

What GDP Indicators Do Not Tell You: Alternative Indicators of Economic Growth and Real Convergence

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This paper points out the limits of GDP and the importance of supplementing it with other indicators available in the national accounts. The wealth of a country does not depend on the volume of goods and services the economy manages to produce, but rather on its appropriate structure and quality. Such quality is best reflected in foreign trade and this is especially true of small, open economies whose exports are a large share of total output. Economic analyses typically work with the GDP indicator, which however does not reflect the impact of the changes of terms of trade.

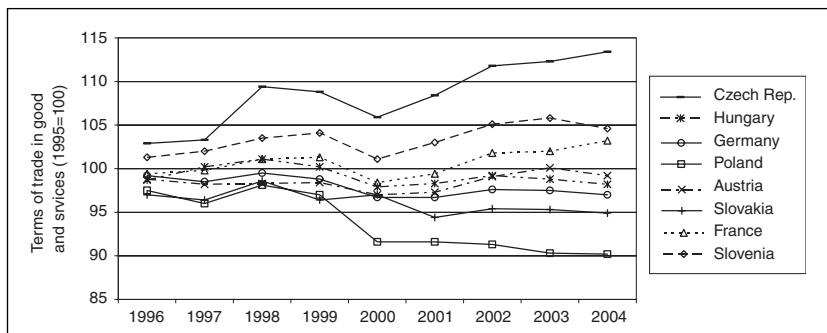
The paper is organized as follows: In chapter 1 we analyze the impact of terms of trade on real income and the methodology of real gross domestic income indicator (RGDI). We also compare RGDI rates of growth in Central European countries based on our own calculations. In chapter 2 we analyze the conditions under which real GDP growth does not fully reflect the progress of real convergence. We investigate the so-called Gerschenkron effect in the Central European countries and compare recent developments in Slovakia with the familiar statistical paradox of centrally planned economies. The influence of labor productivity and wage relations on the level of unit labor costs and cost competitiveness of Central European economies is compared. In the final chapter we suggest some implications for macroeconomic analysis and economic policy.

1. The Impact of Terms of Trade on Real Income

Real income – unlike real GDP – includes the impact of terms of trade. The Czech economy stands out – at least in the European context – owing to a substantial long-term improvement in terms of trade. These positive terms-of-trade changes affected the economic level of economic development in the country, maintenance of the macroeconomic balance, the real growth of income, and thus the process of real convergence. While in the short run import and export prices in the Czech Republic fluctuated, strongly influencing the external balance, in the long run the country benefitted from unusually significant terms-of-trade gains. These “trading gains” are ignored in analyses that use only the “classic” indicator of GDP.

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GRAPH 1 Terms of Trade in Goods and Services in Selected EU Countries (1995 = 100)^a



Note: ^a according to import/export deflator from national accounts

Source: (European Commission, 2005), p. 84

1.1 Terms-of-Trade Changes in Transitional Economies

Terms of trade (T/T) capture the relationship between export and import prices and thus express the success of a country in its external trade. Their short-term fluctuations are usually associated with price volatility in primary commodities (especially crude oil). These movements are an exogenous variable especially in the case of small open economies.

In contrast, long-term terms-of-trade trends are for the most part endogenous.¹ If an individual country's position in T/T improves, then this fact increases its real income above its "physical" volume of total production. The Czech Republic belongs to such countries, as shown in terms-of-trade comparison with the EU countries (*Graph 1*).

From the countries investigated, the development of terms of trade in the Czech Republic is the most favorable. Whereas in the other Central European new member states (NMS-4)² the index of terms of trade was lower in 2004 in comparison with 1995, in the Czech Republic it was higher by more than 12 %.³

The Czech economy has been very sensitive to one-off fluctuations in terms of trade. In some years the changes in T/T have had a greater influence on the formation of real income than the change in real GDP (*Table 1*).⁴ On the one hand, in 1998, GDP fell by 1.1 %, but this decrease was more than

¹ Providing these trends do not reflect a longer-term phenomenon of redistribution between raw-material exporting and manufacturing countries.

² The NMS-4 are new Central European EU member states, which include the Czech Republic, Hungary, Poland and Slovakia. The NMS-5 include the above and Slovenia, and NMS-8 are all post communist countries, i.e. NMS-10 with the exception of Malta and Cyprus.

³ The rapid rise in T/T in the Czech Republic between the years 1995 and 2004 partly compensated for the deep fall at the start of the transformation. On the same basis (1995 = 100) T/T in the year 1990 were 109.1 %. During 1991 however they fell (after 3 devaluations of the Czechoslovak koruna in the preceding year) by more than 24 percentage points to 84.7 %. They did not return to the previous level of 1990 until 1998. A decline of T/T was also observed in the other transformation countries, such as Poland or Slovenia, at the start of transformation in the early 1990s, but it was not as steep as in the former Czechoslovakia.

⁴ For more details see (Vintrová, 2004).

TABLE 1 Real GDP Growth and the Impact of Terms of Trade in the Czech Republic

	1996	1997	1998	1999	2000	2001	2002	2003	2004
Real GDP growth (in %) ^a	4.2	-0.7	-1.1	1.2	3.9	2.6	1.5	3.2	4.7
Change in T/T (in % of GDP) ^b	1.6	0.2	3.5	-0.3	-1.8	1.7	2.2	0.1	0.3
in bn. CZK	24	4	62	-6	-37	37	51	2	7

Notes: ^a In constant prices, calculated on the basis of the chaining method, i.e. GDP of the current year in average prices of the previous year related to GDP of the previous year in current prices.

^b Change of T/T adjusted to previous year average prices related to GDP of previous year in current prices.

Source: (Czech Statistical Office, 2005) – author's adjustment

offset by an improvement in terms of trade equivalent to 3.5 % of GDP. In 2002 the gain in T/T was 2.2 % of GDP, which was greater than the gain in real GDP growth (1.5 %). On the other hand, in 2000, real GDP grew fast at 3.9 %, but unfavorable T/T development lowered real resources by 1.8 % of GDP, and real income growth was lower than in 1998, the year of the biggest GDP decline.

In absolute terms the favorable impact of terms of trade peaked in 1998, when it raised real income by 62 bn. constant CZK. The fall of 37 bn. CZK in 2000, caused by higher import prices, was reversed during the following year. The subsequent favorable development in terms of trade in 2002 led to a growth in real income of 51 bn. CZK. In summary, such large changes in real domestic income are difficult to ignore.

Long-term improvements in terms of trade are endogenous and reflect qualitative changes in the tradable output of the given country. These are qualitative changes in the widest sense of the word, and not just improvements in technical parameters, which statisticians try to include in price indices according to the possibilities available.⁵ These qualitative changes reflect transfers of labor and capital to: (i) activities with higher value added, (ii) to more sophisticated products, and (iii) to superior technologies. In addition, these changes reflect an improvement in the price premia of domestic brands and/or an elimination of discount for 'goods from the east' and a better integration into the international trade network. These factors may increase export prices and raise real income without any growth in the 'physical volume' of exported goods and services. Such changes accelerated in the Czech economy following the inflow of foreign direct investment (FDI) at the end of the 1990s.

1.2 Real Income Indicator

Changes in terms of trade are excluded from the measure of GDP in constant prices. This comes from the principle on which this indicator is based: "What would happen if there were no changes either in domestic or foreign prices?" Thus, real GDP considers only the growth in volume of production,

⁵ The impact of quality changes in transition economies is analyzed in more detail in (Filer – Hanousek, 2000).

while its valuation in foreign markets as well as import price changes are ignored. However, unlike domestic price changes, export and import price changes influence the real income available for consumption and investment in a given country. For this reason GDP may not provide a full picture of the overall achievements of an economy.

To express the impact of terms of trade on aggregate indicators of economic activity was a challenge for analysts as early as during the second half of the 20th century. Although in large economies with extensive domestic markets the impact of T/T on real income is small, U.S. statisticians developed indicators to reflect this impact. Since the beginning of the 1980s the Bureau of Economic Analysis has published the so-called “Command-basis GNP”, which includes T/T changes (Denison, 1981). The International Monetary Fund has used ad hoc GDP adjustments for T/T changes for several decades.

Of the economically developed European countries, long-term improvements in terms of trade have been characteristic for Switzerland, which has recorded very slow rates of real GDP growth. Ulrich Kohli of the Swiss National Bank proposed an indicator on the basis of a production function. ‘Real’ GDP (*GDPV*) is calculated according to:⁶

$$GDPV = TDDV + XGSV (PXGS/PMGS) - MGSV \quad (1)$$

where *TDDV* is real domestic demand, *XGSV* and *MGSV* are volumes of import and export (in real terms) and *PXGS* and *PMGS* are import and export deflators. An improvement (worsening) in export deflators implies that a smaller (greater) volume of exports is required for coverage of imports and thus increases (lowers) resources for coverage of domestic demand. Swiss *GDPV* has grown in the long run on average faster by one-half of one percent than traditional real GDP.⁷

In the 1990s in the national accounts methodology a comprehensive indicator was developed to include the impact of T/T changes. After revisions, the SNA 93 and ESA 95 systems recognize and use an indicator of real gross domestic income – RGDI.⁸ The equation for calculating “trading gains or losses” (*T*) has, in the national accounts (ESA 95), the following form:

$$T = (X - M)/P - (X/P_x - M/P_m) \quad (2)$$

where *X* is export of goods and services, *M* import of goods and services, *P_x* price deflator of exports, *P_m* price deflator of imports and *P* average price deflator of foreign trade balance.⁹

⁶ The term “real” here does not mean an expression in constant prices, but product that the country has in reality at its disposition (Kohli, 2004).

⁷ The calculation is quoted from the survey “OECD Economic Surveys 2003–2004”, part Switzerland, Box 1 – Command GDP: a real income indicator.

⁸ The UN and EU economic and statistical institutions prepared and approved these improved systems in cooperation with individual countries.

⁹ This equation is defined according to current methods for the calculations based on the average prices of the previous year. The average price deflator of foreign trade balance is usually calculated as the average of import and export price deflators.

TABLE 2 RGDI and Real GDP Growth
(annual percent change in constant prices)

	1996	1997	1998	1999	2000	1996–2000 annual average
Real gross domestic income	5.8	–0.5	2.3	0.9	2.1	2.1
Real gross domestic product	4.2	–0.7	–1.1	1.2	3.9	1.5
Difference in percentage points	1.6	0.2	3.4	–0.3	–1.8	0.6
	2001	2002	2003	2004	2001–2004 annual average	1996–2004 annual average
Real gross domestic income	4.3	3.7	3.3	5.0	4.0	2.9
Real gross domestic product	2.6	1.5	3.2	4.7	2.9	2.1
Difference in percentage points	1.7	2.2	0.1	0.3	1.1	0.8

Source: (ČSÚ, 2005) – author's adjustment

The balance of goods and services, adjusted separately for export- and import-price changes against the basic period (see expressions in the second set of brackets of the above equation), is compared with the balance in current prices, adjusted for the average price deflator of exports and imports (see footnote 9). The difference in such adjusted balances represents the overall influence of T/T changes, added to GDP at constant prices (which, using the chaining method, means prices from the previous year).

$$RGDI = GDP + T \quad (3)$$

The RGDI indicator is quite similar to Kohli's GDPV. The difference lies only in the fact that while when construing GDPV the overall influence of T/T is added to exports, in the national accounts exports and imports are calculated separately at the previous year's prices and the difference of the thus derived balance against the balance at current prices (adjusted around the average deflator) is added to GDP. On balanced foreign trade, both approaches show almost the same results.

1.3 In the Czech Republic Real Income Grew Faster than Real GDP

In the Czech Republic the positive impact of terms of trade is even stronger than in Switzerland. RGDI has grown approximately one percent faster than real GDP. In 1996–2004 the difference was 0.8 %, while in 2001–2004 it increased to 1.1 % (*Table 2*).

An improvement in terms of trade enables faster growth of domestic demand – consumption and investment – than the GDP formation, without disturbing the external balance. In the Czech Republic, for example, household consumption and gross fixed capital formation during 1996–2004 increased annually by 2.8 %, while GDP increased by only 2.1 %. The development of these components, on which depend the standard of living and the future well-being of the economy, correspond to the development of RGDI, which grew on average by 2.9 %. The rate of growth of domestic de-

TABLE 3 Balance of Trade, Goods and Services
(in current prices)

	1995–2000 annual average	2001	2002	2003	2004	1995–2004 annual average	2001–2004 average average
% GDP	–3.2	–2.5	–2.0	–2.2	–0.5	–2.5	–1.8

Source: (ČSÚ, 2005) – author's calculations

mand (including general government consumption and changes in inventories) exceeded the formation of real GDP by 0.5 percentage points.

Thanks to the favorable development of T/T, the external economic balance did not worsen even though domestic demand growth outpaced real GDP growth. The deficit in the goods and services balance declined to an average of 1.8 % of GDP in 2001–2004 from 3.2 % of GDP in 1995–2000, and in 2004 it dropped to a mere 0.5 % of GDP (*Table 3*).

1.4 An Alternative Picture of Economic Performance in Central Europe as a Result of T/T Changes

In other new member countries of Central Europe the impact of T/T changes on real income has differed from that in the Czech Republic (Graph 1). Using RGDI for international comparisons of economic development, we find that the relative speed of convergence is different from that based on real GDP.

Czech real gross domestic income in per capita terms was one of the fastest growing in Central Europe.¹⁰ During 2001–2004 this indicator grew at an average annual rate of 4.2 % (calculated using data from the Czech Statistical Office). The NMS-5 are currently not publishing data on RGDI. It can however be calculated using national accounts data published by EUROSTAT. According to our calculations of RGDI per capita using the formula of ESA 95 (equations 2 and 3),¹¹ Czech economic growth is the most dynamic (*Table 4*). In contrast, using per capita GDP, the rates of growth were among the slowest.

2. Rates of GDP Growth and the Measurement of Real Convergence

Higher rates of GDP per capita growth at constant prices are used to prove that less developed countries are approaching the economic level of more developed countries. However, even for this purpose the dynamics of the real GDP indicator are not always the most appropriate.

¹⁰ Indicators of GDP per capita, which measure the economic level and the progress of convergence, differ in different directions from overall GDP rates of growth in individual countries. The deviation is, however, only of the order of one or two tenths of percent of annual average. Among the compared countries, the rates of growth per capita are lower only in Slovenia due to increasing population.

¹¹ The time series on export and import deflators for individual countries are drawn from the European Commission (2005), data on the volume of exports and imports and GDP from national accounts of relevant countries, published by EUROSTAT.

TABLE 4 Real Gross Domestic Income and GDP in per capita Terms in NMS-5 Countries, 2001–2004
(average annual rates of growth, in %)

	RGDI	GDP	Difference in p. p.
Czech Republic	4.2	3.1	1.1
Hungary	4.1	3.9	0.2
Slovakia	4.0	4.7	–0.7
Slovenia	3.7	3.2	0.5
Poland	2.6	2.9	–0.3
EU-25	1.4	1.3	0.1

Source: (European Commission, 2005); EUROSTAT – National Accounts; author's calculations

In comparisons of economic levels of different countries, gross domestic product per capita in purchasing power parity is used to exclude price level differences. The purchasing power parity is an artificial international currency unit drawn on the basis of existing currency from the average price level in the group of countries under comparison. Such a unit forms the PPS (Purchasing Power Standard) for European Union countries, giving the average price level in the EU-25 based on the EUR, or for comparisons made within the framework of the OECD there is the ‘international dollar’, which records the average price level in the current 30 OECD countries.

In practice it is possible to find examples of countries recording fast rates of growth of real per capita GDP; however, the level of development of the given country did not approach that of the compared economies, or was approaching it more slowly than suggested by the rates of growth of GDP. This paradox is well known from the centrally planned economies. While these economies showed an unusually fast real GDP growth rate, they did not approach the economic level of developed market economies but lagged even further behind. We will document a similar statistical paradox using data for the Slovak economy and its Central European neighbours. These problems are again related to the impact of terms-of-trade changes.

2.1 The Gerschenkron Effect and the Existing Old and New Statistical Paradoxes

Apart from the above mentioned external price effects, the “statistical quality” of price indices can affect the rate of growth of real GDP in individual countries. Local statistical offices use different methods of calculating production and services in constant prices. Price indices in some cases either overestimate the level of inflation and thus undervalue economic growth, or conversely do not capture the full measure of inflation and thus overestimate real GDP growth.

The problem of obsolete constant price indices is known in the literature as “index number relativity”. It is intuitively explained as a negative correlation between volume growth of production in individual groups of products and services and the development of their relative prices. It is also

called the Gerschenkron effect after the economist who, shortly after WWII, analysed the development of Soviet industrial production.

The centrally planned economies were separated from the development in the more developed economies and this isolation led to a worsening of the quality of goods and services (in the broad sense of the word). However, the decline in quality was not reflected in the inflation indices and was shown as fictitious real GDP growth. Regulated prices did not appropriately price individual parts of products, because their relative prices did not equal their relative marginal costs. While deviations from marginal-cost pricing exist in market economies too, in centrally planned economies they were much more noticeable. In the 1980s, the problem of overvalued volume indices in centrally planned economies was identified, for example, by Marer (1985, pp. 168–171).

The measurement problem is the greater the more volume indices of individual production components differ from each other and the more the range of price distortion correlates with growth in the volume indices. For example, if prices of products, whose market share rapidly increases, sharply fall, then prices of traditional products, whose market share falls, stagnate or rise. In centrally planned economies inordinately large weight was given to rapidly growing economic sectors.

Is it possible that the statistical paradox is turning around and that a widely defined improvement in quality is not reflected in real GDP? In such a case even slower growth of real per capita GDP may lead to a relatively fast convergence toward the level of developed countries. “Domestic” price indices may hide quality changes, which could be fictively shown as inflation. We find some evidence of this effect: favorable terms-of-trade developments in the Czech economy, accompanied by a long-term real appreciation of the koruna. As a result, nominal and real convergence may in this case occur more quickly than it appears according to GDP growth.

The investigation of the Gerschenkron effect in new EU member countries is appropriate as obsolete constant price indices are more of a problem in these economies than in market economies. The earlier the base year of the price index, the more these prices tend to mismeasure production growth. During periods of sharp structural changes, which took place in these economies during the 1990s, constant prices could become obsolete very quickly. Moreover, in individual countries this process has had different speeds and also different directions.

After the disintegration of the Council for Mutual Economic Assistance (CMEA) market and the change to a market system, the structure of domestic and foreign demand changed fundamentally. More exacting demands arose for quality, technical level, wider variety, fashion-consciousness and diversity of the market, to which the structure of production gradually adapted. What is being compared, therefore, is a product of an altogether different structure and quality, which is, de facto, only of limited comparability in time and space.

The move to a chaining method of constant price recalculation (using the previous year as a basis) to a large degree minimizes the distortionary effect of “obsolete” constant prices. Czech national accounts converted to this method as one of the first among the new EU member states to do so,

TABLE 5 GDP per capita in NMS-4, relative to EU-25
(in %, EU-25 = 100)

	2000 in current PPS ^a	2004		
		in current PPS ^a	implied by real GDP growth ^b	difference in p.p.
Czech Republic	64.3	70.3	69.0	1.3
Hungary	53.1	61.1	60.2	0.9
Poland	45.9	46.7	49.0	-2.3
Slovakia	47.5	52.0	54.3	-2.3

Note: ^a PPS, Purchasing Power Standards, i.e. a common currency that eliminates the differences in price levels between the EU-25 countries.

^b Calculated as the country's relative GDP in 2000 (in current PPS) multiplied by the GDP growth index per capita differential (2004/2000) to EU-25 in constant prices.

Source: EUROSTAT 2005 – Structural Indicators [downloaded 8. 11. 2005]; author's calculations

while statistical offices in the other new member countries are still preparing for this step. This fact makes cross-country comparisons more questionable among states who have until now been using constant prices with an earlier base year (usually 1995), accompanied with obsolete base year weights.

The distortions caused by obsolete constant price indices can be shown in the disparity between the reported rates of GDP growth and real convergence, measured in purchasing power parity (PPP). The cross-country comparisons of economic levels are typically made in current prices and current market exchange rates to be able to capture the price changes of the given year. The current purchasing parity rate is therefore influenced by changes in terms of trade and by other structural changes, such as by changing weights of individual GDP components, both of which are not reflected in the same way in constant price GDP calculations.¹²

The indicators of real convergence may differ substantially from constant price GDP rates, providing the changes in current purchasing parity rates differ substantially from the implicit, constant-price GDP deflators. Among the NMS-4, the greatest negative difference can be observed in Slovakia and Poland, while the difference in Hungary and in the Czech Republic is of similar magnitude, but positive (*Table 5*).

Changes in terms of trade play a significant role in the process of real convergence in the transitional economies. The real convergence of countries with favorable T/T development, such as the Czech Republic or Hungary, is proceeding more quickly than is indicated by GDP growth (measured in domestic constant prices) in relation to the EU-25. On the contrary, the real convergence of countries with unfavorable T/T changes, such as

¹² By converting the volume of exports and imports into current purchasing power parity, the Exchange Rate Deviation Index coefficient (ERDI) is 1, while by converting the other GDP components, such as investment or consumption, ERDI is much higher due to the lower price level in the transitional economies (in the Czech Republic ERDI is equivalent to about 2). The changes in terms of trade are taken into account in current purchasing power parity calculations, while by calculating the GDP in constant domestic prices, terms of trade are excluded as price changes. The weight of exports and imports in the total GDP then also differs significantly in aggregates measured in purchasing power parities and in domestic constant prices.

TABLE 6 GDP per capita Growth Index
(in %, constant prices)

	2003/1990 ^a	2003/1995 ^b
Czech Republic	113.2	117.7
Slovakia	122.7	134.7
Hungary	122.4	137.6
Poland	122.5	138.1

Source: ^a EUROSTAT, Structural Indicators and national yearbooks – author's adjustment

^b EUROSTAT, Structural Indicators – author's adjustment

Slovakia or Poland, is proceeding more slowly than would GDP growth indicate. (Compare also the differences between GDP and RGDI growth in 2001–2004 in Table 4.)

In Slovakia the reported constant-price GDP per capita growth was 4.7 % on average in 2001–2004, while in the EU-25 GDP per capita grew only by 1.3 % annually. As a result, the economic level of Slovakia – measured in PPP – should have reached 54.3 % of the EU-25 in 2004. However, it was only 52.1 % in current PPP. The negative difference of 2.2 percentage points in four years, i.e. 0.6 p.p. per annum is caused by the worsening of T/T and by other structural influences. To reach the economic level of 52.1 % of the EU-25, the true average annual rates of GDP growth in Slovakia were only 3.6 %. In other words, the officially recorded rates of GDP growth in Slovakia are overestimated by about one-fourth.¹³

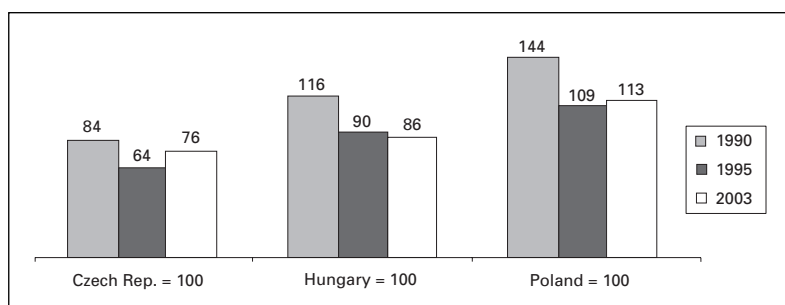
The limited usefulness of real GDP growth has led some authors to propose alternative indicators based on foreign currency. For example, Singer (2005) recommended converting GDP in transitional economies into current euros using market exchange rates and then deflating this indicator by the average inflation index in the euro zone. Such an adjusted indicator is closer to the development of real income, defined in national accounts, as it reflects the changes in terms of trade. However, it captures not only the progress of real convergence, but also of the nominal convergence influenced by price level convergence.

2.2 The Long-term Puzzle of the Slovak Economy

We observe another puzzle in the development of the Central European countries. Fast, constant domestic-price GDP growth in Slovakia is not reflected in Slovakia's convergence with neighbouring countries. Per capita GDP growth, measured at constant domestic prices was, for the whole transformation period, faster in Slovakia than in the Czech Republic and almost as fast as in Hungary and Poland (*Table 6*).

¹³ The worsening of T/T in Slovakia can be shown also in the difference between the foreign trade balance in current and constant prices. While the 2004 balance in current prices of goods and services was negative to the tune of 36 billion SKK, equivalent to –2.7 % of GDP, the balance in constant prices remained positive to the tune of 14 billion SKK, i.e. 1.7 % of GDP (Slovak Statistical Office, National Accounts 2005).

GRAPH 2 GDP per capita in Slovakia Relative to the Czech Republic, Hungary and Poland (in %, current purchasing power parity)



Source: (Auer – Müller, 1993); OECD – EUROSTAT 2004; EUROSTAT – Structural Indicators, 2005

Contrary to the reported faster/identical growth, the economic level of Slovakia neither got closer to its neighbours compared with the basic year of transformation, nor maintained its original distance. The relative level of Slovakia declined, compared to all neighbours. Whereas in 1990 Slovak GDP per capita at purchasing power parity was above the level of that of Hungary (116 %), at present it is far below (86 %); vis-à-vis the Czech Republic it fell from 84 % to 76 %; and vis-à-vis Poland it declined from 144 % to 113 % (*Graph 2*).

The comparison of the Slovak level of economic development vis-à-vis the Czech Republic in the base year is measured in the common currency (the Czechoslovak koruna, CSK) and at a single price level, providing “ideal-parity” conditions. Hence, the Czech-Slovak exchange rate cannot be overvalued. Slovak and Czech GDP is measured by GDP formation and not by GDP use – the latter one was larger in Slovakia due to the pre-split transfers from the Czech Republic. The pre-split “cost” prices enabled it to reach higher incomes under conditions of lower productivity than happened later under conditions of a market economy. Comparisons in 1992 CSK thus reflect the real distribution of incomes between the Czech Republic and Slovakia at that time.¹⁴

¹⁴ However, the comparability of data over the long run presents a certain problem here. For 1990 data are calculated for Czechoslovakia and other transitional countries according to the ECP'90 project, that is, a comparison with Austria in international schillings – see (Auer – Müller, 1993). Data for the Czech and Slovak Federal Republic (ČSFR) were divided into the Czech Republic and Slovakia according to the relationship of GDP per capita in CSK, published in the Czechoslovak statistical yearbook (FSÚ, ČSÚ and SŠÚ, 1992). The years 1995 and 2003 in PPS are taken from EUROSTAT – Structural Indicators (2005). Between 1990 ECP and 2003 ECP several methodical revisions took place. These revisions were applied, however, to all countries equally and we believe that they did not affect the relationship materially. Moreover, over such a long period it would be problematic to use the method of retrospective interpolation according to constant purchasing power parity because such an approach would distort the investigated puzzle, namely the relationship between real GDP growth rates and the level of development at current purchasing power parity. See (OECD, 2005) for an example on such replotation: the OECD estimated the Slovak economic level in 1992 to be 64 % of the Czech Republic's level, measured in per capita GDP at constant purchasing power parity. This contradicts, of course, koruna calculations carried out by the FSÚ at the beginning of the 1990s, which estimated the relative economic level at 76 %.

The decline in the economic level of Slovakia relative to its neighbors dates mostly to the first half of the 1990s. The rate of decline vis-à-vis Hungary slowed and was reversed vis-à-vis the Czech Republic and Poland. This reversal was slower, however, than suggested by the published rates of GDP per capita growth.

2.2.1 Adaptation of the Slovak Economy after the Split of Czechoslovakia

Analysis of the real convergence in Slovakia relative to its neighbours is complicated as the transformation processes interacted with the consequences of the split of Czechoslovakia. After the split, Slovakia lost transfers from the Czech lands equivalent on average to 11 % of Slovak GDP (conversely, the Czech Republic gained resources worth 4 % of Czech GDP).¹⁵

Also GDP formation – not only GDP domestic use – showed a post-split decline. The separation of the Slovak economy required some adaptation of prices, wages, private and public consumption, and investment in the lower labor productivity and lower per capita output. The range of this adjustment was large, because the pre-split Slovak GDP per capita and GDP per worker were 76 % and 88 % of the Czech level, respectively, whereas average wages were almost identical to Czech average wages (97 % of the Czech level). Under such conditions the Slovak economy could not continue to operate without a loss of competitiveness in the international market.

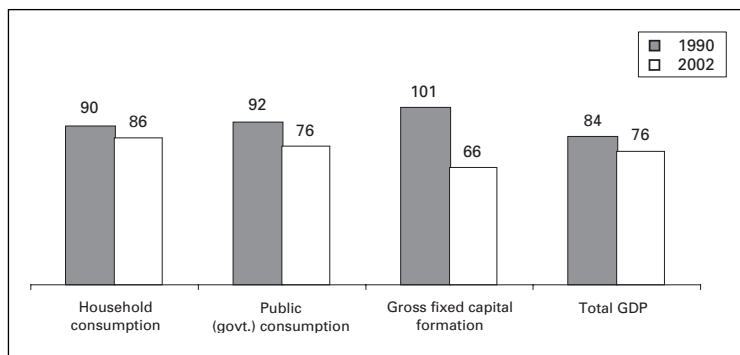
Maintaining competitiveness required adjustment in key macroeconomic parameters, such as the relative wage level and private and public consumption in relation to the neighbouring countries, in order to reduce relative prices of tradable goods and services. The devaluation of the Slovak koruna helped with price competitiveness in the external market. Of course, nominal exchange rate adjustment resulted in irreversible losses of real income owing to a decline in terms of trade.

We can document the macroeconomic adaptation of the Slovak economy using the main GDP expenditure components, all expressed relative to the Czech economy. The level of per capita household consumption fell significantly, as did investment (*Graph 3*). In 1990 per capita investment in Slovakia was higher than in the Czech Republic, while in 2002 it was only two-thirds of the Czech level. Investment in Slovakia fell relative to the Czech Republic despite the very high Slovak investment-to-GDP ratio, which exceeded the European average and was one of the highest of all transitional countries.

Average wages fell the most. Before the split, Slovak and Czech wages were among the highest in Central Europe. Slovak wages were a mere 3 % lower than their Czech counterparts. At present Slovak nominal and real wages are the lowest in Central Europe and with the exception of Latvia and Lithuania are the lowest in the EU-25. In nominal terms, Slovak wages

¹⁵ Author's calculation on the basis of data from national economic balance, published in the Historical FSÚ yearbook and in the linked statistical yearbooks of FSÚ, ČSÚ and ŠSÚ (FSÚ, 1985), (FSÚ, ČSÚ, ŠSÚ, 1992).

GRAPH 3 Per capita Consumption and Investment in Slovakia Relative to the Czech Republic, 1990 and 2002
(the Czech Republic = 100, current prices and current parities)



Note: 1990 in koruna terms (CSK), 2002 in PPS terms, acc. ECP'2004

Source: author's calculations based on FSÚ, ČSÚ and ŠSÚ (1992) and OECD – EUROSTAT (2004)

are less than two-thirds of Czech wages (346 euros compared with 531 euros in 2003, respectively) and only about 14 % of Austrian wages – see Table 7).

Nominal wages relative to neighbouring countries declined through a combination of slow nominal wage growth and exchange rate depreciation. The real-wage gap is smaller than the nominal one due to the lower price level of Slovakia. Relative to the Czech Republic, 2003 real wages fell to 72 % (measured by purchasing power parity). Wages fell also relative to other Central European countries and even relative to Poland, which has had a lower level of economic development than Slovakia.

2.2.2 Is the Slovak GDP Disappearing into a Black Hole?

The explanation of Slovak GDP losses can be found primarily in the consequences of market disintegration. After the split of Czechoslovakia Slovak production, previously traded at regulated “cost” prices irrespective of the differences in labor productivity, was redirected to foreign markets. In these markets international prices were applied, taking foreign competition into account. On the one hand, to gain a market share Slovak prices had to accommodate lower productivity. On the other hand, Slovakia was purchasing imports in external markets, which turned out to be more expensive than in the domestic market.

After the separation of the currencies, the Slovak koruna lost value relative to the Czech koruna and in 2003 the exchange rate was 77 CZK/100 SKK. While depreciation made Slovak goods price competitive, it indirectly worsened Slovak terms of trade, because it motivated Slovak producers to compete on price only. Whereas terms of trade in the Czech Republic in 2004 improved against 1992 by 26.9 %, in Slovakia they worsened by 7.7 %. Compared to 1995, terms of trade improved in the Czech Republic by 12.2 % and in Slovakia they worsened by 5.1 %, of which the in-

TABLE 7 Average Gross Monthly Wages in NMS-8 Countries in 2003
(relative to Austria)

	Nominal (market exchange rate)		Real (purchasing power parity)	
	EUR	Austria = 100	EUR/PPS	Austria = 100
Czech Republic	531	21	994	43
Hungary	541	22	968	41
Poland	497	20	1 006	43
Slovakia	346	14	719	31
Slovenia	1 083	43	1 443	62
Estonia	430	17	751	32
Lithuania	298	12	620	27
Latvia	311	12	645	28
Austria	2 499	100	2 337	100

Source: (Havlik – Podkaminer – Gligorov et al., 2005, pp. 115–119)

crease of Slovak export prices represented 26 % and the increase of Slovak import prices represented 33 %. The export-to-GDP ratio was high in both countries (in the Czech Republic and Slovakia around 70 % of GDP and almost 80 % of GDP, respectively), and therefore the impact of T/T changes on real income was remarkable. Different developments in T/T led to a different real income dynamic, affecting the possibility of domestic GDP use. While Czech real income grew significantly faster than GDP, Slovak real income grew markedly more slowly. Thanks to the fact that consumption and investment growth fell behind GDP growth in Slovakia, the external balance did not deteriorate. The Slovak economy shows rapid GDP growth, a significant part of which, however, has been lost in worsening terms of trade, especially during the first few years after the split.

2.3 Labor Productivity Growth and Unit Labor Costs in the New Member States

Slovakia improved its labor productivity significantly, overcoming partly the impact of the 1993 split. While right after the split GDP per worker was 11 % lower in koruna terms than in the Czech Republic, in 2003 it was lower by only 5 % in purchasing power parity terms. Improving labor productivity has been the main source of economic growth. It will take at least another decade, however, before Slovakia reaches the 1990 level of economic development relative to the Czech Republic (i.e., 84 % of the Czech level, measured by GDP per capita in CSK).

Low wages and taxes have transformed the Slovak economy into a highly price-competitive economy with the lowest unit labor costs in the EU (Table 8). Slovakia became a typical “low-cost economy”. It is worth noting that the Czech Republic chose a different path, orienting its economy towards non-price (qualitative) competitiveness.

TABLE 8 Labor Productivity and Unit Labor Costs (ULC) in NMS-8 Relative to EU-15, 2003

	GDP per worker EU-15 = 100 ^a	Aggregate ULC ^b	
		per GDP unit EUR/PPS	EU-15 = 100
Czech Republic	58	0.30	46
Hungary	63	0.30	45
Poland	54	0.28	46
Slovakia	55	0.22	33
Slovenia	70	0.46	70
Estonia	45	0.30	45
Lithuania	39	0.22	33
Latvia	44	0.24	36

Note: Labor productivity measured by gross domestic product per worker in PPS, labor costs calculated according to average compensation per employee (national accounts), market exchange rate.

Source: ^a (EUROSTAT, 2005 – Structural Indicators)

^b (EUROSTAT, 2004 – Statistics in Focus) – author's calculation

3. Conclusions

The analyses of the measurement problems of GDP and other commonly used macroeconomic indicators go beyond technical or statistical issues. The measurement problems and abuse of macroeconomic indicators may affect economic policy by poorly informing policy makers.

Neglecting the impact of terms of trade on real income in the Czech economy distorts the assessment of the macroeconomic balance. While in large economies the differentiation between real gross domestic income and gross domestic product is usually not very interesting, in the Czech economy neglecting the differences between RGDI and GDP could result in inappropriate fiscal, monetary, and income policies.

If domestic demand, i.e. consumption and investment, grow faster than GDP, then either inflation or external economic imbalance, or both, should result. However, such an outcome will not arise as long as favorable developments in terms of trade are taking place. Strict anti-inflationary monetary policy or over-restrictive fiscal policy would in such a case only stifle economic growth. The positive terms-of-trade changes in the Czech economy allowed the monetary and fiscal policies to be less restrictive than in other new member countries without creating macroeconomic imbalances. We note, however, that knowledge of alternative indicators of the national accounts is not at all common.¹⁶ It must be added that the Czech Statistical Office was one of the first of the new member states to start to publish these indicators and that they are thus readily accessible for analysts.

¹⁶ Cf. (Benáček, 2004), (Kubíček – Tomšík, 2004a,b), (Lommatzschová, 2004) and (Spěváček, 2005).

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SUMMARY

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What the GDP Indicator Does Not Reveal in Economic Analyses

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In real terms, gross-domestic-product indicators do not record a country's trading gain or loss. The real growth of gross domestic income, which include terms-of-trade changes, were approximately one percentage point higher than the GDP growth rates of the Czech Republic and belonged among the fastest in central Europe. Moreover, real GDP growth does not accurately express the development of real convergence.