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Republic of Poland: Selected Issues

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REPUBLIC OF POLAND

Selected Issues

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Approved by European I Department

May 21, 2003

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I. FISCAL POLICY, SUSTAINABILITY AND FISCAL RISK ON THE WAY TO EU ACCESSION[1]

A. Introduction

1. **This paper analyzes fiscal developments and the sustainability of the current fiscal stance in Poland.** It also analyzes fiscal risks and fiscal vulnerability by investigating the contingent liabilities of the government and by performing stress tests to gauge the exposure of the budget to fiscal risks. Using different approaches, the paper tries to determine the size of fiscal adjustment Poland needs to undertake to strengthen the fiscal position and to reduce exposure to fiscal risks to a more manageable level.

B. Fiscal Policy Stance

2. **The headline deficit increased rapidly in the last two years.** The general government overall deficit increased from 3.1 percent of GDP in 2000 to an estimated 6.7 percent in 2002 (Figure 1).[2] Though a significant part of the increase in the headline deficit is attributable to the widening output gap, high deficits in the last two years are also explained by the weak underlying fiscal position. The cyclically adjusted overall deficit, the measure used here to gauge the underlying fiscal position, remained high throughout the second half of the 1990s (in the range of 3½ to 4½ percent of GDP) and was further increased in 2001 (by some ¾ percent of GDP). Even though the economy was brought to a virtual standstill by late 2001, the 2002 budget aimed at tightening the structural fiscal position (by some ⅔ percent of GDP). In the event, mainly as a result of lower-than-expected inflation, the ex post fiscal stance turned out to be neutral, and the headline deficit reached an estimated 6.7 percent of GDP.

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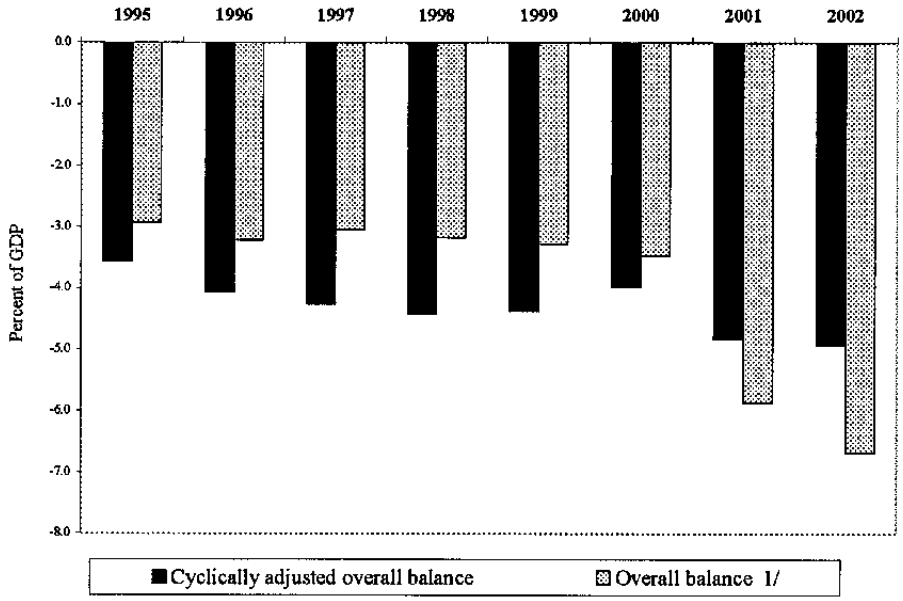
[1] Prepared by István P. Székely.

[2] Unless stated differently, the analysis presented in this chapter uses general government overall balance on a cash basis (GFS86), including payments in compensation for insufficient indexation in the 1990s, as a measure of fiscal deficit.

Figure 1. Poland: Fiscal Policy Stance, 1995–2002

(In percent of GDP)



Source: Staff calculations.

[1/] General government overall cash deficit and cyclically adjusted general government overall cash deficit.

C. Debt Dynamics

3. **Public debt also increased rapidly during the last two years, from 40.7 percent of GDP at end-2000 to 47.6 percent at end-2002.** Staff project public debt at 52 percent of GDP by end 2003. Moreover, if budget priorities are not rearranged to free up additional resources for co-financing EU financed projects and the contribution to the EU budget, additional net EU-related spending may reach ½ to 1 percent of GDP per year during 2004–06. This, together with the current weak structural fiscal position, will put continued pressure on public finances in the coming years. Even if the present output gap is fully eliminated by 2008, unchanged fiscal policies (defined as unchanged annual rate of change in real non-EU related primary expenditure) and the budgetary impact of EU accession are projected to lead to an increase in public debt relative to GDP to about 70 percent in 2013. Under this scenario, public debt would surpass the constitutional limit of 60 percent of GDP in 2007 (Box 1, Figure 2 and Table 1).

Box 1. Constitutional Debt Limit in Poland

Poland is unique among the EU accession countries in that it has a constitutional limit on public debt, 60 percent of GDP, and a set of supporting procedures, stipulated in the Public Finance Act (PFA), that are aimed at arresting the increase in the public debt-to-GDP ratio before it reaches 60 percent. The debt limit and the supporting procedures embedded in the constitution and the PFA are more stringent than the Maastricht debt limit for a number of reasons.

The effective constitutional limit on public debt is lower than the Maastricht limit because the limit applies to public debt including the risk weighted stock of outstanding treasury guarantees (PFA Art. 37). At end-2002, the risk weighted stock of treasury guarantees added to public debt amounted to 1.6 percent of GDP. (The total stock of outstanding guarantees at face value was 4.2 percent of GDP). Beside the overall limit on public debt, there is a limit on the amount of debt a sub-national government can accumulate (60 percent of revenues, PFA, Art. 114).

When public debt exceeds 50 percent of GDP, the first threshold for the supportive procedures, the deficit in the state budget for the following year presented to Parliament cannot be larger as a ratio to revenues than in the current year. The same limit applies to each sub-national government. (PFA, Art 45).

When public debt exceeds 55 percent of GDP, the deficit of the state budget in the budget for the following year should be set at a level which ensures that the public (treasury) debt-to GDP ratio (including the risk weighted stock of outstanding state guarantees) will not exceed the level reached in the latest year for which that ratio was officially published. For sub-national governments, the allowed level of the deficit would be reduced proportionally based on a formula which takes into account how close public debt is to 60 percent of GDP. (PFA Art. 45).

When public debt reaches 60 percent of GDP, public finance entities cannot issue new guarantees, within one month the government has to submit to Parliament an economic program aimed at reducing public debt below 60 percent of GDP, the government has to submit to parliament a balanced state budget for the next year, sub-national governments have to submit balanced budgets, and no guarantee can be issued by public finance entities in the subsequent fiscal year. (PFA Art. 45).

Table 1. Poland: Fiscal Sustainability Indicators for the General Government under Unchanged Fiscal Policies 2001-16 1/
(In Percent of GDP)

	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Budget deficit																
Primary balance (cash)	-2.6	-3.6	-3.7	-4.6	-4.0	-3.3	-3.3	-2.5	-1.9	-1.7	-1.3	-0.9	-0.5	0.0	0.4	0.8
Interest costs	2.8	3.1	3.2	3.2	3.1	3.3	3.3	3.5	3.6	3.7	3.8	3.8	3.8	3.8	3.8	3.7
Overall balance (GFS, cash)	-5.4	-6.7	-6.9	-7.7	-7.1	-6.6	-6.6	-6.0	-5.5	-5.4	-5.1	-4.7	-4.3	-3.8	-3.4	-2.9
Financing	5.4	6.7	6.9	7.7	7.1	6.6	6.6	6.0	5.5	5.4	5.1	4.7	4.3	3.8	3.4	2.9
Foreign borrowing	-1.5	0.3	0.4	0.2	0.3	0.3	0.3	0.4	0.5	0.6	0.6	0.7	0.7	0.7	0.7	0.7
Domestic borrowing	6.0	6.1	5.9	6.5	5.8	5.5	5.9	5.3	5.0	4.9	4.5	4.0	3.6	3.1	2.7	2.2
Privatization receipts	0.9	0.3	0.6	1.1	1.0	0.8	0.5	0.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Debt sustainability indicators																
General government debt (end-year stock)	40.3	46.0	50.4	54.0	56.3	58.3	61.1	63.2	64.5	66.0	67.3	67.5	67.6	67.2	66.2	64.4
Public debt (end-year stock) 2/	41.6	47.6	52.0	55.6	57.9	59.9	62.8	64.9	66.2	67.9	69.2	69.5	69.7	69.2	68.4	66.6
Public debt (end-year stock) as percent of primary own revenue 2/	116.1	134.3	145.5	156.8	162.8	168.9	177.6	184.2	188.6	194.5	198.9	199.7	200.1	198.9	196.4	191.3
Vulnerability indicators																
General government gross borrowing requirement	13.1	17.6	20.3	25.7	22.2	21.2	20.4	19.3	20.0	19.1	18.1	17.3	16.0	15.8	15.0	14.0
Gen. gov. gross borrowing req. including renewal of short-term	22.5	26.3	27.8	31.7	24.3	22.7	21.9	20.7	21.5	20.5	19.5	18.6	17.2	17.0	16.2	15.0
Gross borrowing requirement as percent of primary own revenue	34.3	47.0	53.6	68.5	59.1	56.5	54.6	51.8	53.9	51.7	49.2	47.1	43.6	42.9	40.8	38.0
Interest expenditure as percent of primary own revenue	7.5	8.4	8.4	8.5	8.3	8.8	8.9	9.3	9.7	10.0	10.2	10.3	10.4	10.4	10.3	10.1
Assumptions																
Real growth (in percent)	1.0	1.4	2.6	4.1	5.3	5.3	5.3	5.3	5.0	4.3	4.3	4.3	4.3	4.3	4.3	4.3
Average effective real interest rate on general government debt (in percer	1.5	5.2	5.4	4.0	3.1	3.2	3.0	3.0	3.1	3.1	3.1	3.1	3.1	3.1	3.1	3.1
Rate of real appreciation (against the USD, CPI based, in percent)	8.1	-0.4	5.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0

Sources: Data provided by the authorities; and Fund staff estimates and projections.

1/ Unchanged fiscal policies mean unchanged annual rates of increase in non-EU related real primary expenditure.

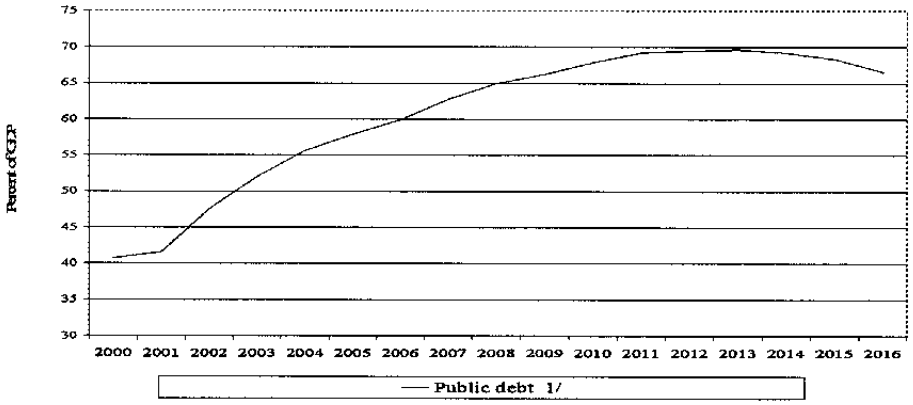
2/ Includes the risk-weighted stock of outstanding guarantees as stipulated in the Public Finance Act.

3/ Including the renewal of short-term debt (less than 1 year maturity) within the year.

4/ Total interest cost divided by average stock of debt during the year and deflated by CPI.

Figure 2. Poland: Public Debt with Unchanged Fiscal Policies After 2003, 2000–16

(In percent of GDP)



Source: Staff calculations.

[1/] Public debt includes the risk weighted stock of outstanding state treasury guarantees. Historical observations until 2002; staff projections for 2003–16.

D. Fiscal Risks

4. **Exposure to fiscal risks is significant and it is likely to increase in the future if fiscal policy remains unchanged.** In determining the sustainability and gauging the vulnerability of fiscal policies, three major groups of fiscal risks will be considered: macroeconomic risks (stemming from changes in growth, the exchange rate and interest rates), refinancing risk, and risk stemming from contingent liabilities.

Macroeconomic risks

5. **High potential growth in Poland is accompanied by high volatility of actual growth.** While the average growth in Poland since 1992 has been some 2.3 percentage points above the average growth of the euro area, the standard deviation of growth from its average in Poland (1.9 percentage points) was also higher than in the euro area (by some 0.8 percentage point). Thus, fiscal risk stemming from fluctuation in growth is considerably higher than in most euro area countries. Looking forward, volatility in growth may diminish, as the period of rapid restructuring comes to an end, but it is likely to stay considerably higher than in the euro area.

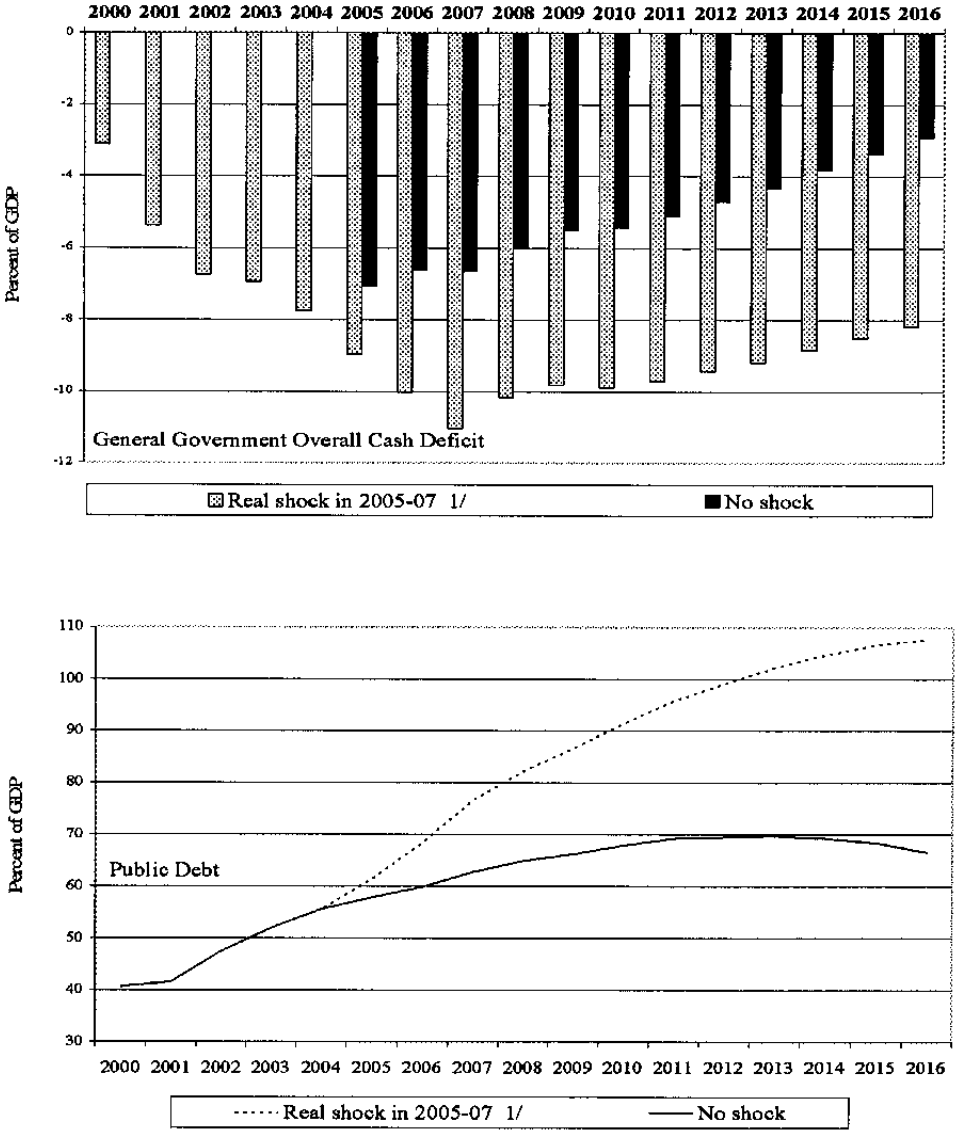
6. **A negative growth shock in 2005–07 similar in size to that in 2001–03 would significantly weaken public finances.**[3] It would raise general government deficit above

[3] In this scenario, the output gap would widen to 5 percent of potential GDP in 2006 and would close by 2011.

10 percent of GDP by 2007, which in turn would push public debt above 100 percent of GDP by 2012 (see Figure 3). These results suggest the magnitude of the vulnerability of public finances to a negative growth shock in Poland.

Figure 3. Poland: Deficit and Debt under Alternative Growth Scenarios, 2000–16

(In percent of GDP)



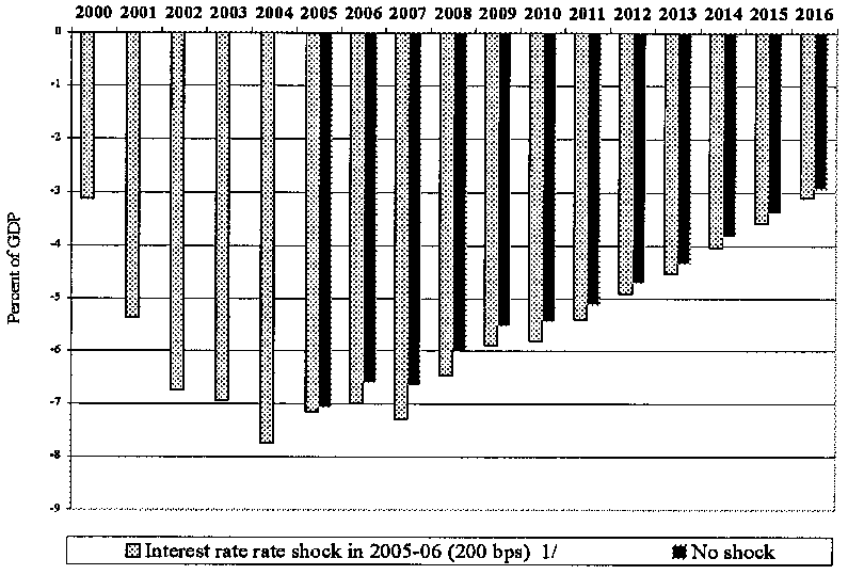
Source: Staff calculations.

[1/] In the alternative scenario, GDP growth was reduced by 3 percentage points in 2005–06 and by 1¾ percentage points in 2007 (compared to the original scenario shown in Table 1). This would widen the negative output gap to 5 percent of potential GDP. The output gap would close by 2011. All other assumptions were kept unchanged.

7. **The budget is also vulnerable to exchange rate and interest rate shocks although to a lesser extent, for plausible ranges of shocks, than to growth shocks.** By reducing the share of foreign debt in total debt, from close to ½ at end-1999 to below ⅓ by end-2002, Poland significantly reduced the exposure of the budget to exchange rate risk. An illustrative 10 percent nominal depreciation for two years (2005–06, returning to the original path in 2007 and leaving all other assumptions shown in Table 1 unchanged) would result in an increase in the overall deficit relative to GDP by less than 0.1 percentage point lasting only for two years. However, the impact of an increase in domestic interest rates would be considerably stronger. As Figure 4 shows, a 200-basis point increase in domestic interest rates for two years (2005–06, returning to the original path in 2007 and leaving all other assumptions shown in Table 1 unchanged) would result in a lasting increase in deficit, peaking at ¾ percentage point in the third year and would push up the public debt-to-GDP ratio by 2½ percentage points in the longer run. Though the kind of nominal (and real) interest rate changes Poland went through in 2000–02 are unlikely to happen again, as price stability has been achieved by now, domestic interest rates may remain volatile in the future.

Figure 4. Poland: General Government Deficit under Alternative Interest Rate Assumptions, 2000–16

(In percent)



Source: Staff calculations.

1/ In the alternative scenario, domestic interest rates increased by 200 basis points in 2005–06 (compared to the original scenario presented in Table 1); all other assumptions kept unchanged.

Refinancing risk

8. **As public debt continues to increase under unchanged policies, gross borrowing requirement also reaches higher levels.** Under unchanged policies, it is projected to be close to 70 percent of total revenue by 2004, compared to 34 percent in 2001 (Table 1). This means that even a short period of market turbulence could pose a threat to public finances and eventually to macroeconomic stability, unless the government keeps sufficiently large liquid reserves—a costly proposition which could also make macroeconomic management more difficult. As the average maturity of new borrowing is assumed to gradually increase (from 2¾ years in 2002 to 3½ years in 2005), the gross borrowing requirement is projected to decline, even though debt relative to revenue is projected to increase until 2013 under unchanged policies.

Contingent liabilities

9. **Contingent liabilities of the budget are also a potential threat to the stability of public finances.** At end-2002, outstanding state treasury guarantees were ZL 32.6 billion or 4.2 percent of GDP. The 2003 state budget allows the government to issue ZL 23 billion or 2.9 percent of GDP of new guarantees.

10. **The Ministry of Finance has a well-designed system of recording and monitoring guarantees.** The existing system of risk assessment follows the best practice in commercial banking, and it is based on a well-maintained data base of financial information on the beneficiaries. Moreover, the risk weighted stock of outstanding guarantees is included in public debt (adding some 1.6 percent of GDP to public debt at end-2002). Nonetheless, a rapidly increasing stock of outstanding guarantees will inevitably increase the risk the state budget will have to undertake. This risk is not necessarily reflected in current deficit measures, as the allocation for expected payments on called guarantees in the budget bears no direct relationship to the risk-weighted stock of outstanding guarantees included in the public debt.

11. **Large, financially weak state-owned companies, in particular in coal mining, steel and defense industries, and the Polish State Railways, are also an important source of contingent liabilities in Poland.** Some of the borrowing of these companies has already been guaranteed by the state treasury, and, thus, is accounted for in the public debt. As the restructuring progresses, the state treasury could be called upon to issue further guarantees to support these companies. In 2002, the Polish State Railways issued over Zl 2.7 billion (0.4 percent of GDP) of new debt guaranteed by the state treasury, while the Industrial Development Agency issued Zl 600 million (0.1 percent of GDP) in state treasury guaranteed debt to support the restructuring of the steel industry.

E. The Size of the Required Fiscal Adjustment

12. **This analysis suggests a need for strengthening the structural fiscal position.** The calculations below attempt to gauge the size of the required structural adjustment.

Fiscal adjustment due to the constitutional limit on public debt

13. **The constitutional debt limit sets legally binding limits on deficit at each level of the general government, starting when public debt reaches 50 percent, which is likely to happen this year.** The rule would require that in the 2005 budget (as the end-2003 public debt number would be officially published in May 2004) the deficit relative to revenue be kept below its level in 2003 (Box 1). However, this is not likely to effectively limit the deficit, as under unchanged policies, the general government deficit would remain within the prescribed limit. Nonetheless, some of the sub-national governments and/or the state budget, depending on how transfers are budgeted, may face constraints on their deficits already in 2005. Under unchanged policies, the next threshold for the ratio of general government debt to GDP, 55 percent, would be exceeded in 2004. This would require an adjustment in the 2006 budget that stops the increase in the public debt-to-GDP ratio—effectively a reduction in general government expenditure relative to GDP of 2¼ percentage points, which could be achieved only by keeping total primary expenditure (excluding EU-financed projects and transfers to the EU budget) unchanged in nominal terms. This would reduce the structural deficit relative to GDP to 1½ percentage points below its 2003 level. If the adjustment was permanent, it would keep public debt below 60 percent of GDP in the subsequent years.

Fiscal adjustment required to meet the Maastricht fiscal criteria by 2006

14. **The authorities' goal is to meet the Maastricht criteria by 2006.** As the calculations in the Staff Report for the 2003 Article IV Consultation (SM/03/181) suggest, this would require a structural adjustment relative to GDP of around 1¼ percentage points between 2004 and 2006. If it is to be achieved through expenditure measures, the annual increase in real primary expenditure, excluding EU-financed budget programs, would have to be kept below 1 percent in 2004–06. If Eurostat ruled that the second-pillar pension funds are not part of the general government, the required fiscal adjustment relative to GDP would have to be some 2 percentage points larger.[4] In this case, real primary expenditure, excluding EU-financed budget programs, would have to be reduced by about ½ percent annually in 2004–06.

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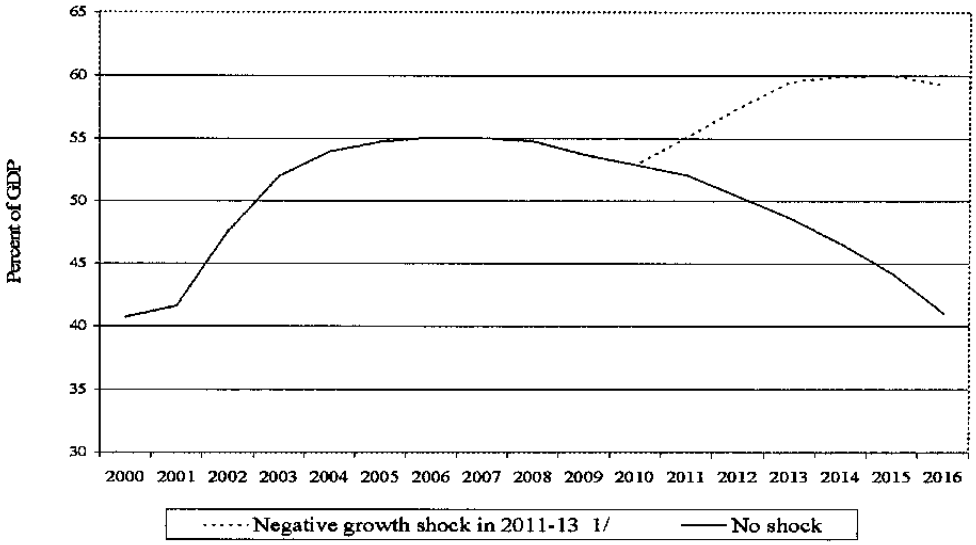
[4] The 3 percent Maastricht deficit limit applies to general government net borrowing (ESA95). This deficit measure (as interpreted by the authorities) is different from general government overall (cash) deficit (GFS86) for several reasons, the most important one being the treatment of second–pillar pension funds. In 2002, the authorities reclassified these funds as part of the general government. This resulted in a reduction of the net borrowing of the general government of some 1.3 percent of GDP. As these funds will continue to have increasing surpluses, the difference due to this reclassification is likely to reach around 2 percent of GDP in 2006. Thus, if Eurostat does not accept the authorities' interpretation of ESA95, the net borrowing of the general government will be larger by some 2 percent of GDP in 2006.

F. Fiscal Risk and Fiscal Position

15. **By improving the fiscal position, Poland could lower the exposure of the budget to fiscal risk.** This section assesses the size of the fiscal adjustment that would substantially reduce risk stemming from growth volatility, perhaps the biggest risk the budget is exposed to at this stage. Specifically, an adjustment as discussed in the Staff Report for the 2003 Article IV Consultation (SM/03/181) (real primary expenditure restraint sufficient to reduce the structural deficit relative to GDP by 1¼ percentage points by 2006) and not reversed through 2010, would significantly reduce the impact on the debt ratio of a growth shock comparable to that shown in Figure 3. That shock, which would push public debt above 100 percent of GDP if it happened on the base of present policies, would cause only a temporary increase in the debt-to-GDP ratio if it occurred after 2011, when public debt would be down to 52 percent of GDP (Figure 5). A strengthened fiscal position, together with a higher average maturity (and duration) of public debt, would also significantly reduce the exposure to refinancing and interest rate risks. Under the adjustment scenario, by 2011, the gross financing requirement of the budget relative to its own revenues would be some ⅓ less than what it would be without adjustment.

Figure 5. Poland: Public Debt under Alternative Growth Assumptions, 2000–16

(In percent)



Source: Staff calculations.

1/ In the alternative scenario, GDP growth was reduced by 3 percentage points in 2011–12 and by 1¾ percentage points in 2013 (compared to the adjustment scenario); all other assumptions were kept unchanged.

G. Conclusions

16. **Though the current fiscal stance is not unsustainable in a technical sense, reducing fiscal vulnerability, as well as complying with the constitutional limit on debt and meeting the Maastrich criteria will require a major fiscal adjustment.** Specifically, the calculations in this analysis suggest that the structural fiscal position will have to improve by at least 1¼ to 1½ percent of GDP over 2004–06. An adjustment of this size is likely to keep public debt below 55 percent and reduce general government net borrowing (ESA95, with second-pillar pension funds included) below 3 percent of GDP by 2006. In any event, the constitutional clause on the debt limit and the supporting procedures in the Public Finance Act will require this adjustment when public debt exceeds 55 percent of GDP. But without a well-designed package of structural fiscal, mainly social expenditure, reforms, ad hoc attempts to comply with the law are likely to be unsustainable in the longer run. Moreover, most structural expenditure reforms need time, in many cases several years, to produce sizable savings. Thus, delaying the adjustment until the law mandates would almost inevitably lead to a low quality and socially costly adjustment.

II. Structural and Cyclical Labor Market Changes in Poland[1]

A. Introduction

1. **Since 1990, Poland has traced a distinct path with the strongest output growth among Central European countries up to the end of the decade and the lowest growth since then**. This output dynamic has also caused gyrations in the unemployment rate, which after having declined to about 10 percent by end-1997 almost doubled by end-2002. Polish unemployment rates went from being high but "about the same" as the euro area average in 1997 to being the highest among OECD and transition countries in 2002 (Table 1). The extraordinary surge in unemployment in such a short period (during which output growth was low but still positive) suggests that shocks other than variations in aggregate demand, i.e., shocks of a more structural nature, may also have played a role. Alternatively, structural and cyclical shocks may have interacted in a particular way with institutions to generate the observed rise in unemployment rates.

Table 1: Unemployment Rates in Transition Countries and the Euro Area, 1992-2002

(In percent)

	Bulgaria 1/	Czech Rep. 1/	Hungary 2/	Poland 3/	Slovak Rep. 2/	Slovenia 4/	Euro area 2/
1992	n.a.	n.a.	9.8	13.7	n.a.	n.a.	8.4
1993	21.4	4.3	11.9	14.9	n.a.	9.1	10.0
1994	20.2	4.3	10.7	13.9	13.6	9.1	10.7
1995	16.5	4.0	10.2	13.1	13.1	7.4	10.5
1996	14.1	3.9	9.9	11.5	11.3	7.3	10.7
1997	14.4	4.8	8.7	10.2	11.8	7.1	10.8
1998	14.1	6.5	7.8	10.6	12.5	7.7	10.2
1999	15.7	8.7	7.0	15.3	16.2	7.4	9.4
2000	16.9	8.8	6.4	16.0	18.6	7.2	8.4
2001	19.7	8.1	5.7	18.5	19.2	5.9	8.0
2002	18.1	7.3	5.8	19.7	18.5	5.9	8.3

Sources: National Labor Force Surveys as reported by national authorities; and OECD Analytical Database.
1/ Period average up to 2001. Average from the first to the third quarter for 2002.
2/ Period average.
3 / Fourth quarter.
4 / Second quarter.

2. **The main task of this chapter is to identify and evaluate a possible structural increase in unemployment rate in Poland.** Although the large decline in investment since 2000 is certainly a major cause for reduced labor demand, labor force survey data for Poland are used to show that shifts in the relationship between unemployment and real wages adjusted for technological growth—a "labor supply-like" shift—have also contributed

[1] Prepared by Marcello Estevão.

significantly to the rise in unemployment. These shifts were rooted in increased mismatches between the supply of and the demand for labor linked to privatization and production restructuring. In addition, relatively generous social benefits vis-à-vis the market wages of less-skilled workers likely kept job-search intensity low. These factors caused a continuous structural worsening of the labor market since 1995, the first year in our sample, and by 1998 actual unemployment rates were likely below structural levels forcing wages to shoot up. The subsequent cyclical slowdown and rapid increase in unemployment only made such a continuing structural deterioration more evident. Although part of this problem could naturally disappear as new waves of labor market entrants might be molded to better match labor demand and older job-searchers move into retirement age, policies to increase the attractiveness of work and skill upgrade should be considered.

3. **It is also shown that region-specific characteristics translated these transition-related industry-specific shocks, as well as other sectoral shocks, into divergent employment performance within Poland.** In other words, pure industry-composition effects have played a minor role in explaining regional employment and unemployment performance. So, industrial policies at the regional level would not have an important impact on job creation as lagging regions face a uniform employment growth gap across sectors. Policies to improve regional infrastructure should be pursued instead. Finally, the chapter documents the surge in youth unemployment in Poland, which is the result of a demographic shock at the same time that output growth declined.

4. **The next section documents important institutional settings and recent labor market developments in Poland.** It also shows that divergent regional employment performance can be mostly explained by region-specific shocks. Section C lays out a theoretical framework to explain possible changes in the equilibrium relationship between wages and unemployment. Section D uses micro data from the Polish Labor Force Survey to show that such a shift has actually occurred continuously since 1995 and has significantly increased the equilibrium unemployment rate in Poland by 2002. Section E concludes this chapter and offers some policy suggestions.

B. Labor Market Characteristics and Developments

Labor market characteristics

5. **Poland presents many of the labor market characteristics of its European neighbors. In particular, unemployment rates not only vary widely across regions but these differences are quite persistent (Table 2).** The pattern shown in Table 2 has been broadly unchanged for decades: unemployment has been historically the highest in the low-income agricultural regions bordering the Baltic Sea and Russia and along the German border. This persistence is also evident in the large rank correlation of regional unemployment between 1993 and 2002 (0.70). However, the recent economic slowdown tamed these differences somewhat (the coefficient of variation of regional unemployment rates declined from a peak of 0.244 in 1998 to the low of 0.184 in 2002) as the brunt of recession was felt proportionately more in previously dynamic regions.

Table 2. Poland: Regional Unemployment Rates, 1993-2002 1/

(In percent)

	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002
Total	14.6	16.4	15.1	14.3	13.1	11.4	12.8	17.0	18.6	20.6
Dolnoslaskie	17.0	18.0	17.5	16.0	16.2	14.9	15.5	22.8	23.8	25.9
Kujawsko-Pomorskie	18.1	20.2	18.5	16.3	14.6	12.3	13.8	16.6	19.6	21.2
Lubelskie	14.2	14.4	14.4	12.8	11.3	9.0	11.5	16.5	15.7	17.3
Lubuskie	17.5	20.7	21.3	17.1	13.9	13.9	16.5	20.7	24.4	29.1
Lódzkie	15.9	17.2	14.2	14.3	13.1	11.9	12.7	16.5	20.3	22.5
Malopolskie	10.8	12.8	12.3	12.9	11.9	9.6	9.8	12.3	13.9	17.1
Mazowieckie	13.2	14.7	13.3	12.2	10.8	9.6	10.5	14.1	14.0	16.9
Opolskie	18.1	18.1	15.0	13.0	12.3	10.3	14.9	16.2	18.3	19.1
Podkarpackie	13.4	15.3	16.8	15.6	14.6	11.4	13.6	17.3	20.5	19.8
Podlaskie	13.1	15.2	12.6	10.8	12.5	11.8	12.8	17.9	17.5	18.2
Pomorskie	18.9	18.8	17.7	15.3	13.3	10.9	11.2	18.2	19.1	22.9
Slaskie	12.4	12.4	11.8	11.4	10.8	9.3	11.4	16.9	18.8	21.7
Swietokrzyskie	11.8	17.3	15.8	16.1	13.1	13.5	14.4	17.8	20.2	19.8
Warminsko-Mazurskie	18.6	26.7	22.7	24.5	22.7	18.5	20.0	26.3	26.3	26.9
Wielkopolskie	12.8	15.6	14.2	14.1	11.5	8.9	10.1	14.4	16.7	17.0
Zachodniopomorskie	19.5	20.9	17.3	17.4	17.5	17.7	20.4	20.0	22.9	26.2
Coefficient of variation	0.189	0.207	0.196	0.216	0.220	0.244	0.234	0.192	0.184	0.184
Memo:										
Labor force participation 2/	68.6	69.1	67.4	66.7	66.6	66.1	65.9	65.8	65.8	65.0
Employment rate 3/	58.5	57.8	57.2	57.2	57.9	58.6	57.5	54.6	53.6	51.6

Sources: Polish Labor Force Survey for the first quarter of each year; and author's calculation.

Note: Rank correlations of regional unemployment rates in Poland: Between 1993 and 2002= 0.70; between 1993 and 1998 = 0.60; and between 1998 and 2002= 0.79.

1/ Unemployment rate defined as the number of jobless people between ages of 15 and 64 looking for a job as a percentage of the labor force (unemployed plus employed individuals.)

2/ Labor force participation rate is the ratio of the labor force to the working-age population. Working-age population defined as population between 15 and 64 years of age.

3/ Employment rate is the share of employed individuals within the working-age population.

6. **Regional discrepancies in unemployment rates are the result of mismatches between local labor productivity and reservation wages.** The highly-publicized low regional mobility in Poland is likely an important explanatory variable. But, imperfect wage adjustment to local labor markets—maybe because national factors tend to equalize wages across regions—can also be at the root of the problem. In particular, the annual income of minimum wage earners seem high in Poland: it was about 35 percent of the median income in the country in 2000, a level above the average of European countries in transition. (OECD, 2002a) Also, because of substantial economic differences across regions, the nationally-set minimum wage may be more binding in poorer areas. It actually reached about 40 percent of the local average wages and 95 percent of the average wage of the lowest paid 20 percent of workers in poorer regions in 1999 (World Bank, 2001). Selassie (2001) shows that there is indeed a positive correlation between the relative size of the minimum wage (minimum wage as a share of regional median wages) and regional unemployment in 1999 although one cannot infer the direction of causality from simple correlation statistics. Relatively high minimum wages may have also prevented the hiring of young workers and by 2001 Poland posted the highest rate of youth unemployment among OECD countries (Table 3). The

increase in youth unemployment is also a result of a larger-than-usual increase in labor force because of the mini-baby boom of the 1980s in Poland. In response to this acute problem, Polish authorities have recently lowered the minimum wage allowed for young first-time job holders.[2] Although it is hard to argue against the hypothesis that a national minimum wage will tend to be more binding in regions with lower marginal labor productivity, there has been no direct evidence of the importance of the minimum wage in pricing labor out of the market during the recent economic slowdown.

7. **Benefit replacement rates increase substantially in Poland once individuals leave the unemployment insurance system and receive social assistance transfers.** Table 4 illustrates this fact using OECD data for particular types of families, although the pattern is in general true for other family situations as well. Benefits replacement rates are actually quite low in Poland in the first-month an individual is out-of-work but changes dramatically once individuals stop qualifying for unemployment insurance (which lasts a maximum of 18 months) because of generous social assistance programs. The only country with the same type of strong increase in replacement rates in the long run (for qualifying individuals) is the United Kingdom, although the Czech Republic also shows the same feature.

8. **Large long-run replacement ratios seem to have implications for the composition of the unemployment pool.** Poland not only posted one of the largest unemployment rates among OECD countries in 2001 (only the Slovak Republic had a higher unemployment rate then), but also had a much above-average proportion of long-term unemployment (Table 3). The share of long-term unemployed workers (individuals searching for a job for 12 months or more) jumped eleven percentage points from the first quarter of 2001 to reach 57 percent in the first quarter of 2002.[3]

9. **Such a diminished prospect of finding jobs after more than a year unemployed has also resulted into declining labor force participation rates.** Cutting through variations in the unemployment rate and labor force participation, the share of employed individuals among those of working age, the employment rate, indicates overall labor utilization. According to this measure, labor utilization in Poland was second to last among OECD countries in 2001; and by the first quarter of 2002, the last data point in Table 2, it reached the low of 51.6 percent. Continuing declines in labor force participation and employment rates in Poland to very low levels suggest the existence of better alternatives than working. Not only the recent deceleration in output but also the large replacement rates discussed above are likely culprits.

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[2] A law was passed in October 2002 setting the minimum wage for labor market entrants as 80 percent of the nationally-set legal figure in the first year of work and 90 percent in the following year.

[3] These figures are based on data from the Polish Labor Force Survey (LFS)—a different source of information on Poland than the one shown in Table 3. See Appendix I for a discussion of the LFS data used in this chapter.

Table 3. Labor Utilization in Selected OECD Countries, 2001

	Unemployment rate 1/						Incidence of long-term unemployment by duration 2/		Employment rates 3/
	Total	By age groups			By gender		6 months and over	12 months and over	
		15-24	25-54	55-64	Men	Women			
Australia	6.7	12.7	5.3	4.7	6.9	6.3	38.7	21.5	68.9
Austria 4/	3.5	4.9	3.1	4.6	3.2	3.9	36.2	23.4	68.2
Belgium	6.2	15.3	5.4	3.0	5.7	6.9	66.5	51.7	59.7
Canada	7.3	12.8	6.2	5.9	7.6	6.8	16.8	9.5	70.9
Czech Republic	8.2	16.6	7.2	4.9	6.8	9.9	71.3	52.7	65.3
Denmark	4.2	8.3	3.5	4.0	3.7	4.8	38.5	22.2	75.9
Finland	9.2	19.9	7.4	8.9	8.7	9.1	42.2	26.2	67.7
France	8.8	18.7	8.1	6.1	7.1	10.8	57.2	37.6	62.0
Germany 5/	8.0	8.4	7.5	11.2	7.9	8.2	67.6	51.5	65.9
Greece	10.4	28.0	8.8	4.1	6.9	15.6	69.0	52.8	55.6
Hungary	5.7	10.8	5.1	3.0	6.3	5.0	68.1	46.7	56.6
Iceland	2.3	4.8	1.7	2.0	2.1	2.5	21.0	12.5	84.6
Ireland 6/	3.7	6.2	3.2	2.6	3.9	3.5	76.1	55.3	65.0
Italy 7/	9.6	27.0	7.6	4.4	7.4	13.1	77.4	63.4	54.9
Japan	5.2	9.7	4.4	5.7	5.4	5.1	46.2	26.6	68.8
Korea	3.9	9.7	3.4	2.1	4.4	3.2	13.0	2.3	62.1
Luxembourg	1.9	6.7	1.4	0.3	1.6	2.2	43.5	27.6	63.0
Mexico	2.2	4.1	1.6	1.0	2.1	2.4	4.1	1.1	60.1
Netherlands 4/,6/	3.3	6.6	2.7	2.4	2.6	4.2	80.7	43.5	72.1
New Zealand	5.4	11.8	4.1	3.5	5.5	5.3	31.3	16.8	71.8
Norway	3.5	10.5	2.6	1.6	3.6	3.4	13.4	3.7	77.5
Poland	**18.6**	**41.0**	**15.8**	**9.7**	**17.2**	**20.2**	**66.1**	**43.1**	**53.5**
Portugal	4.3	9.2	3.5	3.2	3.4	5.4	58.0	38.1	68.7
Slovak Republic	19.3	39.1	15.9	12.3	19.8	18.8	67.6	48.2	56.9
Spain	10.5	20.8	9.3	6.3	7.5	15.3	61.8	44.0	58.8
Sweden	5.1	11.8	4.1	4.9	5.4	4.7	36.7	22.3	75.3
Switzerland	2.5	5.6	2.1	1.7	1.8	3.5	...	...	79.0
Turkey	10.9	19.9	8.6	3.5	11.2	10.0	37.6	23.1	45.1
United Kingdom	4.8	10.5	3.9	3.3	5.3	4.2	43.6	27.7	71.3
United States	4.8	10.6	3.8	3.1	4.9	4.7	11.8	6.1	73.1
OECD countries	**6.7**	**14.1**	**5.6**	**4.5**	**6.2**	**7.3**	**47.0**	**31.1**	**65.9**
EU countries	**6.2**	**13.5**	**5.3**	**4.6**	**5.3**	**7.5**	**57.0**	**39.1**	**65.6**

Sources: OECD (2002); Labor Force Survey database.

1/ Unemployment as a percentage of the labor force.

2/ Long-term unemployment as a percentage of unemployed.

3/ Employment as a percentage of the working-age population.

4/ Austria and Netherlands: data for 2000.

5/ Germany: data are for 2000 for incidence of long-term unemployment by duration.

6/ Ireland and Netherlands: data are for 1999 for incidence of long-term unemployment by duration.

7/ Italy: data for 25-59 and for 60-64.

Table 4. Net Replacement Rates for Two-Family Types at Average Earnings Level, 1999

(In percent of Average Production Worker's Earnings, APW)

	Single parent with two children		Couple with two children	
	Long-term	First month	Long-term	First month
Australia	47	47	62	62
Austria	69	73	72	76
Belgium	69	65	68	64
Canada	60	91	62	91
Czech Republic	74	71	80	70
Denmark	79	78	80	73
Finland	62	87	89	83
France	43	72	42	72
Germany	63	71	65	70
Greece	11	47	10	44
Hungary	40	61	38	60
Iceland	65	68	87	66
Ireland	56	52	56	57
Italy	14	50	18	53
Japan	61	70	68	64
Korea	16	55	18	54
Luxembourg	59	87	75	87
Netherlands	61	81	71	89
New Zealand	64	64	68	68
Norway	58	83	62	74
Poland	**56**	**47**	**74**	**46**
Portugal	64	80	63	79
Slovak Republic	60	80	80	78
Spain	37	76	39	73
Sweden	59	85	85	78
Switzerland	69	92	75	91
United Kingdom	71	49	80	49
United States	38	58	46	57
OECD average	54	69	62	69
Poland's rank	19th	26th	10th	27th

Sources: OECD (2002), Benefits and Wages; OECD Indicators.
Note: See also: www.oecd.org/els/social/workincentives.

10. **The disincentive to work is exacerbated by a relatively high tax wedge between wages and take-home pay (Table 5).** Since 1993, the first year with data for Poland, tax wedges have been significantly above average OECD levels. The combination of large tax wedges and replacement rates makes the poverty trap for potential workers at low wages quite strong and creates incentives for underground work. That can be detected by the large share of self-employed, who probably underreport their income to the tax authorities, while the hiring firm does not need to pay social security taxes on their labor (OECD, 2002a). Many observers of the Polish labor market and government authorities actually blame such a wedge for the large grey economy in Poland, although direct statistical evidence on its size does not exist.

Developments

11. **Against this institutional background, strong productivity gains over much of the 1990s fueled output growth and real wage gains but also served to displace workers (Figure 1).** Labor productivity grew more than 5 percent on average between 1992 and 1998. About the same rate of growth was posted between 1999 and 2002. However, while in the first period output grew an average of 5½ percent a year and employment edged up, in the latter period it grew on average 2½ percent a year and employment fell by 2½ percent a year. Even though, employment growth was slow in the first period, unemployment rates fell as labor force participation declined continually.[4] Part of the surge in real wages up to 1998 was the result of these large productivity gains, although increases in unit labor costs and the evidence in latter sections of this chapter suggest that wages grew above and beyond the room created by productivity improvements. From then on, wage growth tapered off while unemployment rates soared.

12. **The large aggregate productivity growth may mask important sectoral variation as industry specific shocks buffeted the economy.** First of all, firm restructuring was deeper in heavy industries, e.g. mining and steel mills. Second, the Russian crisis directly hit some Polish exporters severely. After having tripled between 1992 and 1997, exports to Russia dropped sharply. By 2002, exports to Russia represented only about 3 percent of total exports (a third of the 1997 share) suggesting the initial shock had a lasting effect.[5] Third, the trend real appreciation observed in the 1990s (partly due to Balassa-Samuelson effects) was

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[4] With increased skill mismatches between downsized employees and the newly-installed machinery, the government stepped up social transfers, including earlier retirement schemes, to curb increases in unemployment. This also contributed to declining employment rates. Keane and Prasad (2002) show that this policy avoided a widening of the income distribution in Poland and likely helped ease political resistance to privatization and restructuring.

[5] That is even more remarkable because after 8 years of large declines in GDP, Russia posted an average 6 percent growth between 1999 and 2002. In addition, Polish authorities mentioned that growing exports to Russia after 1999 were concentrated in new sectors while the establishments which previously exported to Russia remained closed.

Table 5. Total Tax Wedge 1/

(For Individuals Earning the Average Production Worker's Earnings (APW); in percentage of APW.)

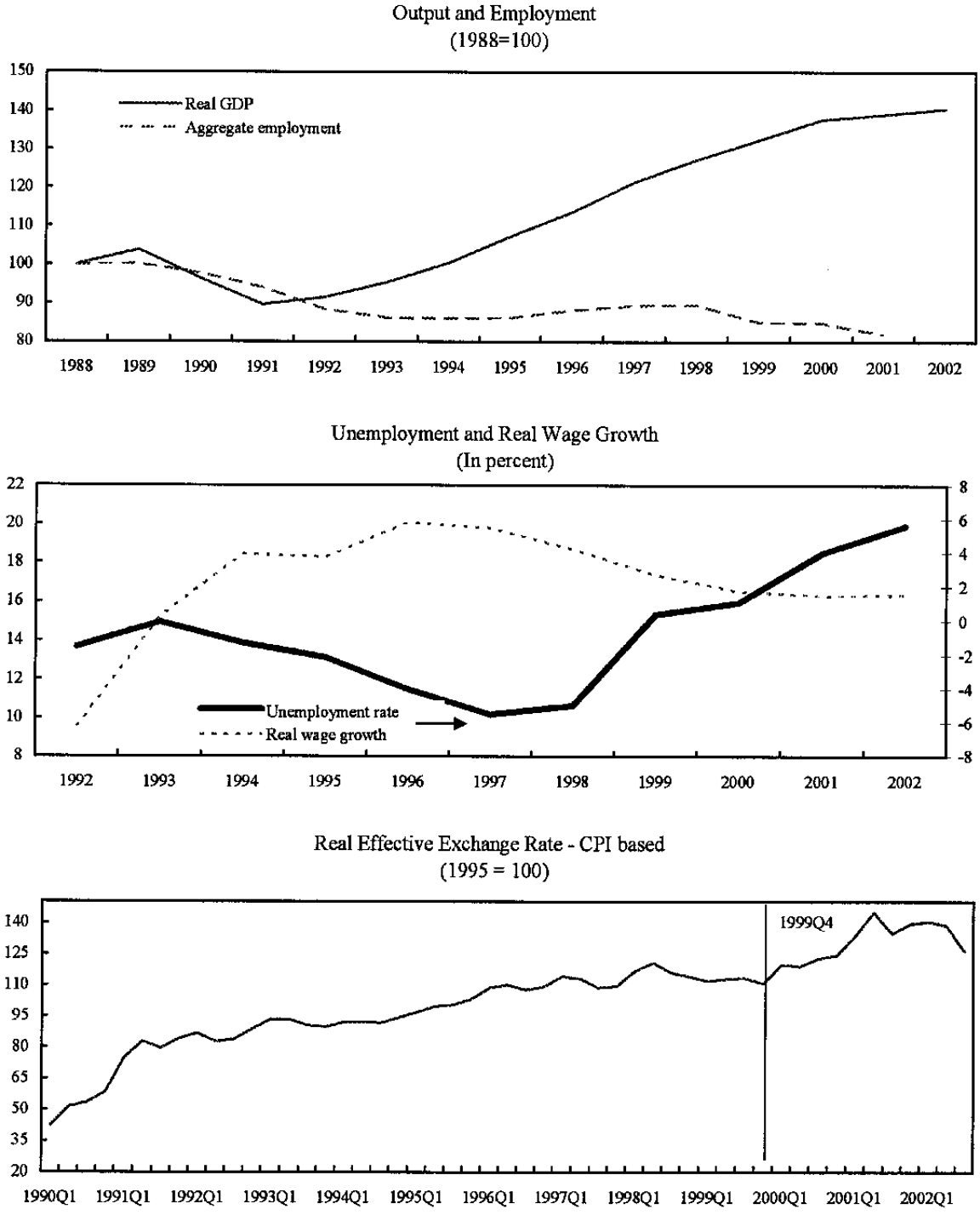
	Single worker without children			Couple with two children (one-earner)		
	1993	1998	2001	1993	1998	2001
Australia	23.0	25.4	23.1	14.9	15.5	13.1
Austria	40.0	45.8	44.7	24.3	32.7	29.4
Belgium	54.6	56.8	55.6	38.6	41.1	40.2
Canada	30.8	31.7	30.2	20.6	22.9	20.5
Czech Republic	42.6	42.8	43.0	23.1	23.4	27.8
Denmark	47.0	43.7	44.2	32.5	30.1	31.3
Finland	49.3	48.8	45.9	38.1	40.7	38.8
France	n.a.	47.6	48.3	n.a.	38.5	39.4
Germany	46.4	52.2	50.7	33.6	35.9	32.6
Greece	35.3	36.1	36.0	34.3	36.5	36.1
Hungary	n.a.	51.6	52.6	n.a.	40.3	38.9
Iceland	22.0	24.8	25.7	-11.2	0.4	2.8
Ireland	40.0	33.0	25.8	29.9	22.5	12.8
Italy	49.2	47.5	46.2	42.4	37.5	35.6
Japan	21.2	19.6	24.2	16.0	14.0	20.4
Korea	n.a.	14.7	16.6	n.a.	13.9	16.0
Luxembourg	34.9	33.8	33.9	12.5	12.0	11.5
Mexico	26.6	21.9	15.6	26.6	21.9	15.6
Netherlands	45.7	43.5	42.3	35.7	33.2	32.4
New Zealand	24.0	20.0	19.6	22.2	14.8	16.8
Norway	36.8	37.5	37.0	23.0	25.6	27.2
Poland	**44.1**	**43.2**	**42.9**	**36.8**	**37.4**	**38.0**
Portugal	33.3	33.8	32.5	25.3	26.5	24.2
Slovak Republic	n.a.	n.a.	42.0	n.a.	n.a.	30.1
Spain	38.0	39.0	37.9	32.9	33.3	31.0
Sweden	45.6	50.7	48.6	37.7	44.4	41.4
Switzerland	28.7	30.0	29.5	17.3	17.8	17.9
Turkey	40.0	39.8	43.2	40.0	39.8	43.2
United Kingdom	32.6	32.0	29.7	23.8	24.9	17.8
United States	31.2	31.0	30.0	24.7	23.7	19.4
OECD (26) /2	37.0	37.1	36.1	26.8	27.3	26.1

Source: OECD (2001), Taxing Wages.

1/ Total tax wedge is comprised of social security payments by employers and employees, and personal

2/ Average OECD line includes only countries with observations in each of the three years.

Figure 1. Poland: Growth and Slump



Sources: National Accounts, Labor Force Survey; IMF-WEO database.

steepened at the end of 1999 and its weeding out effect on less productive firms may have also increased.

13. **These industry-specific shocks had different impact on employment across sectors (Table 6).**[6] While employment declined in almost all industries between 1998 and 2002 the fall was sharpest in goods-producing sectors (manufacturing, mining, construction, and agriculture and fishing). Interestingly, the decline in agricultural employment in the latter period was smaller than earlier, suggesting that the lack of outside opportunities kept many farmers attached to their land. Also, private sector employment decelerated markedly after 1998 while public sector employment continued to decline.

14. **It is conceivable that variations in sector performance might be the reason behind divergent regional employment growth through an industry-composition effect.** A shift-share analysis can shed light on the relative importance of industry-composition effects and region-specific effects (e.g., skill composition of the labor force, degree of education, people's reservation wages, and so on) to explain regional employment growth differentials.[7] Briefly, the growth differential between a region and the national average can be split in three components: structural, differential and allocative. The structural component indicates the growth share due to the specialization (industry mix) of each region. The differential component measures the part of growth due to region-specific factors. Finally, the allocative component measures the covariance of the two factors and can be interpreted as regional growth deriving from its specialization in those activities where the region is most competitive. This breakdown can be written as:

$$g_j - g = \sum_i s_{ij} g_{ij} - \sum_i s_i g_i = \mu_j + \pi_j + \alpha_j \qquad (1)$$

where, g is the aggregate employment growth rate, g_j employment growth rate in region j, g_i employment growth rate in industry i, g_{ij} = employment growth in industry i in region j, s_{ij} = share of industry i employment in region j in total employment of region j, and s_i = share of industry i in aggregate employment.

15. **The structural, differential and allocative effects are represented, respectively, by μ_j, π_j, and α_j and can be written as:**

$$\mu_j = \sum_i (s_{ij} - s_i) g_i \quad \text{or} \quad \sum_i s_{ij} g_i = g + \mu_j \qquad (2)$$

---

[6] Because of data availability, the analysis is constrained to seven major sectors. The Labor Force Survey register more disaggregated information on a person's industry of employment. But, because of sample size problems, a finer sector aggregation would not be representative of regional employment in each industry.

[7] For a recent discussion on the pros and cons of shift-share analysis and its algebra see Esteban (2000). This section follows the nomenclature in Traistaru and Wolff (2002).

Table 6. Poland: Employment, 1995-2002

(In thousands employed, unless otherwise indicated.)

Year	Total	By sector							By ownership 1/	
		Agriculture and Fishing	Manufacturing and Mining	Mostly Public Utility Services 2/	Construction	Trade and Repair	Several Services 3/	Transport and Communication	Public	Private
1995	14,438	3,201	3,503	2,903	820	1,778	1,391	843	64.3	35.7
1996	14,481	3,067	3,537	2,975	815	1,876	1,327	884	61.4	38.6
1997	14,779	2,983	3,526	3,050	919	1,946	1,443	912	57.9	42.1
1998	15,115	2,878	3,537	3,124	1,003	2,081	1,541	951	54.4	45.6
1999	14,941	2,706	3,429	3,071	1,020	2,124	1,706	885	51.9	48.1
2000	14,319	2,549	3,210	2,990	952	2,040	1,703	874	48.5	51.5
2001	14,148	2,555	3,218	2,907	941	1,994	1,698	835	45.5	54.5
2002	13,696	2,562	2,919	2,909	836	1,923	1,699	848	45.8	54.2
									Employment changes 4/	
Annual percent change 1995-1998	1.5	-3.5	0.3	2.5	7.0	5.4	3.5	4.1	-3.9	10.1
Annual percent change 1998-2002	-2.4	-2.9	-4.7	-1.8	-4.5	-2.0	2.5	-2.8	-6.5	1.9

Sources: Labor Force Survey for the first quarter of each year; and author's aggregation.

1/ As a percentage of total employment.

2/ Includes electricity, gas, and water supply; public administration and defense; education; health and social work; and extra-territorial organizations and bodies.

3/ Includes hotels and restaurants; financial intermediation; real state and business services; household employees; and other community, social, and personal services activities.

4/ Annualized percent changes in employment levels according to ownership structure.

$$\pi_j = \sum_i (g_{ij} - g_i)s_i \quad \text{or} \quad \sum_i s_i g_{ij} = g + \pi_j \tag{3}$$

$$\alpha_j = \sum_i (s_{ij} - s_i)(g_{ij} - g_i) \tag{4}$$

So, for instance, if $s_{ij} > s_i$ in sectors with high positive employment growth rates in the aggregate and $s_{ij} < s_i$ in sectors with low positive employment growth rates in the aggregate, μ_j will be positive and one can say that the production structure in this region contributed to better employment performance and, likely, better-than-average unemployment levels. π_j describes how region-specific effects determine deviations from national growth as the structure of production is assumed to be identical across regions (instead of the industry growth rates as is the case with μ_j) but region-specific performance in each industry is taken into account. α_j will be positive in regions where there is a positive correlation between deviations from national industry growth and their regional performance.

16. **A variance decomposition of (1) can be used to evaluate the importance of structural, differential and allocative factors for differentials in regional employment growth.** The variance of the left-hand-side term in (1) is:

$$\text{var}(g_j - g) = \text{var}(\mu_j) + \text{var}(\pi_j) + \text{var}(\alpha_j) + 2[\text{cov}(\mu_j, \pi_j) + \text{cov}(\mu_j, \alpha_j) + \text{cov}(\pi_j, \alpha_j)] \tag{5}$$

The yearly share of each term in the right-hand side of (5) on the total variance of regional growth dispersion gives the relative importance of each factor across time.

17. Table 7 shows the variance decomposition derived in (5):

Table 7. Poland: Variance Decomposition of Regional Employment Growth

Year	Total variance	Share of each term in (5) in percent			
		Var(μ_j)	Var(π_j)	Var(α_j)	Covariance terms
1996	22.4	2.2	128.9	5.2	-36.3
1997	10.5	5.2	140.3	44.2	-89.7
1998	15.7	3.9	81.0	12.4	2.6
1999	22.3	2.3	105.1	10.4	-17.8
2000	72.0	0.0	128.9	15.8	-44.8
2001	36.6	0.0	125.5	8.1	-33.7
2002	17.6	1.9	92.4	8.9	-3.3

Note: Data are aggregated into 16 regions and seven major sectors as defined in Table 6.
Sources: Labor Force Survey for the first quarter of each year; and author's calculations.

18. **The variance of regional employment growth rose substantially between 1999 and 2001 before returning to pre-1999 levels in 2002. An upsurge in the volatility of region-specific industry performance, π_j, was the dominant factor behind this increase,**

while structural factors (summarized by μ_j) remained largely irrelevant. This does not mean that industry-wide shocks were not important, but rather that they had different impacts on employment growth depending on region-specific factors.[8] These results imply that an active industrial policy at the regional level (i.e., fostering some activities to the detriment of others) would not have an important impact on job creation as lagging regions face a uniform employment growth gap across sectors. Policies to improve regional infrastructure, to promote labor mobility within and across regions, and to upgrade the skills of unemployed workers would likely be more effective in shrinking geographic differences in employment growth and lowering the persistent dispersion in unemployment rates.[9]

C. Labor Market Equilibrium and Shocks[10]

The theory

19. **The issues discussed so far point to an interaction between shocks (transition to a market economy) and institutions (high level of out-of-work benefits) as potential reasons for growing equilibrium unemployment rates in Poland.** An evaluation of the contribution of these effects to changes in unemployment requires a setup that is rich enough to capture such interaction but simple enough to allow empirical verification. The simplest-yet-rich model for this task is a bargaining model that generates unemployment in equilibrium with a well-specified role for institutions and shocks.

20. **Beginning with the production side, assume the economy grows along a balanced path determined by the rate of labor augmenting (Harrod-neutral) technological growth, g_a.** The production function for a representative firm combines labor and capital according to a constant returns to scale technology:

$$Y_i = F(AN_i, K_i), \quad F_1 \text{ and } F_2 > 0;\ F_{11} \text{ and } F_{22} < 0;\ F_{12} > 0 \tag{6}$$

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[8] An important caveat needs to be made: This result may change somewhat if more disaggregated information for industry employment were available. For instance, some regions may have been highly specialized in industries exporting goods to Russia around 1998. But, in the analysis presented here, employment in these industries fall under the large "manufacturing and mining" category. On the positive side, Traistaru and Wolff (2002) found similar results for Bulgaria, Hungary and Romania using a similar level of data aggregation.

[9] Even though changes in regional labor force participation create a wedge between employment growth and movements in the unemployment rate, regional employment growth and unemployment rates are strongly negatively correlated (-0.21).

[10] The theoretical framework is based on Estevão and Nigar (2002) and Blanchard (2000). Layard et al (1991) present a pertinent discussion of different labor market models with equilibrium unemployment.

Y_i, N_i, K_i and A denote the firm's output, labor, and capital, and the aggregate technology level.

21. **The demand for output is a function of the firm's relative price, P_i/P, with the aggregate price level, P, taken as exogenous**:

$$Y_i^d = Y_i^d \left(\frac{P}{P_i} \right)^{\varepsilon}, \qquad \varepsilon > 1 \tag{7}$$

22. **Labor demand is obtained as the solution of the firm's profit maximization problem, assuming that capital is fixed and there are no costs to adjust labor.** Since all firms are identical, the subscript i can be dropped in the first-order condition. The labor demand curve will be of the type:

$$N = G\left(\frac{W(1+t^e)}{PA}, \frac{K}{A} \right), \quad G_1<0 \text{ and } G_2>0 \tag{8}$$

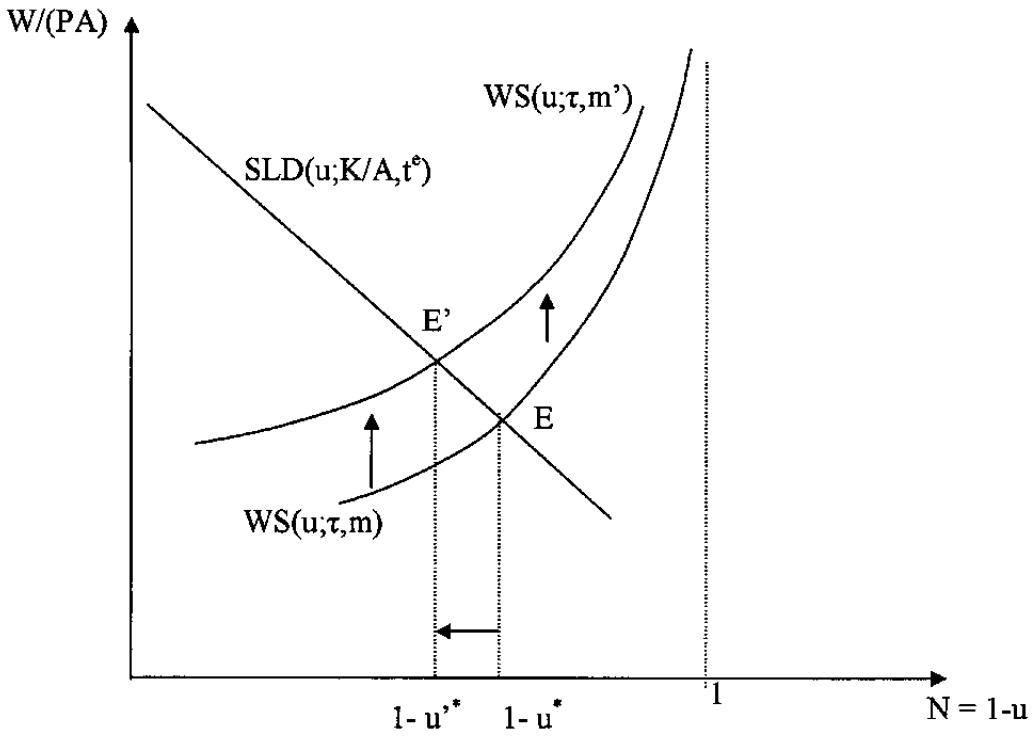
The link between real wages in efficiency units, $W/(PA)$, and labor is affected by the level of capital in efficiency units and the rate of employers' social security contributions, t^e. This relationship is drawn as the curve SLD in Figure 2, where the labor force is normalized to 1 and $N = 1-u$ (u is the unemployment rate.) The curve will shift when the optimal stock of capital, K, or the rate of firms' social security contributions changes. Variations in the optimal stock of capital, assumed exogenous here, capture variations in producers' economic expectations or changes in macro variables (e.g. interest rates).

23. **A "labor supply-like" relationship can be obtained according to a *right-to-manage* model in which firms and unions bargain over wages given the labor demand.** The bargaining problem can be described as the maximization of an overall utility of firms and unions subject to labor demand (8). So, workers know the elasticity of labor demand and take the effects of high wages on labor demand into consideration when bargaining with firms. The outcome will depend on workers' relative bargaining power; the ratio between the fiscal wedge on unemployment income and the fiscal wedge on labor income, τ, which determines the relative take-home pay derived from working; and the out-of-work benefits and other determinants of unemployment income (in particular, an individual's productivity in non-market activities), B. The probability of getting a job elsewhere in case bargaining fails can be approximated by the unemployment rate, as it indicates the extent of competition for existing jobs: that is what ends up linking wages to unemployment in equilibrium. Changes in how well the unemployment rate approximates the extent of slack in the labor market, due for instance to increased mismatch between labor skills demanded and supplied, will also affect bargained wages. Solving this maximization problem produces an equation like:

$$\frac{W}{B} * \tau = f(m,u), \quad f_m>0 \text{ and } f_u<0 \tag{9}$$

24. **In words, the negative equilibrium relationship between wages and the unemployment rate, *u*, is mediated by the relative tax wedge on wages vis-à-vis the unemployment income, τ, unemployment income, *B*, and a structural variable, *m*, representing the markup of wages over workers' alternative income if out of a job.** This alternative income depends not only on income while unemployed, *B*, but also on work income as there is a chance that laid-off workers get re-hired (again, in the model, that depends on competition for available jobs which is proxied by the unemployment rate). Equation (9) generates the wage-setting curve in Figure 2 as prices, *P*, and the level of technology, *A*, are used as proxy variables for unemployment income, *B*, which is not readily observed.[11] In practice, such an approximation leaves particular institutional features as part of the "residual" in equation (9) and are captured by the catch-all parameter *m*.

Figure 2. A Graphic Representation of the Model



[11] Individuals' income when unemployed depends on institutional arrangements, as well as on labor productivity while engaged in home production. The use of prices and technological growth as proxies for productivity in home production and variation in benefits replacement rates is justified because unemployment benefits and social transfers are usually at least partially indexed to inflation and tend to follow developments in productivity. See Blanchard and Katz (1997) for further discussion on the use of this approximation for unemployment income.

25. **Upward shifts in the wage-setting curve would generate more unemployment for a given level of real wages in efficiency units, *W/(PA)*.** For an unchanged tax wedge, a larger markup of wages over individuals' alternative income when unemployed (a move from *m* to *m'* in Figure 2) would cause the shift. Several factors can, potentially, cause such a change in the wage-setting curve: more generous benefit replacement rates would lower job-search intensity among the unemployed and allow workers to bargain for higher wages; stronger unions' bargaining power would allow workers to demand more wages and keep a larger share of value-added for themselves; lower sensitivity of employment to output in firms' production function and lower elasticity of goods demand to prices would make employment less sensitive to wage variations and would allow workers to increase the markup over their alternative income. The markup parameter would also increase if skill mismatches deepen because unemployed individuals would be more imperfect substitutes (and, therefore, a weaker threat) to current job-holders.

26. **Among all the possible candidates, increased skill-mismatch, resulting from the restructuring process, and weaker job-search intensity, as the share of the long-term unemployed rises, are the likely cause for the potential upward shift in the wage-setting curve in Poland.** Although high benefit replacement rates and tax wedges may affect the level of unemployment and labor force participation, the data do not point to significant changes in these variables since the mid-1990s. Nor there is evidence that any of the parameters determining unions' bargaining power (e.g., the extent of labor force unionization or legal changes favoring unions during the bargaining process) have changed. The relatively stable share of employees' compensation in aggregate value-added in Poland since the mid-1990s points to a stable elasticity of labor demand to changes in labor costs.[12] Finally, increased competition in product markets as Poland continues transition and globalization of production intensifies should imply larger elasticity of demand with respect to goods prices. This effect would force the wage-setting curve down as price increases due to wage cost pressures would have larger effects on firms' goods demand and, consequently, on employment.

27. **So, estimates of upward movements in the wage-setting curve would indicate the existence of a structural worsening in labor market conditions because of restructuring-related skill mismatches and lower job-search intensity.** On the other hand, labor demand shocks would shift the SLD curve in Figure 2 and trace the wage-setting relationship but would not be captured by the data as a modification in the wage-setting curve. For the purpose of this chapter, labor demand shifts are called "cyclical" although they may also represent structural or long-term changes associated, for instance, to deep expectation changes because of EU entry, and so on. Increased skill mismatch and weaker job search would also affect the elasticity of wages to the unemployment rate, represented as a flattening of the wage-setting relationship in Figure 2.

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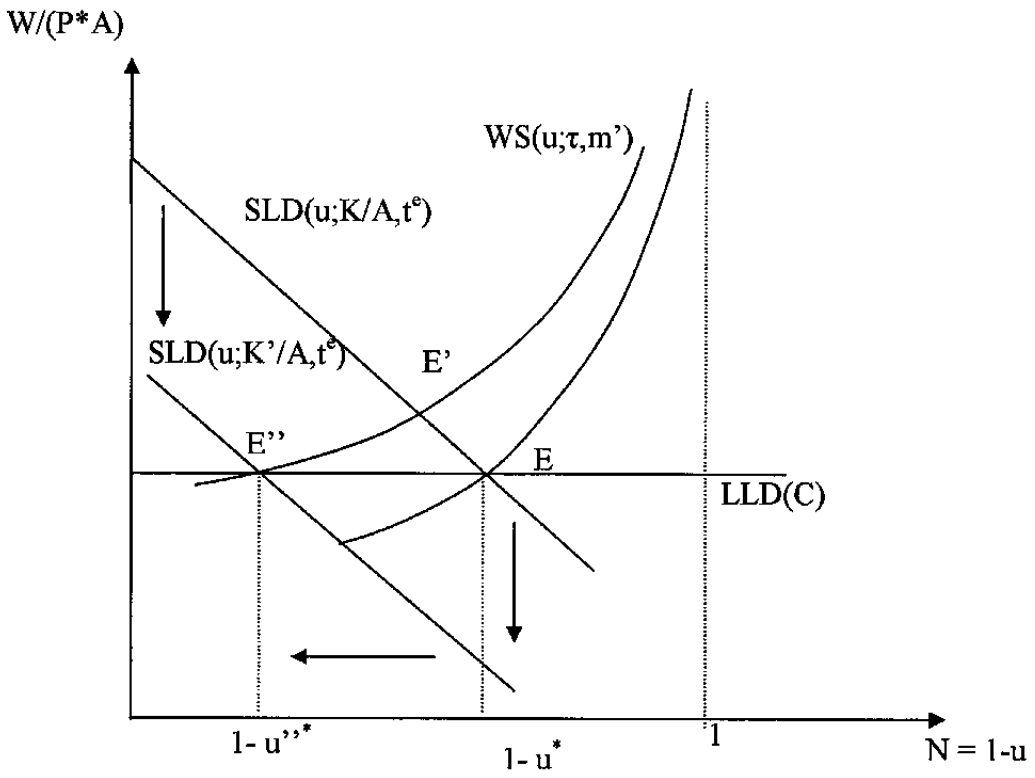
[12] The share of labor costs in total value-added is traditionally used as a proxy for the output/employment elasticity in the production function when workers are paid their marginal product, i.e. when firms hire labor on their labor demand curve.

28. In the long term, shifts in the wage-setting curve would be amplified into larger changes in the equilibrium unemployment rate as the capital stock adjusts to close the difference between the profit rate and the user cost of capital. In the long run, capital is variable and, assuming interest rates are determined abroad, the user cost of capital, *C*, is exogenously given. In this case, labor costs in efficiency units are set to equalize the profit rate to the user cost of capital independently of the unemployment rate as in:

$$C = \pi = g\left(\frac{W(1+t^e)}{PA}\right) \qquad (13)$$

As shown in Figure 3, the capital stock declines slowly to adjust profit rates to the user cost of capital after an upward shift in the wage-setting curve. This adjustment would stop when the wage-setting curve, the short- and the long-run labor demand (LLD) meet (point E'' in Figure 3).

Figure 3. Adjustment to the Long-Run Equilibrium



The empirical strategy

29. **Equation (9) was estimated with first-quarter data between 1995 and 2002 from the Labor Force Survey produced by the Polish Statistical Institute (GUS).** The following log-linear version of (9) illustrates what the empirical exercise will capture:

$$\ln(w_{irt}/(P_t * A_t)) = a + X_{it}'b + g_t \ln u_{rt} + d_t + d_r + e_{irt} \qquad (10)$$

where ln refers to natural log, w_{irt} is the hourly wage rate of individual i living in region r in year t, X_{it} is a vector of individual observable characteristics, u_{rt} is the unemployment rate in region r at year t, d_t and d_r are respectively temporal and regional dummies, and e_{irt} is the error term. d_t and g_t would point to shifts in the wage-setting relationship suggesting changes in structural unemployment. Because of data limitations, aggregate (as opposed to regional) measures of prices, P_t, and technology, A_t, were used.[13] The inclusion of a vector of individual specific characteristics allows controlling for many workers' characteristics (e.g., education, occupation, industry of employment, etc) which are certainly important for wage determination and could be correlated to the level of unemployment in each region. Finally, because Polish regions are used as the relevant level of aggregation for unemployment rates, estimates for the wage/unemployment elasticity shed some light on how fast wages adjust to temporary changes in regional unemployment.

30. **Blanchflower and Oswald (1994) show that estimates of (10), the so-called "wage curve", produce an elasticity of wages with respect to regional unemployment rates of about –0.1 for virtually all the countries analyzed.**[14] But, the authors have not explored the possibility of studying shifts in this relationship as a way of identifying structural unemployment changes. In addition, when estimating the relationship between unemployment and wages from survey data, it is necessary to guard against possible inefficient estimation that would result from covariance among individuals which is not entirely attributable to either their measured characteristics or the local unemployment rate (Moulton, 1986, 1990). To address this concern, the two-step estimation approach discussed in Card (1995) is used. In a first step, the following equation is estimated:

$$\ln w_{irt} = a + X_{it}'b + \sum_{r,t} \omega_{rt} \cdot 1_{Region=r} \cdot 1_{Time=t} + e_{irt} \qquad (11)$$

The interactive region and time dummies capture all region and time variation in the data, including those of inflation, labor-saving technological growth, aggregate changes in

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[13] Technological progress is assumed to be labor augmenting (Harrod neutral) to allow for balanced growth in a dynamic setup. The measure proposed here is a proxy for this variable and has also been used in Blanchard (1997). See Appendix II for a description of how this measure was derived for Poland.

[14] These countries were Australia, Austria, Canada, Germany, United Kingdom, Ireland, Italy, Netherlands, Norway, South Korea, Switzerland, and the United States.

institutions and replacement rates, and regional unemployment rates. The coefficients of these dummies, ω_{rt}, can be interpreted as the log average hourly regional wage at time t after controlling for individual specific characteristics. In a second step, this adjusted log wage variable can be deflated by the CPI and by an index capturing labor-saving technological growth and be regressed on the regional unemployment rate, region effects (to capture permanent effects on wage levels), time dummies (to measure the shifts in the wage-setting curve) and an interactive term to capture a changed elasticity for the period after 1998, $post98*lnu_{rt}$, as shown in equation (12):

$$\omega_{rt} - \ln(P_t * A_t) = c + g \ln u_{rt} + g_1 * post98 * \ln u_{rt} + d_t + d_r + e_{rt} \qquad (12)$$

31. **Because individual idiosyncrasies are already purged from the data in the first step, the coefficient of the time dummies and/or changes in the wage/unemployment elasticity as depicted in equation (12) can be readily matched to the aggregate developments discussed in previous sections.**

D. Structural Labor Market Changes[15]

32. **Using the preferred specification of equation (12), the equilibrium unemployment rate in Poland is estimated to have increased by about 15 percent since the mid-1990s.** Different specifications were tried and several econometric issues were dealt with. Those are discussed in Appendix III which includes all the econometric results in Table A2. The preferred specification, shown in column (1) of Table A2 and replicated below, excludes the interactive term with the unemployment rate as it is shown to be highly collinear with the time dummies capturing shifts in the intercept of equation (12). The constant and the coefficients of the regional dummies are shown in Table A2 but excluded here.

$$\omega_{rt} - \ln(P_t * A_t) = -0.065 * \ln u_{rt} + 0.046 * d_{1996} + 0.049 * d_{1997} + 0.096 * d_{1998} + \\ + 0.110 * d_{1999} + 0.109 * d_{2000} + 0.127 * d_{2001} + 0.154 * d_{2002}$$

[15] The first-step equation (11) is estimated using first-quarter LFS data from 1995 to 2002. The matrix of individual characteristics is comprised of: age, gender, marriage status, seven categories for the level of education (completed degree), 22 occupation types, 32 sectors of employment, company ownership (private or public), dummies if the job is temporary or if the worker holds an additional job, number of months in the current job and town size. Some standard transformations of these characteristics were also included: the square of age, and interactions between the education dummies, and age and age square, to account for non-linearities between work experience, human capital and wages. Individual hourly wages are equal to reported monthly net (of social security contributions) earnings of paid employees divided by actual weekly hours of work. The estimated coefficients tend to conform to standard priors: returns to education are positive, length of job tenure (months of work) has a positive coefficient, wages increase with age at a decreasing rate, married individuals tend to receive larger wages, industry and occupation dummies are jointly-significant. The actual estimates can be obtained upon request from the author.

The coefficient of the dummy variable for 2002 shows that real hourly wages adjusted for technology and composition effects (in the first-step regression) increased 15 percent for a given rate of unemployment since the mid-1990s. This can be roughly translated into a 15 percent increase in the long-term equilibrium unemployment rate as the wage-setting curve moves along a flat long-run labor demand curve (Figure 3). So, for the sake of illustration, taking the OECD estimates for the NAIRU in Poland in 1995 at around 13¾ percent, the estimates presented here would project the long-run NAIRU in 2002 at around 15¾ percent.[16] Cyclical shifts in labor demand, account for the extra unemployment observed in 2002.[17] While one could expect that a cyclical recovery in investment would reduce current unemployment rates to about 15 percent, structural policies aiming at shifting the wage-setting relationship down would create room for further declines.

33. **The upward shift in the wage-setting curve has been continuous since 1995, the beginning of the sample, and the cyclical slowdown after 1998 only made the underlying structural worsening in the labor market more evident.** The coefficients for the time dummies before 1999 are highly significant suggesting upward shifts in the wage-setting curve even before the economic slowdown initiated in mid-1998. The coefficient for the 2002 dummy is also statistically different from the coefficient for 1998, suggesting further shifts since then. Therefore, the observed detachment of wages to movements in the unemployment rate is a continuous process associated to transition, and the resulting firm restructuring, and not only a break after 1998.

34. **The estimated wage/unemployment elasticity is -0.065, a bit smaller than the reported universal estimate of -0.1 presented in Blanchflower and Oswald (1994).** However, large methodological differences between both studies prevent a direct comparison of these results. In addition, Estevão and Nigar (2002) showed, using a similar methodology to the one presented here, that OLS estimates of a wage-setting relationship for France generates an elasticity between -0.02 and -0.03 depending on the model used, a value significantly lower than the estimate for Poland. The same paper produces a -0.1 elasticity for France using an instrumental variables approach. Even though, the same instrumental variables approach could not be applied to the Polish case, the results for France point to the

[16] The unemployment rate according to official data on the number of people registered in the labor offices tend to be lower than the LFS-derived measure. The forecast presented in the staff report uses the registered unemployment rate data. So, the NAIRU consistent with the forecast would be a bit lower than the one discussed here.

[17] Notice that part of the decline in investment could be related to the long-run adjustment process of the capital stock depicted in Figure 3. Nevertheless, an evaluation of such an effect is outside the scope of this chapter.

possibility that the actual wage-unemployment elasticity in Poland may lie around -0.1 or be even bigger than that.[18]

E. Conclusions and Policy Discussions

35. **This chapter shows that structural changes in the Polish labor markets can explain part of the sharp increase in unemployment rates since 1998.** It actually shows a continuous structural worsening of the wage-setting curve towards more unemployment for a given wage level since the mid-1990s which became more evident with the cooling of economic activity after 1998. Additional evidence also shows that sector composition effects cannot explain regional disparities in employment performance within Poland even after the industry-specific shocks at the end of the 1990s.

36. **These conclusions were obtained by examining individual level data to unearth shifts in the equilibrium relationship between wages and unemployment once labor force composition effects and technological progress are taken into account.** Using the point estimates obtained here, the equilibrium unemployment rate was estimated to have increased by about 15 percent between 1995 and 2002 (with a 6 percent increase between 1998 and 2002). Benefits replacement rates, tax wedges, some product-side parameters and other institutional variables have remained roughly constant since the mid-1990s (or implied a downward shift in the wage-setting curve). Therefore, the likely culprits of the worsening in equilibrium unemployment rates are increasing skill-mismatches (because of economic restructuring and privatization), and lower job-search intensity among unemployed workers (as the share of long-term unemployed expanded and generous social transfers created a wedge between labor and out-of-work income.)

37. **Other countries facing similar labor market problems have introduced policies to enhance in-work benefits and improve skills of unemployed individuals.** The rise in long-term unemployment and in mismatches between the supply of and the demand for labor skills call for further labor market reforms. A cyclical output recovery would only have limited positive effects on unemployment and would serve to boost wages. Several countries have tried to improve incentives to work by introducing negative income taxes at the lower end of the wage distribution. Examples are the earned income tax credit (EITC) in the US, the working families' tax credit in the UK, and the more recently introduced *prime pour l'emploi* in France. Also, the accumulation of social transfers with work income could be considered. In France, for example, some social transfers (the *Revenue Minimum d'Insertion*, RMI, for instance) can be kept when an individual accepts a job, although the preservation of these benefits is means-tested and in most cases only temporary. Skill upgrade of unemployed workers should also be an aim but the evidence on the effectiveness of training programs elsewhere is sketchy. Direct subsidies to find and keep a job may be a better way to enhance worker skills through on-the-job training.

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[18] Lagged unemployment rates were used as instruments for an equation like (12) in the case of France. Here, estimates using lagged unemployment rates as instruments produced coefficients with very wide standard errors, and do not seem appropriate for the Polish data.

38. **These policies would also work in the direction of narrowing regional disparities in labor market performance, which tend to be driven by region-specific effects including the skill-mix of the local labor force.** On the other hand, industrial policies at the regional level would not have an important impact on job creation as lagging regions face a uniform employment growth gap across sectors. Policies to promote labor mobility within and across regions would also help to shrink differences in employment growth and to lower the persistent dispersion in regional unemployment rates. All the measures discussed here should, nonetheless, be studied carefully and adapted to Polish reality. In particular, the room for targeted tax cuts and increased spending on skill-upgrading policies may be narrow because of the difficult fiscal situation.

THE POLISH LABOR FORCE SURVEY

The LFS is conducted as a sample survey which allows the generalization of its results to the whole population. The quarterly sample currently amounts to 24,570 housing units and generates, on average, 50,000 observations each quarter. The survey was carried out quarterly, sampling individuals on the mid-month week containing the 15th day. Since the fourth quarter of 1999, a continuous observation method (mobile surveying week for all months of each quarter) has been used.

This chapter uses data for the first quarter of each year from 1995 to 2002. Data for the first quarter of 1993 and 1994 were also available but significant discontinuities in the way key variables were recorded (sector of employment, occupation categories, firm ownership, among others) prevented the inclusion of these first two years in the panel data used in the estimation. Consistent information on region of residence for the whole sample period was also available thanks to special data work performed by GUS analysts.[19]

Hourly wage information is obtained after dividing reported monthly net (of social security contributions) earnings of employees by actual weekly hours of work in the reference week. Therefore, the sample does not include self-employees. As to be expected from the aggregate reduction in employment in Poland throughout the sample period, the size of the resulting database varied from about 16,200 observations in 1995 to about 10,500 in 2002. The entire panel data used in the first step regression contains about 112,000 observations.

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[19] A large administrative reform in Poland in 1999 re-configured the regional breakdown from 42 to 16 entities. Therefore, original LFS data do not provide consistent information on region of residence throughout the sample period. The author thanks Hanna Strzelecka from the GUS, and Robert Sierhej and Cyrus Sassanpour from the IMF Resident Representative office in Warsaw for their help in obtaining the modified version of the LFS data. Dorota Holzer-Zelazewska from the World Bank and Beata Kudela from the IMF gave great help with data documentation and survey translations. Jan Rutkowski from the World Bank provided crucial insights on data availability for Poland at the beginning of this research.

CAPITAL ACCUMULATION AND TECHNOLOGICAL GROWTH IN POLAND

Using a simple Cobb-Douglas production function, the output level is determined by labor-saving technological growth, labor and capital inputs as in (A.1):

$$Y = (A * N)^{\alpha} * K^{(1-\alpha)} \qquad \text{(A.1)}$$

A, the technology variable, can be obtained by residual using measures of output and production inputs as well as an estimate of the labor elasticity, α. For output and labor input, GDP and total employment were used. The labor elasticity was assumed to be 0.7 throughout the sample, as in many calculations for other countries. Besides the usual caveats with this type of calculation, there are no official estimates of the capital stock for Poland. The methodology proposed in Doyle, Kuijs, and Guorong (2001) to calculate the capital stock in Poland using national accounts data on gross fixed investment was used instead. Briefly, the basic assumptions are:

a) 1985 capital-output ratio was 10 percent lower than the one in Hungary (see Borensztein and Montiel (1991));

b) depreciation rate set at 5.5 percent, lower than the one used for other Central European Countries because of the larger share of buildings in total capital stock in Poland;

c) transition to a market economy made 35 percent of the capital stock obsolete in 1991.

As a reality check, the resulting capital stock in 1998 matches an official estimate for the year.

The resulting path of labor-saving technological growth for Poland as well as calculations for selected European, Anglo-Saxon and Japanese economies are shown in the table below. The calculations for these other countries use OECD data for the business sector because that is the level of aggregation for which the OECD calculates the stock of capital. The same value for the labor elasticity, 0.7, is used. As it can be seen in the table, the technological growth after the mid-1990s broadly matches the figures for the other economies with the exception of the well-known cases of the USA and Canada where an acceleration of total factor productivity, associated to "new economy" effects, is present. Notice, however, that the data for these other economies should be marked down when making direct comparisons with Poland since it is to be expected larger technological growth in the business sector than in the economy as whole. The surge in technological growth in the first half of the 1990s (which is not included in the analysis in this chapter) is reasonable because it comes immediately after the transition from communism, and the rapid economic changes it entailed.

Table A1. Labor-Saving Technological Growth in Selected Countries

(Percent change at an annual rate)

	Poland	France	Germany	Italy	Netherlands	Spain	Canada	U.K.	U.S.A.	Japan
	(Total)	(Business sector)								
1991-95	7.8	3.2	4.2	4.6	3.3	4.6	3.9	4.6	4.0	2.8
1995-98	3.4	3.5	2.6	3.2	3.7	4.1	4.1	3.8	5.6	3.2
1998-02	3.4	3.6	2.0	2.4	2.9	3.7	4.8	3.6	4.6	2.7

Sources: OECD; Polish authorities; and author's calculations.

TECHNICAL DISCUSSION OF ECONOMETRIC ESTIMATES

Equation (12) is estimated using Feasible Generalized Least Squares (FGLS) to allow for variation in regional error variance and serial correlation of the residuals. The dependent variable is comprised of the coefficients of the interactive dummies adjusted for CPI inflation and a measure of labor-saving technological growth. The first problem with estimating the second-step equation (12) is that the interactive post-1998 term is likely to be quite correlated to the time dummies from 1999 to 2002. So, even though one should expect smaller wage/unemployment elasticity to come together with an outward shift of the wage-setting curve, in practice there may not be enough variation in the data to estimate both effects.

Estimates in columns (1) to (3) in Table A2 illustrate this problem. Column (1) lists the preferred specification used to derive the main conclusions in this chapter. Column (2) adds an interactive dummy with the unemployment elasticity for the post-1998 period. Column (3) excludes the time dummies but keeps the interactive term. In column (2), the interactive term with the unemployment rate is positive, as expected, but it is not statistically different from zero. The wage-setting curve is estimated to have shifted up continuously during the sample but the precision of the estimated shifts are weak after 1998 (with the exception of the shift in 2002). Lack of precision of these estimates suggests the collinearity argued above. The time dummies are excluded in the specification listed in column (3) and the coefficient of the interactive term is precisely estimated to be 0.03 while the estimated unemployment elasticity for before 1999 is -0.11. Because the exclusion of the time dummies may provoke more serious specification errors (and because an F-test reveal that they are jointly significant in specification (2) while the interactive term is not) specification (1) is chosen as the best one.

Several variations of equation (12) may prove to be important. First, the relationship between log unemployment and log wages may not be linear. In this case, higher order polynomials of the local unemployment rate can be used in the estimation of (12). Second, since wages may not adjust immediately to variations in unemployment, lagged wages should be included, which is a common practice in the literature on the Phillips curve.[20]

Blanchflower and Oswald (1994) showed some evidence that the relationship between wages and the unemployment rate is convex but can be well-approximated by a simple log-linear function as written in (12). Column (4) in Table A2 checks for non-linearities in this log specification by including a square term for the log unemployment rate. It provides only weak evidence of some non-linearity in the log specification as the coefficient of the quadratic term is statistically different from zero only at the 10 percent level of significance. The shifts in the wage curve were not affected by the inclusion of the quadratic term. Other specifications (including the cube of the log unemployment rate, for instance) were more strongly rejected by the data.

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[20] See Bell (1996) and Blanchard and Katz (1997).

Another debate in the literature on wage equation estimation refers to its interpretation. While in its pure form equation (12) relates the *level* of wages to the *level* of unemployment it could be more appropriate to relate *changes* in wages to log unemployment. The data flatly rejects this alternative model (not shown) and also a variant of it when lagged log unemployment rate is included (also not shown). A less radical dynamic specification of (12) (and the one actually used and rejected by Blanchflower and Oswald (1994)) includes lagged wages as a regressor. The results are shown in column (5). Because of the presence of a lagged dependent variable, regional fixed effects, and serial correlation of the residuals Arellano and Bond (1991) GMM estimator is used. The coefficient of the lagged term is deemed to be insignificantly different from zero.[21] The wage-setting curve is still estimated to have shifted up within the sample period.

[21] Following the suggested procedure in Arellano and Bond (1991), the coefficient estimates and their standard errors are obtained from the robust one-step version of their GMM estimator. On the other hand, the model evaluation statistics reported at the bottom of column (5) are the ones obtained from their two-step estimator. The over-identifying restrictions imposed by their model cannot be rejected and the hypothesis of serial correlation of order one (but not of order two) are confirmed.

Table A2. Poland: Estimates of the Wage-Setting Relationship 1/

	(1)		(2)		(3)		(4)		(5)	
	Coef.	Std. Err.	Coef.	Std. Err.	Coef.	Std. Err.	Coef.	Std. Err.	Coef.	Std. Err.
Ln(unemp. rate)	-0.065**	0.017	-0.071**	0.019	-0.110**	0.017	-0.266*	0.118	-0.055*	0.024
Ln(unemp. rate)*post98	...	...	0.014	0.016	0.031**	0.002	...	...	...	...
Ln(unemp. rate)^2	...	...	...	...	...	...	0.037	0.022	...	...
Ln(wage) lagged once	...	...	...	...	...	...	...	...	0.228	0.159
Regional dummies:										
Kujawsko-Pomorskie	-0.049**	0.010	-0.048**	0.010	-0.051**	0.014	-0.047**	0.010	n.a	n.a
Lubelskie	-0.048**	0.011	-0.048**	0.011	-0.057**	0.014	-0.047**	0.011	n.a	n.a
Lubuskie	0.018*	0.008	0.018*	0.008	0.018	0.013	0.016	0.009	n.a	n.a
Lodzkie	-0.054**	0.009	-0.054**	0.009	-0.059**	0.014	-0.052**	0.009	n.a	n.a
Malopolskie	-0.022*	0.011	-0.021*	0.011	-0.033	0.017	-0.021	0.011	n.a	n.a
Mazowieckie	0.062**	0.012	0.063**	0.012	0.052**	0.018	0.064**	0.012	n.a	n.a
Opolskie	0.004	0.011	0.004	0.011	-0.003	0.016	0.006	0.012	n.a	n.a
Podkarpackie	-0.048**	0.007	-0.047**	0.007	-0.051**	0.014	-0.046**	0.007	n.a	n.a
Podlaskie	-0.045**	0.009	-0.045**	0.009	-0.054**	0.014	-0.043**	0.009	n.a	n.a
Pomorskie	0.003	0.007	0.003	0.007	-0.001	0.012	0.004	0.007	n.a	n.a
Slaskie	-0.017	0.009	-0.018*	0.009	-0.028*	0.014	-0.017	0.009	n.a	n.a
Swietokrzyskie	-0.082**	0.009	-0.082**	0.009	-0.086**	0.014	-0.080**	0.009	n.a	n.a
Warminsko-Mazurskie	-0.007	0.010	-0.006	0.010	0.002	0.016	-0.011	0.010	n.a	n.a
Wielkopolskie	-0.032**	0.011	-0.032**	0.011	-0.041**	0.016	-0.031**	0.010	n.a	n.a
Zachodniopomorskie	0.029**	0.007	0.029**	0.007	0.033*	0.015	0.029**	0.007	n.a	n.a
Time dummies:										
d1996	0.046**	0.005	0.046**	0.005	...	...	0.047**	0.005	...	...
d1997	0.049**	0.006	0.048**	0.006	...	...	0.050**	0.006	...	...
d1998	0.096**	0.007	0.095**	0.008	...	...	0.094**	0.007	0.047**	0.012
d1999	0.110**	0.006	0.074	0.044	...	...	0.110**	0.006	0.053**	0.017
d2000	0.109**	0.006	0.070	0.047	...	...	0.108**	0.006	0.049*	0.022
d2001	0.127**	0.007	0.088	0.048	...	...	0.124**	0.007	0.075*	0.039
d2002	0.154**	0.008	0.114**	0.049	...	...	0.150**	0.008	0.102*	0.048
Constant	-6.501**	0.051	-6.483**	0.056	-6.330**	0.048	-6.231**	0.164	-0.003	0.010
Estimation method	FGLS		FGLS		FGLS		FGLS		Arellano and Bond GMM est.	
Error structure	Heterosk. & AR(1) Estimated AR(1) coeff. = 0.2		Heterosk. & AR(1) Estimated AR(1) coeff. = 0.2		Heterosk. & AR(1) Estimated AR(1) coeff. = 0		Heterosk. & AR(1) Estimated AR(1) coeff. = 0.2		Coefficients: Homosk. & AR(1) Model evaluation: Het. & AR(1)	
Diagnostic statistics	Wald Chi-sq. (23) = 1299.0 Prob. > Chi-square = 0 Log likelihood = 351.0		Wald Chi-sq. (24) = 1299.1 Prob. > Chi-square = 0 Log likelihood = 351.3		Wald Chi-sq. (17) = 305.8 Prob. > Chi-square = 0 Log likelihood = 264.6		Wald Chi-sq. (24) = 1304.62 Prob. > Chi-square = 0 Log likelihood = 352.1		Sargan test: Chi sq.(20) = 10.2 Prob. > Chi-square = 0.96 H0: no 1st order autocorr. z = -3.06; Pr > z = 0.00 H0: no 2nd order autocorr. z = 0.16; Pr > z = 0.87	
Number of observations	128		128		128		128		96	
Number of groups	16		16		16		16		16	
Number of time periods	8		8		8		8		6	

Source: Author's estimation using first quarter LFS data from 1995 to 2002.

Notes:

The year 1995 and the Dolnolaskie region are the excluded dummies in the estimations above. In column (5) the excluded dummy is the one for 1997 as the lag structure in that specification uses up two years of data.

* Significant at 5 percent level; ** Significant at 1 percent level.

1/ Refers to Equation 12 in the text.

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