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# Economic Restructuring in the New EU Member States and Selected Newly Independent States: Effects on Growth, Employment and Productivity[1]

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## Executive Summary

This paper provides an overview of longer-term structural developments in the New EU Member States (NMS) from Central and Eastern Europe NMS and in selected newly independent states (NIS: Belarus, Russia and Ukraine). It analyses structural changes in both groups of countries and patterns of productivity catching-up at both macro level and within the individual industries. With the transformational recession of early 1990s left behind, the majority of NMS and NIS embarked on a path of rapid economic growth. The NMS, and recently also NIS, have experienced an impressive productivity catching-up, at both macroeconomic level and in manufacturing industry in particular. Structural changes observed during the past decade brought the NMS' economies nearer to the economic structure observed in the EU-15, but the shifts of labor among individual sectors or industries themselves did not have any marked impact on aggregate productivity growth. Similar to EU-15, the recent productivity catching-up observed in both the NMS and NIS resulted overwhelmingly from across-the-board productivity improvements in individual sectors of the economy while employment shifts among sectors had only a negligible effect on aggregate productivity growth. Notwithstanding fast productivity catching-up, the estimated productivity levels indicate that NMS (and even more so the NIS) are in this respect still considerably lagging behind advanced West European economies, implying a huge catching-up potential. The shadow side of productivity catching-up is a difficult situation on the labor market. Estimated elasticity of employment

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to GDP growth suggest that economic growth below 5% per year will not be sufficient to generate additional jobs. The required further productivity convergence may thus be in conflict with urgently needed employment growth.

**Keywords:** Structural change, economic growth, productivity, employment, EU integration, Central and Eastern Europe, Newly Independent States
**JEL classification:** E24, F43, J21, J60, O11, P52

# 1. Development of GDP, Employment and Macro-Productivity in NMS

The Central and Eastern European countries which became members of the EU on 1st May 2004 – the Czech Republic, Estonia, Hungary, Latvia, Lithuania, Poland, the Slovak Republic and Slovenia (the New EU Member States – NMS) went through the dramatic phase of the "transitional recession" in the first half of the 1990s. In this period their GDP and employment recorded considerable declines (chart 1), due to supply as well as demand shocks caused by the loss of traditional export markets, the disruption of existing supply chains and decision-making structures, sudden trade liberalisation and restrictive macroeconomic policies. During 1990–1995, the NMS experienced a cumulated decline of real GDP by 4.6%. This translated into a substantial *negative* growth differential ("falling behind" by more than 12 percentage points) for the NMS vis-à-vis the EU-15 which grew by nearly 8% during that period (chart 1 and table 1).[2]

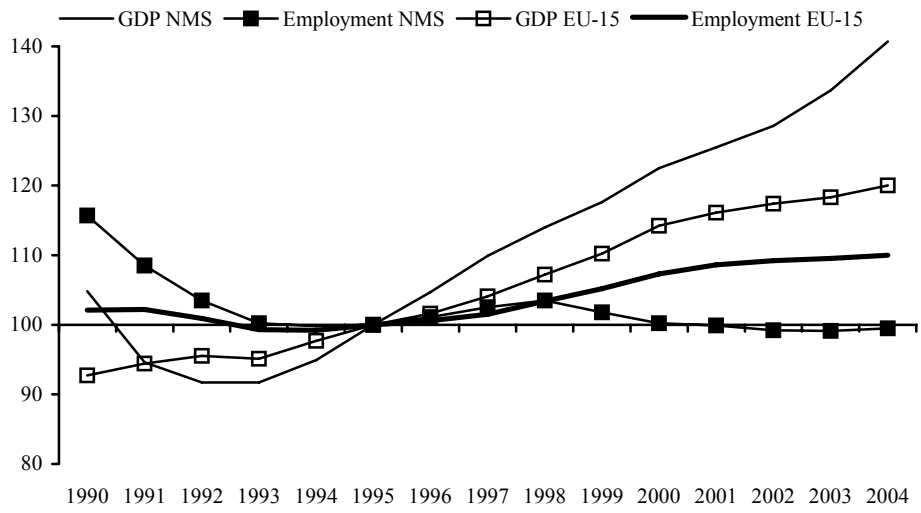
From 1993/94 onwards (in Poland already in 1992), economic recovery gained momentum in the NMS and their average growth began to exceed that of the EU-15.[3] However, a closer look reveals that most of these countries experienced further – at times sharp – interruptions in their growth processes due to delayed/failed corporate restructuring and occasional financial crises (often called "secondary transformational recessions") and/or macroeconomic imbalances, sometimes caused by unsustainable current account or fiscal deficits. Also, the growth process became more differentiated across the region, with the two candidate countries, Romania and Bulgaria, lagging behind significantly (see in the Appendix). For the period 1995–2004, the average annual growth rate of GDP was 3.9% for the NMS. GDP growth accelerated moderately after 1995 in the EU-15 as well, with an average annual growth rate of 2% over the period 1995–2004. The growth differentials thus turned in favour of the NMS: it reached more than 20 percentage points in cumulative terms and 1.8 percentage points per annum for

[2] For the NMS, this paper draws on the author's earlier study undertaken on request of EU DG Employment, Social Affairs and Equal Opportunities during 2004 (see Havlik, 2005).

[3] Data on individual countries can be found in the Appendix.

the NMS. Taking into consideration the whole period 1990–2004, there has been just a small difference in cumulative GDP growth for the NMS relative to the EU-15 (less than 5 percentage points and therefore hardly any catching-up (table 1).

*Chart 1: GDP, Employment and Productivity in the EU–15 and the NMS*




*Note: 1995 = 100.*

*Source: wiiw database incorporating national statistics and AMECO, wiiw estimates (weighted averages).*

*Employment* in the NMS declined even more strongly than GDP in the first years of transition (–13% between 1990 and 1995) and did not fully recover even afterwards (chart 1 and table 1). For the whole period 1990–2004, the cumulated employment decline in the NMS reached 14% (nearly 6 million jobs were lost) – again with notable differences across the region. In the more recent period for which comparable data are available (after 1995), declining employment in Poland has been the main contributor for the dismal labor market performance of NMS as a group (see Landesmann and Vidovic, 2005). In the EU-15, overall employment declined in the first half of the 1990s as well, but to a much lesser extent than in the NMS. In the second half of the 1990s and early 2000s, EU-15 employment has been moderately growing (1.1% annually), resulting in a cumulated increase of employment throughout the whole period 1990–2004 by almost 8%.

## *Table 1: Long-Term Productivity Catching-Up of NMS and NIS vis-à-vis EU-15*

| Country groups | 1990–1995 | | | | 1995–2004 | | | | 1990–2004 | | | | 2000–2004 | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | growth rate in % | | growth differential against EU-15 in pp | | growth rate in % | | growth differential against EU-15 in pp | | growth rate in % | | growth differential against EU-15 in pp | | growth rate in % | | growth differential against EU-15 in pp | |
| | cumu-lated | annual average | cumu-lated | annual average | cumu-lated | annual average | cumu-lated | annual average | cumu-lated | annual average | cumu-lated | annual average | cumu-lated | annual average | cumu-lated | annual average |
| NMS[1)] | | | | | | | | | | | | | | | | |
| GDP | -4.6 | -0.9 | -12.4 | -2.5 | 40.7 | 3.9 | 20.7 | 1.8 | 34.2 | 2.1 | 4.8 | 0.3 | 14.9 | 3.5 | 9.8 | 2.3 |
| Employment | -13.5 | -2.9 | -11.5 | -2.5 | -0.5 | -0.1 | -10.5 | -1.1 | -14.0 | -1.1 | -21.8 | -1.6 | -0.7 | -0.2 | -3.2 | -0.8 |
| Macro-productivity | 10.3 | 2.0 | 0.3 | 0.0 | 41.4 | 3.9 | 32.3 | 3.0 | 56.0 | 3.2 | 35.9 | 1.9 | 15.7 | 3.7 | 13.2 | 3.1 |
| Belarus | | | | | | | | | | | | | | | | |
| GDP | -33.9 [2)] | -9.8 [2)] | -41.7 | -11.4 | 77.0 | 6.5 | 57.0 | 4.5 | 17.0 [3)] | 1.2 [3)] | -12.4 | -0.6 | 30.1 | 6.8 | 25.0 | 5.6 |
| Employment | -12.2 [2)] | -3.2 [2)] | -10.2 | -2.8 | -2.5 | -0.3 | -12.5 | -1.3 | -14.4 [3)] | -1.2 [3)] | -22.2 | -1.7 | -3.2 | -0.8 | -5.7 | -1.4 |
| Macro-productivity | -24.7 [2)] | -6.9 [2)] | -34.8 | -8.8 | 81.5 | 6.8 | 72.4 | 5.9 | 36.6 [3)] | 2.4 [3)] | 16.6 | 1.1 | 34.4 | 7.7 | 31.9 | 7.1 |
| Russia | | | | | | | | | | | | | | | | |
| GDP | -34.7 [2)] | -10.1 [2)] | -42.5 | -11.6 | 37.1 | 3.6 | 17.1 | 1.5 | -10.4 [3)] | -0.8 [3)] | -39.8 | -2.7 | 26.6 | 6.1 | 21.5 | 4.8 |
| Employment | -13.1 [2)] | -3.5 [2)] | -11.1 | -3.1 | 5.0 | 0.5 | -5.0 | -0.5 | -8.8 [3)] | -0.7 [3)] | -16.5 | -1.2 | 4.9 | 1.2 | 2.3 | 0.6 |
| Macro productivity | -24.8 [2)] | -6.9 [2)] | -34.9 | -8.8 | 30.5 | 3.0 | 21.4 | 2.0 | -1.8 [3)] | -0.1 [3)] | -21.9 | -1.5 | 20.7 | 4.8 | 18.2 | 4.2 |
| Ukraine | | | | | | | | | | | | | | | | |
| GDP | -47.7 [2)] | -14.9 [2)] | -55.5 | -16.5 | 27.8 | 2.8 | 7.8 | 0.7 | -33.1 [3)] | -3.0 [3)] | -62.5 | -4.9 | 41.1 | 9.0 | 36.0 | 7.7 |
| Employment | -3.5 [2)] | -0.9 [2)] | -1.5 | -0.5 | -15.9 | -1.9 | -25.9 | -3.0 | -18.8 [3)] | -1.6 [3)] | -26.6 | -2.1 | 0.6 | 0.1 | -1.9 | -0.5 |
| Macro productivity | -45.8 [2)] | -14.2 [2)] | -55.8 | -16.1 | 52.0 | 4.8 | 42.9 | 3.8 | -17.6 [3)] | -1.5 [3)] | -37.7 | -2.8 | 40.3 | 8.8 | 37.8 | 8.2 |
| EU-15 | | | | | | | | | | | | | | | | |
| GDP | 7.8 | 1.5 | - | - | 20.0 | 2.0 | - | - | 29.4 | 1.9 | - | - | 5.1 | 1.3 | - | - |
| Employment | -2.0 | -0.4 | - | - | 10.0 | 1.1 | - | - | 7.8 | 0.5 | - | - | 2.5 | 0.6 | - | - |
| Macro productivity | 10.1 | 1.9 | - | - | 9.1 | 1.0 | - | - | 20.1 | 1.3 | - | - | 2.5 | 0.6 | - | - |

*Notes: 1) NMS: Central and Eastern European New EU Member States, comprising the Czech Republic, Estonia, Hungary, Latvia, Lithuania, Poland, the Slovak Republic and Slovenia (data for individual NMS – see in the Appendix). 2) 1991–1995.–3) 1991–2004.*

*Sources: wiiw Database incorporating national statistics, CISSTAT, wiiw calculations using AMECO.*

Turning now to aggregate developments of productivity, *macro-productivity* in the NMS rose on average at a similar pace as in the EU-15 in the period 1990–1995 (table 1).[4] But productivity gains in the NMS during that period resulted solely from massive labor shedding which overcompensated the fall in output. Thus, productivity gains reflected at that time the painful adjustment process going on in these countries rather than a successful restructuring and modernisation of their economies.

In the second half of the 1990s and early 2000s, the rise of macro-productivity strongly accelerated in the NMS and this time productivity growth was supported by fast rising GDP at relatively constant employment levels in most NMS (Poland was the main exception). During 1995–2004, productivity growth was significantly higher in the NMS than in the EU-15 (3.9% per annum as compared to 1% in the EU-15). The process of impressive "productivity catching-up" of the NMS after 1995 (more than 30 percentage points) is clearly demonstrated in chart 1 by a difference between GDP and employment lines. The cumulated "productivity gain" of the NMS vis-à-vis the EU-15 over the whole period 1990–2004 reached nearly 36 percentage points, almost all of which was achieved after 1995 (table 1).

## 2. Development of GDP, Employment and Macro-Productivity in Selected NIS

Effects of transformational recession on the Newly Independent States (NIS) were even more pronounced that in the Central and Eastern European NMS and lasted longer since they were compounded by the break up of the Soviet Union, occasional civil conflicts as well as by delayed reforms or reform setbacks. The Central Asian and Caucasian former Soviet republics (Azerbaijan, Georgia, Kyrgyzstan and Tajikistan were hit hardest; where GDP fell by half between 1991 and 1995). Severe GDP declines occurred in Moldova and Ukraine as well. On average, CIS (12 republics of the Commonwealth of Independent States) GDP fell by nearly 40% between 1991 and 1995 and did not fully recover until 2004.[5]

Developments in the three NIS analysed in this paper– Belarus (BY), Russia (RU) and Ukraine (UA) – are shown in U-shaped lines in chart 2. During the first half of 1990s, the most dramatic fall in GDP was recorded by Ukraine (almost 50%); Belarus and Russia suffered a bit less (–35%). NIS GDP decline was much bigger than in Central and Eastern European NMS; the fact that Baltic States

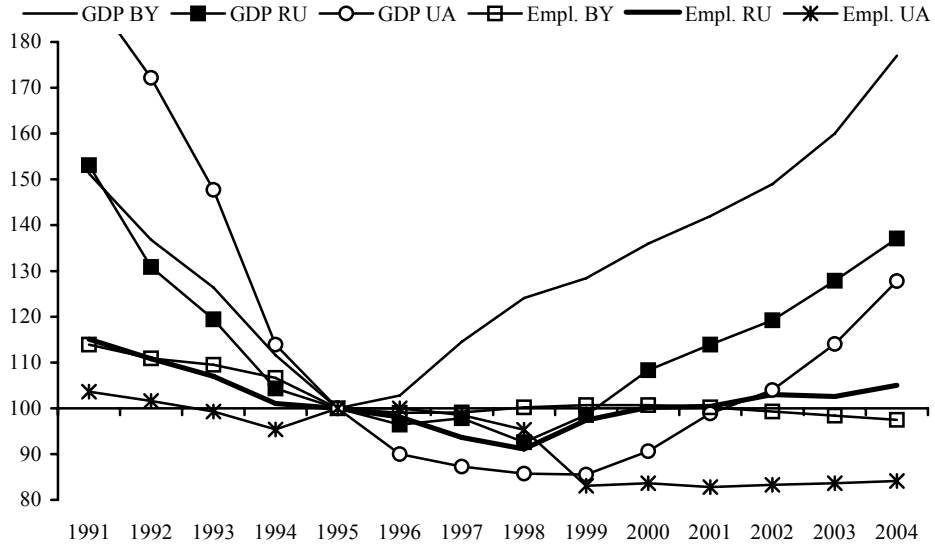
[4] Macro-productivity is defined as GDP per employed person – employees and self-employed.

[5] Several former Soviet republics suffered from GDP declines even before 2001. It is interesting to note that Belarus, Uzbekistan and Kazakhstan, with cumulative GDP declines between 20-30%, fared relatively better during the early transition period - see CIS Statistical Yearbook, CISSTAT, Moscow, 2005.

suffered to a similar extent suggests than disintegration of the Soviet Union was the main culprit. The two latter countries, Belarus and Russia, experienced a drop in employment of similar magnitude like the NMS during this period. In contrast, employment decline in Ukraine was much less pronounced – a possible indication of delayed reforms. Yet delayed (active) restructuring is visible in all three NIS: it is demonstrated by enormous falls in labor productivity – in contrast to NMS where productivity increased more or less in line with EU-15 in the first half of 1990s (table 1).

After 1995, the NIS GDP started to recover (although the recovery was interrupted in 1998 by the Russian financial crisis), and the economic growth even strengthened in early 2000s. The fastest GDP growth – at least according to official statistics – was recorded in Belarus (6.5% per year on average during 1995–2004), followed by Russia and Ukraine (table 1). Yet both latter countries (and especially Ukraine) performed worse in terms of GDP growth than NMS in this period. However, in terms of productivity growth Belarus and Ukraine outperformed the NMS (Ukraine partly thanks to labor shedding). Russian productivity growth was least impressive – as employment started to recover.

*Chart 2: GDP, Employment and Productivity in Selected NIS*

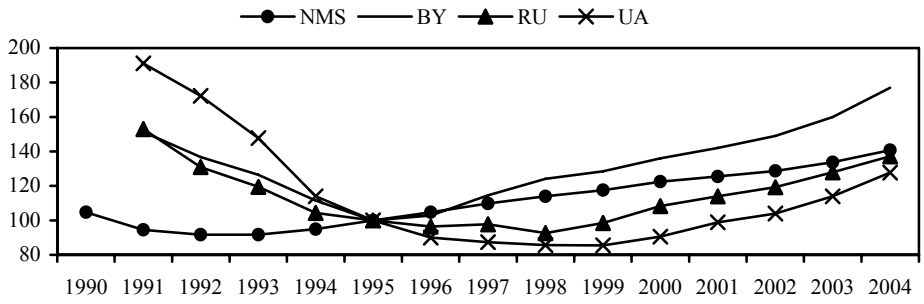



*Note: 1995 = 100.*

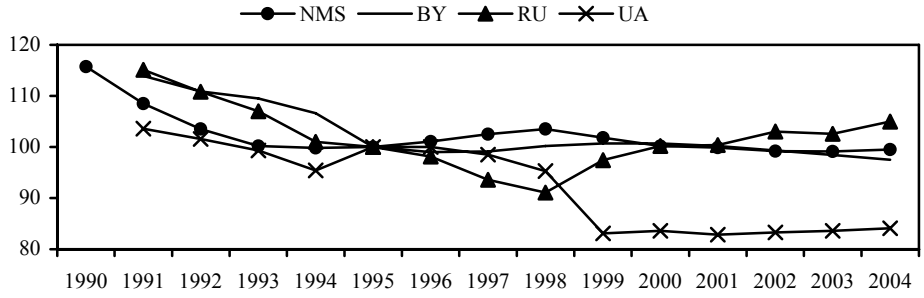
*Source: wiiw Database incorporating national statistics and CISSTAT.*

*Chart 3: GDP, Employment and Macro-Productivity in the NMS and Selected NIS*

**GDP**

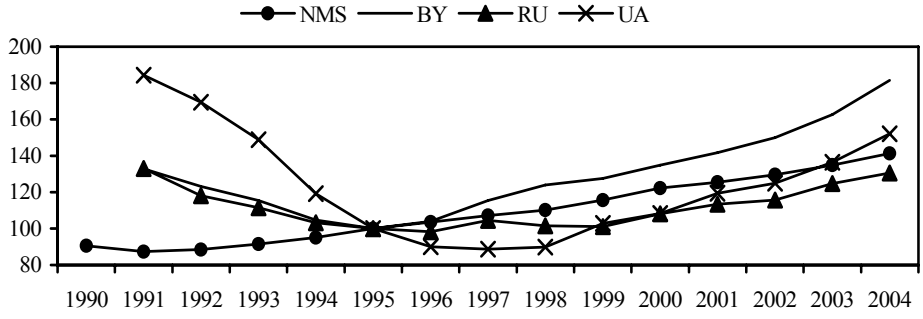



**Employment***




**) employees and self-employed.*

**Macro-productivity**
(GDP per persons employed)




*Note: 1995=100.*

*Source: wiiw Database incorporating national statistics, CISSTAT.*

Over the whole transition period (1990–2004), the NIS economic performance has been largely disappointing. Their cumulated economic growth has been not only lower than in NMS, but Russia and especially Ukraine even fell back in terms of GDP and productivity.[6]

Compared to EU-15, all three NIS fell back in terms of GDP (contrary to catching-up of NMS). Only Belarus enjoyed somewhat higher productivity growth than EU-15, yet even in this respect the NMS performance had been much better (table 1). The aggregate picture of comparative economic developments in NMS and NIS in the whole transition period 1990–2004 (illustrated in chart 3) thus suggests not only a worse relative performance of the NIS, but even their widening gap vis-à-vis EU-15 (with the exception of productivity catching-up in Belarus).

Our hypothesis regarding delayed restructuring in the NIS seems to be supported by looking at the more recent macroeconomic performance (during 2000–2004 – see table 1). In this period, both Belarus, Russia and especially Ukraine (but other NIS as well) enjoyed rapid GDP growth and strong productivity improvements which were not only bigger than in EU-15 but even substantially higher than the majority of NMS. Yet whether this is a reflection of first positive restructuring effects, belated accommodation to Soviet disintegration or simply a reflection of low starting levels (and therefore of a higher potential for catching-up in line with Gerschenkron hypothesis) remains to be seen.[7]

## 3. Estimated Income and Productivity Gaps: EU-15, NMS and Selected NIS

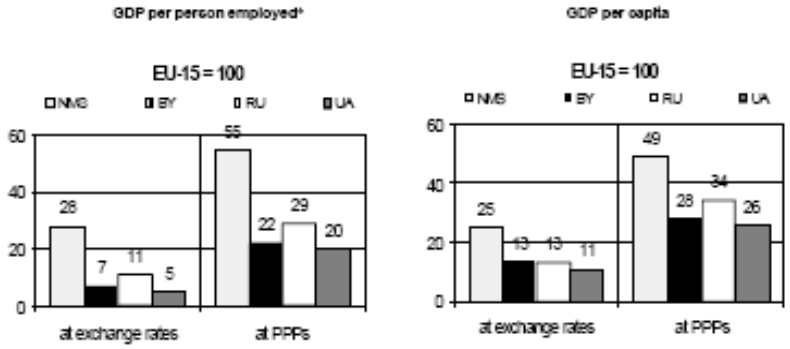
Despite a remarkable productivity catching-up, the level of macro-productivity in the NMS is still very low compared to the EU-15 average, leaving ample space for further growth and catching-up. In the year 2004, the average level of macro-productivity (compared at current exchange rates) for all Central and Eastern European NMS was only 28% of the average EU-15 level. Measured at purchasing power parities (PPPs), which correct for undervalued currencies still prevailing in most NMS, the average level of macro-productivity in NMS reached about 55% of the EU-15 average (chart 4).[8]

[6] By end-2004, only Armenia, Belarus, Kazakhstan and Uzbekistan have surpassed their respective GDP levels of 1991 – see CISSTAT, op. cit.

[7] Baltic States (Estonia, Latvia and Lithuania) also display high catching-up rates of GDP and productivity growth.

[8] However, for the more advanced NMS such as Slovenia and the Czech Republic, macro-productivity measured at exchange rates has already reached between 50 % and 60 % of the EU-15 level, resp. between 70% and 80%, if PPPs were used for conversion. At the same time, even the least developed NMS (Latvia, Lithuania and Poland) have higher productivity and income levels than NIS (Russia).

*Chart 4: Levels of Macro-Productivity and of GDP per Capita in the NMS and Selected NIS, year 2004*




**) employees and self-employed; PPPs = purchasing power parities.*

*Source: wiiw calculations using national statistics, CISSTAT and AMECO database.*

Per capita real incomes (a crude measure of economic development level) in the NMS are even lower than productivity due to their relatively low employment rates (and high unemployment). In the NIS, crude estimates (especially for Belarus which does not participate in international PPP comparisons) of macro-productivity and per capita incomes suggest even lower levels than in NMS and thus also a huge potential for catching-up. NIS productivity gaps behind the NMS are of similar magnitude as the NMS gap vis-à-vis EU-15 (chart 4). However, contrary to the NMS, relative per capita incomes in the NIS are somewhat higher that relative productivity levels. Again, the main explanation for this are employment rates (which are relatively high in the NIS – at least according to the official statistics).[9]

## 4. Changes in Broad Sectoral Structures

Economic developments in the transition countries were characterized by large shifts in the sectoral composition of GDP and employment, indicating a clear tendency of adjustment towards the broad economic structures in the more advanced countries. The NMS started off in 1990 with a larger agricultural and industrial sector on the one hand and a smaller services sector than the more advanced EU-15 countries on the other hand (charts 5 and 6; see also Havlik, 2005;

[9] Belarus PPP with respect to EUR was estimated by the author after extrapolation with GDP price deflators from intra-CIS PPP comparison for 2000 using Russia as a bridge (27.1 BYR per RUR in 2000 - see: www.gks.ru/bgd/free/b02_18/IswPrx.dll/Stg/d000/i030860r.htm).

Landesmann and Vidovic, 2005).[10] Similar broad patterns of structural change have been underway in the NIS as well (although comparable data are available for later period only). The broad shifts occurring after 1990 in the transition countries can thus be summarized under the headings of *de-agrarianization, de-industrialization and tertiarization*. However, there are a few recent interesting cases of "re-agrarianization" and "re-industrialization" as well. But while the former are considered to be of a transitory nature, the latter may become a more common phenomenon in the future – at least for some NMS.

An overall tendency for de-agrarianization, de-industrialization and tertiarization can be observed in the EU-15 throughout this period as well, but here it has been much less pronounced than in the NMS. There has been one example of *re-industrialization* within the EU-15 as well, namely that of Ireland, where the share of industrial value added in GDP increased from 32% in 1990 to 37% in 2001 – yet employment shares remained constant (European Commission, 2003).

## 4.1 De- and Re-Agrarianization

In all NMS, the shares of agriculture in GDP *and* in employment fell dramatically during 1990s ("de-agrarianization").[11] Employment in agriculture declined significantly in absolute terms as well.

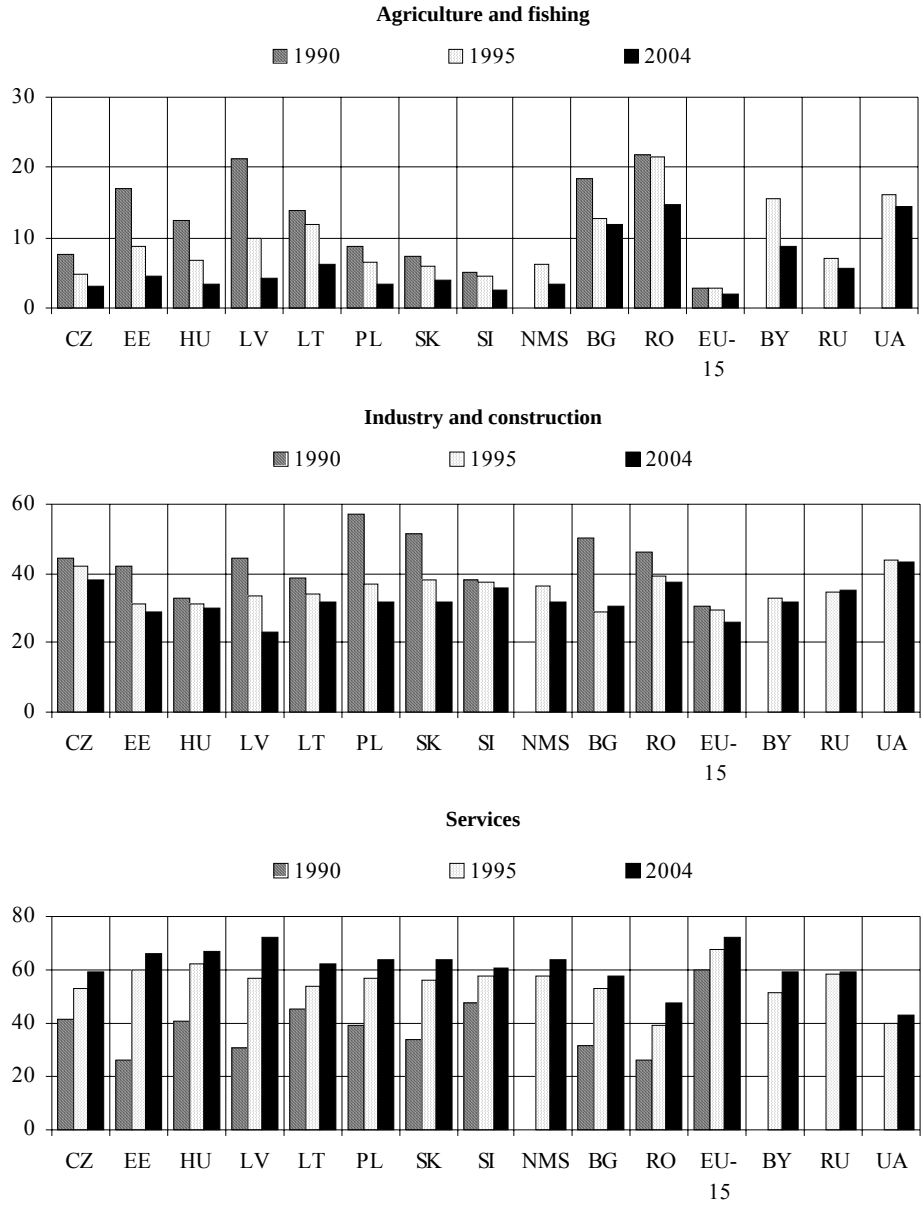
Despite massive de-agrarianization in the NMS, the shares of agriculture in both GVA and employment of these countries is on average still higher than in the EU.[12] In the more advanced NMS such as the Czech Republic, Hungary and Slovenia, the difference to the EU-15 was minimal in the share of gross value added (GVA), though not in terms of employment shares. In general, the differences between GVA shares and employment shares in agriculture are larger in the NMS than in

[10] Under the previous regime, industry was emphasized at the expense of services and, furthermore, service activities were often supplied within big industrial combines, which meant that they were classified under "industry" and to some extent "agriculture" as well. Most services were considered "unproductive" and their contribution to the efficient functioning of the economy was neglected. Also, many modern services that play an important role in market economies (such as marketing, financial services, real estate and other business services) were simply not needed under socialism.

[11] Sector shares in this section are defined as gross value added (GVA) of agriculture (industry, services) in gross domestic product (GDP). Because of the so-called "Financial intermediation services indirectly measured" (FISIM), which are included in GDP but not in gross value added, the so defined shares of the three sectors will not add up exactly to 100 %.

[12] In Poland, Bulgaria and Romania the share of employment in agriculture has been very high (25% and more than 40%, respectively). This results from the severe employment crises due to the dramatic decline in industrial employment and the so far limited absorption capacity of the services sectors.

*Chart 5: Comparison of NMS, NIS and EU-15 Gross Value Added Structures in 1990, 1995 and 2004, % of GVA*




*Note: GVA = gross value added.*

*Sources: wiiw Database incorporating national statistics and CISSTAT; wiiw calculations using AMECO.*

the EU-15, due to the relatively low productivity in NMS' agriculture as compared to the other sectors of the economy. With competitive pressures rising and modernization in agriculture accelerating after accession, we may thus expect agricultural employment in the NMS to fall. This is particularly relevant for Poland, some of the Baltic countries and for the candidate countries Bulgaria and Romania, where the differences between GVA shares and employment shares in agriculture are huge (compare charts 5 and 6), and productivity levels particularly low (chart 4).

Shares of agriculture in NIS' output and employment declined during the last decade as well. Yet GVA shares are still higher than in NMS (especially in Ukraine), but lower than in Bulgaria and Romania. Except Ukraine, employment shares are lower than in less advanced NMS (Latvia, Lithuania and Poland), and also lower than in Bulgaria and Romania. Overall, the process of de-agrarianization is underway in the NIS as well.

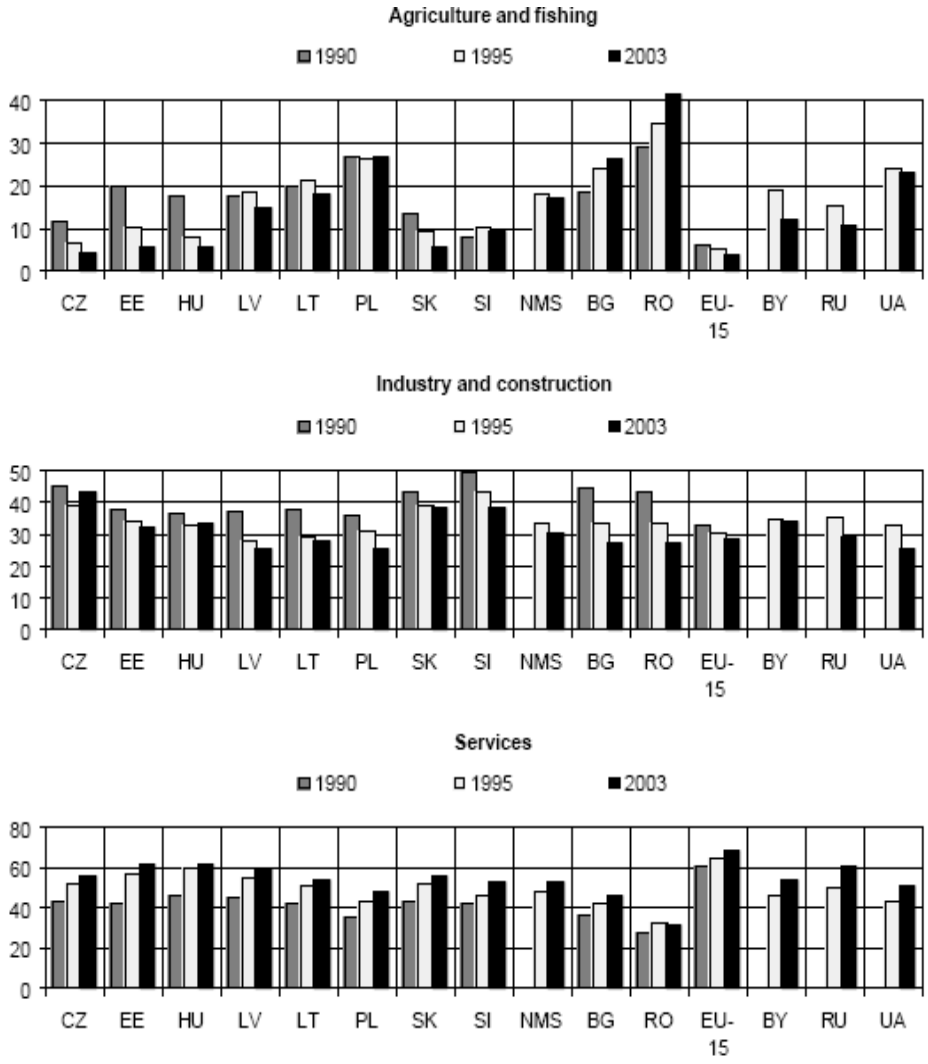
## 4.2 De- and Reindustrialization

The share of industry (comprising manufacturing, mining, water & electricity supply and construction) declined in terms of both GVA and employment in most NMS. This decline was sharper in the first years of transition and levelled off after 1995. Yet industrial employment dropped strongly in absolute terms even after 1995 (by nearly 1.3 million persons between 1995 and 2004, nearly 1 million of them in Poland). However, by around 1998/1999, labor shedding in industry bottomed out and employment started to rise slightly in some NMS (e.g. in Hungary, in the Czech and Slovak Republics; Poland is again an exception). On average, the shares of industry and construction in both GVA and employment in the NMS still tend to be somewhat higher than in the EU-15 (30% and 27%), with some countries having particularly high employment shares of industry (e.g. Czech Republic, Slovakia, Slovenia – chart 6).

NIS output shares of industry were fairly stable (at least after 1995); they are also somewhat higher than in the NMS. Except Belarus, NIS industry employment shares declined, implying a strong rise in labor productivity (however, this may be related to a structural shift towards resource- and capital-intensive industries in Russia and Ukraine – see below). The share of industrial employment in several NMS (particularly in Poland) and in Ukraine is even lower than in EU-15. However, this is not a sign of a "progress towards post-industrial society", but rather results from a severe industrial crisis in the former countries.

In contrast, (as illustrated by the recent example of Hungary and the Czech Republic), there is a possibility for a few additional NMS (e.g. Slovakia) to experience some kind of re-industrialization in the future. Low labor costs and the pool of skilled labor make the NMS an attractive location for FDI in export-oriented manufacturing productions and, as demonstrated by many south-east

*Chart 6: Comparison of NMS, NIS and EU-15 Employment Structures in 1990, 1995 and 2003, % of total*




*Sources: wiiw Database incorporating national statistics and CISSTAT; wiiw calculations using AMECO.*

Asian economies, strong export orientation might well lead to a higher share of industry in both GDP and employment than would be typical for a certain stage of economic development. However, whether this process will lead to the creation of a substantial number of additional jobs is not sure. [13]

## 4.3 Tertiarization

The *share of services,* in both GVA and employment, has increased significantly in most NMS since the beginning of transition – and indication of a clear structural "catching-up". However, during early stages of transition, the rise of GVA and employment shares of services was mainly of a "passive nature", reflecting a less pronounced decline of employment in services than in both industry and agriculture. Only when growth of the overall economy gained momentum, employment in services started to rise in absolute terms as well: between 1995–2004 about 1 million new services jobs were created in the NMS. Despite rapid expansion, the shares of services in GVA and especially in employment in the NMS are still distinctly lower than in the EU-15.[14] Moreover, in all NMS the gap vis-à-vis the EU-15 is largest in the field of financial and other business services (marketing, consulting, auditing etc.). Within the services sector, employment gains were due to job creation in the market services segment (especially in trade, tourism and real estate – see Landesmann and Vidovic, 2005). The services sector thus may become the major provider of new employment. But again, whether this process will lead to the creation of additional jobs is not sure. Parts of the service sector (especially financial services and retail trade) currently experience a restructuring process (as witnessed by industry earlier) which is associated with considerable efficiency improvements and layoffs of redundant workers.[15]

In the NIS, the services sector has been expanding as well, yet its GVA shares are lower than in both EU-15 and the NMS. Interestingly, shares of employment in services in Belarus and in Russia are even higher than in the NMS (chart 6). This may reflect an underdevelopment (or under-reporting) of higher value added segment of services (financial services), or a bloated government sector (public services), for instance in Russia where services share in GVA did not change between 1995 and 2004 (chart 5).

[13] See Landesmann and Vidovic (2005) for more details; Stehrer (2005) for development scenarios.

[14] Services shares are particularly low in the second-round accession countries, Bulgaria and Romania.

[15] The evidence for productivity gains in NMS' services sectors has been mixed so far. Moreover, a proper assessment is plagued by numerous conceptual and statistical problems (Wölfl, 2004). Rough estimates of labor productivity growth in services is provided in section 4 below.

In general, there seem to be no marked differences in broader structural developments between NMS and the NIS (and especially between the less advanced NMS like Latvia, Lithuania and Poland on the one hand and more advanced NIS like Belarus, Russia and Ukraine on the other hand).

## 5. Structural Change and Productivity Growth

In this section we will look in more detail at patterns of structural change during the recent phase of transition. We will examine in particular the effects of structural changes on NMS and NIS labor productivity growth which – as shown above – has been quite impressive in all countries concerned. The traditional assumption of the growth accounting literature considers structural change as an important source of growth and overall productivity improvements. The standard hypothesis assumes a surplus of labor in some (less productive) parts of the economy (such as agriculture), thus shifts towards higher productivity sectors (e.g. industry) are beneficial for aggregate productivity growth. Even within industry shifts towards more productive branches should boost aggregate industrial productivity. On the other hand, structural change may have a negative impact on the aggregate productivity growth if labor shifts to industries with slower productivity growth (parts of services sector). The "structural bonus and burden" hypotheses were examined on example of Asian economies by Timmer and Szirmai (2000), on a large sample of OECD and developing countries (Fagerberg, 2000), and more recently by Peneder and EU DG Employment for USA, Japan and EU member states (Peneder, 2002, European Commission, 2003b). A recent paper by the present author examined productivity growth patterns in Central and Eastern European NMS (Havlik, 2005).

The overall developments regarding output, employment and productivity described above mask substantial structural changes within NMS' economy and its individual sectors. Structural changes reflect *inter alia* different speeds of restructuring and resulting efficiency gains or losses at branch level. The impact of structural change on NMS' and NIS' aggregate productivity growth will be evaluated by a frequently applied shift-share analysis (see Havlik (2005), in analogy with Timmer and Szirmai (2000), Fagerberg (2000), Peneder (2002) and others). Shift-share analysis provides a convenient tool for investigating how aggregate growth is linked to differential growth of labor productivity at sectoral level and to the reallocation of labor between industries. It is particularly useful for the analysis of productivity developments in the NMS and NIS where data limitations prevent us to use more sophisticated econometric approaches (see box 1).[16]

[16] Even this kind of analysis encounters a number of serious statistical problems. Several NMS and NIS do not publish longer time series on sectoral value added data at constant

## *Box 1: Decomposition of Aggregate Labour Productivity Growth*

Using the same notation as presented in Peneder (2002), we decompose the aggregate growth of labor productivity into three separate effects:

$$growth(LP_T) = \frac{LP_{T,fy} - LP_{T,by}}{LP_{T,by}} = \frac{\overbrace{\sum_{i=1}^{n} LP_{i,by}(S_{i,fy} - S_{i,by})}^{I:static\ shift\ effect} + \overbrace{\sum_{i=1}^{n} (LP_{i,fy} - LP_{i,by})(S_{i,fy} - S_{i,by})}^{II:dynamic\ shift\ effect} + \overbrace{\sum_{i=1}^{n} (LP_{i,fy} - LP_{i,by})S_{i,by}}^{III:within\ growth\ effect}}{LP_{T,by}} \quad (1)$$

where LP=labor productivity; by=base year, fy=final year; T=Σ over industries i; $S_i$=share of sector i in total employment.

First, the structural component is calculated as the sum of relative changes in the allocation of labor across industries between the final year and the base year, weighted by the value of sector's labor productivity in the base year. This component is called the static shift effect. It is positive/negative if industries with high initial levels of productivity (and usually also high capital intensity) attract more/less labor resources and hence increase/decrease their share of total employment. The standard structural bonus hypothesis of industrial growth postulates a positive relationship between structural change and economic growth as economies upgrade from low to higher productivity industries. The structural bonus hypothesis thus corresponds to an expected positive contribution of the static shift effect to aggregate growth of labor productivity:

The structural bonus hypothesis:

$$\sum_{i=l}^{n} LP_{i,by}\ (S_{i,fy} - S_{i,by}) > 0 \quad (2)$$

Second, dynamic shift effects are captured by the sum of interactions of changes in employment shares and changes in labor productivity of individual sectors/industries. If industries increase both labor productivity and their share of total employment, the combined effect is a positive contribution to overall productivity growth. In other words, the interaction term becomes larger, the more labor resources move toward industries with fast productivity growth. The interaction effect is however negative, if industries with fast growing labor productivity cannot maintain their shares in total employment. Thus, the interaction term can be used to evaluate Baumol's hypothesis of a structural burden of labor reallocation. This hypothesis predicts that employment shares shift away from progressive industries towards those with lower growth of labor productivity (Baumol, 1967). We would expect to confirm the validity of structural burden hypothesis in the NMS and NIS due to the above sketched shifts from industry to services (with lower productivity levels)

prices. Owing to the lack of sector-specific price indexes we have applied GDP price deflators to calculate series at constant prices. Moreover, the measurement of output in certain services sectors is especially problematic (Wölfl, 2004). We hope to refine productivity analysis with more detailed data in the later stage of the project.

at the macro level, respectively due to shifts from heavy (and capital-intensive) to light industries within manufacturing.

The structural burden hypothesis:

$$\sum_{i=l}^{n}(LP_{i,fy} - LP_{i,by})(S_{i,fy} - S_{i,by}) < 0 \tag{3}$$

The third component, the "within growth" effect, corresponds to a growth in aggregate labor productivity under the assumption that no structural shifts in labor have ever taken place and each industry (sector) has maintained the same share in total employment as in the base year. We must, however, recall that the frequently observed near equivalence of within growth effect to the aggregate productivity growth cannot be used as evidence against differential growth between industries. Even in the case that all positive and negative structural effects net out, much variation in productivity growth can be present at the more detailed level of activities.[17]

Table 2 shows a decomposition of productivity growth in the NMS (as well as in Bulgaria and Romania) and in selected NIS at both macro level (total gross value added) and in manufacturing industry for the period 1995–2004. As far as the economy as a whole is concerned, structural bonus hypothesis is mostly confirmed, though the contribution of labor shifts from low to high productivity growth sectors to aggregate productivity growth was in most cases rather small, in Romania and Belarus even negative. A more substantial structural bonus effect (contributing more than 10% of total productivity growth) is observed only in Bulgaria, Poland and Russia. In most countries, agriculture and industry reduced the static shift effect on productivity growth as labor moved away from these sectors and employment shares declined (see also chart 6 above). In several NMS, there was also a decline in employment shares (and therefore a negative static shift effect) in education. And nearly everywhere one can observe highly positive static shift

[17] As productivity has a robust tendency to grow, the within growth effect is practically a summation over positive contributions only. Conversely, for each industry the sign of the contribution to both static and dynamic shift effects depends on whether labor shares have increased or decreased. The shift effects therefore capture only that comparatively small increment to aggregate growth which is generated by the net difference in productivity performance of the shifting share of the labor resources. Even that increment can either be positive (structural bonus) or negative (structural burden). In short, offsetting effects of shifts in employment shares of industries with high and low levels of labor productivity, as well as high and low productivity increases, explain why shift share analyses regularly fail to reveal substantial direct contributions of structural change to aggregate growth.

effects of real estate and, paradoxically, of public administration as well (the latter also in Russia).

Except for Bulgaria, dynamic shift effects play an even smaller role as far as the contribution to aggregate productivity growth is concerned; structural burden (a small negative dynamic shift effect) was detected only in Slovenia, Romania and Ukraine. In the majority of both NMS and NIS, the contribution of agriculture and industry to the dynamic shift effect was negative since – as mentioned above – employment shares of these sectors declined. It is therefore not surprising that the overwhelming part (more than 90%, except Poland: 74%) of aggregate productivity growth in both NMS and NIS during the period 1995–2004 can be attributed to *productivity growth within individual economic sectors*. This is broadly in line with productivity developments observed in advanced market economies,[18] but still somewhat surprising given the major restructuring that had occurred in the NMS and NIS in that period. Obviously, aggregate productivity growth in transition countries has resulted almost exclusively from productivity improvements within individual sectors and their across the board productivity catching-up. In this respect, both NMS and NIS economies display similarities with the more advanced EU-15 member states (Peneder, 2002, European Commission, 2003b) yet their overall productivity growth has been much more impressive (except Bulgaria – see table 2).

Having in mind the above mentioned data caveats regarding sectoral price deflators and productivity measurement in the services sector, a detailed inspection of sectoral productivity performance gives a widely heterogeneous picture.[19] In most NMS and NIS, agriculture, construction, trade, hotels and restaurants, as well as health and social work sectors recorded *below average* labor productivity growth (chart 7a). On the other hand, data would suggest positive contributions of industry, transport (including telecommunications), real estate and other (community and social services) activities to aggregate productivity growth.

Data presented in the second part of table 2 reveal that structural features of productivity growth in manufacturing industry were somewhat different.[20] The evidence for individual NMS is mixed again, but a structural bonus (positive static shift effect) was detected only for Poland, Slovenia, Latvia and Lithuania. The negative static shift effect present in the remaining NMS (and in Bulgaria and Romania) means that labor moved away from (initially) high productivity

[18] Peneder (2002) and European Commission (2003b) have found similar results for EU-15 countries and the USA in the period 1995-1999.

[19] Owing to the lack of sectoral price deflators, nominal GVA growth in individual sectors was converted to constant prices with GDP price deflator. The measurement of output (and productivity) in services sector – especially in trade, real estate and financial intermediation poses serious problems – see O'Mahony and van Ark (2003), Wölfl (2004).

[20] Manufacturing industry output was deflated with "proper" sectoral price deflators.

manufacturing branches (which are usually more capital intensive and use more intermediate inputs) like coke and refined petroleum, chemicals and basic metals branches.[21] Structural burden hypothesis – a negative dynamic shift effect – could be confirmed for half of NMS. In Hungary (and to a lesser degree also Poland, Slovakia and Slovenia), dynamic shifts were dominated by simultaneous productivity improvements and growing employment shares in just a few branches (usually in electrical, optical equipment and transport equipment). Nevertheless, the aggregate productivity growth in NMS' manufacturing was again clearly dominated by productivity improvements within individual manufacturing branches. Havlik (2003a), Hunya (2002), as well as the various case studies (see EU DG Employment study), provide some evidence for the key role played by foreign direct investments in productivity improvements and restructuring of NMS' manufacturing. Van Ark and Piatkowski (2004) show that the main contribution to productivity growth in selected NMS (the Czech Republic, Hungary, Poland and Slovakia) during 1993–2001 came from ICT-using manufacturing and non-ICT manufacturing. Contrary to EU-15 and USA, the contribution of ICT-producing branches to aggregate productivity growth was much lower in the NMS (with the exception of Hungary).

In the NIS, comparable industry-specific data are so far available only for Russia (years 1995–2002) and Ukraine (2000–2004). For Russia, the shift and share analysis confirms both the structural burden and bonus hypotheses with positive values of the static shift effect and a negative dynamic shift effect (table 2). Three industries contributed most to the "structural bonus" which size has been unique among the analysed countries: food and beverages, chemicals and basic metals. Nevertheless, even in Russia a larger part of the total productivity growth originated from "within growth" effect, the biggest contributors being coke and refined petroleum, basic metals and transport equipment (the only industry where productivity declined was machinery and equipment n.e.c.). Structural features of manufacturing productivity growth in Ukraine during the more recent (and shorter) period are similar to NMS, yet its productivity growth has been extraordinary high.

Decomposition of manufacturing industry productivity growth thus again shows similar characteristics to those observed for EU-15 countries. For these countries, Peneder (2002) found only a weak evidence for the reallocation of labor towards high productivity branches (at more detailed 3-digit NACE level) and could not confirm the structural bonus hypothesis even for a longer time period (1985–1998). Similar findings were obtained earlier by Timmer and Szirmai (2000) for a small sample of Asian economies, as well as by Faberberg (2000) for a number of OECD and developing countries. In this respect, we may conclude that the recent industrial restructuring in the NMS did not differ too much from the earlier

[21] Note that due to limited data availability we use gross production as a measure of output. The negative static shift effect was particularly large in Bulgaria and Romania.

experience of other countries since shifts of labor among individual (2 digit NACE) industries apparently did not play a major role in total productivity improvements.

*Chart 7a: Productivity Growth in NMS and NIS by eEconomic Sectors, 1995–2004 (Annual Averages, Relative to Total Gross Value Added per Employed Person)*

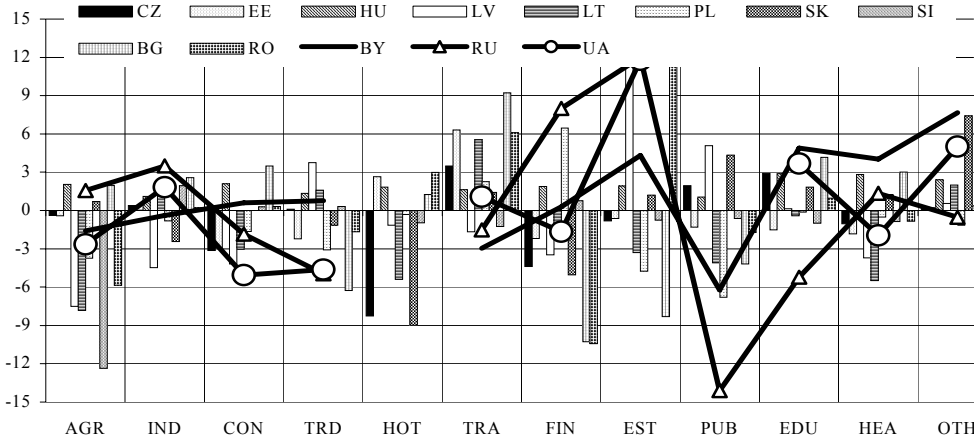
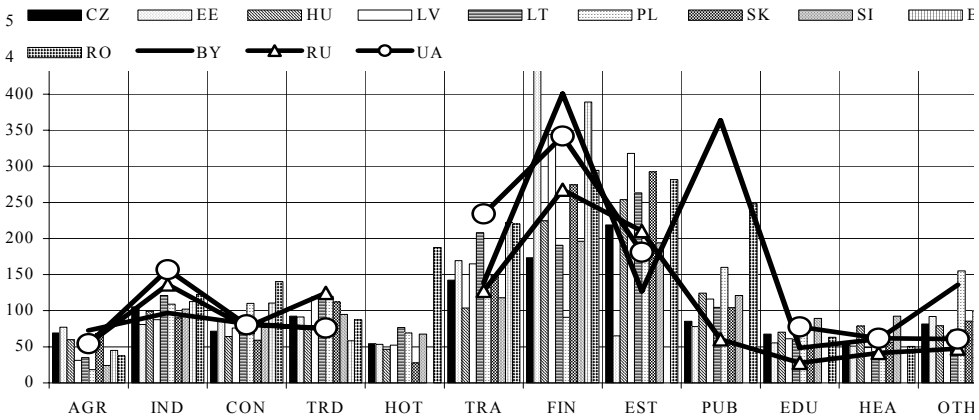



*Chart 7b: Productivity Levels in NMS and NIS Economic Sectors, 2004 (Total Gross Value Added per Employed Person =100)*




*Sectors: AGR: Agriculture, forestry and fishing; IND: Mining, quarrying, manufacturing, electricity, gas and water supply; CON: Construction; TRD: Wholesale, retail trade; HOT: Hotels and restaurants; TRA: Transport, storage and communications; FIN: Financial intermediation; EST: Real estate, renting and business activities; PUB: Public administration and defence; EDU: Education; HEA: Health and social work; OTH: Other activities.*

*Source: wiiw calculations based on wiiw Database and CISSTAT Database.*

*Table 2: Decomposition of Productivity Growth in NMS and Selected NIS (Shift-Share Analysis), 1995–2004*

| | | Percentage of total labor productivity growth explained by: | | | | |
|---|---|---|---|---|---|---|
| | | **static shift effect** LPby*(Sfy-Sby)/LPby | **dynamic shift effect** (LPfy-LPby)*(Sfy-Sby)/LPby | **within growth effect** (LPfy-LPby)*Sby/LPby | **Total productivity effect** | **growth** in % p.a. |
| Bulgaria, gross value added | 1996-2003 | 48.4 | -39.9 | 91.5 | 100.0 | 2.3 |
| Bulgaria, manufacturing output | 1995-2004 | -15.7 | -72.2 | 187.9 | 100.0 | 3.3 |
| Czech Republic, gross value added | 1995-2004 | 2.3 | 0.3 | 97.4 | 100.0 | 6.1 |
| Czech Republic, manufacturing output | 1995-2004 | -0.7 | -11.5 | 112.3 | 100.0 | 5.0 |
| Hungary, gross value added | 1995-2003 | 5.5 | 2.9 | 91.6 | 100.0 | 12.4 |
| Hungary, manufacturing output | 1995-2004 | -2.2 | 27.8 | 74.4 | 100.0 | 9.0 |
| Poland, gross value added | 1995-2003 | 16.7 | 9.3 | 74.1 | 100.0 | 9.8 |
| Poland, manufacturing output | 1995-2004 | 3.1 | 2.5 | 94.3 | 100.0 | 10.0 |
| Slovak Republic, gross value added | 1995-2003 | 5.0 | 1.5 | 93.4 | 100.0 | 7.0 |
| Slovak Republic, manufacturing output | 1995-2004 | -0.9 | 2.1 | 98.8 | 100.0 | 8.0 |
| Slovenia, gross value added | 1995-2003 | 3.3 | -2.6 | 99.4 | 100.0 | 7.5 |
| Slovenia, manufacturing output | 1995-2004 | 6.9 | 5.8 | 87.3 | 100.0 | 3.3 |
| Romania, gross value added | 1995-2003 | -0.4 | -0.7 | 101.1 | 100.0 | 10.0 |
| Romania, manufacturing output | 1995-2004 | -13.1 | -23.4 | 136.5 | 100.0 | 5.0 |
| Estonia, gross value added | 1995-2004 | 2.9 | 0.3 | 96.8 | 100.0 | 9.6 |
| Estonia, manufacturing output | 1995-2003 | -7.6 | -4.3 | 112.0 | 100.0 | 9.5 |
| Latvia, gross value added | 1995-2003 | 2.5 | 8.5 | 89.1 | 100.0 | 9.8 |
| Latvia, manufacturing output | 1995-2003 | 6.4 | -1.0 | 94.6 | 100.0 | 7.1 |
| Lithuania, gross value added | 1997-2003 | 5.0 | 1.8 | 93.2 | 100.0 | 7.5 |
| Lithuania, manufacturing output | 1995-2001 | 10.1 | -2.9 | 92.7 | 100.0 | 8.9 |
| Belarus, gross value added | 1995-2003 | -0.2 | 1.9 | 98.3 | 100.0 | 9.3 |
| Belarus, manufacturing output | . | . | . | . | . | . |
| Russia, gross value added | 1995-2004 | 10.4 | 0.8 | 88.8 | 100.0 | 9.2 |
| Russia, manufacturing output | 1995-2002 | 24.0 | -6.6 | 82.5 | 100.0 | 4.1 |
| Ukraine, gross value added | 1995-2003 | 0.4 | -4.9 | 104.6 | 100.0 | 8.8 |
| Ukraine, manufacturing output | 2000-2004 | 6.4 | 2.8 | 90.8 | 100.0 | 19.3 |

*Notes:* *Aggregate productivity based on gross value added at constant prices (without FISIM) and employment according to LFS statistics: Bulgaria: 12 NACE 1-digit sectors (1996–2003), Czech Republic: 12 sectors (1995–2004), Hungary and Poland: 12 sectors (1995–2003), Slovak Republic: 12 sectors (1995–2003), Slovenia: 12 sectors (1995–2003), Romania: 12 sectors (1995–2003), Estonia: 12 sectors (1995–2004), Latvia: 12 sectors (1995–2003), Lithuania: 12 sectors (1995–2003), Belarus: 11 sectors (1995–2003), Russia: 11 sectors (1995–2004). Ukraine: 10 sectors (1995–2003). Constant prices data estimated with GDP price deflators. FISIM: Financial intermediation services indirectly measured. Manufacturing labor productivity based on gross output at constant prices and employment for 14 NACE 2-digit manufacturing sectors.*

*Sources: wiiw Database incorporating national statistics; CISSTAT, UNIDO and wiiw Industrial Database.*

There is some evidence of a structural burden effect in NMS' manufacturing since employment shifts towards slower productivity growth industries had, on average, slightly negative impact on aggregate productivity growth in manufacturing. The overwhelming part of overall manufacturing productivity growth in the NMS can be attributed to *productivity improvements taking place in nearly all manufacturing industry branches (albeit at widely different rates)* – a process stimulated particularly by effects of FDI. In several NMS (especially in Hungary, Poland, Slovakia and Estonia), manufacturing labor productivity has recently expanded even faster than it did in the "Asian Tigers" countries during their rapid catching-up period.

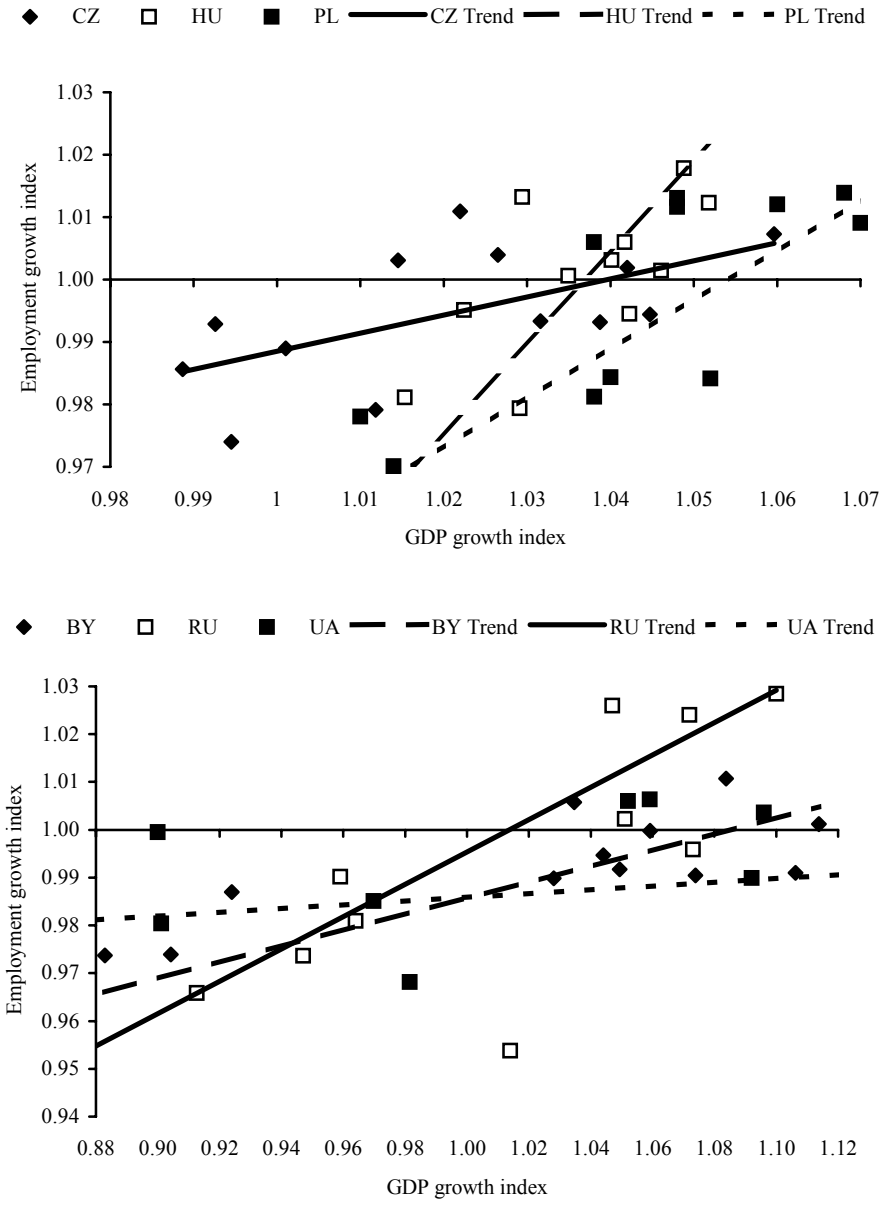
In contrast to most NMS, in Russian manufacturing industry, both structural bonus and burden hypotheses, were confirmed though the bulk of overall productivity growth also resulted from the "within growth" effect. Nevertheless, a fairly large part of productivity growth (24%) was attributed to labor shifts toward more productive industries (especially to food and beverages, chemicals and basic metals at the expense of textiles and transport equipment). And compared to NMS, the growth of productivity in manufacturing was not really impressive (4.1% per year during the period 1995–2002). In Ukraine, we get a picture similar to the NMS; the measured productivity growth in 2000–2004 is exceptionally high – almost 20% per year. There are no comparable data for manufacturing industry in Belarus.

# 6. Productivity Catching-Up and Employment Growth Dilemmas

Productivity growth recorded in most transition countries, both the NMS and NIS, in the period after 1995 has been associated with only meagre increases of employment (in manufacturing industry even with considerable job losses – see Havlik, 2005). In the context of the EU Lisbon Strategy which aims at both improved competitiveness and high employment growth, the NMS thus face an even greater challenge than the EU-15 Member States. Focusing on both targets simultaneously (i.e. fast productivity growth and employment growth) may be conflicting.[22] Taking into account that NMS are confronted with a situation of low productivity levels (about half of the EU-15 average – see above) and, at the same time of high unemployment (on average nearly twice the EU-15 level), they need to foster both productivity and employment growth simultaneously. Realistically, the main accent of economic policies in these countries should focus on at least keeping existing jobs while simultaneously maintaining the recent pace of productivity catching-up.

[22] Policies aiming at higher employment may have negative consequences for labor productivity growth at least in the short run – see O'Mahony and van Ark et al., 2003.

*Chart 8: Employment Elasticity of GDP Growth in Selected NMS and NIS, 1992–2004*




*Source: wiiw calculations from wiiw Database based on national statistics and CISSTAT.*

This is a formidable task. The relation between employment and production growth (employment elasticity to output growth – see Employment in Europe, 2002) in the NMS and NIS has been rather disappointing. Even in the recent period of relatively robust economic growth (that is after 1995) there has been little effect on the job creation; the employment elasticity to GDP growth has been much below unity. This is illustrated in chart 8 where indexes of GDP and employment growth (and the respective trend lines for the period 1992–2004) are plotted for selected NMS and NIS. There are differences between individual countries: a constant employment would require GDP growth of at least 3.5% in Hungary, yet about 4% in the Czech Republic and more than 5% in Poland (even higher GDP growth would be required in Belarus and Ukraine).

Regression estimates covering a sample of all NMS (that is without Bulgaria and Romania) for the time period 1995–2004 show that the average critical rate of GDP growth which would prevent further employment decline in the NMS has been about 5% per year in the period 1995–2004, which is again much more than the GDP growth actually achieved during that period (the regression model II with lagged GDP as an explanatory variable gives a better fit – table 3, see also table 1 above).[23] As shown in chart 8, there are differences in estimated critical growth rates among individual NMS. However, regression estimates with country-specific dummies did not yield statistically significant parameters, even dummy variable for NIS was not statistically significant (see Appendix for several variants of estimated regressions).

For the manufacturing industry, the same estimation method yielded even more disturbing results: the critical rate of production growth was here more than 10% per year, nearly twice as high as the average manufacturing growth rate actually achieved during the (high growth) period of 1995–2004. Seen from this angle, and taking into account the expected rates of economic growth and evolving economic structures, the prospects for rising employment outside of services are not very encouraging. Without a substantial acceleration of their economic growth and/or significant job creation in the services sector, the NMS seem to be condemned either to remain substantially less productive than the EU-15 Member States, or to face the challenge of an even higher unemployment in the future.[24]

[23] This compares with a critical GDP growth rate of just 0.5% estimated for the same period for the EU, USA and Japan, respectively 1.3% GDP growth estimated for these countries for the period 1992-2002.

[24] Similar conclusions have been made by Gabrisch and Buscher (2006) who analyze relationship between unemployment and output in NMS. During the last couple of years, the only sectors where additional jobs were created in the NMS are trade, hotels and restaurants, real estate, public administration and other activities – see Landesmann and Vidovic (2005) for more details. A recent ILO study shows that Asian countries are

*Table 3: Regression Estimates of NMS Employment Elasticity to GDP Growth, 1995–2004*

*Model I: Employment (vEMP) and GDP growh (vGDP)*

| Source | SS | df | MS | | |
|---|---|---|---|---|---|
| | | | | Number of obs | = 80 |
| | | | | F( 1, 78) | = 8.14 |
| Model | .005349622 | 1 | .005349622 | Prob > F | = 0.0055 |
| Residual | .051258319 | 78 | .000657158 | R-squared | = 0.0945 |
| | | | | Adj R-squared | = 0.0829 |
| Total | .056607941 | 79 | .000716556 | Root MSE | = .02564 |

| vEmp | Coef. | Std. Err. | t | P>\|t\| | [95% Conf. | Interval] |
|---|---|---|---|---|---|---|
| vGDP | .2835475 | .09938 | 2.85 | 0.006 | .0856971 | .481398 |
| _cons | .7007948 | .1041376 | 6.73 | 0.000 | .4934727 | .9081169 |

*Note: The estimated regression equation for a sample of 8 NMS was:*

*vEMP = const + b*vGDP*

*where:*

*vEMP: index of employment growth,*

*vGDP: index of GDP growth.*

*Min. estimated GDP growth index (critical growth rate )needed for employment staying at least constant (vEMP = 1) is thus: ((1-cons)/b) = 1.058.*

*Model II: Employment (vEMP) and GDP growth lagged one year (vGDPl)*

| Source | SS | df | MS | | |
|---|---|---|---|---|---|
| | | | | Number of obs | = 80 |
| | | | | F( 1, 78) | = 19.60 |
| Model | .011366897 | 1 | .011366897 | Prob > F | = 0.0000 |
| Residual | .045241044 | 78 | .000580013 | R-squared | = 0.2008 |
| | | | | Adj R-squared | = 0.1906 |
| Total | . 056607941 | 79 | .000716556 | Root MSE | = . 02408 |

| vEmp | Coef. | Std. Err. | t | P>\|t\| | [95% Conf. | Interval] |
|---|---|---|---|---|---|---|
| vGDPl | .3220141 | .0727399 | 4.43 | 0.000 | .1772 | .4668282 |
| _cons | .6614394 | .0760293 | 8.70 | 0.000 | .5100767 | .812802 |

*Min. estimated GDP growth index (critical growth rate)needed for employment staying at least constant (vEMP = 1) is thus: ((1-cons)/b) = 1.051.*

*Source: Author's calculations, wiiw Database.*

facing a similar problems of "jobless growth" – see *International Herald Tribune*, 1 February 2006, p. 12.

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# Appendix

*Table A1: Long-Term Productivity Catching-Up of NMS and Selected NIS vis-à-vis the EU*

**GDP, constant prices, 1995=100**

| | **1990** | **1991** | **1992** | **1993** | **1994** | **1995** | **1996** | **1997** | **1998** | **1999** | **2000** | **2001** | **2002** | **2003** | **2004** |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Czech Republic | 105.0 | 92.8 | 92.3 | 92.3 | 94.4 | 100.0 | 104.2 | 103.4 | 102.2 | 103.5 | 107.5 | 110.3 | 112.0 | 115.5 | 120.6 |
| Estonia | 143.9 | 124.3 | 106.7 | 97.3 | 95.7 | 100.0 | 104.4 | 116.0 | 121.1 | 121.5 | 131.1 | 139.5 | 149.6 | 159.6 | 172.1 |
| Hungary | 112.8 | 99.3 | 96.3 | 95.7 | 98.5 | 100.0 | 101.3 | 106.0 | 111.1 | 115.8 | 121.8 | 126.5 | 130.9 | 134.7 | 140.4 |
| Latvia | 201.6 | 180.6 | 117.7 | 100.2 | 100.8 | 100.0 | 103.8 | 112.4 | 117.7 | 121.6 | 129.9 | 140.3 | 149.4 | 160.5 | 174.2 |
| Lithuania | 172.4 | 162.7 | 128.1 | 107.3 | 96.8 | 100.0 | 104.7 | 112.0 | 120.2 | 118.1 | 122.8 | 130.6 | 139.4 | 152.9 | 163.2 |
| Poland | 89.7 | 83.4 | 85.6 | 88.8 | 93.5 | 100.0 | 106.0 | 113.2 | 118.6 | 123.5 | 128.5 | 129.7 | 131.5 | 136.6 | 143.9 |
| Slovak Republic | 115.7 | 98.8 | 92.4 | 89.0 | 94.5 | 100.0 | 106.1 | 111.0 | 115.6 | 117.4 | 119.7 | 124.3 | 130.0 | 135.8 | 143.3 |
| Slovenia | 103.0 | 93.8 | 88.7 | 91.2 | 96.1 | 100.0 | 103.6 | 108.6 | 112.4 | 118.7 | 123.3 | 126.6 | 130.8 | 134.1 | 140.3 |
| **NMS-8** | **104.8** | **94.6** | **91.7** | **91.7** | **94.9** | **100.0** | **104.7** | **109.9** | **114.0** | **117.6** | **122.5** | **125.5** | **128.6** | **133.7** | **140.7** |
| Cyprus | 79.7 | 80.3 | 88.0 | 88.6 | 93.9 | 100.0 | 101.9 | 104.2 | 109.2 | 114.4 | 120.1 | 124.9 | 127.4 | 129.9 | |
| Malta | 78.3 | 81.4 | 85.2 | 89.0 | 94.1 | 100.0 | 104.0 | 109.0 | 112.8 | 117.3 | 124.9 | 123.4 | 125.5 | 126.0 | |
| **NMS-10** | **104.3** | **94.3** | **91.6** | **91.6** | **94.9** | **100.0** | **104.7** | **109.8** | **113.9** | **117.5** | **122.4** | **125.4** | **128.6** | **133.6** | **137.4** |
| Bulgaria | 118.4 | 104.6 | 97.0 | 95.5 | 97.2 | 100.0 | 90.6 | 85.5 | 88.9 | 91.0 | 95.9 | 99.9 | 104.8 | 109.5 | 115.6 |
| Romania | 111.4 | 97.0 | 88.5 | 89.8 | 93.3 | 100.0 | 103.9 | 97.6 | 92.9 | 91.8 | 93.7 | 99.0 | 104.1 | 109.5 | 118.6 |
| **NMS-8 plus BG, RO** | **106.7** | **95.6** | **91.4** | **91.5** | **94.7** | **100.0** | **103.8** | **106.8** | **109.8** | **112.6** | **117.1** | **120.5** | **124.0** | **129.1** | **136.3** |
| **NMS-12: NMS-10 plus BG, RO** | **106.2** | **95.3** | **91.3** | **91.5** | **94.7** | **100.0** | **103.8** | **106.8** | **109.8** | **112.7** | **117.2** | **120.5** | **124.0** | **129.1** | **133.7** |
| **EU-15** | **92.7** | **94.4** | **95.5** | **95.1** | **97.7** | **100.0** | **101.6** | **104.1** | **107.2** | **110.2** | **114.2** | **116.1** | **117.4** | **118.3** | **120.0** |
| **Belarus** | | **151.3** | **136.8** | **126.4** | **111.6** | **100.0** | **102.8** | **114.5** | **124.1** | **128.4** | **136.0** | **142.0** | **149.0** | **160.0** | **177.0** |
| **Russia** | | **153.1** | 130.9 | 119.4 | 104.3 | 100.0 | 96.4 | 97.8 | 92.6 | 98.5 | 108.3 | 113.9 | 119.2 | 127.9 | 137.1 |
| **Ukraine** | | **191.1** | 172.2 | 147.7 | 113.9 | 100.0 | 90.0 | 87.3 | 85.7 | 85.5 | 90.6 | 98.9 | 104.0 | 114.0 | 127.8 |

**Employment, 1000 persons**

| | 1990 | 1991 | 1992 | 1993 | 1994 | 1995 | 1996 | 1997 | 1998 | 1999 | 2000 | 2001 | 2002 | 2003 | 2004 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Czech Republic | 5351 | 5059 | 4927 | 4874 | 4927 | 4963 | 4972 | 4937 | 4866 | 4764 | 4732 | 4750 | 4765 | 4733 | 4707 |
| Estonia | 826 | 807 | 761 | 699 | 675 | 633 | 619 | 617 | 607 | 579 | 573 | 578 | 586 | 594 | 596 |
| Hungary | 5052 | 4534 | 4083 | 3827 | 3752 | 3679 | 3648 | 3646 | 3698 | 3812 | 3849 | 3860 | 3871 | 3922 | 3900 |
| Latvia | 1409 | 1397 | 1294 | 1205 | 1083 | 970 | 952 | 993 | 991 | 973 | 944 | 965 | 980 | 985 | 990 |
| Lithuania | 1853 | 1898 | 1855 | 1778 | 1675 | 1644 | 1659 | 1669 | 1656 | 1648 | 1586 | 1522 | 1583 | 1607 | 1600 |
| Poland | 16280 | 15326 | 14677 | 14330 | 14475 | 14735 | 15021 | 15439 | 15800 | 15374 | 15018 | 14924 | 14590 | 14469 | 14600 |
| Slovak Republic | 2459 | 2152 | 2175 | 2118 | 2110 | 2147 | 2225 | 2206 | 2199 | 2132 | 2102 | 2124 | 2127 | 2165 | 2170 |
| Slovenia | 910 | 839 | 784 | 756 | 746 | 745 | 742 | 743 | 745 | 758 | 768 | 779 | 783 | 777 | 800 |
| **NMS-8** | **34139** | **32011** | **30556** | **29587** | **29443** | **29516** | **29837** | **30251** | **30561** | **30039** | **29571** | **29500** | **29285** | **29252** | **29363** |
| Cyprus | 257.2 | 258 | 269.3 | 268.7 | 272.8 | 285.1 | 287.8 | 287.0 | 289.9 | 293.7 | 301.9 | 307.6 | 311.8 | 313.4 | |
| Malta | 119.72 | 122.02 | 123.58 | 124.66 | 125.28 | 129.23 | 131.14 | 131 | 131.7 | 131.1 | 134.2 | 136.5 | 136.1 | 134.1 | |
| **NMS-10** | **34516** | **32391** | **30949** | **29980** | **29841** | **29930** | **30256** | **30669** | **30982** | **30464** | **30007** | **29945** | **29732** | **29700** | |
| Bulgaria | 4097 | 3564 | 3274 | 3222 | 3242 | 3282 | 3286 | 3157 | 3153 | 3088 | 2980 | 2968 | 2992 | 3097 | 3200 |
| Romania | 10893 | 10813 | 10622 | 10260 | 10037 | 9752 | 9436 | 9201 | 8918 | 8616 | 8525 | 8596 | 8600 | 8643 | 8600 |
| **NMS-8 plus BG, RO** | **49129** | **46387** | **44451** | **43069** | **42721** | **42550** | **42559** | **42609** | **42631** | **41743** | **41075** | **41065** | **40877** | **40992** | **41163** |
| **NMS-12: NMS-10 plus BG, RO** | **49505** | **46767** | **44844** | **43462** | **43119** | **42964** | **42978** | **43027** | **43052** | **42168** | **41512** | **41509** | **41325** | **41440** | |
| NMS-7 (= NMS-8 minus Poland) | **17859** | **16684** | **15879** | **15257** | **14968** | **14781** | **14817** | **14812** | **14760** | **14666** | **14553** | **14577** | **14695** | **14783** | |
| **EU-15** | 159447 | 159686 | 157557 | 155105 | 154966 | 156219 | 157208 | 158633 | 161498 | 164291 | 167580 | 169680 | 170636 | 171034 | |
| **Belarus** | | 5022.5 | 4891.4 | 4827.7 | 4700.9 | 4409.6 | 4364.8 | 4369.9 | 4416.6 | 4442 | 4441 | 4417.4 | 4380.8 | 4339 | 4300 |
| **Russia** | | 73848 | 71068 | 68642 | 64785 | 64149 | 62928 | 60021 | 58437 | 62475 | 64255 | 64400 | 66071 | 65800 | 67383 |
| **Ukraine** | | 24995 | 24505.0 | 23945.0 | 23025.0 | 24125 | 24114 | 23756 | 22998 | 20048 | 20175 | 19972 | 20091 | 20163 | 20296 |

**Employment, 1995=100**

| | 1990 | 1991 | 1992 | 1993 | 1994 | 1995 | 1996 | 1997 | 1998 | 1999 | 2000 | 2001 | 2002 | 2003 | 2004 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Czech Republic | 107.8 | 101.9 | 99.3 | 98.2 | 99.3 | 100.0 | 100.2 | 99.5 | 98.0 | 96.0 | 95.3 | 95.7 | 96.0 | 95.4 | 94.8 |
| Estonia | 130.4 | 127.3 | 120.2 | 110.3 | 106.6 | 100.0 | 97.8 | 97.4 | 95.8 | 91.5 | 90.4 | 91.2 | 92.4 | 93.8 | 94.1 |
| Hungary | 137.3 | 123.2 | 111.0 | 104.0 | 102.0 | 100.0 | 99.2 | 99.1 | 100.5 | 103.6 | 104.6 | 104.9 | 105.2 | 106.6 | 106.0 |
| Latvia | 145.2 | 144.0 | 133.4 | 124.2 | 111.6 | 100.0 | 98.1 | 102.4 | 102.1 | 100.3 | 97.3 | 99.5 | 101.1 | 101.6 | 102.0 |
| Lithuania | 112.7 | 115.5 | 112.9 | 108.2 | 101.9 | 100.0 | 100.9 | 101.6 | 100.8 | 100.2 | 96.5 | 92.6 | 96.3 | 97.8 | 97.3 |
| Poland | 110.5 | 104.0 | 99.6 | 97.3 | 98.2 | 100.0 | 101.9 | 104.8 | 107.2 | 104.3 | 101.9 | 101.3 | 99.0 | 98.2 | 99.1 |
| Slovak Republic | 114.5 | 100.2 | 101.3 | 98.7 | 98.3 | 100.0 | 103.6 | 102.8 | 102.4 | 99.3 | 97.9 | 98.9 | 99.1 | 100.8 | 101.1 |
| Slovenia | 122.1 | 112.6 | 105.2 | 101.4 | 100.1 | 100.0 | 99.5 | 99.8 | 100.0 | 101.8 | 103.1 | 104.5 | 105.1 | 104.3 | 107.3 |
| **NMS-8** | **115.7** | **108.5** | **103.5** | **100.2** | **99.8** | **100.0** | **101.1** | **102.5** | **103.5** | **101.8** | **100.2** | **99.9** | **99.2** | **99.1** | **99.5** |
| Cyprus | 90.2 | 90.5 | 94.5 | 94.2 | 95.7 | 100.0 | 100.9 | 100.7 | 101.7 | 103.0 | 105.9 | 107.9 | 109.4 | 109.9 | 0.0 |
| Malta | 92.6 | 94.4 | 95.6 | 96.5 | 96.9 | 100.0 | 101.5 | 101.4 | 101.9 | 101.5 | 103.8 | 105.6 | 105.3 | 103.8 | 0.0 |
| **NMS-10** | **115.3** | **108.2** | **103.4** | **100.2** | **99.7** | **100.0** | **101.1** | **102.5** | **103.5** | **101.8** | **100.3** | **100.0** | **99.3** | **99.2** | **0.0** |
| Bulgaria | 124.8 | 108.6 | 99.7 | 98.2 | 98.8 | 100.0 | 100.1 | 96.2 | 96.1 | 94.1 | 90.8 | 90.4 | 91.2 | 94.4 | 97.5 |
| Romania | 111.7 | 110.9 | 108.9 | 105.2 | 102.9 | 100.0 | 96.8 | 94.3 | 91.4 | 88.4 | 87.4 | 88.1 | 88.2 | 88.6 | 88.2 |
| **NMS-8 plus BG, RO** | **115.5** | **109.0** | **104.5** | **101.2** | **100.4** | **100.0** | **100.0** | **100.1** | **100.2** | **98.1** | **96.5** | **96.5** | **96.1** | **96.3** | **96.7** |
| **NMS-12: NMS-10 plus BG, RO** | **115.2** | **108.9** | **104.4** | **101.2** | **100.4** | **100.0** | **100.0** | **100.1** | **100.2** | **98.1** | **96.6** | **96.6** | **96.2** | **96.5** | **0.0** |
| **EU-15** | **102.1** | **102.2** | **100.9** | **99.3** | **99.2** | **100.0** | **100.6** | **101.5** | **103.4** | **105.2** | **107.3** | **108.6** | **109.2** | **109.5** | **110.0** |
| **NMS-7** | **120.8** | **112.9** | **107.4** | **103.2** | **101.3** | **100.0** | **100.2** | **100.2** | **99.9** | **99.2** | **98.5** | **98.6** | **99.4** | **100.0** | |
| **Belarus** | | **113.9** | **110.9** | **109.5** | **106.6** | **100.0** | **99.0** | **99.1** | **100.2** | **100.7** | **100.7** | **100.2** | **99.3** | **98.4** | **97.5** |
| **Russia** | | **115.1** | **110.8** | **107.0** | **101.0** | **100.0** | **98.1** | **93.6** | **91.1** | **97.4** | **100.2** | **100.4** | **103.0** | **102.6** | **105.0** |
| **Ukraine** | | **103.6** | **101.6** | **99.3** | **95.4** | **100.0** | **100.0** | **98.5** | **95.3** | **83.1** | **83.6** | **82.8** | **83.3** | **83.6** | **84.1** |

**GDP per employed person (macro-productivity) , 1995=100**

| | 1990 | 1991 | 1992 | 1993 | 1994 | 1995 | 1996 | 1997 | 1998 | 1999 | 2000 | 2001 | 2002 | 2003 | 2004 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Czech Republic | 97.3 | 91.0 | 92.9 | 94.0 | 95.1 | 100.0 | 104.0 | 103.9 | 104.2 | 107.8 | 112.7 | 115.2 | 116.6 | 121.1 | 127.2 |
| Estonia | 110.4 | 97.6 | 88.7 | 88.2 | 89.7 | 100.0 | 106.8 | 119.0 | 126.5 | 132.9 | 145.0 | 153.0 | 161.9 | 170.1 | 182.9 |
| Hungary | 82.1 | 80.6 | 86.7 | 92.0 | 96.6 | 100.0 | 102.2 | 106.9 | 110.6 | 111.7 | 116.4 | 120.5 | 124.4 | 126.4 | 132.4 |
| Latvia | 138.9 | 125.5 | 88.2 | 80.7 | 90.3 | 100.0 | 105.8 | 109.8 | 115.3 | 121.2 | 133.5 | 141.1 | 147.8 | 158.1 | 170.7 |
| Lithuania | 153.0 | 140.9 | 113.5 | 99.2 | 95.0 | 100.0 | 103.7 | 110.3 | 119.3 | 117.8 | 127.2 | 141.0 | 144.8 | 156.4 | 167.6 |
| Poland | 81.2 | 80.2 | 85.9 | 91.4 | 95.1 | 100.0 | 104.0 | 108.1 | 110.6 | 118.4 | 126.0 | 128.1 | 132.9 | 139.1 | 145.3 |
| Slovak Republic | 101.0 | 98.6 | 91.2 | 90.2 | 96.2 | 100.0 | 102.4 | 108.0 | 112.9 | 118.2 | 122.3 | 125.6 | 131.2 | 134.7 | 141.8 |
| Slovenia | 84.3 | 83.3 | 84.3 | 89.9 | 95.9 | 100.0 | 104.1 | 108.8 | 112.5 | 116.6 | 119.6 | 121.1 | 124.4 | 128.6 | 130.7 |
| **NMS-8** | **90.6** | **87.3** | **88.5** | **91.5** | **95.1** | **100.0** | **103.6** | **107.2** | **110.1** | **115.6** | **122.2** | **125.5** | **129.6** | **134.9** | **141.4** |
| Cyprus | 88.3 | 88.7 | 93.2 | 94.1 | 98.1 | 100.0 | 100.9 | 103.6 | 107.4 | 111.0 | 113.4 | 115.8 | 116.5 | 118.2 | |
| Malta | 84.5 | 86.2 | 89.1 | 92.3 | 97.1 | 100.0 | 102.5 | 107.6 | 110.6 | 115.6 | 120.3 | 116.8 | 119.2 | 121.5 | |
| **NMS-10** | **90.4** | **87.2** | **88.5** | **91.5** | **95.2** | **100.0** | **103.5** | **107.1** | **110.0** | **115.5** | **122.1** | **125.4** | **129.4** | **134.6** | |
| Bulgaria | 94.9 | 96.3 | 97.2 | 97.3 | 98.4 | 100.0 | 90.5 | 88.9 | 92.6 | 96.7 | 105.6 | 110.5 | 114.9 | 116.1 | 118.6 |
| Romania | 99.7 | 87.5 | 81.2 | 85.4 | 90.7 | 100.0 | 107.4 | 103.4 | 101.6 | 103.9 | 107.2 | 112.4 | 118.0 | 123.5 | 134.5 |
| **NMS-8 plus BG, RO** | **92.4** | **87.7** | **87.4** | **90.4** | **94.4** | **100.0** | **103.8** | **106.7** | **109.5** | **114.8** | **121.3** | **124.8** | **129.0** | **134.0** | **140.9** |
| **NMS-12: NMS-10 plus BG, RO** | **92.2** | **87.6** | **87.5** | **90.4** | **94.4** | **100.0** | **103.8** | **106.7** | **109.5** | **114.8** | **121.3** | **124.8** | **129.0** | **133.8** | |
| **EU-15** | **90.9** | **92.3** | **94.6** | **95.7** | **98.5** | **100.0** | **101.0** | **102.6** | **103.7** | **104.8** | **106.4** | **106.9** | **107.5** | **108.0** | **109.1** |
| Ameco orig | 91.6 | 92.0 | 94.4 | 95.7 | 98.4 | 100.0 | 101.1 | 102.7 | 103.9 | 105.1 | 106.8 | 107.3 | 108.0 | 108.7 | 109.7 |
| **Belarus** | | 132.8 | 123.3 | 115.5 | 104.7 | 100.0 | 103.9 | 115.5 | 123.9 | 127.5 | 135.0 | 141.7 | 150.0 | 162.6 | 181.5 |
| **Russia** | | 133.0 | 118.1 | 111.6 | 103.3 | 100.0 | 98.3 | 104.5 | 101.6 | 101.1 | 108.2 | 113.4 | 115.7 | 124.7 | 130.5 |
| **Ukraine** | | 184.4 | 169.5 | 148.8 | 119.3 | 100.0 | 90.0 | 88.6 | 89.9 | 102.9 | 108.3 | 119.5 | 124.9 | 136.4 | 152.0 |

*Notes: No GDP data available for Malta 1990. A rough wiiw estimate was used for calculating the aggregate GDP of NMS-8, NMS-10 and NMS-12.*
*– Employment including employees and self-employed.*

*Source: NMS: wiiw Annual Database; EU, Cyprus, Malta: AMECO and national statistics.*

## *Table A2: Additional Regression Estimates of Employment Elasticity to GDP Growth, 1995–2004*

*Model I: Employment (vEMP) and GDP growth (vGDP); sample of 8 NMS, BG, RO, 3 NIS (BY, RU, UA)*

| Source | SS | df | MS | | |
|---|---|---|---|---|---|
| | | | | Number of obs | = 130 |
| | | | | F( 1, 128) | = 9.99 |
| Model | .006982492 | 1 | .006982492 | Prob > F | = 0.0020 |
| Residual | .089454875 | 128 | .000698866 | R-squared | = 0.0724 |
| | | | | Adj R-squared | = 0.0652 |
| Total | .096437367 | 129 | .000747576 | Root MSE | = .02644 |

| vEmp | Coef. | Std. Err. | t | P>\|t\| | [95% Conf. | Interval] |
|---|---|---|---|---|---|---|
| vGDP | .1657639 | .0524423 | 3.16 | 0.002 | .0619978 | .2695299 |
| _cons | .8245711 | .0545756 | 15.11 | 0.000 | .7165839 | .9325583 |

*Model II: Employment (vEMP) and GDP growth (vGDP); sample of 8 NMS, BG, RO, 3 NIS (BY, RU, UA) (NIS dummy)*

| Source | SS | df | MS | | |
|---|---|---|---|---|---|
| | | | | Number of obs | = 130 |
| | | | | F( 2, 127) | = 4.97 |
| Model | .007003088 | 2 | .003501544 | Prob > F | = 0.0083 |
| Residual | .089434279 | 127 | .000704207 | R-squared | = 0.0726 |
| | | | | Adj R-squared | = 0.0580 |
| Total | .096437367 | 129 | .000747576 | Root MSE | = .02654 |

| vEmp | Coef. | Std. Err. | t | P>\|t\| | [95% Conf. | Interval] |
|---|---|---|---|---|---|---|
| vGDP | .164774 | .0529595 | 3.11 | 0.002 | .0599767 | .2695714 |
| DUM | -.0009504 | .0055574 | -0.17 | 0.864 | -.0119475 | .0100466 |
| _cons | .8258196 | .0552681 | 14.94 | 0.000 | .7164541 | .9351851 |

*Model III: Employment (vEMP) and lagged GDP growth (vGDPl); sample of 8 NMS, BG, RO, 3 NIS (BY, RU, UA)*

| Source | SS | df | MS | | |
|---|---|---|---|---|---|
| | | | | Number of obs | = 130 |
| | | | | F( 1, 128) | = 10.01 |
| Model | .006995345 | 1 | .006995345 | Prob > F | = 0.0019 |
| Residual | .089442022 | 128 | .000698766 | R-squared | = 0.0725 |
| | | | | Adj R-squared | = 0.0653 |
| Total | .096437367 | 129 | .000747576 | Root MSE | = .02643 |

| vEmp | Coef. | Std. Err. | t | P>\|t\| | [95% Conf. | Interval] |
|---|---|---|---|---|---|---|
| vGDPl | .1329142 | .0420081 | 3.16 | 0.002 | .0497941 | .2160343 |
| _cons | .8598375 | .0433882 | 19.82 | 0.000 | .7739864 | .9456885 |

*Model IV: Employment (vEMP) and lagged GDP growth (vGDPl); sample of 8 NMS, BG, RO, 3 NIS (BY, RU, UA) (NIS dummy)*

| Source | SS | df | MS | | |
|---|---|---|---|---|---|
| Model | .007065691 | 2 | .003532846 | Number of obs | = 130 |
| Residual | .089371676 | 127 | .000703714 | F( 2, 127) | = 5.02 |
| | | | | Prob > F | = 0.0080 |
| Total | .096437367 | 129 | .000747576 | R-squared | = 0.0733 |
| | | | | Adj R-squared | = 0.0587 |
| | | | | Root MSE | = .02653 |

| vEmp | Coef. | Std. Err. | t | P>\|t\| | [95% Conf. | Interval] |
|---|---|---|---|---|---|---|
| vGDPl | .1365025 | .0436575 | 3.13 | 0.002 | .0501122 | .2228928 |
| DUM | .0018081 | .0057188 | 0.32 | 0.752 | -.0095083 | .0131245 |
| _cons | .8557193 | .045448 | 18.83 | 0.000 | .7657859 | .9456527 |

*Model V: Employment (vEMP), GDP growth (vGDP) and lagged GDP growth (vGDPl); sample of 8 NMS*

| Source | SS | df | MS | | |
|---|---|---|---|---|---|
| Model | .013722409 | 2 | .006861204 | Number of obs | = 80 |
| Residual | .042885532 | 77 | .000556955 | F( 2, 77) | = 12.32 |
| | | | | Prob > F | = 0.0000 |
| Total | .056607941 | 79 | .000716556 | R-squared | = 0.2424 |
| | | | | Adj R-squared | = 0.2227 |
| | | | | Root MSE | = .0236 |

| vEmp | Coef. | Std. Err. | t | P>\|t\| | [95% Conf. | Interval] |
|---|---|---|---|---|---|---|
| vGDP | .1940474 | .0943572 | 2.06 | 0.043 | .0061581 | .3819367 |
| vGDPl | .2850295 | .0735131 | 3.88 | 0.000 | .1386462 | .4314128 |
| _cons | .4968122 | .1093566 | 4.54 | 0.000 | .2790554 | .7145691 |

*Model VI: Employment (vEMP), GDP growth (vGDP) and lagged GDP growth (vGDPl); sample of 8 NMS (NMS dummies)*

| Source | SS | df | MS | | |
|---|---|---|---|---|---|
| | | | | Number of obs | = 80 |
| | | | | F( 9, 70) | = 5.60 |
| Model | .023702004 | 9 | .002633556 | Prob > F | = 0.0000 |
| Residual | .032905936 | 70 | .000470085 | R-squared | = 0.4187 |
| | | | | Adj R-squared | = 0.3440 |
| Total | .056607941 | 79 | .000716556 | Root MSE | = .02168 |

| vEmp | Coef. | Std. | Err | t | P>\|t\| | [95% Conf. | Interval] |
|---|---|---|---|---|---|---|---|
| vGDP | .354271 | .0948158 | 3.74 | 0.000 | .16516 | .5433751 | |
| vGDPl | .3113643 | .0694653 | 4.48 | 0.000 | .1728201 | .4499084 | |
| DUMcountry1 | .0071376 | .0099683 | 0.72 | 0.476 | -.0127436 | .0270188 | |
| DUMcountry2 | -.0195508 | .0098465 | -1.99 | 0.051 | -.0391891 | .0000875 | |
| DUMcountry3 | .0087011 | .0097871 | 0.89 | 0.377 | -.0108186 | .0282208 | |
| DUMcountry4 | -.016589 | .0098719 | -1.68 | 0.097 | -.036278 | .0031 | |
| DUMcountry5 | -.0189547 | .0099885 | -1.90 | 0.062 | -.0388762 | .0009668 | |
| DUMcountry6 | -.0036834 | .009741 | -0.38 | 0.706 | -.0231112 | .0157445 | |
| DUMcountry7 | .0123968 | .0097566 | 1.27 | 0.208 | -.0070621 | .0318557 | |
| DUMcountry8 | (dropped) | | | | | | |
| _cons | .3052912 | .1127265 | 2.71 | 0.008 | .0804654 | .5301171 | |

*Model VII: Employment (vEMP), GDP growth (vGDP) and lagged GDP growth (vGDPl); sample of 8 NMS (NMS and time-specific dummies)*

| Source | SS | df | MS | Number of obs | = | 80 |
|---|---|---|---|---|---|---|
| | | | | F( 18, 61) | = | 3.90 |
| Model | .030301358 | 18 | .001683409 | Prob > F | = | 0.0000 |
| Residual | .026306583 | 61 | .000431255 | R-squared | = | 0.5353 |
| | | | | Adj R-squared | = | 0.3982 |
| Total | .056607941 | 79 | .000716556 | Root MSE | = | .02077 |

| vEmp | Coef | Std | Err. | t | P>\|t\| | [95% Conf. | Interval] |
|---|---|---|---|---|---|---|---|
| vGDP | .4064047 | .1000702 | 4.06 | 0.000 | .2063018 | .6065075 |
| vGDPl | .2607078 | .0703854 | 3.70 | 0.000 | .1199634 | .4014522 |
| DUMcountry1 | .0063903 | .0095826 | 0.67 | 0.507 | -.0127712 | .0255519 |
| DUMcountry2 | -.0207065 | .0094611 | -2.19 | 0.032 | -.0396251 | -.0017879 |
| DUMcountry3 | .0079877 | .0093844 | 0.85 | 0.398 | -.0107776 | .026753 |
| DUMcountry4 | -.0180978 | .0094863 | -1.91 | 0.061 | -.0370669 | .0008712 |
| DUMcountry5 | -.0200459 | .0096254 | -2.08 | 0.041 | -.0392931 | -.0007986 |
| DUMcountry6 | -.00433 | .009339 | -0.46 | 0.645 | -.0230045 | .0143444 |
| DUMcountry7 | .0117864 | .0093517 | 1.26 | 0.212 | -.0069135 | .0304863 |
| DUMcountry8 | (dropped) | | | | | |
| DUMyear1 | (dropped) | | | | | |
| DUMyear2 | (dropped) | | | | | |
| DUMyear3 | (dropped) | | | | | |
| DUMyear4 | .0025919 | .0104 | 0.25 | 0.804 | -.0182041 | .023388 |
| DUMyear5 | .0102987 | .0105836 | 0.97 | 0.334 | -.0108646 | .0314619 |
| DUMyear6 | .0128129 | .010758 | 1.19 | 0.238 | -.0086991 | .0343249 |
| DUMyear7 | .0196529 | .0107504 | 1.83 | 0.072 | -.0018439 | .0411496 |
| DUMyear8 | .0181758 | .0109365 | 1.66 | 0.102 | -.0036931 | .0400447 |
| DUMyear9 | (dropped) | | | | | |
| DUMyear10 | .0215946 | .0106242 | 2.03 | 0.046 | .0003502 | .0428391 |
| DUMyear11 | .029626 | .0105394 | 2.81 | 0.007 | .0085512 | .0507009 |
| DUMyear12 | .0269578 | .0105059 | 2.57 | 0.013 | .0059501 | .0479656 |
| DUMyear13 | .0219043 | .0105448 | 2.08 | 0.042 | .0008187 | .0429899 |
| _cons | .2880442 | .1165777 | 2.47 | 0.016 | .0549327 | .5211557 |