy (29 p.p.), and Spain (23 p.p.).

**Table 2.3. Development gap in new EU member countries vis-à-vis the EU15 average, 1989–2015 (GDP per capita in PPP, EU15 = 100)**

Country	1989	2004	2010	2014	2015 <sup>a</sup>
<b>Poland</b>	<b>38</b>	<b>43</b>	<b>57</b>	<b>62</b>	<b>64</b>
Bulgaria	47	30	40	43	44
Croatia	51	50	54	54	54
Czech Republic	75	69	73	78	80
Estonia	54	48	58	70	70
Lithuania	55	44	52	69	69
Latvia	52	41	46	59	59
Romania	34	30	42	51	52
Slovakia	59	50	67	71	72
<b>Slovenia</b>	<b>74</b>	<b>75</b>	<b>77</b>	<b>76</b>	<b>77</b>
Hungary	56	55	59	62	63

<sup>a</sup> Own estimates calculated using GDP growth rates for the first three quarters of 2015 and 2014 data for relative development levels.

Source: IMF (2005) for 1989; Eurostat (2016) for 2004–2015; own calculations.

As far as the new EU CEE member countries are concerned, Poland was the most successful in catching up with the region's wealthiest countries in 2010–2015. It narrowed its gap in the level of economic development with Slovenia by 13 p.p. and with the Czech Republic by 9 p.p. However, a process of real income divergence was at work as well: Poland's development gap vis-à-vis Estonia and Lithuania increased. At the same time, two other countries, i.e. Latvia and Romania, edged closer to Poland's development level.

As seen in Table 2.3, in 2015 Poland's GDP per capita in PPP terms stood at 64% of the EU15 average.<sup>2</sup> This was equivalent to a gain of 26 percentage points from 1989 to 2015, of which 21 points were gained since Poland's EU entry in May 2004. These trends can be attributed to a remarkable acceleration in Poland's real convergence process after EU accession. From 1990 to 2003, the gain was 0.5 p.p. per year on average; in 2004–2015 it quadrupled to nearly 2 p.p. annually.

Poland's growth and real convergence performance looks quite good compared with other new EU members from Central and Eastern Europe, particularly in the long term encompassing the systemic transformation process so far. From 1990 to 2015, Poland was the undisputed leader in catching up with the EU15 in terms of economic development. However, that changed after 2004. In the period following the EU's enlargement, the real convergence process was the fastest in Lithuania, which narrowed its income gap vis-à-vis the EU15 by 25 percentage points. Further down the list were Estonia, Slovakia, and Romania, each of which narrowed their income gaps by 22 p.p. In Poland, this process was not much slower (21 p.p.). From 2010 to 2015, Lithuania (17 p.p.) was the most successful in the convergence process, followed by Latvia (13 p.p.), Estonia (12 p.p.), and Romania (10 p.p.). Further down the list were the Czech Republic and Poland (each with 7 p.p.).

## Income convergence between the EU11 and EU15

This subchapter intends to assess income convergence among the 11 Central and Eastern European (CEE) countries that joined the EU in 2004, 2007, and 2013: Poland, Bulgaria, Croatia, the Czech Republic, Estonia, Hungary, Latvia, Lithuania, Romania, Slovakia, and Slovenia (EU11). Convergence in these countries is analyzed in relation to the old EU members (EU15). This study is a follow-up to previous analyses on the subject published in earlier editions of this report (see e.g.: Matkowski and Próch-

---

<sup>2</sup> This indicator is based on the latest available statistics (February 2016) and is slightly different from the indicator adopted in the simulation projections of the convergence process in the next section of this chapter (63).

niak, 2015). The 2013 edition includes an analysis of regional convergence in regions across the EU (Matkowski and Próchniak, 2013). The methodology of the analysis is described in detail in the 2008 edition of the report (Próchniak, 2008).

This analysis covers the 1993–2015 period. All the calculations were also made for three subperiods, 1993–2000, 2000–2007, and 2007–2015, in order to assess the stability of the catching-up process over time. The calculations are based on the time series of real GDP per capita at purchasing power parity (PPP in \$), extracted from the International Monetary Fund database (IMF, 2016). When converting nominal GDP per capita at PPP (in current prices) into real GDP per capita at PPP (in constant prices), we used the GDP deflator for the United States.

The results of testing  $\beta$ -convergence between the EU11 countries and the EU15 are presented in Table 2.4 and Figure 2.1. The convergence is analyzed among the 26 EU countries as well as between the EU11 and EU15 areas. The aggregated data for the two regions, EU11 and EU15, are weighted averages with variable weights reflecting the population of a given country included in a specific group in a given year.

**Table 2.4. Regression results for  $\beta$ -convergence**

Period	$\alpha_0$	$\alpha_1$	$t$ -stat. ( $\alpha_0$ )	$t$ -stat. ( $\alpha_1$ )	$p$ -value ( $\alpha_0$ )	$p$ -value ( $\alpha_1$ )	$R^2$	$\beta$ -convergence	$\beta$
26 countries of the enlarged EU									
1993–2015	0.2047	–0.0184	6.72	–5.97	0.000	0.000	0.5976	yes	0.0186
1993–2000	0.0722	–0.0039	1.14	–0.61	0.265	0.548	0.0152	no	–
2000–2007	0.4229	–0.0383	7.69	–7.03	0.000	0.000	0.6729	yes	0.0390
2007–2015	0.1673	–0.0160	2.64	–2.62	0.014	0.015	0.2228	yes	0.0162
2 regions (EU11 and EU15)									
1993–2015	0.2478	–0.0230	.	.	.	.	1.0000	yes	0.0232
1993–2000	0.1390	–0.0111	.	.	.	.	1.0000	yes	0.0112
2000–2007	0.4287	–0.0396	.	.	.	.	1.0000	yes	0.0404
2007–2015	0.3380	–0.0322	.	.	.	.	1.0000	yes	0.0328

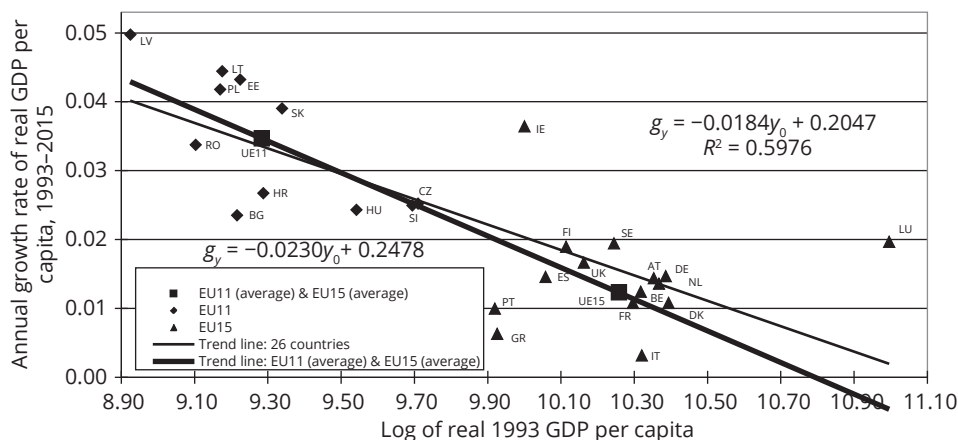
Source: Own calculations.

The results confirm the existence of a clear-cut income-level convergence of the EU11 countries toward the EU15 throughout the 1993–2015 period. The catching-up process took place both among the 26 countries of the examined sample and between the two regions, EU11 and EU15. Countries with lower 1993 income levels recorded more rapid economic growth on average in 1993–2015 than those countries that were initially more developed. Since the Central and Eastern European economies were



less developed in 1993, these results demonstrate an evident catching-up process by the EU11 countries with Western Europe.

Figure 2.1. GDP per capita growth rate over the 1993–2015 period and the initial GDP per capita level



Source: Own calculations.

Figure 2.1 shows that the dispersion of the points representing individual countries is not far from the negatively sloped trend line. This results in a relatively high value of the  $R$ -squared coefficient, at 60%. Differences in the initial income level account for almost two-thirds of the differences in the economic growth rates for the 1993–2015 period.

The points marked in Figure 2.1 make it possible to compare the outcomes of individual countries and to assess changes in their competitive positions during the studied period. The highest GDP per capita growth rates were reported by the Baltic states and Poland. GDP per capita in Latvia, Lithuania, Estonia, and Poland grew at a rate exceeding 4% annually throughout the 1993–2015 period, although these countries' initial income levels were relatively low. Slovakia also recorded a rate of economic growth at about 4%, but its initial income level was slightly higher. The results shown by these countries helped strengthen convergence inside the group.

The position of Poland is favorable compared with other CEE countries. Poland ranked fourth in terms of the average rate of economic growth among the 26 EU countries in 1993–2015. Rapid economic growth in Poland was one of the factors leading to an improvement in the country's competitive position.

Aggregated data for the two regions, the EU11 and EU15, further confirm the existence of convergence in the 1993–2015 period. In Figure 2.1, the points representing

these two regions are marked by squares. The EU11 group as a whole recorded more rapid economic growth than the EU15 area, but the group's initial income level was much lower.

The  $\beta$ -coefficients, which measure the speed of convergence, stand at 1.86% for the 26 countries and at 2.32% for the two regions. The  $\beta$ -coefficients allow us to estimate the time needed to reduce the development gap between the studied countries. If the average growth patterns observed in 1993–2015 continue, the countries of the enlarged EU will need about 30–35 years to reduce the gap to their common hypothetical steady state by half. (The value is calculated as follows:  $-\ln(0.5)/0.0186 = 37.3$  years and  $-\ln(0.5)/0.0232 = 29.9$  years).

These results point to a slow catching-up process by the EU11 countries toward Western Europe. Based on these estimates, it is not expected that the income levels in Poland and other Central and Eastern European countries will become equal to those in Western Europe in the medium term.

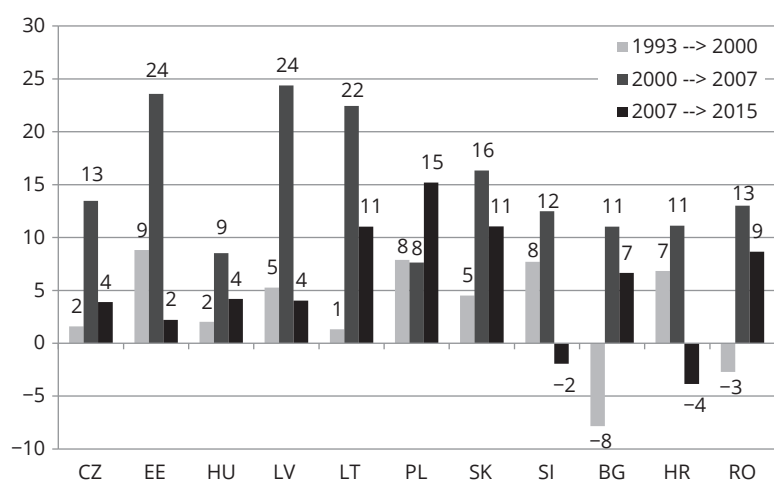
A closer look at the stability of the convergence process over time reveals that the speed of the catching-up process during the periods was highly differentiated. The high instability of the pace of convergence in the analyzed countries was driven by several factors, including the global crisis. In 1993–2000, in the sample of the 26 EU countries, there was no statistically significant decrease of the income gap between the CEE economies and the EU15 (on average for the whole group). For the 1993–2000 period, the slope of the trend line is negative but statistically insignificant. Such statistical outcomes of model estimation indicate a lack of convergence despite a negative slope of the trend line. The speed of convergence accelerated strongly from 2000 to 2007 in a trend that was undoubtedly driven by the EU's enlargement. The clear-cut convergence trend that occurred at the beginning of the first decade of the 21st century slowed down substantially after 2007. This was largely due to the global crisis.

The results of  $\beta$ -convergence presented here are the average results for the whole region. As shown in Figure 2.1, individual EU11 countries displayed different rates of GDP per capita growth and different degrees of convergence toward Western Europe. It is worth examining the nature of the catching-up process in individual EU11 countries toward the EU15 in the respective subperiods.

Figure 2.2 shows by how many percentage points the income gap of a given EU11 country to the EU15 area decreased in the 1993–2000, 2000–2007, and 2007–2015 periods. The data in Figure 2.2 confirm the conclusions drawn from the analysis of  $\beta$  convergence. Namely, for all the CEE countries except Poland, the income gap toward Western Europe closed at the fastest rate in 2000–2007. In the three Baltic states, the income gap in this period decreased by more than 20 percentage points. Poland was the only country that significantly improved its relative development level in the last

several years. In the 1993–2000 and 2000–2007 periods, Poland reduced its income gap with Western Europe by 8 p.p. This process accelerated from 2007 to 2015, with Poland narrowing its development gap by 15 p.p. during that period. EU funds probably played a major role in accelerating the pace of convergence in Poland after EU enlargement, leading to increased competitiveness in the Polish economy. Poland was a key recipient of funds from the EU's 2007–2013 budget. The amount of money granted by the EU in the form of various types of aid and structural funds positively influenced the Polish economy on both the demand and supply sides. As a result, Poland recorded relatively good economic growth figures in the last few years, becoming the only EU country to avoid recession during the global crisis. The EU's 2014–2020 budget sets aside more structural funds for new member states and should prove to be a major driver of convergence in Poland toward Western Europe in the coming years.

**Figure 2.2.** The reduction in individual EU11 countries' income gap toward the EU15 in the three consecutive subperiods<sup>a</sup>



<sup>a</sup> The changes are expressed in percentage points; in each year the EU15 GDP per capita at PPP is taken as a base equal to 100. Source: Own calculations based on IMF data (IMF, 2016).

$\sigma$ -convergence of the Central and Eastern European countries toward Western Europe is measured by changes in the standard deviation of the GDP per capita levels among the 26 EU countries as well as between the EU11 and EU15 areas. The results of the trend line estimation for standard deviations are shown in Table 2.5. Figure 2.3 offers a graphical illustration of the outcomes.

The data in Table 2.5 show that there existed  $\sigma$ -convergence both among the 26 EU countries and between the EU11 and EU15 areas during the time period as a whole.

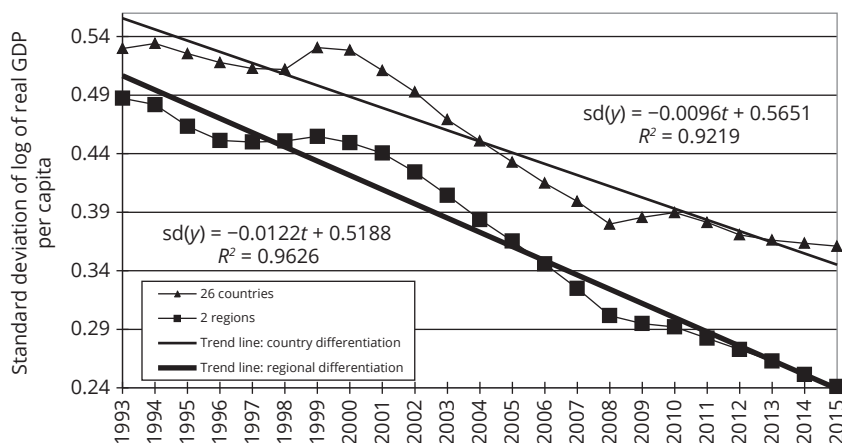
The slopes of both estimated trend lines are negative and statistically significant at high levels of significance (confirmed by  $p$ -values standing at 0.000). The high values of the  $R$ -squared coefficients (exceeding 90%) reflect a very good fit of empirical points to the trend line.

Table 2.5. Regression results for  $\sigma$ -convergence

Period	$\alpha_0$	$\alpha_1$	$t$ -stat. ( $\alpha_0$ )	$t$ -stat. ( $\alpha_1$ )	$p$ -value ( $\alpha_0$ )	$p$ -value ( $\alpha_1$ )	$R^2$	$\sigma$ -convergence
26 countries of the enlarged EU								
1993–2015	0.5651	-0.0096	67.87	-15.74	0.000	0.000	0.9219	yes
1993–2000	0.5278	-0.0009	76.02	-0.64	0.000	0.548	0.0634	no
2000–2007	0.5471	-0.0188	323.38	-56.24	0.000	0.000	0.9981	yes
2007–2015	0.3991	-0.0043	96.74	-5.91	0.000	0.001	0.8330	yes
2 regions (EU11 and EU15)								
1993–2015	0.5188	-0.0122	72.31	-23.23	0.000	0.000	0.9626	yes
1993–2000	0.4846	-0.0052	69.99	-3.82	0.000	0.009	0.7087	yes
2000–2007	0.4749	-0.0184	152.87	-29.85	0.000	0.000	0.9933	yes
2007–2015	0.3279	-0.0095	104.60	-17.04	0.000	0.000	0.9765	yes

Source: Own calculations.

Figure 2.3. Standard deviation of GDP per capita, 1993–2015



Source: Own calculations.

Figure 2.3 shows the standard deviation of log GDP per capita levels. As we can see, income differences between the EU11 countries and the old EU members displayed

a downward trend. Income differences decreased the most obviously and consistently in the second part of the analyzed period, which means after 2000. In 2009–2010, due to the global economic crisis and decelerated economic growth in many rapidly developing countries, income differences among the 26 countries of the analyzed group increased, although the average data for the two regions do not support this evidence.

## Closing the income gap: a forecast

This section presents a simulative forecast of the catching-up process between the CEE countries (EU11) and Western Europe (EU15). Our forecast (or, more precisely, simulation) will be made according to three hypothetical scenarios, which update our earlier forecasts presented in previous editions of this report.<sup>3</sup> The presentation is arranged similar to our previous income convergence forecasts in order to facilitate comparisons, but it uses new information, based on entirely new calculations and the newest input data.

The first scenario is a simple extrapolation of past growth trends. It assumes that individual CEE countries and the EU15 group as a whole will in the future maintain the average yearly growth rates of per capita GDP noted in the 1993–2015 period.<sup>4</sup> For most CEE countries, and particularly for Poland, this is a very optimistic scenario from the point of view of the period needed to close the income gap between the two groups of countries.

The second scenario is more analytical in nature. It is based on the newest medium-term GDP forecast released by the IMF (IMF, 2016) and on a long-term demographic forecast published by Eurostat (Eurostat, 2015). The latter assumes that during the next five years, CEE countries and the EU15 group as a whole will develop in line with the GDP growth forecast given by the IMF, and from 2021 on they will continue to grow at the constant GDP growth rate foreseen by the IMF for 2020. The assumed growth rates of total GDP have been transformed into per capita terms using Eurostat's population projections until 2080.<sup>5</sup> Compared with the first scenario, this second scenario

---

<sup>3</sup> See e.g. Matkowski and Próchniak, 2013, 2014, 2015.

<sup>4</sup> The GDP per capita growth rates quoted here refer to the growth of real GDP measured at constant prices in national currencies (euro in the case of EU15). The rates differ slightly from the growth rates calculated from PPS GDP data, which were used in the calculations made in the previous section of this paragraph.

<sup>5</sup> Due to the lack of comparable demographic data, we have assumed no further change in population numbers after 2080.

seems to be more realistic, though the assumptions about future GDP growth in the CEE countries are also quite optimistic.<sup>6</sup>

The common feature of both these scenarios is the assumption that the CEE countries will maintain some lead over the EU15 group as regards the growth of per capita GDP and, as a result, the catching-up process will continue. We shall focus on calculating the probable length of the period needed to close the income gap (against the average per capita GDP level in the EU15). The basic difference between the two variants is that the ratios of the GDP per capita growth rates between the CEE countries and the EU15 group in the first scenario are assumed to remain constant, at their average levels noted in the 1993–2015 period, while in the second scenario these ratios may change, according to the assumed future GDP growth and the expected population change.

In both of the above scenarios, the reference point in our forecast is the relative level of GDP per capita in 2015. The initial income gaps existing in 2015 (relative levels of per capita GDP) have been calculated using European Commission estimates (European Commission, 2015a). The period necessary to close the income gap depends on the initial income gap and the assumed future growth rate of per capita GDP. The algorithm used to calculate the length of the catching-up period was presented and discussed in an earlier edition of this report.<sup>7</sup>

Our calculations have been made in two versions as regards the estimation of the initial income gap and the expected length of the catching-up period. In the first version, the income gap is measured by the relative level of per capita GDP calculated at the purchasing power standard (PPS). In the second version, the income gap is measured by the relative level of per capita GDP calculated at current exchange rates (CER). Although such calculations are usually done with respect to per capita income calculated at PPS, in this analysis we will consider both ways of measuring the income gap (at PPS and CER) because it is still not certain if the estimates of per capita GDP at PPS for CEE countries are adequate and not overestimated.

It should be remembered that the EU15 group, used here as a reference frame to represent the average income level in Western Europe, is composed of 15 countries that belonged to the EU before its major enlargement in 2004 and 2007 (it does not correspond exactly to the group of 15 Western European countries that belong to the euro area, usually denoted as the EA15). The growth rates of per capita GDP for the EU15 group used in the first scenario refer specifically to this group, but under the second and third scenarios, because of the lack of data for this group, we used the

---

<sup>6</sup> The assumed GDP growth rate for Poland after 2020 (3.6% per year) lies within the range viewed as feasible in several growth forecasts for the next 10–20 years, though it may not be sustained in the longer term due to the demographic barrier.

<sup>7</sup> See Matkowski and Próchniak, 2012, p. 57.

GDP growth rates given by the indicated data sources for the euro area (EA19), which do not differ much from those for the EU15 group and are an acceptable substitute.

**Table 2.6. Closing the income gap – scenario 1**

Country	GDP per capita growth rate (%)	GDP per capita in 2015 (EU15 = 100)		Number of years necessary to reach the average level of GDP per capita in the EU15	
	1993–2015	PPS	CER	PPS	CER
Bulgaria	3.4	43	19	39	77
Croatia	2.8	54	31	39	75
Czech Rep.	2.5	79	47	18	59
Estonia	4.5	69	47	12	24
Hungary	2.4	64	33	38	94
Latvia	5.0	59	38	14	26
Lithuania	4.6	69	38	11	29
<b>Poland</b>	<b>4.2</b>	<b>63</b>	<b>33</b>	<b>16</b>	<b>38</b>
Romania	3.5	50	24	31	64
Slovakia	4.0	72	44	12	30
Slovenia	2.5	77	56	20	45
EU15	1.2	100	100	–	–

Source: Authors' calculations based on data from Eurostat (2016) and the European Commission (2015a), supplemented where necessary by some auxiliary data from the IMF (2016).

**Table 2.7. Closing the income gap – scenario 2**

Country	GDP growth rate (%)		GDP per capita in 2015 (EU15 = 100)		Number of years necessary to reach the average level of GDP per capita in the EU15	
	2015–2020	2021–	PPS	CER	PPS	CER
Bulgaria	2.1	2.5	43	19	54	139
Croatia	1.7	1.8	54	31	176	.
Czech Rep.	2.4	2.2	79	47	37	122
Estonia	3.2	3.4	69	47	16	33
Hungary	2.2	2.1	64	33	56	184
Latvia	3.8	4.0	59	38	15	28
Lithuania	3.2	3.6	69	38	10	28
<b>Poland</b>	<b>3.6</b>	<b>3.6</b>	<b>63</b>	<b>33</b>	<b>20</b>	<b>46</b>
Romania	3.4	3.3	50	24	33	70
Slovakia	3.3	3.1	72	44	18	42
Slovenia	2.0	2.0	77	56	47	122
EU15	1.6	1.6	100	100	–	–

Source: Authors' calculations based on data from Eurostat (2016), the European Commission (2015a) and the IMF (2016).

The assumptions made in the first two scenarios and the results of our calculations are presented in Table 2.6 and Table 2.7. The first column in both tables shows the assumed growth rates of per capita GDP or total GDP; the next two columns give the initial levels of GDP per capita at PPS and CER relative to the average level in the EU15; and the last two columns indicate the number of years necessary to reach the average level of per capita GDP in the EU15 if the initial per capita GDP level is measured at PPS or at CER.

In 2015, GDP per capita in all the CEE countries belonging to the EU was much lower than the EU15 average. The lowest per capita GDP was noted in Bulgaria (43% of the EU15 average at PPS and 19% at CER) and Romania (50% and 24% respectively), while the highest levels were seen in Slovenia (77% at PPS and 56% at CER) and in the Czech Republic (76% and 47%). In Poland, per capita GDP in 2015 accounted for 63% of the EU15 average when calculated at PPS and 33% when calculated at CER. For all the CEE countries, the per capita GDP values calculated at PPS are much higher than those converted at CER. Consequently, the period necessary to close the income gap calculated at PPS is considerably shorter than the period required for closing the income gap calculated at CER.

Scenario 1 is a simple extrapolation of the past trends of GDP per capita, assuming that the CEE countries (EU11) and the EU15 group will maintain the average yearly growth rates of per capita GDP recorded in the 1993–2015 period. Under this assumption, individual CEE countries would need 11 to 39 years to reach the average level of per capita GDP seen in the EU15 group if the initial income gap is calculated at PPS, and 24 to 94 years if it is calculated at CER. The three Baltic states, Estonia, Latvia, and Lithuania, along with Slovakia and Slovenia, would have the best catching-up prospects if they continued to develop according to their past trends. Estonia would need only 12 years at PPS or 24 years at CER to reach the average income level of the EU15. Lithuania would need 11 or 29 years for the same, and Latvia would take 14 or 26 years. Poland would need 16 years if the initial income gap is calculated at PPS or 38 years if it is calculated at CER. For Slovakia, the respective catching-up periods are 12 or 30 years, for Slovenia they are 20 or 45 years, and for the Czech Republic 18 or 59 years. Hungary, Romania, Bulgaria, and Croatia are in the worst positions. Hungary, keeping up its earlier growth trend, would need 38 years to achieve the average income level at PPS seen in the EU15, or 94 years if it is measured at CER. Romania would need 31 or 64 years, and Bulgaria together with Croatia would wait 39 or 75–77 years.

The time required to close the income gap against the EU15 under scenario 2 differs from that obtained in scenario 1 because the future GDP growth rates assumed here differ from past trends. For most CEE countries, the catching-up period turns out to be longer than in the first scenario. The convergence period becomes a little



shorter only for Lithuania (10 years at PPS and 28 years at CER). For the remaining countries in the group, the catching-up period does not change much or it becomes longer. For Latvia and Estonia, the expected catching-up period rises to 15–16 years at PPS or 28–33 years at CER. For Slovakia, it rises to 18 or 42 years respectively, and for the Czech Republic and Slovenia to 37 and 47 years at PPS or 122 years at CER. For Romania, the catching-up period remains almost the same: 33 years at PPS or 70 years at CER. For Hungary, Bulgaria, and Croatia, the prospects of full income convergence with Western Europe are very remote. For Hungary and Bulgaria, the catching-up period is about 55 years at PPS and 140 or 180 years respectively at CER. In the case of Croatia, only the first figure (at PPS) can be assessed reasonably: it is 176 years, while the alternative estimate (at CER) jumps into a very distant future and may be meaningless. Poland is placed in the middle of the CEE group in this respect, with a chance to close the income gap toward Western Europe within 20 years if the initial income gap is calculated at PPS, or 46 years if it is calculated at CER.

The above estimates of the catching-up period in terms of per capita GDP measured at PPS should be treated as minimal because they have been made at constant prices and exchange rates noted at the starting point, on the assumption that the current price differentials between the CEE and EU15 will not change. In fact, due to the gradual equalization of price levels within the EU28, the purchasing power of the future income earned in any of the CEE countries may turn to be lower than expected on the basis of constant price calculations, with a resulting increase in the period needed to close the income gap.

In addition to the purely extrapolative forecast presented in scenario 1, which is based on the growth trends observed in the whole transition period of 1993–2015 – or instead of this forecast – we could also develop a similar extrapolative forecast of income convergence based on the growth pattern observed in the 2004–2015 period, after the EU's enlargement to include CEE. The retrospective analysis of the catching-up process, presented in the preceding section, brings some empirical evidence of the acceleration of income convergence between the CEE countries and Western Europe after their EU accession. However, identification of the specific effect of integration on the speed of convergence would require further research. The growth patterns seen in the last 10 years, influenced by the global financial and economic crisis as well as the debt crisis in the euro area, were rather atypical and are unlikely to be repeated (let us believe so) in the years to come. Therefore, the average growth rates noted by various EU countries in that period and the resulting growth differentials cannot be directly applied to any reasoning about possible future developments. For instance, Poland, thanks to its continuous output growth, has noted a substantial increase in its real GDP volume since 2004. This was reflected in a relatively high GDP per capita

growth rate of 3.8% per year, whereas the respective average growth rate for the EU15 group in the same period was 0.3%, leading to a growth differential of almost 13:1 between Poland and the EU15. Such a huge difference in the growth rates between the member countries of the same integrated economic area cannot be sustained in the long run. Therefore, the growth patterns seen during the period after Poland's EU accession cannot be used to forecast the future course of the convergence process.

We have also analyzed some other scenarios of the convergence process, including some alternative extrapolation variants with longer and shorter backward observation periods as well as some other variants of analytical forecasts, with different assumptions as to the future growth rates in the CEE countries and in the EU15 group.<sup>8</sup> In all the analyzed variants, the period necessary for Poland to close the income gap toward the EU15, measured at PPS and adjusted for the 2015 starting point, ranged from 15 to 20 years. We can therefore conclude that, under all realistic assumptions, the minimum period necessary for Poland to catch up with the EU15 in terms of the average PPS income level is now 15–20 years.

Thus, expectations voiced until recently by some optimistic authors<sup>9</sup> – that Poland could reach the income level seen in Western Europe within 10 years – were entirely unrealistic. This is simply impossible, both economically and mathematically.<sup>10</sup> Therefore, we have to accept that Poland may be capable of closing the development and income gap with Western Europe, but this would require a lot of time and effort. On the other hand, we cannot exclude the possibility of a considerable slowdown in future growth in Poland and other CEE countries, which could lower the rate of the convergence process and eventually reverse it into divergence. Such a possibility is implied by the third scenario, presented below.

Scenario 3 is based on a long-term growth forecast for EU countries up to 2060, drawn up under the auspices of the European Commission (European Commission, 2015b). This forecast is based on a thorough analysis of the unfavorable demographic trends and their impact on employment and labor productivity, as well as on the expected changes in total factor productivity (TFP). Under the forecast, beginning around 2030, economic growth in Poland and most other CEE countries will slow down, mainly as a result of population aging and the outflow of young working-age people seeking jobs and better living conditions abroad. This would lead to a gradual decrease in the per capita GDP growth rate differential between the CEE countries and Western Europe up to the complete disappearance of any growth advantage, and even

---

<sup>8</sup> Cf. Matkowski 2010, 2013, 2015; Matkowski and Próchniak 2013, 2014, 2015; Matkowski, Próchniak, Rapacki, 2013, 2014.

<sup>9</sup> See e.g. Rybiński, 2009.

<sup>10</sup> A formal proof can easily be made – see e.g. Matkowski and Próchniak, 2012, p. 62.

a reversal of the growth ratio between the two groups, with very low growth rates. One of the consequences of the changing growth patterns would be a decrease in the rate of income convergence between the two groups of countries, up to the complete reversal of the convergence process (at least in some CEE countries) and a switch into divergence, i.e. a renewed widening of the income gap. This forecast is highly pessimistic not only because, for most CEE countries, it practically excludes the chance of closing the income gap toward Western Europe within the lifetime of a single generation, but also because it foresees very slow growth in real income and wealth (about 1.5%–2% a year in terms of per capita GDP) over the next 50 years for both the EU15 and most CEE countries.

The implications of this scenario for the catching-up process between the CEE countries and Western Europe are shown in Table 2.8. Unlike the first two scenarios, which indicated the length of the period needed to close the income gap, this scenario – because of the stopping or reversal of the convergence process within the forecast horizon – gives only the relative income levels foreseen at the beginning of the consecutive decades and the minimum size of the income gap at the turning point from convergence to divergence (for the countries affected by such a switch). For the sake of simplicity, the relative income levels illustrating the size of the income gap in the indicated years are given only in terms of GDP per capita calculated at PPS. The alternative estimates of the relative income calculated at CER would be much lower. The starting point in this scenario again is 2015. The initial income gap was calculated against the EU15 average, but the future GDP per capita growth rates for the reference group were assumed to be equal to the EA19 average, as given in the European Commission forecast.

Table 2.8 shows that starting about 2030, due mainly to unfavorable demographic trends (including expected migration), for most CEE countries the growth advantage over Western Europe will diminish or disappear completely. In the second half of the forecast period, four or five countries in the group, including Poland, will switch from convergence to divergence, while most other countries will stay at about the same relative income level against the EU15 that they have already reached, without any chance of closing the remaining income gap (at least not until 2060). No CEE country may close its income gap toward Western Europe within the next 45 years. Only Lithuania will be quite close to this target just before 2060. Slovakia will approach Western income standards much sooner, around 2040, but after that date its income gap with Western Europe will increase. The least developed countries in the group, Croatia, Bulgaria, and Romania, will cease reducing their income gap with Western Europe around 2050 or somewhat later, stopping at 60% to 65% of the average income level seen in the EU15. Hungary will probably remain at about 80% of the EU15 average, Slovenia and Estonia will reach no more than 85%, and the Czech Republic will stay

at 90% of the average income seen in the EU15. Poland is expected to reach 84% of the average income level in the EU15 around 2045, but after that date its income gap with Western Europe will begin to increase. A renewed divergence can also appear in Slovakia, Hungary, Romania, and Estonia (though, in this last case, it will be a halt rather than reversal of convergence). Of course, this scenario does not indicate the further development of the convergence vs. divergence process after 2060, which is beyond the time scope of the economic and demographic forecast underlying this scenario.<sup>11</sup>

**Table 2.8. Closing the income gap – scenario 3**

Country	GDP per capita growth rate, 2015–2060 (%)	Income gap (GDP per capita at PPS, EU15 = 100)						The minimum income gap
		2015	2020	2030	2040	2050	2060	
Bulgaria	2.0	43	47	53	56	58	58	.
Croatia	1.7	54	55	57	60	63	65	.
Czech Rep.	1.8	79	83	87	90	90	90	.
Estonia	1.8	69	73	81	85	85	84	85(2046)
Hungary	1.8	64	67	75	78	79	77	79(2051)
Latvia	2.3	59	66	80	86	87	88	.
Lithuania	2.1	69	75	87	90	93	96	.
<b>Poland</b>	<b>1.9</b>	<b>63</b>	<b>68</b>	<b>79</b>	<b>84</b>	<b>83</b>	<b>79</b>	<b>84(2044)</b>
Romania	2.0	50	54	60	62	65	65	65(2054)
Slovakia	2.0	72	78	93	97	95	92	97(2038)
Slovenia	1.6	77	80	83	84	83	84	.
EU15	1.4	100	100	100	100	100	100	.

Source: Authors' calculations based on data from Eurostat (2016) and the European Commission (2015a, 2015b).

One can hope that this depressing scenario, precluding any chance of bridging the development and income gap between CEE and Western Europe within one generation, will not come true. Nevertheless, the possibility of such undesirable developments, under *laissez-faire* conditions, cannot be ignored. It should be noted that the reliability of the alarming forecast announced by the European Commission is supported by similar results obtained in another long-term growth projection prepared by the OECD (OECD, 2012). In order to prevent this scenario, well-coordinated, multidirectional efforts must be made as soon as possible by the governments of the

<sup>11</sup> Our previous results for this scenario, based on an earlier version of the European Commission's long-term economic forecast, were even more depressing, suggesting a possible reversal of the convergence process in all the CEE countries except Bulgaria (cf. Matkowski, 2013; Matkowski, Próchniak, 2013, 2014; Matkowski, Próchniak, Rapacki, 2013, 2014).

countries concerned, accompanied by action as part of common European policy, aimed at overcoming the emerging threats to future economic growth and ensuring continuous and healthy development.

In the case of Poland, a complex long-term development program is needed as a guideline for government socioeconomic policy, dedicated to the maintenance and acceleration of economic growth. Such a program should focus on correcting unfavorable demographic trends, creating better institutional and financial conditions for enterprise development, stimulating investment and job creation, and ensuring more even regional development by taking into account the needs and abilities of local communities. Other priorities include the development of selected modern industries, further expansion and modernization of the infrastructure, better use of existing labor and material resources, and promotion of education, knowledge, and innovativeness – all crucial factors of economic growth in a highly competitive international environment.<sup>12</sup>

Poland's new long-term development program should be consistent with the sustainable development strategy adopted by the European Union,<sup>13</sup> but it must focus on solving the most important problems that endanger further development of the Polish economy. The ultimate aim of such a program should be to ensure further satisfactory growth of the Polish economy in order to improve the quality of life and well-being of all citizens. The "Plan for Responsible Development" recently adopted by the government (Ministerstwo Rozwoju, 2016), outlining the strategy of Poland's socioeconomic development may be a step in the right direction, but the future will show what kind of results it will deliver.

## References

- European Commission (2015a), *Statistical Annex of European Economy – Autumn 2015*, ec.europa.eu.
- European Commission (2015b), *The 2015 Ageing Report*, "European Economy," No. 3/2015.
- Eurostat (2015), *Sustainable Development in the European Union: 2015 Monitoring Report of the EU Sustainable Development Strategy*, Luxembourg.
- Eurostat (2016), Eurostat Database, ec.europa.eu/eurostat, accessed Feb. 5, 2016.
- IMF (2005), World Economic Outlook Database, September, www.imf.org.
- IMF (2016), World Economic Outlook Database, October 2015 (updated January 2016), www.imf.org, accessed Jan. 15, 2016.

---

<sup>12</sup> For more on the implications of this scenario for Poland's future development see: Rapacki, 2012, Rapacki and Próchniak, 2013, Matkowski, 2013, 2015; Matkowski, Próchniak, Rapacki, 2013, 2014.

<sup>13</sup> Cf. *Sustainable Development in the European Union ...* (Eurostat, 2015).

- Matkowski Z. (2010), *Perspektywy wzrostu gospodarczego Polski w latach 2010–2020 i docelowy poziom PKB per capita*, in: Płowiec U. (ed.), *Innowacyjna Polska w Europie 2020. Szanse i zagrożenia trwałego rozwoju*, PWE, Warszawa 2010, pp. 62–120.
- Matkowski Z. (2013), *Bariera demograficzna a perspektywy konwergencji*, “Kurier GTF,” No. 4/2013.
- Matkowski Z. (2015), *Czy możemy dogonić Europę Zachodnią?*, “Kurier GTF,” No. 7/2015.
- Matkowski Z., Próchniak M. (2012), *Real Income Convergence*, in: Weresa M.A. (ed.), *Poland. Competitiveness Report 2012. Focus on Education*, World Economy Research Institute, Warsaw School of Economics, Warsaw, pp. 44–63.
- Matkowski Z., Próchniak M. (2013), *Real Income Convergence*, in: Weresa M.A. (ed.), *Poland. Competitiveness Report 2013. National and Regional Dimensions*, World Economy Research Institute, Warsaw School of Economics, Warsaw, pp. 44–64.
- Matkowski Z., Próchniak M. (2014), *Real Income Convergence in the EU: Current Performance and Future Opportunities for Poland*, in: Weresa M.A. (ed.), *Poland. Competitiveness Report 2014. A Decade in the European Union*, World Economy Research Institute, Warsaw School of Economics, Warsaw, pp. 43–60.
- Matkowski Z., Próchniak M. (2015), *The Impact of the Global Crisis on the Income Convergence of Poland and Other Central and Eastern European Countries Toward the Average Income in the EU15*, in: Weresa M.A. (ed.), *Poland. Competitiveness Report 2015. Innovation and Poland's Performance in 2007–2014*, World Economy Research Institute, Warsaw School of Economics, Warsaw, pp. 43–64.
- Matkowski Z., Próchniak M., Rapacki R. (2013), *Nowe i stare kraje UE – konwergencja czy dywergencja?*, in: Walczyk K. (ed.), *Badania koniunktury – zwierciadło gospodarki*, part II, “Prace i Materiały IRG,” vol. 91, Instytut Rozwoju Gospodarczego, Szkoła Główna Handlowa, Warszawa 2013, pp. 63–98.
- Matkowski Z., Próchniak M., Rapacki R. (2014), *Scenariusze realnej konwergencji w Unii Europejskiej – kraje EŚW a UE15*, in: Gorynia M., Rudolf S. (eds.), *Polska w Unii Europejskiej i globalnej gospodarce*, IX Kongres Ekonomistów Polskich, PTE, Warszawa, pp. 201–222.
- Ministerstwo Rozwoju (2016), *Plan na rzecz odpowiedzialnego rozwoju*, [www.mr.gov.pl](http://www.mr.gov.pl), accessed Feb. 16, 2016.
- OECD (2012), *Looking to 2060: Long-Term Global Growth Prospects*, “Economic Policy Papers,” No. 3.
- Próchniak M. (2008), *Methodology of Income Convergence Analysis*, in: Weresa M.A. (ed.), *Poland. Competitiveness Report 2008*, World Economy Research Institute, Warsaw School of Economics, Warsaw, pp. 337–338.
- Rapacki R. (2012), *Oporne doganianie Unii*, “Rzeczpospolita,” June 20, 2012.
- Rapacki R., Próchniak M. (2013), *Stawką przyszłość Polski*, “Rzeczpospolita,” Jan. 23, 2013.
- Rybiński K. (2009), *Mamy szansę na złotą dekadę*, “Polska. The Times,” Oct. 24–25, 2009.