

Statistika

Vol. 48 (3) 2011

Economy and Statistics Journal

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Conjunctural Evolution of the Czech Economy¹

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Abstract

Economic evolution in each country can be expressed by means of annual and quarterly time series. An advantage of quarterly data compilation is the ability to provide a more sensitive description of the conjunctural evolution. Both at the beginning of the economic transformation and in the first decade of the 21st century, economic development in the Czech Republic was distinguished by significant changes in the economy's character. This paper is aimed at describing the conjunctural evolution of the Czech Republic's national economy since 1995 by the methods of saddles and peaks and of Koyck lag.

Keywords

Gross domestic product, saddles and peaks, time lag, short-term time series

JEL code

E21, C82

INTRODUCTION

Economic development in the Czech Republic has, since the early 1990s, been characterised by a number of significant changes and turning points. After the economic transformation of the 1990s, which brought two recession / growth stages, came years of conjuncture. The conjuncture was terminated by the worldwide crisis, first financial and then economic. The Czech economy, perhaps more than any other, has undergone short recession / crisis / conjuncture / gain cycles in the past 20 years. These cycles can be observed in both annual and quarterly data. The quantitative description of such data is not only a view of the past, but also a reminder of the unavoidable cyclic character of national-economy development.

1 EVOLUTION OF THE CZECH ECONOMY — ANNUAL DATA

The beginning years of the economic transformation after 1990 were characterised by a significant drop of economic performance, specifically, industrial and constructional production, plus extensive increases in both prices and the unemployment rate. After a short recession period, an economic boom occurred in 1995–1996. The Czech Republic overcame the obstacles with remarkable speed on its way to a market economy, in comparison with Central and East European countries. However, such speed also implied

¹ This paper was written with the support of the Grant Agency of the Czech Republic No. P402/10/1275 and of the Ministry of Education, Youth and Sports No. MSM 6138439910.

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problems that were not solved — or whose solution was not complete — in privatisation, industrial and banking sector restructuring, etc. These and other factors contributed to the economic crisis of 1997–1999. In 2000, economic development shifted the trend to growth, and the most successful years in the Czech Republic's economic development followed.

Nevertheless, the gain in 2001–2004 and the subsequent boom in 2005–2007 were stages different from each other. The period 2001–2004 was distinguished by stable economic growth supported by a high rate of growth in industrial and constructional production, consumption by households and the general government, as well as gradual improvement of foreign-trade relationships including the terms of trade, significant strengthening of the Czech Crown and a stable or even slightly decreasing unemployment rate, lower inflation rate, and decreasing prices of industrial products. This positive development was, however, accompanied by growing state budget shortages, doubling of the government debt, a growing government deficit, and worsening of the yield balance. In the 2005–2006 time frame, key factors of growth were changed: foreign trade became the main factor of the year-to-year economic growth, amounting to six per cent growth of GDP, the Czech Crown continued to grow stronger, the government debt was stabilised, the government deficit was reduced, and the unemployment rate was decreasing. On the other hand, the balance of trade had become disadvantageous, the terms of trade were getting worse, and household indebtedness and consumption were growing.

In the first seven years of the 21st century, the Czech economy achieved very favourable rate of growth, not only in comparison with the 1990s but also with the EU member countries. The main distinction between the economic development in the Czech Republic after 2000 and that in the 1990s was the gradual improvement of the foreign-trade relationships, leading to a positive balance of trade in 2005, which occurred then for the first time, despite the slow-down in the growth of exports and imports. Foreign-trade relationships thus became the economic growth engine and — after several years — replaced the traditional factors, dominated by household consumption. The positive development of foreign-trade relationships after 2005 was caused by many influences which determined the evolution of the Czech economy after 2000. This favourable result was even achieved despite worsening real exchange rates, caused by the growing prices of crude oil and natural gas. Strengthening of the Czech Crown was favourable for imports and unfavourable for exports. When characterising the evolution in that period, we must not forget the high rate of growth in industrial and constructional production, the related domestic investments, an influx of export-oriented investments from abroad, and — last but not least — a certain degree of saturation by modern investments and technologies in 2000–2001.

NOTE: It is interesting that the Czech economy went through two strongly unbalanced stages in relation to foreign trade. The high deficits of the trade balance had different causes and consequences in each of the periods 1996–1997 and 2000–2001. The former was caused by imbalance between exports and imports (brought about by extensive imports of consumer goods) and was one of the triggers of the economic crisis; while the latter by an influx of foreign investments. The balance of goods and services' exchange with abroad was improving even though the national currency was strengthening by more than one-half in comparison with 1999 (the exchange rate was 42 CZK/USD at the beginning of autumn 2000, and 15 CZK/USD in 2008). This factor also attenuated the growth of prices of imported raw materials. The relationship between the exchange rate and the trade balance is bi-directional as a rule. However, the Czech Crown was not directly affected by the fluctuations of the exchange rates between currencies in the world. It did not even grow weaker in the period of high deficit because it was in high demand due to a high differential in interest rates. The 2001–2007 period of economic gain and growth, which also brought about qualitative changes of the financial markets, showed that the textbook relationship between the exchange rate and development of foreign trade was not applicable. On the contrary: the improving trade balance was accompanied by a continuous strengthening of the Czech Crown, which made exports less advantageous.

Table 1 Selected indices of the national economy evolution in the Czech Republic

	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
GDP growth (% , y / y)	x	4.0	-0.7	-0.8	1.3	3.6	2.5	1.9	3.6	4.5	6.3	6.8	6.1	2.5	-4.1	2.3
FCEh growth (% , y / y)	x	8.4	2.2	-0.8	2.8	1.3	2.3	2.2	6.0	2.9	2.5	5.0	4.9	3.6	-0.3	0.0
GFCF growth (% , y / y)	x	9.9	-5.7	-0.9	-3.3	5.1	6.6	5.1	0.4	3.9	1.8	6.0	10.8	-1.5	-7.9	-3.1
Net exports (as % of GDP)	-4.3	-5.8	-5.2	-1.1	-1.2	-3.0	-2.5	-2.1	-2.3	0.1	3.2	3.4	5.0	4.6	5.6	4.8
Public debt (as % of GDP)	14.6	12.5	13.1	15.0	16.4	18.5	24.9	28.2	29.8	30.1	29.7	29.4	29.0	30.0	35.3	38.5
Terms of trade (%)	1.5	-0.4	0.1	7.2	-2.7	-5.1	1.9	2.0	1.2	2.1	-1.0	-1.5	2.3	-1.3	3.8	-2.9

Explanations: GDP — gross domestic product, FCEh — final consumption expenditure by households, GFCF — gross fixed capital formation; the proportions of the net exports and public debt in the GDP are calculated from the current prices data.

Source: Czech Statistical Office (www.czso.cz), own calculation

The favourable results of the Czech Republic's economy were, however, injured by the signs of the worldwide financial crisis and later the economic recession in 2008–2010. In consequence of decreasing industrial and constructional production, investments into fixed capital were significantly reduced and both exports and imports had decreased. The Czech economy was able to maintain the positive trade balance despite the falling volume and rate of exchange of goods and services with abroad, and the Czech Crown was even slightly further strengthened. Negative results of production industries were only weakly reflected in the slow-down and subsequent stagnancy of the final consumption expenditure by households and the slow-down of the growth of household indebtedness. An increase of the government deficit, a low level of economic activities and a growing unemployment rate led to growth of the government debt rather high above the long-term level of about 30 %, which was valid from 2003 to 2008.

2 CONJUNCTURAL EVOLUTION

Annual data appears to be too aggregated from the viewpoint of economic evolution and economic cycle stages. Analysis of short-term (quarterly) data can bring more information. It is advantageous to apply a very illustrative method of saddles and peaks, complemented with analysis of time lags in short-term time series, to describe individual stages of the economic evolution, especially with respect to the above-described cycles.

2.1 Saddles and peaks

The substance of this method includes determination of relative deviations measured between seasonally adjusted empirical values and the trend curve. The conjunctural evolution of the respective index is illustrated by a chart of such deviations, as well as the magnitudes and signs of the seasonal factors. The method of saddles and peaks consists of the following three steps:

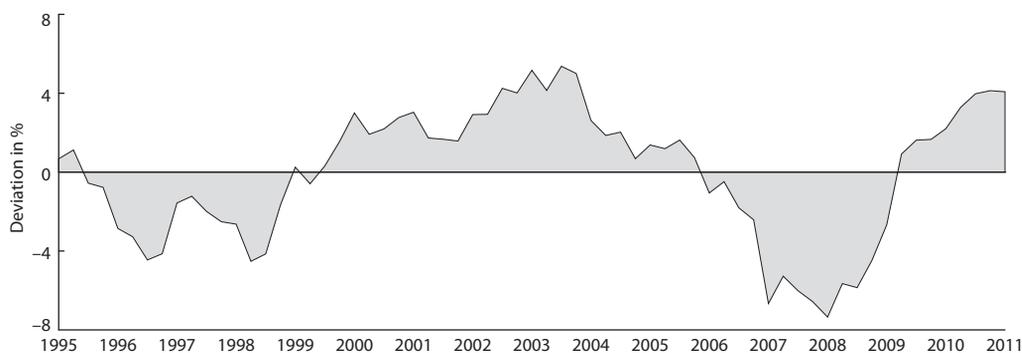
- seasonal adjustment of time series y_t , $t = 1, 2, \dots, n$, with the aid of the so-called seasonal factors;
- calculation of parameters for linear trend $T_t = a + bt$, $t = 1, 2, \dots, n$, calculated from the seasonally cleaned values of the respective index;
- determination of percentage deviations of the original values y_t from trend T_t , namely,

$$\left(1 - \frac{y_t - T_t}{T_t}\right). \quad (1)$$

The input data contains values of macroeconomic indices of the GDP creation and utilisation (Annex, Table I). Figure 1 and Table II in the Annex show results of GDP calculations. We do not present results in the Annex for the selected indices of the GDP utilisation. Saddles and peaks for such indices are only illustrated in the Figures below (Figure 2 through 7).

In the Figure 1, showing the *GDP evolution*, we can see that — despite the positive results of years 1995 and 1996 — the symptoms of recession occurred as early as the second half of 1995 and the saddle of this evolution came in the second half of 1996 (while the year-to-year growth of GDP was at 4 %), and then again in the 2nd and 3rd quarters of 1998. The main reasons for the negative development are well known — an improperly controlled privatisation process, growing deficit of foreign trade, problems in the banking sector, etc. A significant gain was observed at the beginning of 1999 (except for the 2nd quarter of 1999) with a peak in 2003. The main factor for that gain was growing domestic demand and, especially, growing formation of fixed capital. The GDP growth was also sped up by growing final consumption expenditure by households, mainly implied by growing wages and other income of the population. Subsequently, the growth was slowing down and then a saddle came at the beginning of 2006 and the deepest fall in the 1st quarter of 2008. A gain is visible, starting at the 2nd quarter of 2009.

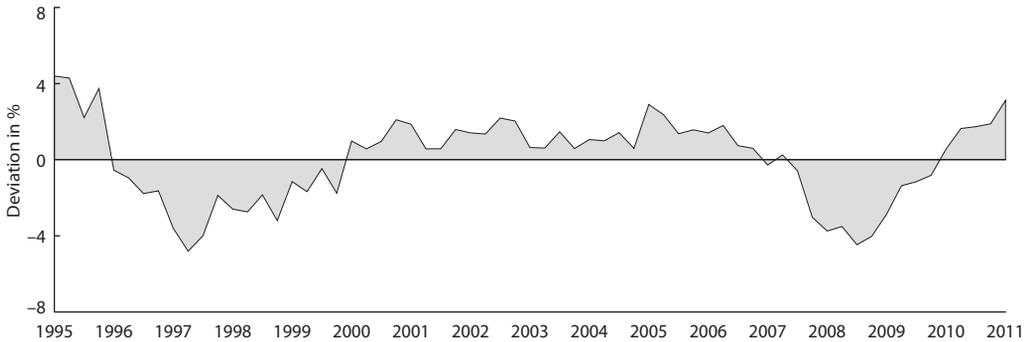
Figure 1 GDP saddles and peaks, for the period 1995–Q1 2011



Source: Czech Statistical Office (www.czso.cz), own calculation

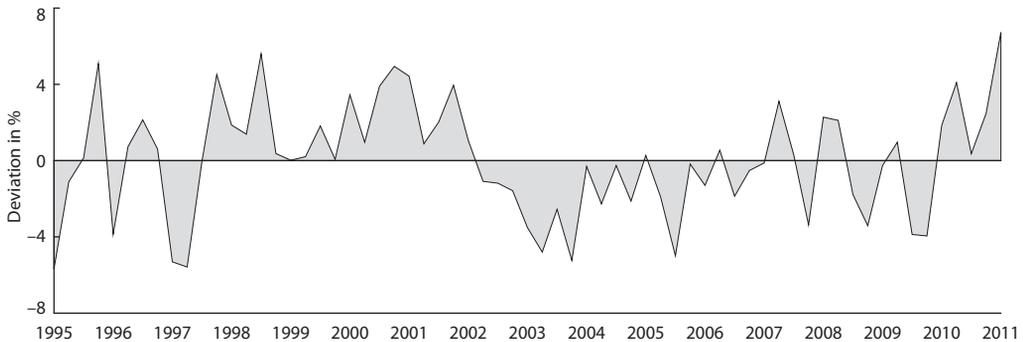
A similar character of saddles and peaks is found for the evolution of *final consumption expenditure by households* (Figure 2); this is another indication of household consumption being not only an important factor in GDP growth, but also a factor with a similar conjunctural evolution. We can also see that the impact of a negative economic situation on household consumption is a long-term one and prevails even after the signs of recession or crisis have faded away. Saddles in household consumption are visible beginning in 1996, prevailing until the end of 1999. The years 2000–2006 were characterised by growing consumption by households, low unemployment rate and an overall favourable economic environment. When the recession came, the unemployment rate began to grow. This loss of certainty caused a slow-down of the final consumption expenditure by households in 2008–2009, with the deepest decline in the 2nd half of 2008. The 1st quarter of 2010 already shows a growing trend in household consumption.

A different character can be seen in the *final consumption expenditure by general government* (Figure 3); for example, its seasonal factors are specific (Table 2). We can see that the final consumption expenditure by general government is more prone to seasonal changes and less sensitive to the economic cycle stages. This aspect is prominent in periods 1995–1997 (in both growth and recession years) and from the

Figure 2 Saddles and peaks in final consumption expenditure by households, for the period 1995–Q1 2011

Source: Czech Statistical Office (www.czso.cz), own calculation

2nd quarter of 2007 to the end of 2009 (i.e. in the recession and crisis years). The significant slow-down of the final consumption expenditure by general government can be seen in the saddles in the growth years, i.e. from the 2nd quarter of 2002 to the 1st quarter of 2007.

Figure 3 Saddles and peaks in final consumption expenditure by general government, for the period 1995–Q1 2011

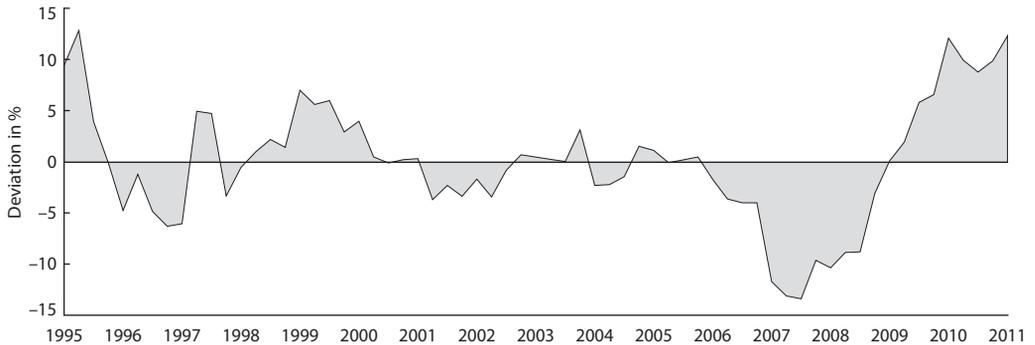
Source: Czech Statistical Office (www.czso.cz), own calculation

Development of *gross fixed capital formation* has a significantly seasonal character as well. However, the Figure 4 clearly indicates the falling investments into fixed capital in the economic-growth period before recession (end of 1995 and entire 1996, or years 2006 through 2008). On the other hand, peaks can be observed at the end of each crisis before the gain (end of 1998 and throughout 1999, or years 2009 and 2010). The economic growth period (2000–2005) shows an unstable rate of investments into fixed capital, with alternating saddles and peaks.

In order to illustrate the importance of the changes in inventories⁵ for the conjunctural evolution of the *gross capital formation* as related to investments into fixed capital, we present here a chart of saddles

⁵ In addition to gross fixed capital formation and the changes in inventories, gross capital formation also includes acquisitions less disposals of valuables. However, the latter's value is less significant and does not decisively affect the evolution of the summary index.

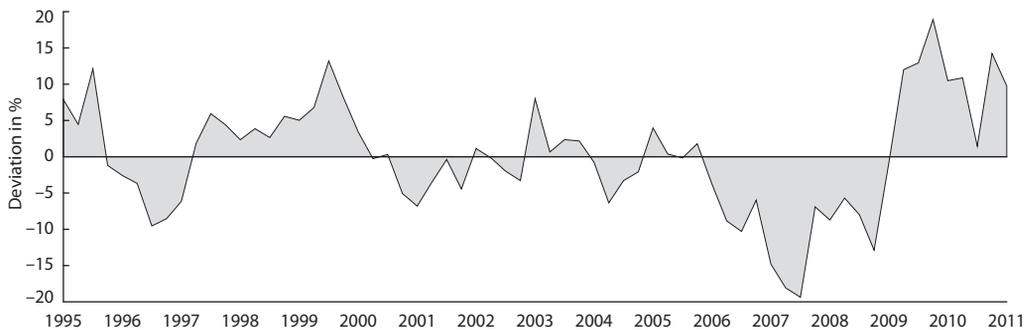
Figure 4 Saddles and peaks in gross fixed capital formation, for the period 1995–Q1 2011



Source: Czech Statistical Office (www.czso.cz), own calculation

and peaks for gross capital formation. The influence of the changes in inventories on the character of saddles is especially prominent from the beginning of 2006 until the 1st quarter of 2009, and that of peaks from the 2nd quarter of 2009 to the 1st quarter of 2011. The influence of seasonal factors on gross capital formation is different from that on gross fixed capital formation (Table 2).

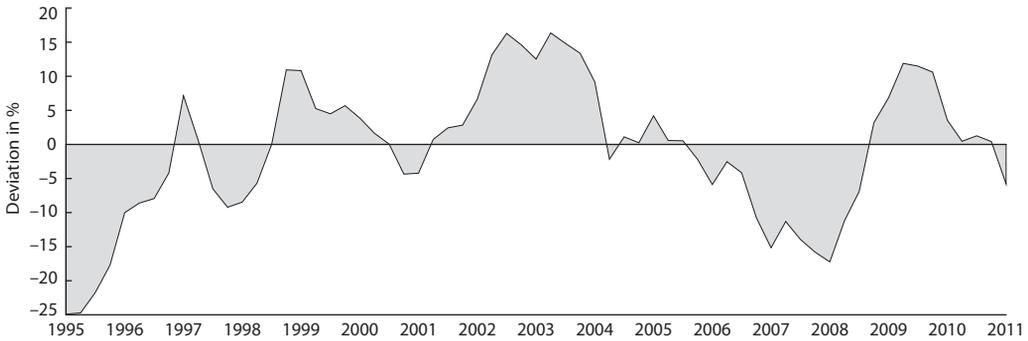
Figure 5 Saddles and peaks in gross capital formation, period 1995–Q1 2011



Source: Czech Statistical Office (www.czso.cz), own calculation

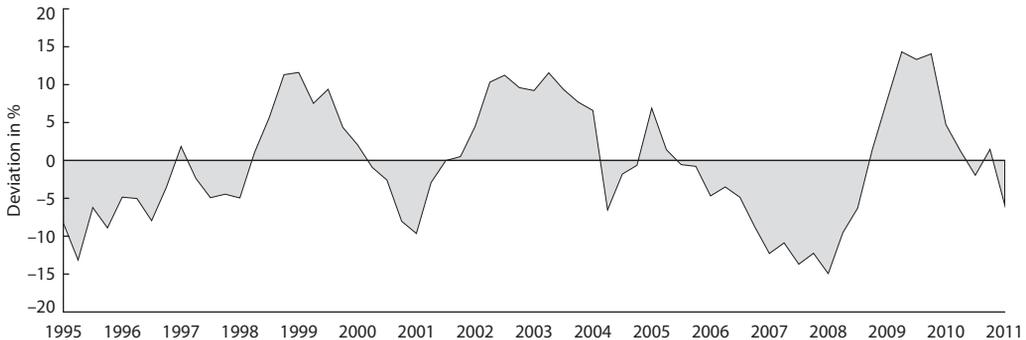
In comparison to Figure 3 through 6, saddles and peaks of the *exports of goods and services* are smoother (Figure 6). At the beginning of the time series, i.e. in the years of the highest deficits in foreign trade with goods and services, we can of course see deep saddles (except for the 1st half-year of 1997), incomparable with the other indices. From the beginning of 1998 until the 3rd quarter of 2005 (except for the transition from year 2000 to 2001, and the 2nd quarter of 2004), the exports of goods and services became more active. After a decline, which prevailed from the last quarter of 2005 until the 3rd quarter of 2008, the exports grew extraordinarily, with a slow-down in the 2nd half-year of 2010 and even a saddle in the 1st quarter of 2011. Nonetheless, we can observe that the evolution of the exports of goods and services (together with the final consumption expenditure by households) is the closest to the GDP saddles and peaks.

Mutually comparing Figures 6 and 7, we can see that the conjunctural evolution of the qualitative stages in the *import of goods and services* has more distinctive saddles and peaks than the *exports of goods*

Figure 6 Saddles and peaks in exports of goods and services, for the period 1995–Q1 2011

Source: Czech Statistical Office (www.czso.cz), own calculation

and services. While there are four stages (distinctive saddles and peaks) for the exports, there are twice as many for imports. This character is implied by the fact that, except for the initial phase prevailing until mid-1998, the saddles and peaks of the imports are significantly more distinctive than those of exports. In other words, the imports are much more sensitive to changes in the conjunctural evolution and respond with more frequent and more significant changes.

Figure 7 Saddles and peaks in imports of goods and services, for the period 1995–Q1 2011

Source: Czech Statistical Office (www.czso.cz), own calculation

The short-term character of the selected economic indices' evolution, expressed in the form of saddles and peaks, must be complemented with the values of the seasonal factors (Table 2).

The level of seasonal dependence is considerable. A typical example is the final consumption expenditure by general government, with a distinctive growth value in the last quarter and a decline at the beginning of each year. The gross capital formation shows an opposite character of periodic oscillations. The least significant fluctuations can be observed in the seasonal factors for the exports of goods and services. Regarding the GDP overall quarterly fluctuations, they cannot be considered significant in the Czech economy, as indicated by the shapes of its saddles and peaks (Figure 1). This fact is a reflection of a similar conjunctural character of the most distinctive factors, namely, final consumption expenditure by households and the exports of goods and services, and also a reflection of mutually cancelling opposite oscillations of some other indices.

Table 2 Seasonal factors for the indices of the GDP creation and utilisation

Quarter	GDP	FCEh	FCEg	GFCF	GCF	Exports	Imports
Q1	0.952	0.937	0.920	0.907	0.948	0.970	0.954
Q2	1.024	1.002	1.003	1.016	1.050	1.029	1.014
Q3	1.008	1.002	0.952	1.014	1.026	0.981	0.980
Q4	1.016	1.059	1.124	1.063	0.977	1.020	1.052

Explanations: GDP — gross domestic product, FCEh – final consumption expenditure by households, FCEg — final consumption expenditure by general government, GFCF — gross fixed capital formation, GCF — gross capital formation.

Source: Czech Statistical Office (www.czso.cz), own calculation

2.2 Koyck Lag

Let us complement the analysis of conjunctural evolution of the fundamental economic aggregate indices with a calculation of the so-called Koyck lag. With the aid of this coefficient, quantitative relationships are determined between the GDP and other indices listed in Table I in the Annex, with respect to their mutual influences on their dynamic properties. The Koyck linear dynamic model with a time-lag independent variable enables us to determine, in the traditional way, the average value of the quarterly time lag. We will proceed in the following three steps:

I) Application of the least squares method to the equation

$$y_t = b_0 + b_1 x_t + u_t, \quad t = 1, 2, \dots, n, \tag{2}$$

where y_t is the GDP time series, x_t is an independent variable (the first column in Table 3); now we determine the residua e_t from the matrix expression $\mathbf{e} = \mathbf{y} - \mathbf{Xb}$,

II) Estimation of the autocorrelation coefficient at lag 1, $r(1)$, as

$$r(1) = \frac{\sum_{t=2}^n e_t e_{t-1}}{\sum_{t=1}^n e_t^2}, \tag{3}$$

III) Calculation of the time lag \bar{p} (with respect to the character of the input data, the time unit is a calendar quarter) between series y_t and x_t , applying the equation

$$\bar{p} = \frac{r(1)}{1 - r(1)}. \tag{4}$$

Table 3 sums up results concerning the selected indices of the GDP utilisation (which play roles of independent variables here):

The data in the Table 3 shows that the changes in the basic factors of economic growth, i.e. final consumption expenditure by households, gross capital formation⁶, as well as imports and exports, are reflected in the GDP with a time lag of one to two calendar quarters. This observation is an indication of a practically stable economic environment, within which considerations of the economic evolution expressed

⁶ Mutually comparing the time lags in gross capital formation and gross fixed capital formation, we can again see that the changes in inventories, and their high degree of variability, are very important for the investments.

Table 3 Time lags and factor equation for the Czech Republic's GDP

GDP factor	GDP = $f(x)$	Average time lag
FCEh	$-47\,782.081 + 2.146x_t$	1.728
FCEg	$70\,992.038 + 4.181x_t$	0.043
GFCF	$-230\,254.406 + 5.218x_t$	0.791
GCF	$-172\,411.346 + 4.686x_t$	1.888
Exports	$229\,410.962 + 0.963x_t$	2.124
Imports	$174\,168.737 + 1.103x_t$	2.664

Explanations: GDP — gross domestic product, FCEh — final consumption expenditure by households, FCEg — final consumption expenditure by general government, GFCF — gross fixed capital formation, GCF — gross capital formation.

Source: Czech Statistical Office (www.czso.cz), own calculation

in the GDP growth values can be based on the short-term evolution of selected indices. A somewhat different situation prevails for the final consumption expenditure by general government, whose time lag with respect to the GDP evolution is virtually zero. The reason for this zero lag

is the above-mentioned high intensity and, at the same time, a specific character of periodic fluctuations of this — more or less planned-economy based — index. This leads to the very short, practically negligible, and — above all — unobservable time lag.

For other indices, the value of the time lag of the respective factor (the first column in Table 3) with respect to the GDP evolution is within the usual limits and similar to those observable in developed and standardised economies in Europe and worldwide.

The indices dominant from this viewpoint include — also due to the high percentage in the utilisation of created resources — mainly the time difference between the final consumption expenditure by households and GDP (namely, nearly two calendar quarters). The final consumption expenditure by households plays a key role in assessments of the economic cycle evolution, which was also reflected in the 2008–2010 period of the financial and global crisis. After the occurrence of the first signs of the crisis in 2008, which we can call “technical recession” (when the GDP growth is negative in two consecutive calendar quarters), no distinctive changes were observed in household behaviour and spending (also Table 1 above). The recession's slow and gradual fading away (in 2010) brought households back to standardised spending stereotypes with a time lag of many months.

We can similarly describe time lags of exports and imports, whether of goods or services, with respect to the GDP evolution. Of course, other factors play their roles as well, such as the exchange rates of CZK to foreign currencies, or evolution of the inflation rate in the recession period. On the other hand, these factors are very sensitive and rather unstable, but no dramatic changes in their values occur in crises. This fact is reflected in the value of the time lag of their influence on the GDP evolution, which value is about two calendar quarters as well.

CONCLUSION

Undoubtedly, short-term time series represent a very lucid and valuable tool for an analytic description of the economic evolution. A number of methods are available for such analysis. One such method is that of saddles and peaks, which enables us not only to compare the evolution curves between individual indices and identify similarities and differences in their conjunctural evolution, but also to compare the slow-down (saddle) or speed-up (peak) periods with the long-term average value. To properly view the similarities and differences in the conjunctural evolution stages, the short-term relationships are complemented with time lag analysis. Even though the presented methods for describing the past evolution do not explicitly mention the prediction aspect, results of both methods can be used to contemplate about the short-term future development.

References

- ARLT J. and ARLTOVÁ M. *Ekonomické časové řady* (Economic Time Series). Prague: Professional Publishing, 2009.
- ENGLE R. F. and GRANGER C. W. J. Cointegration and Error Correction: Representation, Estimation and Testing. *Econometrica*, 1987, No. 55, pp. 251–276.
- FISCHER J. Stabilita čtvrtletních odhadů užití hrubého domácího produktu (Stability of quarterly estimates of GDP utilisation). *Politická ekonomie*. 2004, Vol. 52, No. 3, pp. 344–355.
- FISCHER J. and FISCHER J. Měříme správně hrubý domácí produkt? (Do we measure GDP correctly?). *Statistika*. 2005, Vol. 42, No. 3, pp. 441–445.
- HÁJEK M.: Ekonomický růst v ČR a nových členských zemích Evropské unie v období 1995–2006 (Economic growth in the Czech Republic and new EU member countries in the period 1995–2006). *Politická ekonomie*, 2008, Vol. 56, No. 4, pp. 435–448.
- HINDLS R. and HRONOVÁ S. Profil des comptes dans une économie en transition: cas de la République Tchèque. *Comptabilité nationale — nouvelles frontières*. Paris: Economica, 1999, pp. 63–73.
- HINDLS R. and HRONOVÁ S. Detekce a prognóza bodů obratu v ekonomickém vývoji (Detection and prediction of turning points in economic development). *Politická ekonomie*, 2002, Vol. 50, No. 2, pp. 217–227.
- HRONOVÁ S., FISCHER J., HINDLS R. and SIXTA J. Národní účetnictví — nástroj popisu globální ekonomiky. (National Accounts — a Tool for Describing the Global Economy). 1st edition, Prague: C. H. Beck, 2009.
- JÍLEK J. Vlastnosti vybraných variant čtvrtletních odhadů hrubého domácího produktu (Properties of selected variants of GDP quarterly estimates). *Politická ekonomie*, 1998, Vol. 46, No. 4, pp. 513–525.
- KOYCK L. M. *Distributed Lags and Investment Analysis*. North Holland, Amsterdam 1954.
- MAREK L. Analýza vývoje mezd v ČR v letech 1995–2008 (Analysis of wage development in the Czech Republic in the period 1995–2008). *Politická ekonomie*, 2010, Vol. 58, No. 2, pp. 186–206. ISSN 0032-3233.
- SIXTA J. and FISCHER J. Akrualizace daní, opotřebení fixního kapitálu a investice v sektoru vládních institucí (Accrued tax, fixed capital depreciation, and investments in the government-institutions sector). *Politická ekonomie*, 2010, Vol. 58, No. 6, pp. 798–804. ISSN 0032-3233.
- SPĚVÁČEK V. Makroekonomická rovnováha české ekonomiky v letech 1995–2005 (Macroeconomic equilibrium of the Czech economy in the period 1995–2005). *Politická ekonomie*. 2006, No. 6, pp. 742–761.
- WALD A. *Sequential analysis*. J. Wiley, New York 1947.
- WEI W. W. *Time series analysis, univariate and multivariate methods*. Addison-Wesley Publishing Company Inc., New York 1990.

ANNEXES

Table I Czech Republic GDP by selected type of expenditure (million CZK current prices)

Year	Quarter	GDP	FCEh	FCEg	GFCF	GCF	Exports	Imports
1995	Q1	332 995	235 296	71 216	99 202	108 532	166 908	177 741
	Q2	366 618	258 344	76 417	108 370	126 279	189 006	207 011
	Q3	376 688	270 524	73 709	120 710	115 031	187 785	196 652
	Q4	390 221	288 141	84 984	133 543	127 842	200 395	226 157
1996	Q1	382 859	272 792	78 150	120 712	127 420	188 619	205 972
	Q2	423 953	299 659	83 537	132 244	144 375	208 267	228 348
	Q3	432 152	308 990	80 189	138 446	150 955	207 854	235 647
	Q4	444 324	333 143	98 533	148 950	144 266	218 859	251 944
1997	Q1	415 593	307 172	87 508	128 269	138 642	194 326	224 547
	Q2	455 790	339 298	97 883	130 264	143 688	230 461	257 657
	Q3	461 902	343 712	90 105	131 884	136 137	245 860	263 807
	Q4	477 809	362 898	103 820	151 725	133 390	272 814	291 293
1998	Q1	457 925	330 020	89 253	127 360	133 796	268 062	273 953
	Q2	512 225	360 270	99 866	142 042	147 493	287 496	283 034
	Q3	512 408	364 057	92 700	141 655	147 643	269 152	268 444
	Q4	513 925	396 971	117 891	151 351	137 965	257 872	278 883
1999	Q1	481 895	350 845	98 783	123 121	136 208	254 113	259 271
	Q2	532 968	383 934	109 602	141 441	149 629	295 663	296 258
	Q3	529 465	386 160	104 391	142 157	137 652	293 545	287 892
	Q4	536 469	420 385	127 844	155 541	140 285	310 597	334 798
2000	Q1	504 479	368 369	102 974	132 618	144 684	310 307	318 881
	Q2	558 691	402 203	117 252	155 495	168 048	346 433	357 993
	Q3	557 780	407 330	109 986	157 784	164 992	345 455	359 997
	Q4	568 219	432 271	130 721	166 572	167 392	385 175	416 619
2001	Q1	540 124	389 793	109 437	143 366	166 851	375 892	392 412
	Q2	598 842	428 962	125 828	168 663	180 824	389 458	400 402
	Q3	599 262	435 696	120 104	167 781	173 099	374 575	384 108
	Q4	613 986	462 532	141 298	179 478	173 271	397 283	419 100
2002	Q1	576 665	416 429	121 067	152 068	160 783	372 050	372 597
	Q2	630 141	452 160	136 986	174 844	182 055	375 545	379 619
	Q3	621 004	454 961	132 255	171 794	182 933	353 404	370 294
	Q4	636 622	488 299	159 186	179 081	178 186	383 102	412 965
2003	Q1	598 385	444 700	134 792	154 525	155 508	381 688	383 511
	Q2	660 401	482 305	150 984	175 021	187 641	395 233	404 778
	Q3	650 791	484 847	142 385	176 722	181 895	392 177	408 128
	Q4	667 533	523 793	175 014	181 200	175 218	423 070	454 548
2004	Q1	650 448	467 730	138 503	164 672	176 784	430 704	424 770
	Q2	715 163	507 117	156 092	185 897	208 424	523 786	524 164
	Q3	712 103	511 615	147 348	185 829	199 573	493 170	492 255
	Q4	737 048	552 017	179 643	190 784	189 588	526 866	531 423

Year	Quarter	GDP	FCEh	FCEg	GFCF	GCF	Exports	Imports
2005	Q1	695 181	483 469	145 524	164 816	174 614	490 557	453 459
	Q2	759 356	526 414	164 261	188 400	202 288	549 559	518 905
	Q3	753 526	538 471	162 836	189 200	200 452	534 117	519 514
	Q4	775 799	574 590	185 837	199 478	188 853	580 412	568 056
2006	Q1	749 678	515 747	155 776	175 355	195 338	582 240	543 647
	Q2	812 182	555 882	168 820	201 717	228 722	607 884	580 306
	Q3	819 685	568 623	166 272	203 802	228 392	599 224	576 554
	Q4	840 824	608 537	196 116	215 439	210 790	673 094	651 597
2007	Q1	830 715	549 809	161 828	198 983	223 470	676 808	619 372
	Q2	892 777	591 474	172 758	227 422	256 484	704 573	659 754
	Q3	895 030	603 266	170 847	229 445	255 438	699 096	662 770
	Q4	916 938	660 034	211 607	234 430	219 685	749 828	712 609
2008	Q1	875 731	594 969	165 623	202 880	218 569	733 347	671 154
	Q2	938 004	641 658	182 927	225 845	237 099	748 420	689 173
	Q3	935 145	654 697	182 668	227 113	238 567	696 789	654 908
	Q4	940 117	696 040	221 607	227 338	239 406	665 417	660 746
2009	Q1	875 540	615 784	177 805	189 386	209 183	617 958	567 385
	Q2	919 079	655 678	193 544	209 718	203 629	628 348	568 576
	Q3	907 575	661 185	194 875	202 626	198 372	610 790	562 772
	Q4	923 671	703 236	232 733	212 309	177 305	649 887	606 757
2010	Q1	870 089	620 317	181 769	171 655	191 429	676 243	617 900
	Q2	935 600	662 690	195 646	198 369	212 561	749 834	689 485
	Q3	923 475	668 737	195 027	202 073	231 362	719 131	695 755
	Q4	938 265	712 275	227 706	210 845	193 213	763 561	730 784
2011	Q1	888 885	628 810	180 057	176 215	198 776	781 943	720 644

Explanations: GDP — gross domestic product, FCEh — final consumption expenditure by households, FCEg — final consumption expenditure by general government, GFCF — gross fixed capital formation, GCF — gross capital formation.

Source: Czech Statistical Office (www.czso.cz), own calculation

Table II Deviations of GDP adjusted values form the linear trend (%)

Year	Quarter	GDP y_t	GDP seasonally adjusted	Trend line Y_t	Deviations (%)
1995	Q1	332 995	349 797	352 185	0.7832
	Q2	366 618	357 826	361 892	1.2179
	Q3	376 688	373 681	371 598	-0.4745
	Q4	390 221	384 247	381 305	-0.6948
1996	Q1	382 859	402 177	391 012	-2.7864
	Q2	423 953	413 839	400 718	-3.2138
	Q3	432 152	428 702	410 425	-4.4004
	Q4	444 324	437 521	420 132	-4.0945
1997	Q1	415 593	436 563	429 838	-1.5284
	Q2	455 790	444 917	439 545	-1.1934
	Q3	461 902	458 215	449 252	-1.9730
	Q4	477 809	470 494	458 958	-2.4978
1998	Q1	457 925	481 031	468 665	-2.6293
	Q2	512 225	500 006	478 372	-4.5192
	Q3	512 408	508 318	488 078	-4.1495
	Q4	513 925	506 057	497 785	-1.6700
1999	Q1	481 895	506 210	507 492	0.2390
	Q2	532 968	520 254	517 198	-0.6094
	Q3	529 465	525 238	526 905	0.2929
	Q4	536 469	528 256	536 612	1.5295
2000	Q1	504 479	529 934	546 318	2.9673
	Q2	558 691	545 363	556 025	1.8811
	Q3	557 780	553 327	565 732	2.1521
	Q4	568 219	559 519	575 438	2.7222
2001	Q1	540 124	567 377	585 145	2.9885
	Q2	598 842	584 556	594 852	1.6784
	Q3	599 262	594 478	604 558	1.6113
	Q4	613 986	604 586	614 265	1.5161
2002	Q1	576 665	605 762	623 972	2.8561
	Q2	630 141	615 109	633 678	2.8650
	Q3	621 004	616 047	643 385	4.1814
	Q4	636 622	626 875	653 092	3.9433
2003	Q1	598 385	628 578	662 798	5.0899
	Q2	660 401	644 647	672 505	4.0658
	Q3	650 791	645 596	682 212	5.2887
	Q4	667 533	657 313	691 918	4.9199
2004	Q1	650 448	683 268	701 625	2.5301
	Q2	715 163	698 102	711 332	1.7703
	Q3	712 103	706 418	721 038	1.9357
	Q4	737 048	725 764	730 745	0.5860

Year	Quarter	GDP y_t	GDP seasonally adjusted	Trend line Y_t	Deviations (%)
2005	Q1	695 181	730 258	740 452	1.2792
	Q2	759 356	741 241	750 158	1.0887
	Q3	753 526	747 511	759 865	1.5240
	Q4	775 799	763 921	769 572	0.6292
2006	Q1	749 678	787 505	779 278	-1.1649
	Q2	812 182	792 807	788 985	-0.5952
	Q3	819 685	813 142	798 692	-1.9236
	Q4	840 824	827 951	808 398	-2.5359
2007	Q1	830 715	872 631	818 105	-6.7891
	Q2	892 777	871 479	827 812	-5.3997
	Q3	895 030	887 885	837 518	-6.1414
	Q4	916 938	902 899	847 225	-6.7017
2008	Q1	875 731	919 918	856 932	-7.4835
	Q2	938 004	915 627	866 638	-5.7858
	Q3	935 145	927 680	876 345	-5.9930
	Q4	940 117	925 724	886 052	-4.6126
2009	Q1	875 540	919 718	895 758	-2.8093
	Q2	919 079	897 154	905 465	0.7864
	Q3	907 575	900 330	915 172	1.4896
	Q4	923 671	909 529	924 878	1.5259
2010	Q1	870 089	913 992	934 585	2.0690
	Q2	935 600	913 281	944 292	3.1496
	Q3	923 475	916 103	953 998	3.8374
	Q4	938 265	923 900	963 705	3.9944
2011	Q1	888 885	933 736	973 412	3.9384

Source: Czech Statistical Office (www.czso.cz), own calculation

Compilation of Non-Financial Balances in the Czech Republic¹

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Abstract

The System of National Accounts in the Czech Republic consists of three main parts — institutional sector accounts, input-output tables and balances of non-financial assets. All three parts are compiled interactively by common time schedule. The article deals with balances of non-financial assets and their relation to core institutional sector accounts and explains why the third parallel part of SNA in the Czech Republic was build, describes its weaknesses and future development.

Keywords

National accounts, sector accounts, non-financial assets

JEL code

E01

INTRODUCTION

The System of National Accounts in the Czech Republic consists of three main parts — institutional sector accounts, input-output tables and balances of non-financial assets. All three parts are compiled interactively by common time schedule. The article deals with the balances of non-financial assets. The role of these balances is described in the next three parts. The first part explains their relation to the core sector accounts or how and why the links between balances of non-financial assets and core sector accounts are resolved. In the second part each balance is described in detail and in the third part the benefits of balances of non-financial assets are evaluated.

1 BALANCES OF NON-FINANCIAL ASSETS AS AN INTEGRAL PART OF NATIONAL ACCOUNTS SYSTEM IN THE CZECH STATISTICS

Balances of non-financial assets form an integral part of the Czech National Accounts System. They were created as a parallel system to core sector accounts, extending the information about stocks and flows of each type of non-financial assets in each institutional sector by industry.

¹ The article is based on the paper presented on the “Conference on strengthening sectoral position and flow data in the macroeconomic accounts”, February 28th — March 2nd 2011. The Conference was organized by IMF jointly with OECD for G 20 and other advanced economies to discuss prospective of further enhancement of sectoral accumulation accounts and balance sheets, as well as flow of funds on from whom to whom basis. The IMF valued highly the Czech experience and invited the Czech Statistical Office to present a paper on practices and challenges in compiling sectoral non financial balance sheets and accumulation accounts.

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Balances of non-financial assets, recording stocks and flows of non-financial assets, have always been an important part of the Czechoslovak and Czech statistics. In former Czechoslovakia, there were annually compiled balances of fixed capital in historical and replacement prices and structured by four groups of fixed assets. Stocks and changes of inventories were recorded and evaluated separately. In the early 1980s, national wealth was estimated, including natural resources. However, there was not any direct integration of these balances and occasional estimates — the mutual linkage to flows of goods and services, and to the income and financial flows was weak. Input-output tables played a specific integration role. However, they have been compiled in five-year periodicity. Formerly used “Material product system” (MPS) provided much macroeconomic information, but it was not a complete and fully integrated system.

Transition to the system of national accounts in the early 1990s in the Czechoslovak statistics and the revision of former international national accounts standards in the same period enabled to create a comprehensive and fully integrated system of accounts and tables.

Even before the official approval of the SNA 1993 (UN, IMF, OECD, Eurostat and World Bank, 1993), the Federal Statistical Office started to implement it. Collection and processing of financial statements (balance sheets and profit / loss accounts) for all businesses belonged to responsibility of former Federal, Czech and Slovak Statistical Offices. These data sources allowed for establishing of full sequence of accounts, including balance sheets, for all the institutional sectors and subsector, and also by industries.

In the first stage of implementation of national accounts, the Czech Statistical Offices (CZSO) focused on building a complete, fully integrated system of national accounts, despite of being aware that the contents of the individual items does not match exactly the methodological requirements of SNA. The first complete, fully integrated system of national accounts was compiled and published for the year 1994. It included all current accounts, accumulation accounts and balance sheets for five institutional sectors and eleven sub-sectors. Non-financial assets were broken down according to the non-financial assets classification done by ESA 1995 (Eurostat, 1996) (not all types of non-financial assets were separated correctly, mainly non-residential buildings and other structures were not distinguished and four types of land were not divided exactly by classification).³

From the beginning of the implementation of the national accounts there was an effort to recognize the acquisition of new and existing fixed assets and to balance the flows (acquisition / disposal) of existing fixed assets among institutional sectors and sub-sectors. This approach was important due to profound changes in the Czech economy. Massive restitution of property and privatisation for low prices prompted us to distinguish those flows “with” and “without” payments and to estimate differences against market prices to record as “other capital transfers” in order to avoid misinterpretation of balance item of the capital account “Net lending / net borrowing”.

The original idea was to hold the same and complete structure in both systems, with the extension by industrial breakdown in balances of non-financial assets.⁴ All of required breakdowns of non-financial assets are shown in the Figure 1.

³ With capturing of the land in the proper valuation and classification, in its nature, we have still problems. Before 1993 the land was not included in the balance sheets of companies, because neither valued.

⁴ Non-financial assets are usually classified according to three classifications: (a) by the classification of non-financial assets, i.e. by their nature, (b) by the institutional sector classification of their users, and (c) by the industrial activity classification of their owners. However, also other criteria are important for complete characteristics of stocks and flows of non-financial assets: the way of acquisition (new or existing fixed assets, payable or free of charge) and reason of other flows (by classification of other changes in volume of assets).

Figure 1 Needed breakdowns of non-financial assets⁴

Account	Structure by classifications	Institutional sectors (5) and sub-sectors (11)												
		S.11			S.12				S.13			S.14	S.15	
		by industries (120)												
Opening balance sheet	by types of assets (32)													
Acquisition of non-financial assets account	Acquisition by types of assets (32) by new/used fixed assets Disposal by types of assets (32) Consumption by types of fixed assets (11)													
Other changes in volume of assets account	by reason of changes (7) by types of assets (32)													
Revaluation accounts	Nominal holding gains by types of assets (32) Neutral holding gains by types of assets (32) Real holding gains by types of assets (32)													
Closing balance sheet	by types of assets (32)													

Source: Czech Statistical Office, own construction

It is evident that the combination of all breakdowns of the non-financial assets too complicates the both systems, the balances of non-financial assets and core sector accounts. That's why some simplifications were made, unfortunately not systematically and not by the same manner in all five accounts of balance in both systems. So, the question of which items to keep in the core sector accounts and

Table 1 Closing balance sheet, 2008, Czech Republic (CZK, billions)

Code	Item	Total economy S.1	Non-fin. corp. S.11	Financial corp. S.12	General govern. S.13	Households S.14	NPISH S.15
AN	Non-financial assets	16 668.9	7 867.4	212.4	4 794.8	3 694.8	99.6
AN.1	Produced assets	15 598.8	7 449.2	188.3	4 469.9	3 400.5	91.0
AN.11	Fixed assets	13 814.7	6 153.3	176.7	4 268.6	3 126.7	89.4
AN.1111	Dwellings	3 490.3	478.1	1.1	266.0	2 743.1	2.1
AN.1112	Other buildings and structures	8 095.6	3 805.3	141.3	3 863.5	206.2	79.3
AN.11121	Non-residential buildings	6 251.5	3 330.3	141.3	2 494.4	206.2	79.3
AN.11122	Other structures	1 844.1	475.0	0.0	1 369.1	0.0	0.0
AN.1113	Machinery and equipment	2 116.1	1 781.9	24.2	131.5	170.5	8.0
AN.11131	Transport equipment	588.4	464.7	7.4	31.7	83.9	0.7
AN.11132	Other machinery and equipment	1 527.7	1 317.2	16.8	99.8	86.6	7.3
AN.1114	Cultivated assets	20.1	18.4	0.0	0.3	1.4	0.0
AN.11141	Livestock for breeding, dairy, ...	18.1	16.9	0.0	0.1	1.0	0.0
AN.11142	Vineyards, orchards and other ...	2.0	1.4	0.0	0.2	0.4	0.0
AN.1121	Mineral exploration	12.9	12.6	0.0	0.3	0.0	0.0
AN.1122	Computer software	52.9	33.8	10.1	7.0	2.0	0.1
AN.1123	Entertainment, literary ... originals	27.0	23.4	0.0	0.0	3.6	0.0
AN.1129	Other intangible fixed assets	0.0	0.0	0.0	0.0	0.0	0.0
AN.12	Inventories	1 722.7	1 294.0	11.2	198.9	217.3	1.4
AN.121	Materials and supplies	313.2	250.2	10.6	40.7	11.4	0.2
AN.122	Work in progress	868.5	587.6	0.0	133.1	146.7	1.1
AN.1221	Work in progress on cultivated ass.	678.8	406.7	0.0	132.9	138.3	1.0
AN.1222	Other work in progress	189.6	180.9	0.0	0.2	8.4	0.1
AN.123	Finished goods	106.8	103.1	0.0	0.5	3.3	0.0
AN.124	Goods for resale	434.3	353.2	0.5	24.7	55.9	0.0
AN.13	Valuables	61.4	1.8	0.5	2.4	56.5	0.1
AN.131	Precious metals and stones	34.7	0.0	0.0	0.0	34.7	0.0
AN.132	Antiques and other art objects	26.6	1.8	0.5	2.4	21.8	0.1
AN.139	Other valuables	0.0	0.0	0.0	0.0	0.0	0.0
AN.2	Non-produced assets	1 070.1	418.2	24.0	324.9	294.3	8.6
AN.211	Land	963.4	327.9	9.4	323.3	294.3	8.6
AN.2111	Land underlying buildings and structures	593.2	201.7	9.1	178.7	196.6	7.1
AN.2112	Land under cultivation	316.7	99.1	0.0	118.4	97.7	1.5
AN.2113	Recreational land and ...	0.0	0.0	0.0	0.0	0.0	0.0
AN.2119	Other land and associated surf	53.5	27.1	0.2	26.2	0.0	0.0
AN.212	Subsoil assets	3.2	3.2	0.0	0.0	0.0	0.0
AN.2121	Coal, oil and natural gas reserves	2.0	2.0	0.0	0.0	0.0	0.0
AN.2122	Metallic mineral reserves	0.0	0.0	0.0	0.0	0.0	0.0
AN.2123	Non-metallic mineral reserves	1.2	1.2	0.0	0.0	0.0	0.0
AN.213	Non-cultivated biological resources	0.0	0.0	0.0	0.0	0.0	0.0
AN.214	Water resources	0.0	0.0	0.0	0.0	0.0	0.0
AN.221	Patented entities	0.0	0.0	0.0	0.0	0.0	0.0
AN.222	Leases and other transferable contracts	102.0	87.2	14.7	0.2	0.0	0.0
AN.223	Purchased goodwill	0.0	0.0	0.0	0.0	0.0	0.0
AN.229	Other intangible non-produced ass.	1.5	0.0	0.0	1.5	0.0	0.0

Source: Czech Statistical Office, own calculation

Table 2 Acquisitions of non-financial assets, 2008, Czech Republic (CZK, billions)

Code	Item	Total economy S.1	Non-fin. corp. S.11	Financial corp. S.12	General govern. S.13	House- holds S.14	NPISH S.15
Net acquisitions of non-financial assets, total		286.3	189.4	2.3	-7.6	99.9	2.3
P.51	Gross fixed capital formation	883.2	497.9	16.1	182.5	181.8	4.7
P.511	Acquisitions less disposals of tangible fixed assets	836.0	466.0	10.2	176.9	178.2	4.7
P.5111	Acquisitions of new tangible fixed assets	888.7	540.0	14.5	186.4	142.5	5.2
P.5112	Acquisitions of existing fixed assets <i>of it: free, without payments</i>	303.8	16.0	0.0	34.8	252.8	0.2
P.5113	Disposals of existing tangible fixed assets (-) <i>of it: free, without payments</i>	-356.5	-90.0	-4.3	-44.3	-217.1	-0.7
P.512	Acquisitions less disposals of intangible fixed assets	44.9	31.5	5.9	5.5	2.0	0.0
P.5121	Acquisitions of new intangible fixed assets	46.0	32.5	5.9	5.5	2.0	0.0
P.5122	Acquisitions of existing intangible fixed assets	0.2	0.0	0.0	0.2	0.0	0.0
P.5123	Disposals of existing intangible fixed assets (-)	-1.3	-1.1	0.0	-0.2	0.0	0.0
P.513	Addition to the value of non-produced non-financial assets	2.2	0.5	0.0	0.1	1.6	0.0
P.5131	Major improvements to non-produced non-financial assets	0.1	0.0	0.0	0.1	0.0	0.0
P.5132	Costs of ownership transfer on non-produced non-financial assets	2.1	0.4	0.0	0.0	1.6	0.0
K.1	Consumption of fixed capital (-)	-639.0	-376.4	-16.4	-152.5	-91.3	-2.6
of it:	Consumption of tangible fixed capital (-)	-600.4	-348.9	-11.1	-149.0	-89.0	-2.5
	Consumption of intangible fixed capital (-)	-38.6	-27.5	-5.4	-3.5	-2.3	0.0
P.52	Changes in inventories	47.0	40.3	2.1	-0.9	5.5	0.0
of it:	Changes in inventories of materials and supplies	2.0	2.1	1.8	-2.9	1.1	0.0
	Changes of work in progress	12.8	10.5	0.0	0.9	1.4	0.0
	Changes in inventories of finished goods	9.8	9.3	0.0	0.0	0.5	0.0
	Changes of inventories of goods for resale	22.3	18.4	0.2	1.1	2.6	0.0
P.53	Acquisitions less disposals of valuables	3.5	0.1	0.0	0.1	3.3	0.0
K.2	Acquisitions less disposals of non-financial non-produced assets	-8.3	27.4	0.5	-36.9	0.5	0.1
K.21	Acquisitions less disposals of tangible non-produced assets	0.0	-2.8	0.3	2.3	0.2	0.1
K.211	Acquisitions of land and other tangible non- produced assets	68.7	12.4	0.9	7.5	47.7	0.2
K.212	Disposals of land and other tangible non-produced assets	-68.7	-15.2	-0.6	-5.2	-47.5	-0.2
K.22	Acquisitions less disposals of intangible non-produced assets	-8.3	30.3	0.2	-39.2	0.4	0.0
K.221	Acquisitions of intangible non-produced assets	55.7	55.0	0.2	0.1	0.4	0.0
K.222	Disposals of intangible non-produced assets	-64.1	-24.8	0.0	-39.3	0.0	0.0

Source: Czech Statistical Office, own calculation

which items to move to the balances of non-financial assets, or vice versa, has been solved in quite a pragmatic way.

In opening and closing balance sheets of both systems the complete detailed structure of the non-financial assets is held. An overview of all 32 groups of non-financial assets by five sector accounts is shown in the Table 1.

In Acquisition of non-financial assets account the structure of assets is solved differently in both systems. While in individual balances of non-financial assets the complete detailed breakdown of assets is held, in core sector accounts the acquisition is not structured by the detailed breakdown of non-financial assets (except for the four types of inventory). On the other side, this simplification allows the complete view on acquisition of non-financial assets by institutional sectors and sub-sectors and also on balance of acquisitions and disposal of existing fixed assets. Table 2 serves an example of the full structure of the acquisition of non-financial assets account. Real data for the Czech Republic for the year 2008 are recorded there.

Other changes of each group of assets recorded in “Other changes in volume of assets account” should be structured by reason of these changes (K.3 to K.12). This requirement brings very complicated non-transparent tables because the combination of four classifications (sector x industry x assets x reason of changes). Besides, to receive information about other changes in volume is one of the most complicated and not fully solved issues. None of both systems records complete structure of other changes in volume of assets. In core sector accounts a detailed structure of assets (except inventories) is missing. So, the other volume changes are recorded by each type of the reason but not by detailed structure of assets, however, in structure for five aggregated groups of non-financial assets (and also for four types of inventories). In balances of non-financial assets the reasons of other volume changes are missing. They are recorded in one aggregate item only, because more detailed breakdown would complicate these balances. The Table 3 provides an overview of the changes by reason in 2008.

Table 3 Other changes in volume, 2008, Czech Republic (CZK, billions)

Code	Item	Total Economy S.1	Non-fin. corp. S.11	Financial corp. S.12	General govern. S.13	Households S.14	NPISH S.15
AN	Non-financial assets, total	-43.4	-46.5	-1.7	-0.4	6.4	-1.2
of it:	K.3 Economic appearance of non-produced assets	42.9	3.0	0.0	39.9	0.0	0.0
	K.4 Economic appearance of produced assets	0.0	0.0	0.0	0.0	0.0	0.0
	K.6 Economic disappearance of non-produced assets	-34.3	-34.0	0.0	0.0	-0.4	0.0
	K.7 Catastrophic losses	0.0	0.0	0.0	0.0	0.0	0.0
	K.8 Uncompensated seizures	0.0	0.0	0.0	0.0	0.0	0.0
	K.9 Other volume changes in non-financial assets n.e.c.	-52.1	-15.9	-1.7	-40.5	7.3	-1.2
	K.12 Changes in classifications and structure	0.0	0.3	0.0	0.2	-0.5	0.0

Source: Czech Statistical Office, own calculation

In Revaluation accounts the structure of assets is solved identically in both systems. The breakdown of non-financial assets follows the full complete structure like in balance sheets. In addition, the revaluation account in “core” sector accounts is divided into two sub-accounts “Neutral holding gains / losses account” and “Real holding gains / losses account”. It gives to users an overview of the price impact on net worth by individual groups of non-financial assets. See the Table 4.

Table 4 Revaluation accounts, 2008, Czech Republic (CZK, billions)**Table 4A** Revaluation accounts: Nominal holding gains account, 2008, Czech Republic

Code	Item	Total economy S.1	Non-fin. corp. S.11	Financial corp. S.12	General govern. S.13	Households S.14	NPISH S.15
AN	Non-financial assets	363.9	58.5	7.4	164.8	129.0	4.1
AN.11	Fixed assets	430.5	134.8	5.2	167.3	120.0	3.1
AN.12	Inventories	-209.0	-127.0	0.0	-43.3	-38.4	-0.3
AN.13	Valuables	0.0	0.0	0.0	0.0	0.0	0.0
AN.21	Tangible non-produced assets	136.0	45.5	1.3	40.6	47.4	1.2
AN.22	Intangible non-produced assets	6.3	5.2	0.9	0.2	0.0	0.0

Table 4B Revaluation accounts: Neutral holding gains account, 2008, Czech Republic

Code	Item	Total economy S.1	Non-fin. corp. S.11	Financial corp. S.12	General govern. S.13	Households S.14	NPISH S.15
AN	Non-financial assets	532.9	254.3	6.8	153.9	114.8	3.1
AN.11	Fixed assets	436.4	195.8	5.7	135.2	96.9	2.8
AN.12	Inventories	61.5	45.0	0.3	8.0	8.1	0.1
AN.13	Valuables	1.9	0.1	0.0	0.1	1.8	0.0
AN.21	Tangible non-produced assets	29.9	10.8	0.3	10.5	8.1	0.3
AN.22	Intangible non-produced assets	3.3	2.8	0.5	0.0	0.0	0.0

Table 4C Revaluation accounts: Real holding gains account, 2008, Czech Republic

Code	Item	Total economy S.1	Non-fin. corp. S.11	Financial corp. S.12	General govern. S.13	Households S.14	NPISH S.15
AN	Non-financial assets	-169.1	-195.8	0.6	11.0	14.3	0.9
AN.11	Fixed assets	-5.8	-61.0	-0.5	32.2	23.2	0.3
AN.12	Inventories	-270.4	-172.0	-0.3	-51.3	-46.5	-0.3
AN.13	Valuables	-1.9	-0.1	0.0	-0.1	-1.8	0.0
AN.21	Tangible non-produced assets	106.1	34.7	1.0	30.1	39.3	1.0
AN.22	Intangible non-produced assets	3.1	2.5	0.4	0.1	0.0	0.0

Source: Czech Statistical Office, own calculation

Application of different structures in individual accounts in two systems was mainly due to technical limitations. The technical equipment of the CZSO in the 1990's required too many compromises between the effort to compile a complete set of accounts with complete breakdowns and capacity available.

The result of this compromise is a narrowed view on economic cycle of non-financial assets in detail structures of all used classifications. The entire economic cycle is visible only in several aggregated levels. Table 5 serves an example showing the complete balance by five aggregated groups of non-financial assets.

2 BALANCES OF NON-FINANCIAL ASSETS

Since 1995, the CZSO has annually compiled and published four balances of non-financial assets — balance of fixed assets, balance of inventories, balance of valuables and balance of non-produced assets. The balances are compiled for each institutional sector and sub-sector. In each of these balances, stocks and

Table 5 Aggregated balance of non-financial assets, 2008, Czech Republic (CZK, billions)

Code	Item	Total economy S.1	Non-fin. corp. S.11	Financial corp. S.12	General govern. S.13	Households S.14	NPISH S.15
IV. 1 Opening balance sheet							
AN	Non-financial assets	16 062.2	7 666.0	204.4	4 637.9	3 459.4	94.5
AN.11	Fixed assets	13 151.6	5 902.0	171.6	4 074.2	2 919.4	84.4
AN.12	Inventories	1 852.6	1 355.1	9.3	242.5	244.0	1.7
AN.13	Valuables	57.9	1.8	0.5	2.3	53.2	0.1
AN.21	Tangible non-produced assets	901.8	324.2	8.6	317.9	242.9	8.3
AN.22	Intangible non-produced assets	98.3	83.0	14.4	1.0	0.0	0.0
III. 1.2 Acquisition of non-financial assets account							
AN	Non-financial assets	286.3	189.4	2.3	-7.6	99.9	2.3
AN.11	Fixed assets	242.0	121.1	-0.3	30.1	89.0	2.2
<i>of it:</i>	<i>Acquisitions</i>	<i>881.1</i>	<i>497.5</i>	<i>16.1</i>	<i>182.5</i>	<i>180.2</i>	<i>4.7</i>
	<i>Consumptions</i>	<i>-639.0</i>	<i>-376.4</i>	<i>-16.4</i>	<i>-152.5</i>	<i>-91.3</i>	<i>-2.6</i>
AN.12	Inventories	47.0	40.3	2.1	-0.9	5.5	0.0
AN.13	Valuables	3.5	0.1	0.0	0.1	3.3	0.0
AN.21	Tangible non-produced assets	2.1	-2.4	0.3	2.3	1.8	0.1
AN.22	Intangible non-produced assets	-8.3	30.3	0.2	-39.2	0.4	0.0
III. 3.1 Other changes in volume of assets account							
AN	Non-financial assets	-43.4	-46.5	-1.7	-0.4	6.4	-1.2
AN.11	Fixed assets	-9.5	-4.7	0.1	-3.1	-1.6	-0.2
AN.12	Inventories	32.2	25.7	-0.2	0.5	6.2	0.0
AN.13	Valuables	0.0	0.0	0.0	0.0	0.0	0.0
AN.21	Tangible non-produced assets	-73.3	-36.2	-0.8	-37.5	2.3	-1.0
AN.22	Intangible non-produced assets	7.2	-31.3	-0.9	39.7	-0.4	0.0
III. 3.2 Revaluation account							
AN	Non-financial assets	363.9	58.5	7.4	164.8	129.0	4.1
AN.11	Fixed assets	430.5	134.8	5.2	167.3	120.0	3.1
AN.12	Inventories	-209.0	-127.0	0.0	-43.3	-38.4	-0.3
AN.13	Valuables	0.0	0.0	0.0	0.0	0.0	0.0
AN.21	Tangible non-produced assets	136.0	45.5	1.3	40.6	47.4	1.2
AN.22	Intangible non-produced assets	6.3	5.2	0.9	0.2	0.0	0.0
IV. 3 Closing balance sheet							
AN	Non-financial assets	16 668.9	7 867.4	212.4	4 794.8	3 694.8	99.6
AN.11	Fixed assets	13 814.7	6 153.3	176.7	4 268.6	3 126.7	89.4
AN.12	Inventories	1 722.7	1 294.0	11.2	198.9	217.3	1.4
AN.13	Valuables	61.4	1.8	0.5	2.4	56.5	0.1
AN.21	Tangible non-produced assets	966.6	331.1	9.4	323.3	294.3	8.6
AN.22	Intangible non-produced assets	103.5	87.2	14.7	1.7	0.0	0.0

Source: Czech Statistical Office, own calculation

changes in stocks are recorded by individual group of assets for each of 128 industries by NACE, Rev.1 classification.⁵ The aggregated data of these balances are always identical with corresponding items in corresponding institutional sectors in core sector accounts.

2.1 Balance of fixed assets

The balance of fixed assets is compiled for each sector or sub-sector. In the balance, stocks and flows of 11 groups of fixed assets in the breakdown by 128 industries are recognised. Part of this balance for sub-sector of national non-financial corporations is shown in the Table 6. The balance is compiled using a combination of data from statistical surveys and from model calculation. The surveyed data are used for acquisition and other changes in volume of assets; the model calculation is used for stocks and consumption of fixed capital. Figures on stocks and also consumption are corrected within the model by price indexes by the type of fixed assets.

For the calculation of stocks and consumption of fixed capital, PIM method with specific parameters for each type of fixed assets is used. Only one exception is dwellings, we used a quantitative method for them. PIM method is applied on each sector and each type of fixed assets. So long time series of acquisitions and price indices had to be developed for each of them. The model also works with estimated lifetimes. Lognormal distribution function is used for all types of assets and all sectors [3, 5 and 6].

The most important parameter, the average lifetime, was estimated according to the results of the survey on the age of retired assets. The survey was conducted during five years in the period from 1998 to 2003 and we recorded about 200 000 retirements. The derived average lifetimes and the parameters for distribution function have been used until now. These main parameters of a method by groups of fixed assets are shown in the Table 7.

One of the most important advantages of the application of PIM has been the introduction of order to the entire system of balances of fixed assets. This method is very demanding in terms of quality of input data and their updating. Model access cannot reflect such significant changes in the Czech economy such as the massive privatisation. These changes significantly affected industrial and sector structure of the property. That is why there is a necessity to collect additional information. For example, previously used average lifetimes are already obsolete, particularly with regard to rapid modernisation of recent years. However, the weakest point of our present application of PIM is the acquisition and disposal of existing fixed assets. During last decade the acquisition of existing fixed assets represents in average for the total economy more than 25 % of total acquisition. The acquisition and disposal of existing fixed assets for the whole economy are nearly in balance, but PIM method is applied on individual industries in individual institutional sectors where differences between the acquisition and disposal of existing fixed assets can be very significant. Theoretically, the correct solution is to include the average age of these acquired / disposed assets to the model. However, it is very difficult to realize.

Similarly, also "other changes in volume of assets" make weak the smooth application of the PIM, in particular large catastrophic losses. However, for these events we make corrections based on estimates produced by experts and insurance companies, using mostly quantitative method.

2.2 Balance of inventories

Balances of inventory, similarly like balances of fixed assets, are compiled for each institutional sector and broken down by four types of stocks and by 128 industries. However, the estimate of stocks and flows

⁵ The Czech national accounts are now under the main revision in connection with the transition to NACE Rev. 2). Within this revision, the method of calculating stocks and consumption of fixed capital for dwellings will also be changed (PIM method will be applied).

Table 6 Balance of fixed capital, 2008, Czech Republic (CZK, billions)

Code	Item	Total economy	Agriculture 01	Land transport 60	Real estate service 70
III. 1.2 Acquisition of non-financial assets account					
P.51	Gross fixed capital formation	883.2	19.6	57.1	170.8
of it:	AN.1111 Dwellings	131.2	0.1	0.4	126.8
	AN.11121 Non-residential buildings	212.8	4.6	8.4	26.8
	AN.11122 Other structures	107.9	0.1	0.0	2.1
	AN.11131 Transport equipment	134.7	1.4	34.5	8.9
K.1	Consumption of fixed capital (-)	-639.0	-15.6	-34.0	-88.3
of it:	AN.1111 Dwellings	-76.2	-0.5	-0.2	-71.1
	AN.11121 Non-residential buildings	-150.9	-6.9	-4.1	-8.1
	AN.11122 Other structures	-81.8	0.0	-5.3	0.0
	AN.11131 Transport equipment	-85.8	-2.0	-19.7	-3.5
III. 3.1 Other changes in volume of assets account					
K.3-K.12	Other changes in volume, total	-9.4	-3.8	-0.2	-1.4
of it:	AN.1111 Dwellings	0.2	0.0	0.0	-1.1
	AN.11121 Non-residential buildings	5.8	0.1	0.0	1.8
	AN.11122 Other structures	-7.3	-0.1	0.0	-2.1
	AN.11131 Transport equipment	-2.4	-0.2	-0.2	0.0
III. 3.2 Revaluation account					
K.11	Nominal holding gains/losses	430.5	3.9	16.2	153.5
of it:	AN.1111 Dwellings	147.9	1.0	0.4	136.2
	AN.11121 Non-residential buildings	249.2	4.4	11.0	21.5
	AN.11122 Other structures	79.2	0.0	2.3	0.0
	AN.11131 Transport equipment	-19.6	-0.9	3.2	-1.6
IV. 1 Opening balance sheet					
AN.11	Fixed assets	13 151.6	204.9	490.8	3 600.3
of it:	AN.1111 Dwellings	3 287.2	23.3	8.0	3 026.5
	AN.11121 Non-residential buildings	5 934.5	103.6	262.5	512.3
	AN.11122 Other structures	1 746.3	0.0	50.5	0.0
	AN.11131 Transport equipment	561.6	17.8	135.9	25.0
IV. 2 Changes in balance sheet					
AN.11	Fixed assets	663.1	4.0	39.1	233.0
of it:	AN.1111 Dwellings	203.1	0.7	0.6	190.8
	AN.11121 Non-residential buildings	317.0	2.2	15.3	42.0
	AN.11122 Other structures	97.8	0.0	-3.0	0.0
	AN.11131 Transport equipment	26.9	-1.7	17.7	3.8
IV. 3 Closing balance sheet					
AN.11	Fixed assets	13 814.7	208.9	529.8	3 833.3
of it:	AN.1111 Dwellings	3 490.3	24.0	8.6	3 217.3
	AN.11121 Non-residential buildings	6 251.5	105.8	277.8	554.4
	AN.11122 Other structures	1 844.1	0.0	47.4	0.0
	AN.11131 Transport equipment	588.4	16.1	153.7	28.8

Source: Czech Statistical Office, own calculation

Table 7 Lifetimes and time series of GFCF by group of fixed assets, Czech Republic

Group of assets			Non-fin. corporations S.11	Financial corporations S.12	General government S.13	Households and NPISH S.14+S.15
Dwellings	Block of flats	Lts	15	15	15	15
		Asl	80	80	80	80
	Family house	Lts	15	15	15	15
		Asl	90	90	90	90
Other buildings and structures	Non-residential buildings	Lts	35	35	50	35
		Asl	40–90 (depends on industry)	40–90 (depends on industry)	40–90 (depends on industry)	40–90 (depends on industry)
	Dams	Lts	50		50	
		Asl	100		50	
	Roads	Lts			60	
		Asl			50	
	Railways	Lts			73	
		Asl			30	
	Ducts and sewerage	Lts			50	
		Asl			80	
	Water treatment plants	Lts			50	
		Asl			30	
	Other structures	Lts	35			
		Asl	30–50			
Machinery and equipment	Transport equipment	Lts	50	50	50	50
		Asl	4.5–21	4.5–21	4.5–21	4.5–21
	Other machinery and equipment	Lts	50	50	50	50
		Asl	7.5–21.5	7.5–21.5	7.5–21.5	7.5–21.5
Cultivated assets	Vineyards etc.	Lts	15	15	15	15
		Asl	11	11	11	11
	Livestock	Lts	15	15	15	15
		Asl	4	4	4	4
Intangible fixed assets	Software	Lts	15–40	15–40	15–40	15–40
		Asl	4.5	4.5	4.5	4.5
	Originals	Lts	15–40	15–40	15–40	15–40
		Asl	7	7	7	7
	Mineral exploration	Lts	15–40	15–40	15–40	15–40
		Asl	10	10	10	10

Lts ... the length of time series (number of years), Asl ... the average service lives (years).

Source: Czech Statistical Office, own calculation

use the opposite approach. While for fixed capital the acquisition is surveyed and stocks are counted, for inventories the stocks are surveyed and net acquisition is counted. Balance of inventories for non-financial corporations sector serves an example (see the Table 8).

Opening and closing stocks (or change in stocks) and other changes in volume (e.g. extraordinary damage) are received from statistical surveys or from financial statements. Applying turnover ratio and price indexes on stocks by industry and four types of inventories holding gains / losses are calculated and value

Table 8 Balance of inventories, 2008, Czech Republic (CZK, billions)

Code	Item	Non-fin. Corporations 5.11	Forestry 02	Wholesale trade 51	Real estate services 70
III. 1.2 Acquisition of non-financial assets account					
P.52	Changes in inventories, total	40.3	2.0	3.7	3.2
P.521	Changes in inventories of materials and supplies	2.1	0.0	0.4	-0.3
P.522	Changes of work in progress	10.5	2.0	0.3	2.0
P.523	Changes in inventories of finished goods	9.3	0.0	0.3	0.1
P.524	Changes of inventories of goods for resale	18.4	0.0	2.6	1.4
III. 3.1 Other changes in volume of assets account					
AN.12	Inventories, total	25.7	0.4	-5.4	0.9
AN.121	Materials and supplies	5.3	0.0	-0.6	-0.7
AN.122	Work in progress	8.5	0.4	-0.5	-2.3
AN.123	Finished goods	2.1	0.1	-0.3	0.8
AN.124	Goods for resale	9.8	0.0	-4.1	3.1
III. 3.2 Revaluation account					
AN.12	Inventories, total	-127.0	-106.3	-9.3	0.0
AN.121	Materials and supplies	-1.8	0.0	-0.2	0.0
AN.122	Work in progress	-106.7	-106.2	-0.5	0.4
AN.123	Finished goods	-2.5	-0.1	-0.2	-0.5
AN.124	Goods for resale	-16.0	0.0	-8.4	0.2
IV. 1 Opening balance sheet					
AN.12	Inventories, total	1 355.1	499.5	188.9	19.2
AN.121	Materials and supplies	244.7	0.3	3.8	1.4
AN.122	Work in progress	675.3	498.5	1.9	13.7
AN.123	Finished goods	94.1	0.6	0.9	1.5
AN.124	Goods for resale	341.0	0.1	182.3	2.5
IV. 2 Changes in balance sheet					
AN.12	Inventories, total	-61.1	-104.0	-11.1	4.1
AN.121	Materials and supplies	5.5	0.0	-0.4	-1.0
AN.122	Work in progress	-87.7	-103.8	-0.7	0.1
AN.123	Finished goods	8.9	-0.1	-0.2	0.4
AN.124	Goods for resale	12.2	0.0	-9.8	4.7
IV. 3 Closing balance sheet					
AN.12	Inventories, total	1 294.0	395.6	177.8	23.3
AN.121	Materials and supplies	250.2	0.3	3.4	0.3
AN.122	Work in progress	587.6	394.7	1.2	13.8
AN.123	Finished goods	103.1	0.5	0.7	1.9
AN.124	Goods for resale	353.2	0.1	172.5	7.2

Source: Czech Statistical Office, own calculation

of stocks is corrected. The difference between so adjusted changes in stocks and holding gains / losses and other changes in volume results then in changes in inventories of capital account. These model calculations are used quarterly. Estimated holding gains / losses are used for the adjustment of stocks taken from business accounts but also for the adjustment of output or intermediate consumption (materials).

Specific approaches are used for standing timber and for state's material reserves. In principle, the entire balances are taken from the relevant state administrative body. The method used for pricing of standing timber is now being discussed. Ministry of agriculture uses current market prices for each kind of wood. Present changes in market prices of wood have discovered necessity to use a discounted value of future proceeds for standing timber. It is our plan to eliminate present deformation in holding gains from the work in progress on cultivated assets (see holding gains in forestry, Table 8).

2.3 Balance of valuables

Given small importance of valuables and difficulties with their estimates we focus only on estimate of newly acquired valuables and change in their valuation. We do not expect any other changes in volume, so the closing stocks in balance are calculated as the sum of revaluated opening stocks and current acquisitions less disposals of valuables. For the companies the acquisitions less disposals of valuables is statistically surveyed, for households we made estimate based on two commodities flows — CPA 36.2 (goldsmiths' and jewellery products) and CPA 92.31.1 (art).

2.4 Balance of non-produced assets

The balance of non-produced assets is currently under redevelopment. By the form the current version of the balance of non-produced assets is similar to the structure of other balances of non-financial assets. Stocks and flows of individual types of non-produced assets for each institutional sector are broken down by industry. Compilation and evaluation of the results of this balance have not yet been considered as a priority in the CZSO. Therefore this balance contains only those data, which have been available from the business and general government accounts. The priority was aimed at the process of restitution and privatisation and their recording in capital account. Therefore, the payable and free transactions with non-produced assets (mainly land), have been recorded separately, in particular the land from the General Government sector. Therefore, the schema of the balance has been modified to accommodate these needs. Now, when bigger demand for the non-produced assets data emerges, we have already problems how to describe properly all flows and stocks by each category of non-produced assets.

Based on our past experience, we plan to focus more on evaluation of stocks, changes in the value and on other changes in the volume of assets (e.g. changes in land use, economic appearance or disappearance of intangible non-produced assets). At the same time we expect to use new data source for the valuation and changes in valuation of land, data from the State Cadaster and price maps. Whereas, stock of assets in business accounts is valued in historical prices of acquisition, the business accounts data will be used only for transactions, (purchases and sales) which are usually given in standard market prices, and partially also for other flows (damages).

New scheme of balances of non-produced assets will be shaped by the requirement that instead of one very large internally inconsistent balance (broken down for each institutional sector by industry and covering all types of non-produced assets) we suppose to build three, internally homogeneous balances. The industrial breakdown is under discussion. The separate balances will be compiled for land, subsoil assets and intangible non-produced assets. The exact content will be determined according to the new classification of non-produced assets, respectively, according to the ESA 2010. All accounts in these balances will be of the same general structure, i.e. broken by the same aggregation of that type of assets to clearly show all flows and stocks in each category of non-produced asset, as it is in other balances of non-financial assets. As a new schema of balances of non-produced assets the balance of land is shown in the Table 9.

Table 9 Balance of land, 2008, Czech Republic (CZK, billions)

Code	Item	Total economy S.1	Non-fin. corp. S.11	Financial corp. S.12	General govern. S.13	Households S.14	NPISH S.15
III. 1.2 Acquisition of non-financial assets account							
K.21	Acquisitions less disposals of land, total	0.0	-2.8	0.3	2.3	0.2	0.1
K.211	Acquisitions of land	68.7	12.4	0.9	7.5	47.7	0.2
K.212	Disposals of land (-)	-68.7	-15.2	-0.6	-5.2	-47.5	-0.2
III. 3.1 Other changes in volume of assets account							
AN.211	Land, total	64.6	9.5	0.5	3.1	51.3	0.2
AN.2111	Land underlying buildings and structures	48.2	7.6	0.5	1.0	38.9	0.2
AN.2112	Land under cultivation	14.5	1.3	0.0	0.9	12.3	0.1
AN.2113	Recreational land and associated surface water	0.0	0.0	0.0	0.0	0.0	0.0
AN.2119	Other land and associated surface water	1.8	0.6	0.0	1.2	0.0	0.0
III. 3.2 Revaluation account							
AN.211	Land, total	128.5	45.3	1.3	44.8	35.9	1.2
AN.2111	Land underlying buildings and structures	81.8	29.5	1.3	26.3	23.6	1.0
AN.2112	Land under cultivation	43.5	14.1	0.0	16.9	12.3	0.2
AN.2113	Recreational land and associated surface water	0.0	0.0	0.0	0.0	0.0	0.0
AN.2119	Other land and associated surface water	3.3	1.7	0.0	1.6	0.0	0.0
IV. 1 Opening balance sheet							
AN.2111	Land, total	898.8	321.2	8.6	317.9	242.9	8.3
AN.2112	Land underlying buildings and structures	545.0	196.9	8.4	175.4	157.5	6.8
AN.2113	Land under cultivation	302.2	97.8	0.0	117.5	85.3	1.5
AN.2119	Recreational land and associated surface water	0.0	0.0	0.0	0.0	0.0	0.0
AN.2119	Other land and associated surface water	51.7	26.4	0.2	25.0	0.0	0.0
IV. 2 Changes in balance sheet							
AN.211	Land, total	193.1	52.0	2.0	50.2	87.3	1.6
AN.2111	Land underlying buildings and structures	130.0	34.3	2.0	29.6	62.7	1.3
AN.2112	Land under cultivation	58.1	15.4	0.0	17.8	24.6	0.3
AN.2113	Recreational land and associated surface water	0.0	0.0	0.0	0.0	0.0	0.0
AN.2119	Other land and associated surface water	5.1	2.3	0.0	2.8	0.0	0.0
IV. 3 Closing balance sheet							
AN.211	Land, total	1 091.9	373.2	10.6	368.1	330.2	9.8
AN.2111	Land underlying buildings and structures	674.9	231.2	10.4	205.0	220.2	8.1
AN.2112	Land under cultivation	360.2	113.2	0.0	135.3	110.0	1.7
AN.2113	Recreational land and associated surface water	0.0	0.0	0.0	0.0	0.0	0.0
AN.2119	Other land and associated surface water	56.8	28.7	0.2	27.8	0.0	0.0

Source: Czech Statistical Office, own calculation

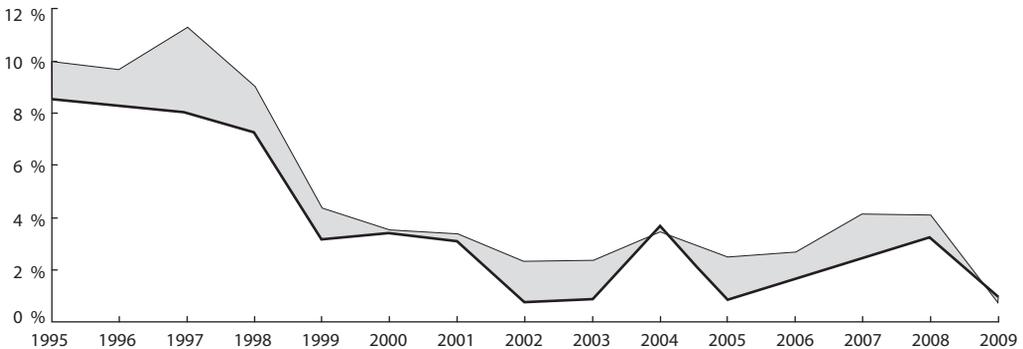
3 THE BENEFITS OF BALANCES OF NON-FINANCIAL ASSETS FOR THE SYSTEM OF NATIONAL ACCOUNTS

The balances of non-financial assets have been created within the system of national accounts of the Czech Republic becoming its integral part. This harmonised system provides great analytical and statistical advantages.

The analytical benefit of the balances of non-financial assets such as harmonic part of the system of national accounts subsists in the ability to show, together with balances of financial assets, the stock and changes in stocks of national wealth / net worth structured by institutional sector, by industry and by type of assets.

For example, the Figure 2 shows the development of the neutral and real holding gains from fixed assets in the sector of households. The shaded area represents the relative level of appreciation of the fixed assets owned by households (particularly dwellings) compared to price development of the final national uses. It should be considered that during last decade 60 % of value of existing dwellings in the Czech Republic has gone through the real estate market and that price surplus realized through the real estate market became an important additional source of financing of household and government current expenditures.

Figure 2 Relative level of appreciation of the fixed assets owned by households



Source: Czech Statistical Office (www.czso.cz), own calculation

The advantage of complete national accounts system subsists in providing comprehensive analytical views. If we assess the impact of price development of real estate separately we may come to erroneous conclusions. The example of the impact of real gains from the non-financial assets (see the Table 10) shows completely reverse impacts of price development on the different components of the net worth in different institutional sectors. Simply, the price impact on non-financial assets cannot be assessed separately from the impact of the financial assets and liabilities (Rybáček, 2010).

Statistical benefit subsists in the fact that it allows comprehensive access and reduces difficulties in those areas that might make the core system of sector accounts more complicated, and enlarges in balances of non-financial assets those areas that are not essential for the core system of sector accounts. The application of the PIM method for calculation of stocks and consumption of fixed capital can serve an example. Similarly, also calculation of holding gains on inventories is based primarily on industry x commodity matrices of stocks. Statistical discrepancies between the closing stocks and corresponding opening stocks are also computed and analysed by individual industry. Generally, analyses in balances of non-financial assets structured by industry provide more accurate data for the core system of sector accounts, and vice versa, the overview from sector accounts helps to make analyses of plausibility in the balances of non-financial assets. For example, calculations of real holding gains

Table 10 Appreciation of net worth due to real holding gains/losses (% of net worth)

Sector / assets	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009
S.11 — Non-financial corporations															
Total	12.4	3.3	8.2	6.8	5.1	2.6	0.0	-3.3	-0.6	-3.5	-2.7	0.6	-1.1	2.1	-4.1
on non-financial assets	-1.9	-4.3	1.5	-1.0	0.1	-0.6	-1.3	-1.4	-0.2	-1.7	1.2	1.7	1.3	-4.1	-2.5
on financial assets	-4.3	-8.3	-8.2	-8.4	-4.0	-4.0	-3.0	-2.1	-1.0	-3.3	-0.5	-1.6	-3.2	-4.8	-1.8
on liabilities	18.5	15.9	14.9	16.2	8.9	7.2	4.3	0.2	0.6	1.5	-3.4	0.4	0.8	11.0	0.2
S.12 — Financial corporations															
Total	-3.5	-4.9	-46.8	-4.0	-27.5	-13.7	-17.4	6.0	-8.8	-20.7	16.7	-58.2	-137.7	40.8	-51.7
on non-financial assets	-0.5	-0.9	1.1	-0.2	-0.1	0.4	-0.1	-1.0	-0.4	-1.0	0.3	0.9	2.1	0.3	-0.7
on financial assets	-123.1	-132.9	-315.5	-115.7	-67.5	-90.4	-80.0	-22.5	-80.9	-114.9	6.6	-172.9	-267.8	-37.3	-34.7
on liabilities	120.1	128.8	267.6	111.9	40.1	76.3	62.7	29.5	72.5	95.2	9.9	113.8	128.0	77.8	-16.3
S.13 — General government															
Total	-2.7	-1.6	-1.8	-1.9	1.3	0.5	0.4	0.2	1.1	2.7	5.8	3.6	4.8	-3.7	0.5
on non-financial assets	0.3	0.8	0.3	0.7	1.0	0.5	0.3	1.1	0.9	-0.2	1.9	1.7	1.8	0.3	-0.3
on financial assets	-3.7	-3.1	-2.7	-3.2	0.1	-0.5	-0.3	-1.1	0.0	1.9	3.5	1.4	2.3	-4.7	0.4
on liabilities	0.7	0.7	0.6	0.6	0.2	0.4	0.5	0.2	0.2	0.9	0.4	0.5	0.6	0.7	0.3
S.14 — Households															
Total	-4.9	-2.6	-1.0	-1.8	-0.8	-1.1	-1.0	0.4	0.6	-1.4	1.0	0.6	0.6	-1.4	0.2
on non-financial assets	0.7	0.4	1.5	0.9	0.5	0.2	0.0	0.7	1.0	-0.2	1.2	1.1	1.1	0.3	-0.4
on financial assets	-6.3	-3.6	-3.3	-3.3	-1.7	-1.6	-1.4	-0.4	-0.6	-1.9	-0.5	-0.9	-1.2	-2.3	0.3
on liabilities	0.6	0.6	0.7	0.7	0.4	0.4	0.4	0.1	0.1	0.7	0.2	0.4	0.7	0.7	0.3

Source: Czech Statistical Office, own calculation

are beneficial not only analytically, but also for the improvement of our work in the field of account of other changes in volume of assets or they call for another verification of the statistical data and possible correction of the few reliable data.

The industrial breakdown of the balances of non-financial assets helps to secure an internal consistency of the entire system of national accounts — via the aggregated items by institutional sectors there is a direct link to “core” sector accounts and via industrial structure there is a direct link to the system of supply and use tables. Industrial breakdown of non-financial assets is therefore important not only from the aspect of analysis but also for internal consistency of the entire system of national accounts.

The CZSO published an analysis of the impact of holding gains, which had a retroactive effect on the improvement of the quality of data provided. At present, we focus mainly on valuation of dwellings, land and forests. These three types of assets represent more than one-third of the national wealth and in the sector of households almost two-thirds of their net worth. Growing market of these assets, including the growing purchases by non-residents needs now better credibility of summary statistical data both in the core sector accounts and balances of non-financial assets.

4 CONCLUSIONS — FARTHER DEVELOPMENT OF BALANCES OF NON-FINANCIAL ASSETS

The current main orientation of the economic statistics and analyses on the output brings out a distorted picture of economy. The national wealth as a final result of economic development should be analysed more preferably. It was important lesson from last financial and economic crises. Statistics should concentrate more on the quantification of stocks and trends of national wealth, on more consistent views on

the national wealth / net worth by institutional sectors, by industries and by type of assets breakdown and also on the better evaluation of stocks and changes in assets.

As a reaction on the new emphasis on national wealth the CZSO should farther improve or extend the existing balances of non-financial assets in the nearest period, in particular: (1) to change radically the Balance of non-produced assets, (2) to continue in improvement of a valuation of stock in the Balance of fixed assets, (3) to change the method of valuation of forests in Balance of inventories and (4) to create a new Balance of durables (to analyse the national wealth in the broader concept).

The balance of non-produced assets should be divided into three balances according to type of assets and concentrate efforts on the balance of the land, to ensure the data from the Cadastre and land prices, according to its nature and the location.

In the balance of fixed assets it is necessary to exclude a land from the value of the buildings (in particular for dwelling), to apply the method of PIM to the dwellings and to improve existing methods of PIM application for other fixed assets (to update the parameters to reflect the impact of the acquisition and sale of the existing fixed assets and to secure data for other changes in volume).

In the Balance of stocks it is necessary to change the method of valuation of forests. Instead of current prices of wood should be used a discounted value of future proceeds.

Durables play an important role in welfare of households. Nevertheless, they are recorded as one-off consumed in National Accounts. So, for analytical reason it should be very useful to record and cumulate them in Balance of durables, including PIM method on each group of these durables.

References

- UNITED NATIONS, IMF, OECD, EUROSTAT, WORLD BANK. *System of National Accounts — SNA 1993*. New York: United Nations, IMF, OECD, Eurostat, World Bank, 1993.
- EUROSTAT. *European system of accounts — ESA 1995*. Luxembourg: Eurostat, 1996, ISBN 92-827-7954-8.
- FISCHER J. and SIXTAJ. Implementation of the New ESA Standard into the Czech National accounts: Capital Services and Related Issues. *Bulletin of the International statistical Institute 56th Session* [CD-ROM]. Lisbon: International Statistical Institute, 2007.
- RYBÁČEK V. Theory and practice of holding gains and losses: Is the importance of revaluation reflected in national accounts? *Statistika*, No. 6, 2010, ISSN 0322-788X.
- SIXTA J. *The Estimates of Consumption of fixed capital*. 8th International Scientific Conference — Applications of Mathematics and Statistics in Economy (AMSE 2005) in Wrocław, Poland.
- SIXTA J. The Influence of the Revision of Consumption of Fixed Capital on GDP. *Statistics: Investment in the Future* [online]. <http://www.czso.cz/sif/conference2004.nsf/i/national_accounts>.

Measurement of Life Satisfaction across the Czech Republic

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Abstract

Examining the quality of life raises many questions and approaches for assessment. Many subjective indicators of living conditions may characterize the quality of life. In the paper we discuss the multidimensional aspect of life satisfaction. The paper focuses on the role of various factors, at aggregate level, in explaining observed regional differences in life satisfaction. The differences will be illustrated by cartographic visualization. At the regional level, we examine what factors make respondents more satisfied. Specifically, we focus on the role of personal job situation, cost of living, and the financial situation of households. The analysis is based on Eurobarometer research. The paper evaluates and compares the life satisfaction across various regions in the Czech Republic. For this purpose, the multivariate linear regression analysis will be used to examine and describe the relationship between life satisfaction as a response variable and selected predictor variables. Data will be analyzed by the SAS 9.2 software.

Keywords

Life satisfaction, regional disparities, multiple linear regression analysis, cartographic visualization, SAS software

JEL code

C29, J17, J28

INTRODUCTION

The aim of this paper is to find and quantify factors affecting the life satisfaction. The multivariate linear regression technique was applied to evaluate the role of regional factors in determining the life satisfaction of individuals across regions of the Czech Republic. We study to what extent questions make respondents more satisfied. Specifically, we concentrate on the role of financial and job situation, cost of living, household and health care. These questions were used as predictor variables, together with other selected questions, which affect the partial satisfaction in the various areas of life. The proportion of satisfied respondents with their life within selected regions was used as a response variable.

The quality of life is determined by the subjective perceptions of individual life stories. According to Maslow's theory the quality of life is about needs, satisfaction and values. This theory is closely as-

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sociated with theories of motivation. Everyone has different needs, everyone prefers — more or less — something different (Maslow 1970). This term is used in a wide range of contexts and various indicators influence the assessment of the quality of life. The evaluation of differences in quality of life has two aspects: objective and subjective. Therefore the research on disparities among regions can be realized both by quantitative and qualitative research (Jánský et al., 2009). The standards of living are evaluated by objective aspects, which can be measured in financial terms. The main data sources are the Czech Statistical Office and various ministries. Subjective well-being is subject to multiple determinants (Sheldon and Hoon, 2007).

The different types of indicators are used as objective characteristics of life satisfaction, for example indexes that are used primarily to compare different groups of inhabitants. These include the Human Development Index (HDI), the Human Poverty Index (HPI), the Gender-related Development Index (GDI) and the Gender Empowerment Measure (GEM). The HDI reflects the inequality between women and men. The GEM measures the active participation of women in economy and politics (Galvasová and Chabičovská, 2009).

The characteristics of subjective satisfaction are largely affected by levels and changes at country level, macroeconomic variables, such as inflation, GDP per capita, unemployment rate and social welfare indicators (Di Tella et al., 2003). In addition, social indicators, e.g. marital status, monthly earnings, and the level of education, can be considered.

This paper offers an analysis of subjective aspects of life satisfaction focusing on views and opinions of Czech residents. The analysis is based on the opinion research (Eurobarometer 71.2). The paper focuses on the role of various factors, at aggregate level, in explaining observed regional differences in life satisfaction. We used multivariate regression and correlation analysis to examine and describe the relationship between life satisfaction and selected predictors. The correlation analysis helps to find the variables that have the greatest impact on the overall life satisfaction of respondents. The differences in the quality of life in various regions can be illustrated by cartographic visualization, which represents the innovative methodical approach (more in Galvasová and Chabičovská, 2009).

1 LIFE SATISFACTION

We may come across lots of definitions and indicators focusing on description and examination of life satisfaction and the overall quality of life. Svobodová and Galvasová (2009) state that the concept of quality of life is very abstract, affected by many factors, which are of long-term character and sometimes contradictory. The terms such as quality of life, well-being and life satisfaction actually identify a maze of closely interrelated but subtly different concepts and show that every relationship between subjective and objective levels of well-being can be dynamically complex. A person's subjective well-being includes both these emotive and cognitive judgments, and different people weigh them differently (Grossi et al., 2010, Dvořáková et al., 2006). Ra (2010) states that subjective well-being includes our response, perceived satisfaction, and assessment of life.

Life satisfaction is not synonymous to happiness, even if these two terms are often used interchangeably. Both are broadly consistent measures of subjective well-being, but have to be considered separately. When asked how happy they are, people tend to consider the more volatile concept of current emotional state, while life satisfaction is closer to the concept of an overall and more stable living flourishing and realizing the best potential within oneself. Beutell (2006) points out that life satisfaction is an overall assessment of feelings and attitudes about one's life at a particular point in time ranging from negative to positive. It is related to better physical and mental health, longevity, and other outcomes that are considered positive in nature. Huppert et al. (2005) state that happiness is considered a more immediate human response whereas life satisfaction refers to a more collectively motivated mindset. In addition, self-ratings of 'happiness' tend to reflect short-term, situation-dependent expressions of mood, whereas

self-ratings of life satisfaction appear to measure longer-term, more projectable evaluations, indicating the extent to which one's experiences match one's expectations.

2 METHODS

The Eurobarometer 71.2 was used as a source for this analysis. It covers the population of the respective nationalities of the European Union Member States, resident in each of the Member States and aged 15+ years. The Eurobarometer was created at the request of the European Commission. The research was made between the 25th of May and the 17th of June 2009 and 1033 citizens of the Czech Republic participated in this Eurobarometer. Nine sub questions, referring to the quality of life, were chosen for detailed analysis.

The sampling points were drawn systematically from each of the "administrative regional units", after stratification by individual unit and type of area. They thus represent the whole territory of the countries surveyed according to the Eurostat NUTS II and according to the distribution of the resident population of the respective nationalities in terms of metropolitan, urban and rural areas. For the purpose of analysis the regions were selected according to the CZ NUTS II territories and the area of residence: village, small / middle size town or large town. Therefore the class variable contains 22 regions.

The global question on the life satisfaction was posed: "On the whole, are you very satisfied, fairly satisfied, not very satisfied or not at all satisfied with the life you lead?" (A1). The proportion of satisfied respondents within the selected regions was chosen as a response variable. The proportion of positive response is a continuous variable therefore the multiple linear regression analysis can be used.

Respondents also answer the question: "How would you judge the current situation in each of the following?"

- Health care system in the Czech Republic (A2);
- The provision of pensions in the Czech Republic (A3);
- The cost of living in the Czech Republic (A5);
- Affordability of energy (A8);
- How affordable housing is in the Czech Republic (A9);
- The economic situation in the Czech Republic (A11);
- Personal job situation (A12);
- The financial situation of a household (A13);
- The employment situation in the Czech Republic (A14).

For each question four possible answers could be given: very good, rather good, rather bad, and very bad. We exclude interviewers who responded 'don't know' or did not respond. For the purposes of analysis the input variables were recoded into two categories (good / bad). The proportions of positive responses within each region were used as predictor variables in the multiple regression analysis.

Finally, maps of the NUTS II regions were produced on the basis of answers to the selected questions. The cartographic visualization is a possible way for presentation of differences in the spatial distribution of reference indicators in various territories and also for comparison with the results of another analysis.

2.1 Regression analysis

The presented paper deals with modeling of relation between life satisfaction as a response variable and more predictor variables. Multiple regression and correlation analysis explores the interaction of several factors on the dependent variable, so there is no significant simplification of reality as in the case of simple linear regression. The aim of this paper was using the multiple regression and correlation analysis to estimate a type of relation between chosen variables and assess the strength of this relationship.

The main objective of the multiple linear regression analysis is to assess the significance of the predictor variables in explaining the variability or behavior of the response variable and predict the values of the response variable given the values of the predictor variables.

The multiple linear regression analysis models the dependent variable Y as a linear function of K independent variables X_1, X_2, \dots, X_K , as follows:

$$Y = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \dots + \beta_K X_K + \varepsilon, \quad (1)$$

where β_0 is the intercept term and $\beta_1, \beta_2, \dots, \beta_K$ are the partial regression coefficients; ε indicates random errors. Estimates of the unknown population parameters $\beta_0, \beta_1, \beta_K$ are obtained by the method of least squares. The method of least squares minimizes the sum of squares of the residuals. If the assumptions of linear regression are valid, the least squares estimates are unbiased estimates of the population parameters and have minimum variance (Hebák et al., 2005, Johnson and Wichern, 2007).

To determine whether the predictor variables explain a significant amount of variability in the response variable, the linear regression model is compared to the baseline model. In a baseline model, there is no association between the response variable and the predictor variables.

Thus, the null hypothesis of the regression model is defined as:

$$\beta_1 = \beta_2 = \dots = \beta_K = 0. \quad (2)$$

It means that regression model does not fit the data better than the baseline model. Alternative hypothesis is the following: The regression model does fit the data better than the baseline model and not all β_K s equal zero (Huber et al., 2006, Mason et al., 2003).

The quality of the regression models fit can be measured by the coefficient of determination. This coefficient is usually referred to as the R^2 value. The value is the proportion of the total variation observed in the data explained by the regression model. The coefficient of determination is written:

$$R^2 = 1 - \frac{SS_E}{TSE}, \quad (3)$$

where SS_E is the sum of squares of residuals and TSE is the total sum of squares (Johnson and Wichern, 2007, Mason et al., 2003).

2.2 Regression diagnostics

The regression analysis is followed by regression diagnostics. It verifies that the data have met the regression assumptions, otherwise the results may be misleading. Assumptions for the linear regression analysis are: The mean of the response variable is linearly related to the predictor variables. The random error terms, ε_j , where $j = 1 \dots J$ and J is the number of residuals, are assumed to have following properties (Johnson and Wichern, 2007):

- $E(\varepsilon_j) = 0$;
- $Var(\varepsilon_j) = \sigma^2$ (constant); and
- $Cov(\varepsilon_j, \varepsilon_k) = 0, j \neq k$.

In other words the errors should be normally distributed with a mean of zero for all j ; the variance of the errors should be constant for all j ; and the errors associated with one observation are not correlated with the errors of any other observation.

Additionally, there are issues that may arise during the analysis. A single observation that is substantially different from all other observations can make a large difference in the results of the regression analysis. There are three ways how an observation can be unusual. Firstly, an outlier, this is an observation with a large residual. An outlier may indicate a sample peculiarity or may indicate a data entry error or other problem. Residuals should be plotted in various ways to detect possible anomalies. Secondly, the high leverage points can affect the estimate of regression coefficients. Habshah et al. (2009) point out that leverage values are being used in regression diagnostics as measures of influential observations in the space of predictor variables. Detection of high leverage values is crucial because of their responsibility for misleading conclusion about the fitting of a regression model, causing multicollinearity problems, masking and / or swamping the outliers, etc. Thirdly, the influence observation means that an individual observation may exert undue influence on the coefficients. The observation is influential if removing the observation substantially changes the estimate of coefficients. Influence can be thought of as the product of leverage and outlierness. To detect influential observations, we used Cook's D statistic. This statistic measures the change in the parameter estimates that results from deleting each observation (Chen et al., 2003, Hebák et al., 2005, Huber et al., 2006).

The multicollinearity also requires attention. It means that the predictor variables are highly collinear, i.e. linearly related, and it can cause problems in estimating the regression coefficients. Variance inflation factor (VIF) provides a measure of the magnitude of collinearity. The problems caused by colinearity can be overcome by (1) deleting one of a pair of predictor variables that are strongly correlated or (2) relating the response Y to the principal components of the predictor variables (more in Huber et al., 2006, Johnson and Wichern, 2007).

2.3 Correlation analysis

The Pearson correlation coefficients were used to measure the degree of linear relationship between two input variables. This coefficient is symmetric and ranges in value from -1 to $+1$. The sample correlation coefficient, r , can be obtained by dividing the covariance ($Cov(X, Y)$) of the two variables by the product of their standard deviations (σ_x, σ_y), as follows:

$$r(X, Y) = r(Y, X) = \frac{Cov(X, Y)}{\sigma_x \sigma_y}, \quad (4)$$

(Hebák et al., 2005, Huber et al., 2006, Salvatore and Reagle, 2002).

3 THE MODEL OF LIFE SATISFACTION

First the distribution of data was examined. The normal distribution is characterized by a bell shape and two parameters: the mean and the standard deviation. The Shapiro-Wilk test verified that the distribution of all input variables is not significantly different from the normal distribution. Next the correlation analysis was used to qualify the degree of linearity between input variables. A common correlation statistic used for continuous variables is the Pearson correlation coefficient of the pair of variables and corresponding p -value. The sample correlation coefficients (Table 1) were produced for all combinations of variables.

The sample correlation coefficient between life satisfaction and financial situation of household is 0.61. The p -value is small, which indicates that the variables are linearly dependent. The second largest sample correlation coefficient is between life satisfaction and satisfaction with personal job situation (0.52). These coefficients are positive, which means that the life satisfaction tends to increase in value as the other variables increase in value. The life satisfaction is negatively correlated with the provision of pensions (-0.45). This negative relationship is probably caused by lack of interest of unsatisfied respondents in the general situation of pensions.

Table 1 Matrix of Pearson correlation coefficients

Var	A1	A2	A3	A5	A8	A9	A11	A12	A13	A14	Legend:
A1	1	.25	-.45	.48	-.09	.20	.33	.52	.61	.23	Are you satisfied with the life you lead? (A1)
A2	.25	1	.16	.14	-.02	.17	.05	.01	.21	-.09	Health care provision (A2)
A3	-.45	.16	1	-.01	.00	-.16	-.27	-.05	-.31	-.05	The provision of pensions (A3)
A5	.48	.14	-.01	1	.32	.52	.66	.37	.52	.52	The cost of living (A5)
A8	-.09	-.02	.00	.32	1	.26	.16	.22	.19	.16	Affordability of energy (A8)
A9	.20	.17	-.16	.52	.26	1	.49	.09	.30	.30	How affordable housing is (A9)
A11	.33	.05	-.27	.66	.16	.49	1	.16	.32	.62	The economic situation (A11)
A12	.52	.01	-.05	.37	.22	.09	.16	1	.66	.44	Personal job situation (A12)
A13	.61	.21	-.31	.52	.19	.30	.32	.66	1	.43	The financial situation of household (A13)
A14	.23	-.09	-.05	.52	.16	.30	.62	.44	.43	1	The employment situation (A14)

Source: Own construction

The objective of multiple regression analysis is to examine and describe the relationship between continuous variables. The null hypothesis is: the linear regression model does not fit the data better than the baseline model. The backward selection method was applied to select the most appropriate model for this analysis. The backward selection starts with fitting a model with all input variables. Then the least significant variable is dropped, so long as it is not significant at the chosen critical level. It continues by successively re-fitting reduced models and applying the same rule until all remaining variables are statistically significant. The null hypothesis of the regression model was also tested. The p -value of the final regression model was less than .05, so we have enough evidence to reject the null hypothesis at the .05 significance level. It means that regression model does fit the data better than the baseline model and the selected predictor variables explain a significant amount of variability of life satisfaction. The coefficient of determination of our resulting model is 0.71, which means that the predictor variables explain 71 % of the total variation in the response values.

The regression model contains the following variables (which represent the proportion of positive responses to these questions):

- Health care in the Czech Republic (A2);
- The provision of pensions in the Czech Republic (A3);
- The cost of living in the Czech Republic (A5);
- Affordability of energy (A8);
- Personal job situation (A12).

Next the regression diagnostics was created. Regression diagnostics verifies that the data have met the regression assumptions. Two observations with high leverage (according to Cook's D statistic) were found in the data, as follows: large cities in Central Moravia (SM3) and medium sized towns in Central Bohemia (SC2). The large cities in Central Moravia (SM3) were found to be influential as well as medium sized towns in Northeast (SV2), which means that removing these observations substantially changes the estimate of coefficients.

The possible reason why the SM3 observation is highly influential is the low number of responses in this region. This combination of NUTS II region and place of living brings only 7 respondents in this category (SM3). Therefore it was excluded from the analysis. The second slightly influential observation (SV2) was correct, so it was kept in the analysis. Then, the data was reanalyzed. The refitted regression diagnostics plots are shown in the Figure 1.

The refitted model achieved a low value (in comparison to the other considered models) of the Mean Square Error measure (MSE = 21.18). The coefficient of determination decreases to 62 %, however, the model is still appropriate. The relationship between the response variable and predictor variables can be characterized by the regression equation, as follows:

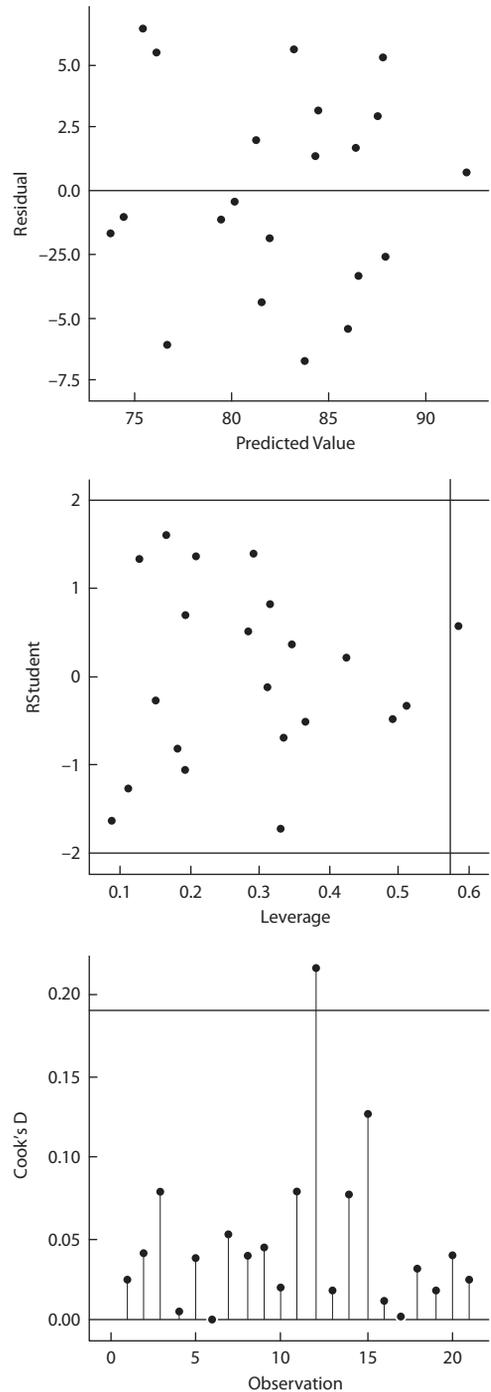
$$\begin{aligned} \text{life satisfaction} = & 64.499 + 0.298(\text{job situation}) \\ & - 0.161(\text{affordability of energy}) + 0.335(\text{cost} \\ & \text{of living}) - 0.347(\text{provision of pensions}) + \\ & 0.194(\text{health care provision}). \end{aligned}$$

The estimated coefficients for predictor variables correspond to the magnitude of change in the response variable given a one-unit change in the predictor variable. The positive value of the coefficient means that life satisfaction tends to increase in value as the predictor variable increases in value. In case of negative value of coefficient it is the reversed. For example, an increase of one percent in the satisfaction with the cost of living (A5) will increase the life satisfaction score by 0.34 percent (*ceteris paribus*). This variable has a high positive impact on the life satisfaction. The satisfaction with personal job situation (A12) and health care system (A2) also positively affect the life satisfaction. Otherwise provision of pensions (A3) and affordability of energy (A8) has negative effect to the life satisfaction. The negative effect of affordability of energy to the life satisfaction is probably obvious. It is related to the fact, that the price of energy is generally higher in the regions with higher life satisfaction (Prague, Central Bohemia, and Southeast). Therefore the high price of energy causes dissatisfaction.

Next, we realized the regression diagnostics of the refitted model. The variance inflation factor examined the presence of multicollinearity, but it was not identified in the model. Therefore the predictor variables are uncorrelated. The other assumptions of the multiple linear regression analysis were also examined. It was found out that the error terms are normally distributed and have equal variances.

As the scatter plot of residual values (Figure 1) shows, the residuals appear to be randomly scat-

Figure 1 Regression diagnostics plots



Source: Own construction

tered about the reference line at zero. There are no apparent trends or patterns in the residuals. Normality of residuals was verified by the Shapiro-Wilk test (p -value .59, the null hypothesis was not rejected). The homogeneity of variance was checked by the White test (p -value .53, the null hypothesis was not rejected). Therefore all assumptions of the multiple linear regression model have been proven.

Figure 2 shows the spread of individual observations in two dimensions. There are actual and predicted percents of respondents satisfied with their life. The first two letters in figure mark the CZ NUTS II territories and the third determines the place of living as follows: 1 — village, 2 — small / middle size town, 3 — large town. The NUTS II and NUTS III classification is shown in the Table 2.

Table 2 CZ NUTS II and NUTS III classification

Short title	Nuts II region	Nuts III region
Pha	Prague	Prague
SC	Central Bohemia	Středočeský
JZ	Southwest	Plzeňský, Jihočeský
SZ	Northwest	Karlovarský, Ústecký
SV	Northeast	Liberecký, Královehradecký, Pardubický
JV	Southeast	Vysočina, Jihomoravský
SM	Central Moravia	Olomoucký, Zlínský
MS	Moravian-Silesian	Moravskoslezský

Source: Czech Statistical Office, own construction

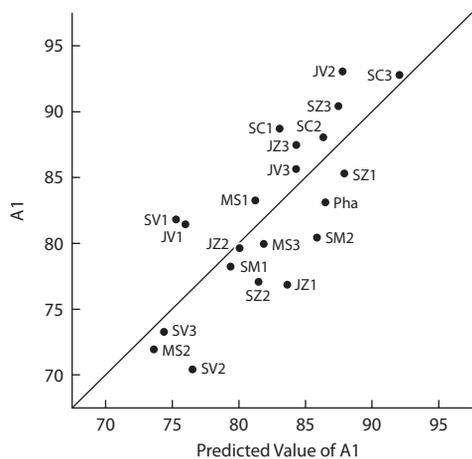
The predicted values of the life satisfaction in all regions were computed by the multiple linear regression model. Figure 2 shows that respondents from all regions of Central Bohemia and Southeast are more satisfied than the regression model predicted. Other regions are not clearly separated. Respondents from large towns in Southwest and Northwest also rated their life satisfaction more positively. Cities in these western regions have more job opportunities than other regions. This fact confirms the results of previous analysis. The personal job satisfaction is correlated with the life satisfaction.

Respondents living in villages of the Northeast and Moravian-Silesian regions are also more satisfied with their life than the prediction indicates. This probably happened because these respondents generally feel satisfied but they are less satisfied in more specific questions. Respondents from remaining regions are less satisfied with their life than the prediction indicates.

Further analysis focuses on comparison of NUTS II regions by overall satisfaction of respondents and by proportion of respondents satisfied with their personal job situation (A12). The personal job situation was selected because the correlation coefficient of this variable and life satisfaction was significant at the .01 significance level. This means that the life satisfaction is significantly affected by personal job situation. This wasn't the highest coefficient of correlation, but the comparison of the answers to these two questions brings interesting results. Regional differences were illustrated by cartographic visualization.

First, the question: "On the whole, are you very satisfied, fairly satisfied, not very satisfied or not at all satisfied with the life you lead?" was analyzed. Figure 3 reflects a proportion of positive responses ranging from 77.6 % to 89.0 %. The most satisfied inhabitants live in Central Bohemia,

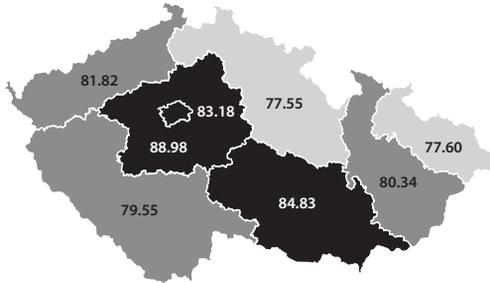
Figure 2 Actual and predicted values of life satisfaction in selected regions (in %)



Source: Own construction

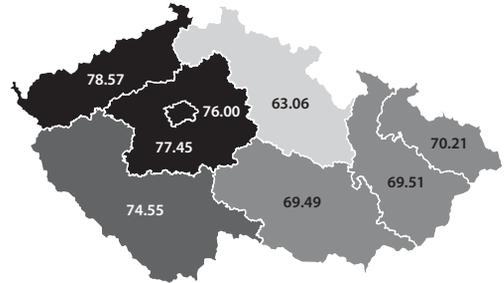
Southeast region, or in Prague. In these territories, the overall proportion of positive responses ranges from 83 % to 89 %. On the other hand, the lowest satisfaction rate is in the Northeast and Moravian-Silesian regions (77.6 %).

Figure 3 Proportion of respondents satisfied with their life (in %)



Source: Own construction

Figure 4 Proportion of respondents who judge their personal job situation positively (in %)



Source: Own construction

The Figure 4 shows an indicator of job satisfaction. It is evident that satisfied respondents live in Prague (76 %) and Central Bohemia (77 %), but the highest satisfaction with job situation surprisingly reached the Northwest region (79 %). This region was highly affected by the transformation process. Therefore, it has the lowest value of GDP per capita and the highest unemployment rate in comparison with other regions of the Czech Republic. However, the Eurobarometer survey shows that the subjective opinions of respondents may be different from the objective indicators. The survey also shows that Northwest is the region with the lowest proportion of respondents who had problems with paying bills. On the other hand, the lowest proportion of satisfied respondents is in the Northeast region (63 %).

Comparing the questions A1 — Are you satisfied with the life you lead? and A12 — How would you judge your personal job situation?, the most significant differences are in the Southeast regions. There is a high proportion of respondents satisfied with their life, but low percent of respondents satisfied with the job situation. Southeast is primarily a rural region with high proportion of agriculture. There is generally low income; lack of jobs; and the unemployment rate is steadily high. These indicators can negatively affect the satisfaction with the job situation. The satisfaction with other partial questions is also low in this region. This means that the overall life satisfaction is not affected by the job situation neither by other sub-questions. The inhabitants of this region are generally satisfied in spite of unfavorable financial and economic situation.

CONCLUSION

The paper focused on examining and quantifying the relationship between life satisfaction and selected variables. We examined to what extent factors make respondents more satisfied. For this purpose, the multivariate linear regression analysis was used. The proportion of respondents satisfied with their life was selected as a response variable. The cartographic visualization was also used as an interpretation support.

The multiple linear regression analysis defined the linear relationships between the response variable (life satisfaction) and predictor variables. Only 5 input variables were used in the final model. These predictors explain a significant amount of life satisfaction. The factors, which affect the life satisfaction most, are: personal job situation, provision of pensions, cost of living, health care provision, and affordability of energy.

The final linear regression model equation is estimated:

$$\text{life satisfaction} = 64.499 + 0.298(\text{job situation}) - 0.161(\text{affordability of energy}) + 0.335(\text{cost of living}) - 0.347(\text{provision of pensions}) + 0.194(\text{health care system}).$$

The coefficient of determination of this model is 0.62. This means that the regression line explains 62 % of the total variation in the response values. The estimated regression coefficients correspond to the magnitude of change in the response variable given a one-unit change in the predictor variable. Therefore an increase of one percent in the satisfaction with the cost of living (A5) will increase the life satisfaction score by 0.34 percent (*ceteris paribus*). It is similar in the case of other coefficients. From the equation we can see that provision of pensions has a negative effect on life satisfaction. This negative relationship is probably caused by lack of interest of unsatisfied respondents in the general situation of pensions. On the other hand, the respondents satisfied with their life are generally unsatisfied with the situation of pensions, because they do not trust the state that it will take care of them in retirement. In the context of older people we can say that the level of life satisfaction is subjective and depends on feelings of people and not just on material things.

The analysis also shows that life satisfaction of respondents is closely related to the personal job satisfaction. Therefore these variables were selected for graphical visualization. The created maps display that the levels of life satisfaction in different regions correspond with the levels of job satisfaction. The only exception is the Southeast region, where only 69.49 % of respondents are satisfied with their job situation, but the overall life satisfaction is more than 80 %. The overall life satisfaction is not considerably affected by partial questions in this region. The satisfaction with these sub-questions is generally low.

Finally, it should be noted that the multiple regression and correlation analysis is only one of many possible approaches to analyze this problem. For the life satisfaction evaluation only a few selected indicators were used, however, the final model identifies the differences between the regions and recognizes what factors make respondents more satisfied.

ACKNOWLEDGEMENTS

The authors gratefully acknowledge the support from the Faculty of Economics and Management, Czech University of Life Sciences, via IGA grant, No. 201111170010, “Methodological approaches to assess subjective aspects of life quality in the regions of the Czech Republic” and No. 201011170031, “Application of data-mining techniques in the field of predictive modeling”.

References

- BUETELL N. *Life Satisfaction*, Encyclopedia [online]. Boston: A Sloan Work and Family, 2006. [cit. 1.6.2011]. <http://wfnetwork.bc.edu/encyclopedia_entry.php?id=3283&area=academics>.
- CHEN X., ENDER P., MITCHELL M. and WELLS C. *Regression with SAS* [online]. UCLA: Academic Technology Services, Statistical Consulting Group, 2003. [cit. 20.4.2011]. <<http://www.ats.ucla.edu/stat/sas/webbooks>>.
- DI TELLA R., MACCULLOCH R. and OSWALD A. J. The macroeconomics of happiness. *Review of Economics and Statistics*. 2003, 85, pp. 809–827.
- DVOŘÁKOVÁ Z., DUŠKOVÁ L. and SVOBODOVÁ L. *Svět práce a kvalita života* (World of work and quality of life). Praha: Výzkumný ústav bezpečnosti práce, 2006.

- GALVASOVÁ I. and CHABIČOVSKÁ K. Metodické přístupy ke kartografickému znázornění disparit v krajích (Methodological approaches to cartographic representation of disparities in the regions). *Regionální disparity*. 2009, 4, pp. 33–42.
- GROSSI E., SACCO P. L., BLESSI G. T. and CERUTTI R. The Impact of Culture on the Individual Subjective Well-Being of the Italian Population: An Exploratory Study. *Applied Research in Quality of Life*, [online]. 2010, pp. 1–24.
- HABSHAH M., NORAZAN M. R. and IMON A. H. M. R. The performance of diagnostic-robust generalized potentials for the identification of multiple high leverage points in linear regression. *Journal of Applied Statistics*. 2009, 36 (5), pp. 507–520.
- HEBÁK P. et al. *Vicerozměrné statistické metody [2]* (Multivariate statistical methods). Praha: Informatorium, 2005.
- HENDL J. *Přehled statistických metod zpracování dat: analýza a metaanalýza dat* (Overview of statistical methods for data processing: analysis and meta-analysis of data). Praha: Portál, 2006.
- HUBER M., MAROVICH P. and THIELBAR M. *SAS Enterprise Guide: ANOVA, Regression, and Logistic Regression*. Cary: SAS Institute Inc., 2006.
- HUPPERT F. A., BAYLIS N. and KEVERNE B. *The Science of Well-Being*. Oxford: University Press, 2005.
- JÁNSKÝ J., HUBÍK S. and ŽIVĚLOVÁ I. Metodologické přístupy k identifikaci zdrojů regionálních disparit (Methodological approaches to identify the sources of regional disparities). *Regionální disparity*. 2009, 4, pp. 23–32.
- JOHNSON R. A. and WICHERN D. W. *Applied Multivariate Statistical Analysis*. New Jersey: Pearson Education, 2007.
- MASLOW A. H. *Motivation and Personality*, 2nd edition. New York: Harper & Row, 1970.
- MASON R., GUNST R. and HESS J. *Statistical Design and Analysis of Experiments*, 6th edition. New Jersey: John Wiley & Sons Inc., 2003.
- RA F. *Subjective well-being: a definition of subjective well-being and happiness*. CreateSpace, 2010.
- SALVATORE D. and REAGLE D. *Schaum's Outline of Theory and Problems of Statistics and Econometrics*, 2nd edition. New York: McGraw-Hill, 2002.
- SHELDON K. M. and HOON T. H. The multiple determination of well-being: independent effects of positive traits, needs, goals, selves, social supports, and cultural contexts. *Journal of Happiness Studies*. 2007, 8, pp. 565–592.

Tourism Employment Module (TEM): Case of the Czech Republic

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Abstract

Tourism Employment Module (TEM) provides information on the significance and contribution of tourism for the national economy in terms of employment. It refers to a system of tables describing the main economic characteristics of tourism (i.e. number of jobs and people employed in tourism by industry, seasonality, working scheme, permanency of job, sex, age groups, level of education or nationality) and classifying thereby tourism as one of branches in the system of national accounts. The article describes basic methodological concept and structure of this tool (and approaches to measuring employment in the tourist industry in general), exploited data sources and provides a brief information on the type and form of publishing of the results as well as the data on principal macroeconomic indicators of tourism-related industries in the Czech Republic in 2003–2009.

Keywords

Tourism, employment, tourism employment module, tourism satellite account, measurement of employment, compilation of the TEM in the Czech Republic

JEL code

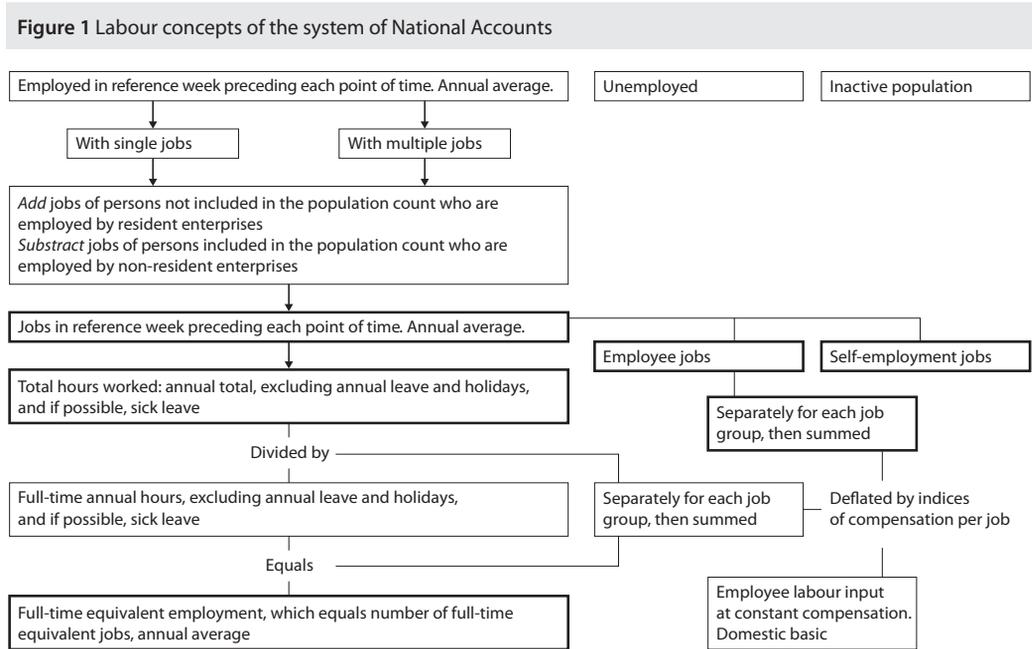
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INTRODUCTION

Different countries tend to use different methodologies and sources to compile employment statistics in general. Concepts and definitions are not always clear-cut between countries. Countries are also in a different phase as it concerns the development of their employment statistics. Some countries are rather advanced, that is: they use a Labour Accounting System (LAS) to compile and present an integrated set of employment data, which are derived from different available sources. Other countries simply compile separate employment statistics from the different sources, meaning that there can be differences between figures describing the same employment phenomenon. A TSA encompasses the demand by visitors and supply of commodities by tourism producers as an integrated framework and relate them to other economic aspects such as investment, employment, balance of payments and government revenues. So, employment is an integrated part of the TSA (and TSA tables) although the scope of the employment issue in the TSA is limited to a homogeneous factor of production. Only little details of the composition of employment are provided. Therefore, there is a strong need for a broader view on the employment issue in tourism as a separate field of attention. A central idea for the long run is to develop an *employment*

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module as a labour extension to a TSA system (OECD, 2000). However, concepts and definitions used for tourism-related employment must have a link with the NA and the TSA.



Note: Boxes with bold lines relate to the concepts of the SNA.
Source: OECD (2000)

The collection and dissemination of tourism-related employment data should eventually provide better possibilities for (Eurostat, 2002b):

1. The description and analysis of the state and dynamics of the tourism labour market and its interaction with the rest of the economy, e.g. an overall picture of the employment status of the tourism labour force and its distribution over the various variables of interest; estimates of net changes which can be derived from successive situation descriptions; studies of the total amount of human resources, their change and allocation between different activities; and studies of the relationship between the cost of labour and the demand for it, on the one hand and the remuneration of labour and the supply of it on the other;
2. To predict and analyse the impact of (changes in) tourism flows and expenditures on employment levels or volumes in the different branches of industry related to tourism.

1 CONCEPTUAL (METHODOLOGICAL) FRAMEWORK OF EMPLOYMENT IN TOURISM

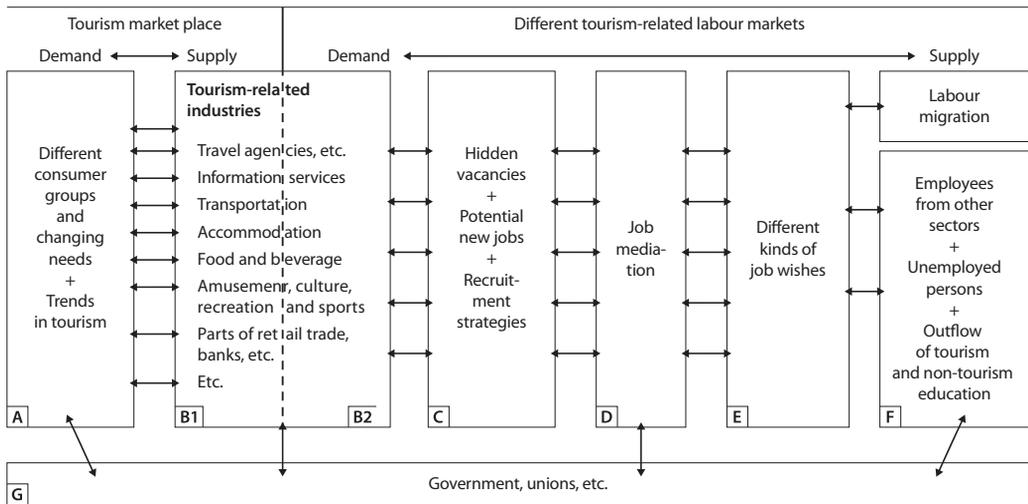
Tourism is a heterogeneous concept and it is difficult to agree on an exhaustive measure of its labour force. Employment in tourism generally includes persons who work in branches linked with the industry. However, the extent of the link varies between fields of activity and between products. As regards fields of activity, a distinction is generally made between primary characteristic tourist activities (accommodation, air travel, travel agencies, etc.), and connected activities (which are not by definition part of the tourist industry but which become a de facto part of it because of the demand for specific products: examples include tourist restaurants or bars, and banks acting as foreign exchange offices).

1.1 Characteristics of tourism industry

Besides the fact that tourism activities, and thereby tourism employment, take place throughout the whole economy, some specific characteristics of the primary branches of the tourism industry are:

- Fluctuations in demand (seasonality), among others, leading to numerical and functional flexibility in a part of the tourism labour force (e.g. higher portions of part-time workers with ‘small jobs’ and a higher labour turnover);
- High labour intensity because of the character of services (e.g. production and consumption are difficult to separate). For example, empty hotel rooms, empty aeroplane seats or empty restaurant chairs cannot be put in store to be sold another day. Also meaning, for example, relatively high labour costs and a very strong relationship between the wage costs and prices;
- Above-average share of self-employment and small family firms;
- Image of poor labour conditions, especially for the jobs on the ‘low-side’ of the tourism labour market. However, these labour conditions can fit in with the needs of certain groups;
- (The image of) the use of immigrant and illegal labour, including students and seasonal workers;
- Little attention for education and vocational training. Reasons, such as seasonal work, high proportions of part-time workers, high labour turnover and limited career opportunities, do not always invite the employer and the employee to invest in education and vocational training;
- Governments are often overlooked as major ‘tourism employers’. Only few data are available on this issue.

Figure 2 General framework of employment in tourism



Source: OECD (2000)

2 THEORETICAL APPROACHES TO MEASUREMENT OF EMPLOYMENT IN TOURISM

There are two possible approaches to measuring employment in the tourist industry. The first is based on demand, or tourist expenditure. The sector is defined by the goods and services purchased by tourists and visitors. The second approach functions on the same lines, but is seen from the perspective of the supply or production of the goods and services on offer to tourists and visitors. Finally, another specific approach to describe tourism-related employment is the occupational approach.

2.1 Demand-side approach

This approach is also known as the expenditure approach. As said, the main reason for this is, that tourism is also a demand-side concept. In very simple words, this approach translates the total amount of expenditure of visitors in a tourism-related branch of industry in a reference period into the number of jobs or full-time equivalents by using some kind of labour-coefficient for that branch of industry. Then, an estimation of the amount or volume of the total direct employment related to tourism can be calculated by the sum of the results of all branches of industry directly related to tourism (specific tourism activities). The basis for this approach are, mostly, multiplier and in- and output techniques, which are strongly related to the methods used in the National Accounts (NA) or in Tourism Satellite Accounts (TSA).

The advantages of this approach are that it is simple, it focuses on the expenditure of visitors (so there is no need for a difficult selection of tourism-related activities), there are many examples available and foremost it can relate directly to other (employment) data in the NA and hence the TSA (Eurostat, 2002b). This makes, for example, a good comparison with other industries and the total economy possible. This approach cannot only present some kind of volume of direct tourism-related employment in a reference period, but it can also provide the possibility to get insight in the indirect employment effects of tourism demand and production through the in- and output tables. These tables provide the intermediate relationships between the main tourism-related industries and other industries (intermediate producers; secondary tourism activities).

Besides the lack of data, the limited amount of detail available and methodological deficiencies, the main disadvantage of this approach is that it cannot produce any good information about the composition or structure of tourism-related employment, especially when it accounts for socio-demographic characteristics (e.g. people employed), such as age, gender, education and nationality.

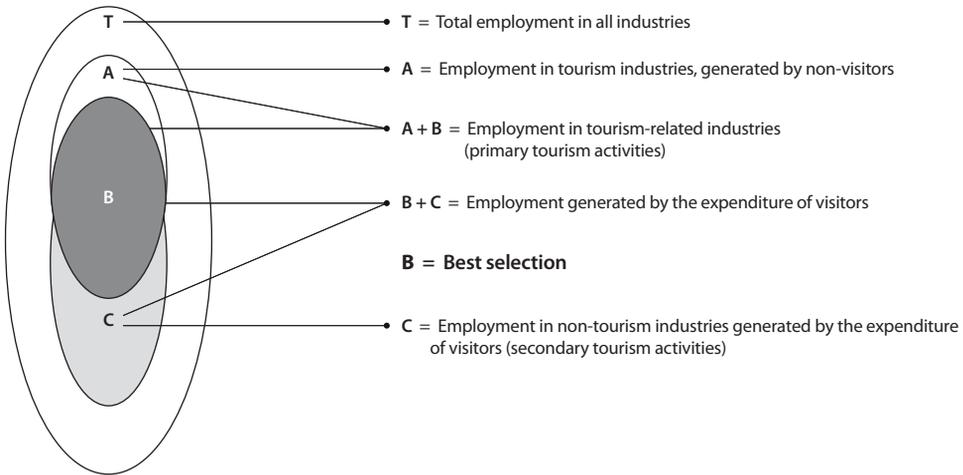
2.2 Supply-side approach

Main economic activity of an enterprise or organisation on the basis of the NACE (ISIC) is used. This approach counts all the people employed or all the jobs in the branches of industry that deliver goods and services directly to visitors (primary tourism activities) and the branches of industry that are indirectly related to tourism (secondary tourism activities). Besides the fact that this approach can produce data on the composition of tourism-related employment, major advantages are that it fits in with most employment statistics, sufficient good and detailed data is available and it can produce information on people employed. If a good selection can be made of which industries belong to 'the tourism industry', then existing data sources and figures can be used quite easily (Eurostat, 2002b). However, the selection of primary and secondary tourism activities is the main problem of this approach.

The major problem for a supply-side approach is the question of which characteristic tourism industries should be included and selected? Only a few industries depend heavily on tourism (A+B in Figure 3), while there are many other industries that also depend, but only partly, on the expenditure of visitors. For example, retail, banks and communication (C in Figure 3). The degree of dependence can also differ strongly in time (seasonality) and location (region). For example, a supermarket in a seaside resort (mainly visitors) or in a residential area. Or the difference between the same seaside supermarket in summer (mainly visitors) and in winter (mainly local residents). On the other hand the branches of industry defined as those which compromise the 'tourism industry' (A+B in Figure 3) can also cater to the needs of non-visitors (A in Figure 3). Therefore only a proportion of the employment in these branches of industry can be associated with tourism. The Standards International Classification of Tourism Activities (SICTA) of the WTO provides some indications of which branches of industry should be allocated totally to tourism activities and which branches of industry are only partly connected to tourism activities.

So the employment in tourism-related branches of industry (A+B in Figure 3), seen from a supply-side approach, does not match exactly the total employment generated by the expenditures of visitors (B+C in Figure 3) (OECD, 2000). First, the selected tourism branches of industry can also provide goods and services to non-visitors (A in Figure 3). And secondly, visitors spend their money not only on products and services of the selected tourism branches of industry, but also on a variety of other industries (C in Figure 3).

Figure 3 Demarcation of tourism-related employment



Source: Own construction by OECD (2000) and Eurostat (2002b)

2.3 Occupational approach

This approach is also a (tourism) supply-side approach, which does not use the NACE classification as a basis to describe tourism-related employment, but the International Standard Classification of Occupations (ISCO). One can think for example of occupations, like hotel manager, airline pilot, waiter, tour-operator and museum-guard. With this approach there are, more or less, the same problems as with the supply-side approach. First a selection has to be made of tourism-related occupations (Eurostat, 2002b). Or the occupations, which can be found in the selected tourism-related branches of industry, can be chosen. Then again, it is difficult to know which occupations to select. We cannot simply know if people who have these kinds of occupations serve to visitors or non-visitors. And, of course, people with occupations not directly connected to tourism also will work in that industry.

3 THE METHOD OF MEASURING EMPLOYMENT IN THE CZECH REPUBLIC

The *Tourism Employment Module* is used in the Czech Republic to assess the significance of the tourist industry to the economy from the perspective of employment. This tool is generally closely linked to the tourism satellite account (TSA) and can be considered a methodical part of this mathematical / statistical model.

The Tourism Employment Module identifies the main macro-economic aggregates (the number of persons employed, the number of jobs, the number of hours worked) and examines employment from various socio-economic and demographic perspectives (status in employment, seasonality, type and permanency of job, sex, age, level of education and nationality). It is in line with the concepts and definitions used in other areas of socio-economic statistics and tourism statistics, in particular the European system of accounts (ESA) 1995, the standards of the International Labour Organisation (ILO) and

other documents to concern tourism statistics issued by world and European organisations (Eurostat, UNWTO, OECD, UN).

The Czech Statistical Office started to compile Tourism Employment Module in 2008 (with data since reference year 2003) and currently this module includes a total of 11 qualitatively different tables (see Annex 2).

In the following sections of this chapter is a detailed description of the methodology of TEM in the Czech Republic (CZSO, 2011b).

3.1 Sources of data

The Tourism Employment Module uses source materials from two main sources:

- Data about employment in National Accounts (NA);
- The labour force sample survey (LFSS).

3.1.1 Data about employment in National Accounts

Data about employment in National Accounts are sourced from business statistical reporting (statistical reports P5-01, P4-01, Pen5-01, Poj5-01, VI1-01, Zdp P5-01, NI1-01). Data to concern the average registered number of employees and the number of working company owners (entrepreneurs) and co-operating members of the household whose activity at the company is their main job (entrepreneurs) are considered in these reports.

Data on employees are available from the survey in natural persons and in converted persons in full-time work (primary and secondary labour relations). Data about self-employed persons are available in natural persons and therefore to identify the converted number of self-employed persons these data for natural persons are multiplied by coefficients from the LFSS which indicate the relationship between converted and natural persons. These coefficients are used in individual branches (in the NACE A17 classification).

Another source of National Accounts used is a survey of employment in a labour force sample survey, to which data on overall employment in national accounting, linked to the LFSS, corresponds.

3.1.2 Labour force sample survey (LFSS)

Carried out continually on a randomly selected sample of households and focuses on identifying the economic position of the population throughout the country. The extent of the survey and employment and unemployment indicators fully correspond to the definitions of the International Labour Organisation (ILO) and the methodical recommendations of Eurostat. The results of the LFSS are published according to the place of residence of the respondents.

All persons usually living in private households are considered in the survey. The survey does not relate to persons living long-term in collective accommodation facilities. For this reason the information for certain groups of the population, in particular foreign nationals living and working in the Czech Republic, is available only to a limited extent.

3.2 Work procedure

Work on all sources of data in the Tourism Employment Module is done at the most detailed possible level of reliability, represented by the NACE classification groups (three-digit classification).² These data

² Selected branches of transport are categorised over and above this since for the needs of tourism it is necessary to delineate passenger transport usually defined in what is known as the classes (4-digit numerical code) of the classification mentioned.

are for work purposes only and are not published in the detail mentioned. Data from NA are used to express the absolute level of employment (they are therefore fully comparable with the data regularly published by the Division of Quarterly National Accounts). Data sources from the LFSS are by contrast used to divide and illustrate employment according to various socio-economic and demographic characteristics as recommended by international manuals. The applied ratio of tourism in employment in individual NACE classifications is bound to the share of tourism production.³

3.3 Character of published data

All data in the Tourism Employment Module present the so-called domestic concept of employment, meaning that it concerns persons working on the economic territory of the Czech Republic. In contrast to the national concept, this concept includes non-residents working in the Czech Republic, but not residents working abroad. Most data is published in a classification of working persons into employed and self-employed. The fundamental unit is the number of natural persons. In terms of the number of jobs, this is increased by all secondary and other employment.

The tables in the module are divided according to the individual characteristic tourism industries (11 basic branches). The values for sectors connected with tourism and the sectors non-specific to tourism are then presented as overall values. The reference period is 2003 to 2009.

4 RESULTS OF THE TOURISM EMPLOYMENT MODULE IN THE CZECH REPUBLIC

4.1 The significance of tourism in the national economy from the perspective of employment between 2003 and 2009

Some 239 500 people were employed in tourism in 2009. Nearly 79 % of this figure accounts for employees and the remainder, almost 1/5, were self-employed. These are the working owners of companies and cooperating members of the household for whom activity at the company is their main job.

Persons working in the tourism sector in 2009 accounted for 4.6 % of the total employment in the national economy, in that there was a clear difference in percentages according to employment status. The percentage of employees was 4.4 % and of self-employed persons 5.2 % (invariably the share in total employment in the relevant category). In comparison with 2003, the share of tourism in total employment from the perspective of employed persons fell by 0.2 percentage points. The share of self-employed persons fell faster than the number of employees (0.7 percentage points and 0.1 percentage points respectively).

Tourism is an industry with lower work productivity, since its share in the creation of gross value added in the economy was 2.7 % in the same period according to the results of tourism satellite accounts (share in the creation of GDP was 2.9 %) (CZSO, 2011c). Only CZK 369 thousand of gross value added pertained to one employee in tourism in 2009, whereas the average employee in the economy as a whole produced an value added of CZK 623 thousand (and therefore around 2/3 more). Employees in tourism, on the other hand, worked some 41 hours (2.3 %) more than the average for the entire domestic economy. Company owners and their family members surpassed the average by 43 hours (2.0 %). The facts identified support the fact that most services and activities associated with tourism are more demanding on the quantity of labour, but do not demand highly-qualified labour force. This is the reason for the lower productivity of work than the average in the Czech Republic (Lejsek, 2011).

Apart from determining the number of persons employed, the Tourism Employment Module also offers information about the number of jobs in tourism. This information includes secondary and other

³ For more detail see Table 5 in the TSA – “Production accounts of individual tourism industries and other industries” (CZSO, 2011c).

Table 1 Key indicators of the employment in tourism in the Czech Republic in 2003–2009*

	2003	2004	2005	2006	2007	2008 ³⁾	2009 ⁴⁾	2009 / 2008 (in %)
Number of people employed in tourism	237 753	236 649	236 682	235 935	236 024	241 236	239 499	99.3
incl.: Self-employed ¹⁾	54 711	56 551	53 884	50 853	51 348	51 635	51 155	99.1
Employees	183 042	180 098	182 798	185 082	184 676	189 601	188 344	99.3
Tourism ratio on total employment								
People employed (%)	4.8	4.8	4.7	4.6	4.5	4.6	4.6	0.0 p.p.
Number of jobs in tourism²⁾	233 507	232 870	233 704	231 476	233 481	236 376	236 588	100.1
incl.: Self-employed ¹⁾	54 040	55 904	53 648	50 625	52 542	51 015	52 411	102.7
Employees	179 467	176 966	180 055	180 851	180 939	185 360	184 177	99.4
Tourism ratio on total employment								
jobs (%)	4.7	4.7	4.7	4.6	4.5	4.5	4.6	-0.1 p.p.

¹⁾ It includes a number of owners of enterprises and their family members whose activity in the enterprise is main job.

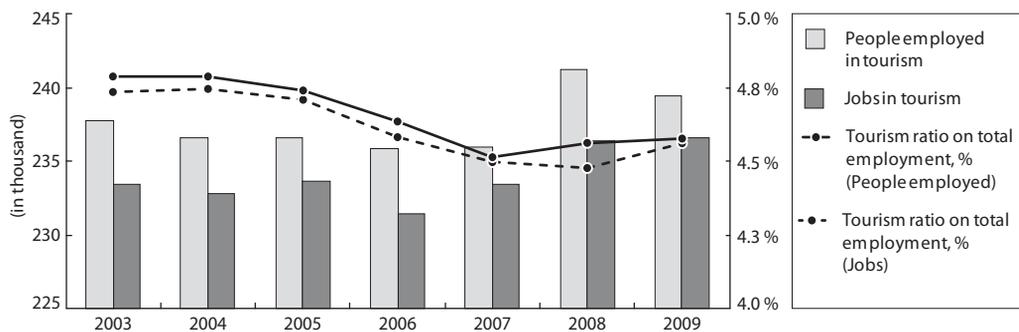
²⁾ Number of jobs in full-time equivalents.

³⁾ Semi-definitive data.

⁴⁾ Preliminary data.

* Annual average number of people employed in main job.

Source: CZSO (2011a)

Figure 4 Employment in tourism and share in the national economy of the Czech Republic


Source: Own construction

employment and is also converted into the equivalent of full working hours (full-time equivalents / ftes). There were 236 600 jobs in tourism in 2009. Of this figure some 184 200 jobs were taken by employees and there were 52 400 self-employed persons. The share of tourism in total employment in terms of the number of jobs in that same year was 4.6 %, by some 0.2 percentage points lower than in 2003. Nonetheless, the number of jobs during the reference period in question rose by an absolute 3 000. This contradiction was caused by the even faster growth of the total number of jobs in the national economy than in tourism, whose significance fell slightly in relative terms.

4.2 The specifics of employment in tourism

4.2.1 The structure of employment in tourism by industry

In terms of the structure of the industry, most people (74 %) worked in branches characteristic for tourism in 2009. This primarily means branches such as accommodation services, food and beverage serv-

ing services, passenger transport, travel agencies, cultural, sporting and other recreation services. Some 68 thousand persons worked in catering and boarding thanks to tourism and some 42 thousand in accommodation services. Almost 14 thousand worked in sector of travel agencies and tour operators. In comparison with 2003, the biggest drop in the number of staff came in rail passenger transport (34 % fewer people) and water passenger transport (28 % fewer people). Other sectors saw an increase in the number of persons employed, most of all supplementary passenger transport services (38 % more people) and air transport (28 % more).

Table 2 Number of jobs and people employed in tourism in the Czech Republic by industries in 2009

	Number of people employed in tourism			Number of jobs in tourism ¹⁾		
	Self-employed ²⁾	Employees	Total	Self-employed ²⁾	Employees	Total
Accommodation services	7 399	34 906	42 305	8 944	34 385	43 329
Food and beverage serving services	17 753	50 048	67 801	17 551	48 300	65 851
Railway passenger transport	0	14 370	14 370	0	14 334	14 334
Road passenger transport	1 575	11 081	12 656	1 555	11 227	12 782
Water passenger transport	5	47	52	5	47	51
Air passenger transport	10	6 445	6 455	10	6 396	6 407
Passenger transport supporting services	81	2 465	2 546	94	2 452	2 545
Passenger transport equipment rental	44	96	140	39	97	136
Travel agency / tour operator services	4 489	9 347	13 836	4 446	9 341	13 787
Cultural services	2 377	10 730	13 107	2 389	10 104	12 493
Sporting and recreational services	825	2 172	2 997	920	2 075	2 995
Characteristic tourism industries	34 558	141 707	176 265	35 953	138 757	174 710
Connected tourism industries	15 962	43 828	59 790	15 821	42 641	58 462
Non-specific tourism industries	635	2 809	3 443	637	2 779	3 416
Total	51 155	188 344	239 499	52 411	184 177	236 588

¹⁾ Number of jobs in full-time equivalents.

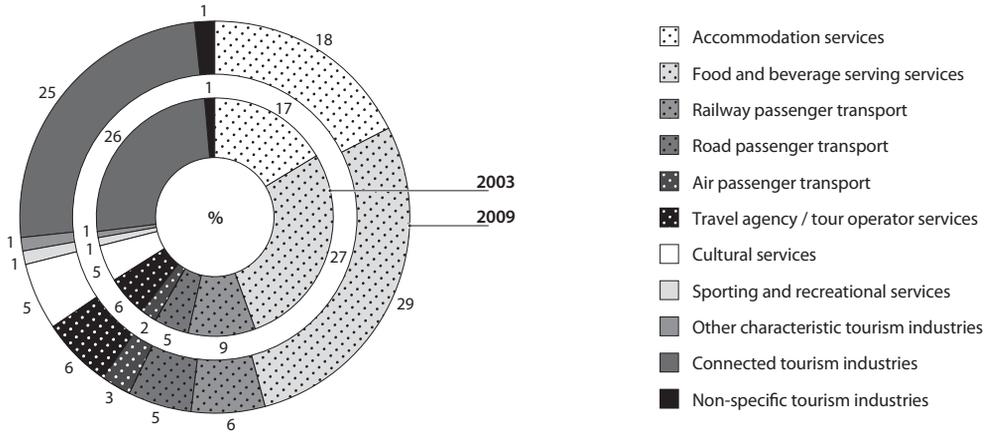
²⁾ It includes a number of owners of enterprises and their family members whose activity in the enterprise is main job.

Source: CZSO (2011a)

Apart from characteristic industries, people were also employed in industries connected with tourism (almost 60 thousand) or in industries non-specific to tourism (over 3 thousand). It does not therefore stand that if an industry is not specific to tourism, it does not employ certain personnel that are involved in tourism. In fact even here you can find activities directly related to tourism (for example the production of maps or souvenirs). The share of branches associated with tourism in overall employment in the industry fell during the reference period from 25.6 % to 25.0 %, whereas the share in activities characteristic for tourism rose (by 0.5 percentage points).

An evaluation of the impacts of the economic crisis on changes in the structure of employment is still a bit premature, but the results to date have confirmed a fall in the number of people working in accommodation facilities (employment in this sector fell by 4.2 % between 2008 and 2009) and in the activities of travel agencies (a fall of 6.1 %). By contrast, the number of persons employed in restaurants and similar facilities rose in 2009 (by 2.4 % year-on-year), as did those in cultural, sporting and other recreation services (by 3.5 %). Some 0.7 % fewer people than in the previous year worked in tourism as a whole in 2009.

Figure 5 Structure of employment in tourism by industries in 2003 and 2009

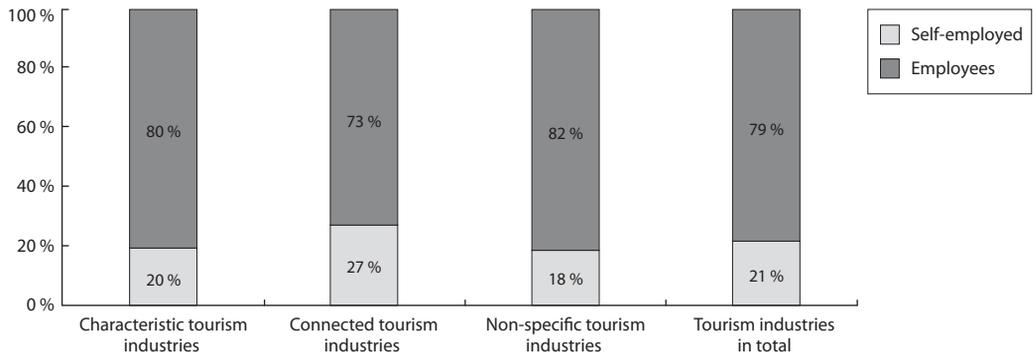


Source: Own construction

4.2.2 Status in employment and work scheme (full-time / part-time)

It is clear from employment status that there is a higher concentration of self-employed persons in tourism than there is in the national economy as a whole. This relates to the fact that tourism is mainly the realm of small companies where the general rule is that the owners and / or family members are involved in the running of the business. Whilst self-employment accounted for over 21 % of all persons working in tourism in 2009, this figure in the economy as a whole was less than 19 %. If we look at individual sectors of the industry, the highest share of self-employed persons was found in travel agencies (32 %), with a higher share also present in restaurants and catering facilities (26 %). By contrast, almost all workers in rail or air transport were employees and the share of entrepreneurs in these sectors was practically zero given the dominance of major companies. The share of self-employed persons fell on average by 2 percentage points in comparison with 2003, again the fastest rate seen at travel agencies (from 6.0 to 4.5 thousand people) or gastronomy (from 20.3 thousand to 17.8 thousand). By contrast, the number of entrepreneurs in sporting and other recreation services rose very quickly (from 0.5 thousand to 0.8 thousand), as was the case in culture (from 1.6 thousand to 2.4 thousand).

Figure 6 Employment in tourism by status in employment in 2009



Source: Own construction

From the perspective of full-time / part-time work it is clear that most people in tourism are employed on a full-time basis (over 93 %), although the ratio of part-time work rose slightly during the reference period (from 6 % to 7 %). This ratio practically remained the same in the economy as a whole at 5.0 % from 2003 onwards. An above-average share of part-time work in activities characteristic for tourism is found in culture (12 %), in sporting and recreation services (10 %) or in the hotel business (9 %). It also ensues from the data that most employees had permanent contracts for an indeterminate period (91 %) and that only in cultural, sporting or catering facilities was employment for a temporary period more common (16 %, 13 % and 12 % respectively). The reason for this is the seasonality of tourism, whereby people are employed with a greater degree of frequency for only a few months in the summer or winter seasons, for example.

4.2.3 Structure by sex and age

The tourism industry is typical for its higher levels of employing women than in the national economy as a whole. Women made up 52 % of all employed persons in tourism in 2008, whereas their share in employment in the economy as a whole was almost 10 percentage points lower. The highest percentage of women were employed in industries connected with tourism (67 %), whereas in the characteristic industries they found greater application than men particularly in culture and accommodation services. Women also prevailed at travel agencies / tour operators, where 66 % women were employed in 2008, men only accounting for 34 % of all the staff. By contrast, the distinctly male sectors included road passenger transport (88 %), water transport (76 %) and of course rail passenger transport (74 %). In comparison with 2003 the number of women in tourism fell somewhat in relative terms (by 1 percentage point), something caused mainly by the decline in the participation of women in employment at travel agencies / tour operators or air passenger transport (both by 8 percentage points).

Tourism can be considered a relatively “young” industry in terms of age groups; in other words, it is an industry in which there is a larger percentage of young people than is the case in the national economy. Employed persons of up to 35 years of age made up 35 % of the total economy in 2008, whereas the same age group made up 41 % of all people in tourism. At the same time it applied in both cases that employed persons gradually shifted from the youngest category (15–24 years) to the older category of 25–34 years. In terms of sector, younger employees were prevalent in food and beverage serving services (56 %) or in sporting and recreation services (47 %). Older employees of over 45 years were mainly involved in rail passenger transport and culture.

4.2.4 Education structure

Characteristic of the education structure in tourism is that people with secondary school education prevail in the period under consideration, with the share of such people reaching 83 % in 2009. University graduates took a share of 11 % in employment in this industry, whereas the figure in the national economy as a whole stood at 18 %. Within the industry the highest percentage of university graduates worked in culture (where around 35 % of the people have university education) and there is an above-average concentration of university-educated people at travel agencies (1/3) and in air passenger transport. By contrast, the highest number of people with primary education in 2009 worked in accommodation services (10 %).

Positive from the perspective of the future quality of services in tourism is the finding that the percentage of university graduates rose by 2.6 percentage points from 2003. The share of people with this education rose most quickly in the activities of travel agencies and tour operators (62 % more university graduates worked here in 2009 than at the beginning of the period under consideration) and in catering services (85 % more than in 2003).

4.2.5 Nationality

The Tourism Employment Module also monitors information about non-residents in overall employment. Such people made up 4 % of the persons employed in tourism in 2009, whereas some 6 % non-residents worked in the economy as a whole. What is more, the ratio of non-residents in the national

Table 3 Summary of key indicators of the employment in the national economy and tourism in the Czech Republic in 2009*

	Tourism		National economy	
	People employed	Percentage	People employed	Percentage
Number of people employed	239 499	100.0 %	5 231 822	100.0 %
By sex				
Males	114 491	47.8 %	3 003 999	57.4 %
Females	125 008	52.2 %	2 227 823	42.6 %
By age				
15–24	27 154	11.3 %	394 916	7.5 %
25–34	70 640	29.5 %	1 437 053	27.5 %
35–44	58 344	24.4 %	1 374 141	26.3 %
45–55	50 384	21.0 %	1 244 183	23.8 %
55+	32 977	13.8 %	781 529	14.9 %
By level of education¹⁾				
ISCED 1 and 2	15 111	6.3 %	307 575	5.9 %
ISCED 3 and 4	198 767	83.0 %	3 999 547	76.4 %
ISCED 5 and 6	25 620	10.7 %	924 700	17.7 %
By status in employment				
Self-employed ²⁾	51 155	21.4 %	977 891	18.7 %
Employees	188 344	78.6 %	4 253 931	81.3 %
By working scheme				
Full-time	223 218	93.2 %	4 955 468	94.7 %
Part-time	16 281	6.8 %	276 354	5.3 %
By permanency of job				
Job for determinate period	17 037	9.0 %	382 805	9.0 %
Permanent job	171 307	91.0 %	3 871 126	91.0 %
By nationality				
Residents	229 608	95.9 %	4 914 525	93.9 %
Non-residents	9 891	4.1 %	317 297	6.1 %

¹⁾ ISCED – Used International Standard Classification of Education.

²⁾ It includes a number of owners of enterprises and their family members whose activity in the enterprise is main job.

* Annual average number of people employed in main job.

Source: CZSO (2011a)

economy as a whole rose at a faster rate. Figures here rose by 3.2 percentage points from 2003 onwards and by 1.8 percentage points in tourism. Almost ten thousand non-residents were employed in tourism industry in 2009. In absolute terms the highest numbers worked in the accommodation and boarding services (1.9 thousand each) and in travel agencies (1.7 thousand). Over 55 % of all non-residents in tourism worked in these three branches. In relative terms, there was clearly higher representation of the same people mainly in the activities of travel agencies, tour operators and in booking and guide activities, where 12 % of all employees did not have resident status.

CONCLUSION

Tourism is an important economic activity with a very positive impact on economic growth and employment at the national and regional level. In the Czech Republic, tourism directly contributes about 3 % of the GDP and directly employs 240 000 people. At the same time, determination of the level and

description of selected characteristics of employment is one of the most important tasks in the process of examination of the economic importance and status of tourism in national economy. Statistical framework and methodological guidance in this process are provided by models for quantification of employment in tourism (employment modules), which are generally closely associated with the tourism satellite accounts. Czech Statistical Office started to compile Tourism Employment Module in 2008 (with data since reference year 2003) and currently this module includes a total of 11 qualitatively different tables (see Annex 2). The Czech Republic belongs to a few countries that compiled and published detailed data on employment in tourism. Due to the mentioned range of measurement could be statistical research in this area even considered as unique in international comparison.

References

- CZSO. *Evropský systém účtů ESA 1995* (European System of Accounts ESA 1995). Prague: Czech Statistical Office, 2000.
- CZSO. *Metodika k Modulu zaměstnanosti cestovního ruchu České republiky* (Methodology to the Module of Tourism Employment of the Czech Republic) [online]. Prague: Czech Statistical Office, 2011b. <[http://www.czso.cz/csu/csu.nsf/i/metodika_modul_zamestnanosti_cestovniho_ruchu/\\$File/metod_mz.pdf](http://www.czso.cz/csu/csu.nsf/i/metodika_modul_zamestnanosti_cestovniho_ruchu/$File/metod_mz.pdf)>.
- CZSO. *Modul zaměstnanosti cestovního ruchu* (Tourism Employment Module) [online]. Prague: Czech Statistical Office, 2011a. <http://www.czso.cz/csu/redakce.nsf/i/modul_zamestnanosti_cestovniho_ruchu>.
- CZSO. *Satelitní účet cestovního ruchu České republiky 2003–2005* (Tourism Satellite Account of the Czech Republic 2003–2005) [online]. Prague: Czech Statistical Office, 2006. <<http://www.czso.cz/csu/2006edicniplan.nsf/p/9211-06>>.
- CZSO. *Satelitní účet cestovního ruchu České republiky. Vývoj za roky 2003–2007*. (Tourism Satellite Account of the Czech Republic 2003–2005. Development in the years 2003–2007) [online]. Prague: Czech Statistical Office, 2008. <<http://www.czso.cz/csu/2008edicniplan.nsf/p/9211-08>>.
- CZSO. *Tabulky satelitního účtu cestovního ruchu* (Tourism Satellite Account Tables) [online]. Prague: Czech Statistical Office, 2011c. <http://www.czso.cz/csu/redakce.nsf/i/tabulky_satelitniho_uctu_cestovniho_ruchu>.
- EUROSTAT, OECD, UNWTO and OSN. *Tourism Satellite Account: Recommended Methodological Framework* (TSA: RMF 2000). Luxembourg – Madrid – New York – Paris: Eurostat, OECD, UNWTO and OSN, 2001.
- EUROSTAT. *European Implementation Manual on Tourism Satellite Accounts* (TSA). Final draft Version 1.0. Luxembourg: Eurostat, 2002a.
- EUROSTAT. *The Eurostat Manual on Employment in Tourism*. First draft, version 2. Nico Heerschap, 2002b.
- EUROSTAT, OECD, UNWTO and OSN. *Tourism Satellite Account: Recommended Methodological Framework* (TSA: RMF 2008). Luxembourg – Madrid – New York – Paris: Eurostat, OECD, UNWTO and OSN, 2008.
- HELLEROVÁ A. and LEJSEK Z. *Analýza cestovního ruchu v České republice od roku 2000 do roku 2009* (Analysis of tourism in the Czech Republic from 2000 to 2009). *Sborník vědeckých příspěvků – Využití statistických dat v cestovním ruchu ČR ve vztahu k řešení regionálních disparit*. 2010. Prague: Institute of Hospitality Management, pp. 49–113.
- LEJSEK Z. *Analýza postavení cestovního ruchu v naší ekonomice* (Analysis of the status of tourism in our economy). *Statistika & My*. 6/2011, pp. 10–14.
- LEJSEK Z. *Satelitní účet cestovního ruchu v České republice* (Tourism Satellite Account in the Czech Republic). *Historie, současný stav, výhled*. *Statistika*. 5/2009, pp. 396–422.
- OECD. *Measuring the Role of Tourism in OECD Economies: the OECD Manual on Tourism Satellite Accounts and Employment*. Paris: OECD, 2000.
- UNWTO. *TSA development: current situation*. Enzo Paci Papers on Measuring the Economic Significance of Tourism, Vol. 1, 2001.
- UNWTO. *Tourism Satellite Account* (TSA) Implementation Project. Enzo Paci Papers on Measuring the Economic Significance of Tourism, Vol. 3, 2003.
- UNWTO. *International Recommendations for Tourism Statistics* (IRTS 2008). New York – Madrid, 2008.

ANNEXES

ANNEX 1 | Terminology⁴

Employees — are defined as all persons, who are working based on a contract for another residential institutional unit and accept a reward (recorded as “employee reimbursements”). Persons are included in employees in the event that they do not also have their own profit-making activity, which represents their fundamental activity. Persons, who temporarily do not work, are also considered employees with the presumption that they have formal employment.

Self-employed — are persons, who are the sole owners or a co-owners of non-associated companies, where they are working, with the exception of non-associated companies classified as quasi-companies. They are doing business and work with paid employees or without them. Self-supportive persons are classified here in the case that they are not also in a paid employment, which represents their main activity; in such a case they are classified as employees. On the other hand these include cooperating members of company owner’s household, for whom the activity in the company is the main employment.

Job (or rather working position) — is defined as explicit or implicit contract between a person and a residential institutional unit on work performance for the determined period or until further notice — termination notice. Included here are second and other employments of the same person. On the contrary who is excluded are persons, who are temporarily not working, but they have a so-called formal employment (formal relation to employment).

Amount of work during working hours — represents a total number of hours actually worked by the employee and self-employed person during an accounting period in the event that their production is within the scope of defined production borders.

Equivalent of full time working hours — equals number of full time employments and is defined as a share of the total number of hours worked and average annual number of hours worked in full time employment within the economic territory.

ANNEX 2 | List of tables in TEM of the Czech Republic⁵

- *TEM T1* Number of jobs and people employed in tourism in the Czech Republic by industries
- *TEM T2* Number of people employed in tourism in the Czech Republic by seasonality
- *TEM T3* Number of people employed in tourism in the Czech Republic by working scheme
- *TEM T4* Number of employees in tourism in the Czech Republic by permanency of job
- *TEM T5* Number of people employed in tourism in the Czech Republic by sex
- *TEM T6* Number of people employed in tourism in the Czech Republic by age groups
- *TEM T7* Number of people employed in tourism in the Czech Republic by level of education
- *TEM T8* Number of people employed in tourism in the Czech Republic by nationality
- *TEM T9* The link with the TSA — Employment output in tourism in the Czech Republic
- *TEM T10* Aggregate indicators of employment in the national economy and tourism in the Czech Republic
- *TEM T11* Aggregate indicators of employment in tourism in the Czech Republic

⁴ CZSO, 2011b.

⁵ CZSO, 2011a.

Labour Market Transition between Q3 2009 and Q3 2010 (a Longitudinal Study)

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Abstract

Economic status according to ILO definition is a basic variable to measure labour activity of population. Using certain criteria we are able to determine the total number of the employed, unemployed or inactive. However, this approach shows only the essential tendencies in the labour market. If we need to obtain a detailed picture of the labour market we have to collect further information on persons employed, unemployed or inactive. This article focuses on basic changes in the labour market. The essential analysis of transition between individual economic activity statuses (employed, unemployed, inactive) is supplemented with a sector analysis and analysis of flexible employment contracts. This approach is considered to be an important and significant method to detect current changes in the labour market in the Czech Republic as well as in Europe.

Keywords

Labour market transition, labour force sample survey, economic status

JEL code

J0, J2, J4, J6

INTRODUCTION

The labour market in the Czech Republic can be described, in general, by basic statistical indicators of employment, unemployment, and economic inactivity. Statistical data defined this way corresponds to a certain state as at certain date, or resulting data may relate to a certain time interval. The employment rate, for instance, may be constructed in the Labour Force Sample Survey (LFSS) as a ratio of the number of employed persons to the total number of population by age, sex, region of the Czech Republic, etc. Then, the resultant data provides a basic overview on conditions in the labour market. This statistical state data is limited in the sense it cannot point out right to detailed causes of changes to the labour market because mutual interactions of the market respective components are not known. It is not known, for example, if an increase in the number of employed persons was caused by the fact that persons, who found jobs, had been so far economically inactive or unemployed, because respective changes over time and across these categories are not known.

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1 METHODOLOGY

The LFSS questionnaire enables to acquire data on persons in five consecutive quarters. On the basis of data obtained this way life's career of individual persons may be compiled for the period of one year. This way defined life's careers of respective persons form the basis of longitudinal studies consisting in monitoring of changes at respective persons over time. Respective life's careers must be, of course, assigned to a certain category and thus respective transitions on the labour market can be generalised.

The very basic indicator monitoring basic changes to the labour market is undoubtedly the economic status, which other basic statistical indicators as the unemployment rate, employment rate, participation rate, or, on the contrary, economic inactivity rate are derived from. Furthermore, the labour market can be characterised by basic groups of aggregated economic activities (sectors) of the national economy. For purposes of this longitudinal study basic distribution into persons employed in agriculture (primary sector), industry, including construction industry (secondary sector), and in services (tertiary sector) is made. In two recent years development in the labour market has been affected by using the flexible employment contracts, that means fixed-term employment contracts and employment contracts for a shorter working time. Important changes to the labour market by the position of persons in employment might result from changes that happened to the labour market between the years 2008 and 2010. For the sake of simplification this analysis employs basic classification if a person is the self-employed (the self-employed with employees, the self-employed without employees, and family workers), or he / she is in the position of an employee (including members of production cooperatives).

The analysis consists of two fundamental calculations. First, transitions among respective categories are quantified in the absolute number of persons. For example, generalising life's career by the economic status into the employed, unemployed, and economically inactive persons enables us to make comparisons of transitions within these categories. A person is employed in the initial quarter, in the next quarter he / she can be still employed, or may move into the categories of the unemployed or economically inactive. We can proceed similarly in the case of the unemployed, who in the next quarter, may be still the unemployed or switch into the categories of the employed or economically inactive. The second comparative method is based on so-called probability of transition in between respective quarters. In this case the quantity sought is probability that the employed will be the employed, unemployed, or economically inactive in the next quarter. According to the principal rule of the probability calculation the sum of these probability values must give 1 for each kind of the economic status. Furthermore, this indicator enables to derive how many per cent of persons remained the employed, or became the unemployed or economically inactive between quarters. Sum of percentages of these probabilities gives always 100 %.

2 DATA AND WEIGHTING

The LFSS is performed in continuous manner on the territory of the Czech Republic; evaluation of results is carried out at respective calendar quarters. Data obtained between Q3 2009 and Q3 2010 forms the basis of this analysis. The sample includes persons who were continuously answering the LFSS questions for all these five quarters. The size of this way defined sample is 10 785 persons and roughly corresponds to one fifth of the whole quarter sample of the LFSS. It is necessary, for the needs of the labour market analysis, to select persons who were older than 15 years for the entire reference period (9 305 persons).

The weighting of the LFSS is a process when each person of the sample is assigned a number of persons living in the Czech Republic, who this particular person shall represent. The weight is built as a ratio of the number of persons of population and the number of persons on the sample of the same age category, sex, and district of residence. Longitudinal studies require so-called longitudinal weights are calculated, when every individual of the sample bears the same weight over the entire reference period (Atkinson and Micklewright, 1991). A model of the longitudinal weight calculation must, moreover, take into account probability of migration and death during the reference period. In a simplified manner the model

counts with the fact the person may die or move away during the reference period. On the other hand, other person may not be included into the sample because this would violate the fundamental rule when a person must be continuously responding in five consecutive quarters.

Weights used for analysing the transitions between labour statuses were constructed in SAS programme using CALMAR macro. Input weights for calibration were the weights which corresponded to the selected persons being involved in LFSS in the 3rd quarter 2009. These weights were calibrated to make the sums of weights for persons by sex, region and age groups (0–14, 20–24, 25–29, 30–34, 35–39, 40–44, 45–49, 50–54, 55–59, 60–64, 65+) equal to the total longitudinal population.

3 ECONOMIC STATUS

Once data was weighted, based on the construction of the longitudinal weights, the number of persons of 15+ years of age was 8 776.0 thousand in the reference period from Q3 2009 to Q3 2010. Development

Tables 1–6 Final weights

Moments			
N	10 785	Sum Weights	10 785
Mean	950.010385	Sum Observations	10 245 862
Std Deviation	414.596413	Variance	171 890.186
Skewness	1.9408903	Kurtosis	8.22328092
Uncorrected SS	1.15873E10	Corrected SS	1 853 663 762
Coeff Variation	43.6412506	Std Error Mean	3.99222919

Basic Statistical Measures			
Location		Variability	
Mean	950.010	Std Deviation	414.59641
Median	855.655	Variance	171 890
Mode	1 114.254	Range	5 485
		Interquartile Range	438.81885

Tests for Normality				
Test	Statistic		p Value	
Kolmogorov-Smirnov	D	0.112046	Pr > D	<0.0100
Cramer-von Mises	W-Sq	52.58168	Pr > W-Sq	<0.0050
Anderson-Darling	A-Sq	315.2904	Pr > A-Sq	<0.0050

Quantiles	
Quantile	Estimate
100 % Max	5 750.616
99 %	2 394.965
95 %	1 827.366
90 %	1 463.814
75 % Q3	1 114.254
50 % Median	855.655
25 % Q1	675.435
10 %	544.554
5 %	476.579
1 %	371.849
0 % Min	265.857

Extreme Observations					
Lowest			Highest		
Value	Position	Obs	Value	Position	Obs
265.857	8 363	8 429	4 819.46	4 491	4 482
265.857	8 378	8 421	4 819.46	4 464	4 498
265.857	8 359	8 385	5 279.66	4 732	4 723
265.857	8 343	8 380	5 509.43	5 587	5 533
265.857	8 360	8 376	5 750.62	4 462	4 500

Source: Own construction

Table 8 Transitions on the labour market: by economic status of population aged 15+ in between Q3 2009 and Q3 2010 (in thousand persons)

Economic status	Q3 2009 / Q4 2009	Q4 2009 / Q1 2010	Q1 2010 / Q2 2010	Q2 2010 / Q3 2010
Employed → Employed	4 698.5	4 670.7	4 693.3	4 731.0
Employed → Unemployed	44.8	59.1	34.3	44.0
Employed → Economically inactive	63.5	86.2	41.6	47.9
Unemployed → Employed	64.3	65.8	86.1	46.6
Unemployed → Unemployed	315.6	290.6	274.1	252.8
Unemployed → Economically inactive	24.2	23.0	24.2	24.1
Economically inactive → Employed	53.2	32.7	43.5	61.2
Economically inactive → Unemployed	18.9	34.9	15.1	42.9
Economically inactive → Economically inactive	3 493.0	3 513.2	3 563.8	3 525.4

Source: CZSO — LFSS

inactivity at the turn of 2009 and 2010. On the contrary, only 67.5 thousand persons moved from the economically inactive group into the one of economically active persons.

A more detailed comparison should be based on so-called probability of transition between respective quarters. That means, for instance, what is the probability value that an employed person would become an unemployed person during the next quarter (Schmitt, 2002, Kaiser, 2006). The economically inactive and then the employed are most stable components by economic status, because majority of persons in these groups did not intend to move into the economically active, or become jobless, respectively. The most significant changes are in the group of the unemployed when, in the relatively favourable period in between Q1 and Q2 2010, probability an unemployed person would remain unemployed was mere 0.713. On the contrary, it was relatively high in the case that a person moved from the category of the unemployed into the category of the employed because this way defined probability of transition was 0.224. This means that almost every fifth unemployed person found a job during Q2 2010. Unfortunately, when Q2 and Q3 2010 are compared, the probability of finding job in the unemployed dropped to 0.144.

Relatively lowest probability of retaining job was in the comparison of Q4 2009 and Q1 2010 when approximately 3 % of persons of the total number of the employed lost job. The relative fall in employment

Table 9 Probability of transitions on the labour market: by economic status of population aged 15+ in between Q3 2009 and Q3 2010

Economic status	Q3 2009 / Q4 2009	Q4 2009 / Q1 2010	Q1 2010 / Q2 2010	Q2 2010 / Q3 2010
Employed → Employed	0.977	0.970	0.984	0.981
Employed → Unemployed	0.009	0.012	0.007	0.009
Employed → Economically inactive	0.013	0.018	0.009	0.010
Unemployed → Employed	0.159	0.173	0.224	0.144
Unemployed → Unemployed	0.781	0.766	0.713	0.781
Unemployed → Economically inactive	0.060	0.061	0.063	0.075
Economically inactive → Employed	0.015	0.009	0.012	0.017
Economically inactive → Unemployed	0.005	0.010	0.004	0.012
Economically inactive → Economically inactive	0.980	0.981	0.984	0.971

Source: CZSO — LFSS

during 2009 and the following moderate improvement in the labour market affected also the economically inactive component of population. As a result of adverse conditions in the labour market the economically inactive also strove to find jobs because they might fear it would be very hard to find a job in the next year. These were, first of all, women who cut short their parental leave. This was also in part caused by the implementation of “three-speed” parental leave when persons on parental leave may choose if they draw parental allowance for two, three, or four years. Therefore between Q3 and Q4 2010 probability of change in status from the economically inactive person into the employed person (0.015) was significantly higher than between Q4 2009 and Q1 2010 (0.009), or between Q1 and Q2 2010 (0.012). The arrival of graduates in the labour market between Q2 and Q3 2010 contributed to a higher probability of transition between the statuses of the economically inactive person and the unemployed person as well.

4 SECTORS (AGGREGATED ECONOMIC ACTIVITIES) OF THE NATIONAL ECONOMY

The first half of 2009 featured a significant drop in employment in the secondary sector; there was no such prominent decrease in the second half of the year yet the decline in the secondary sector still caused an important year-on-year decrease in employment in Q3 and Q4 2009. The evidence for such a decrease is the fact that there were, primarily, persons employed in secondary industry, who lost jobs during Q4 2009 and Q1 2010. There were 50.6 thousand persons employed in industry (incl. construction industry) who lost job in comparison of Q3 and Q4 2009. When Q4 2009 and Q1 2010 are compared then the number of persons, that lost job, was even 61.2 thousand. During the year 2010 the secondary sector was behind the halting of negative trends in the labour market, which meant that 28.2 thousand persons lost job in industry between Q1 and Q2 2010 and even solely 23.2 thousand persons between Q2 and Q3 2010. On the contrary, the secondary sector absorbed new workers in the labour market during 2010 because 53.3 thousand jobless persons found their job in the secondary sector in comparison of Q1 and Q2 2010, and between Q3 and Q4 2010 this number was 38.2 thousand. The increased demand for new workers in the secondary sector was the reason for stopping of adverse trends in the labour market but during Q3 2010 industry was not able to absorb such number of workers and it remains questionable if it recovers to ab-

Table 10 Transitions on the labour market: by activity of the national economy in between Q3 2009 and Q3 2010 (in thousand persons)

Activity of the national economy	Q3 2009 / Q4 2009	Q4 2009 / Q1 2010	Q1 2010 / Q2 2010	Q2 2010 / Q3 2010
Agriculture → Agriculture	160.7	156.2	157.5	161.9
Agriculture → Other activity of the national economy	0.9	1.2	1.4	2.9
Agriculture → Jobless ¹⁾	5.5	5.1	1.2	2.3
Industry → Industry	1 768.2	1 743.7	1 744.7	1 771.0
Industry → Other activity of the national economy	2.4	8.4	2.4	7.8
Industry → Jobless ¹⁾	50.6	61.2	28.2	23.2
Services → Services	2 765.1	2 760.8	2 783.9	2782.2
Services → Other activity of the national economy	1.1	0.5	3.2	5.2
Services → Jobless ¹⁾	52.3	79.1	46.5	66.4
Jobless ¹⁾ → Agriculture	1.6	3.4	8.3	3.3
Jobless ¹⁾ → Industry	43.0	31.7	53.3	38.2
Jobless ¹⁾ → Services	72.9	63.4	68.0	66.3
Jobless ¹⁾ → Jobless ¹⁾	3 851.7	3 861.6	3 877.2	3 845.3

¹⁾ Jobless persons include economically inactive persons and the unemployed.

Source: CZSO — LFSS

sorb some in the near future. The latest development shows rather that the industrial output growth in the Czech Republic will not bring an important increase in employment in the secondary sector.

During the year 2009, the drop in the number of persons in the secondary sector was compensated by the growth of the tertiary sector, or it was shown that in the time of relatively low unemployment there used to be a relatively high number of jobs in the tertiary sector. During the year 2010 jobs in the tertiary sector were lost, on the contrary. It is no surprise that in the reference period most of jobless persons (72.9 thousand) found jobs in the services sector between Q3 and Q4 2009 yet in next quarters this number was lower. The highest labour outflow from the services sector was, conversely, in the comparison of Q4 2009 and Q1 2010 (79.1 thousand persons) and between Q2 and Q3 2010 (66.4 thousand persons). In the period between Q2 and Q3 2010 the numbers of persons moving into and leaving the services sector were balanced.

Table 11 Probability of transition on the labour market: by activity of the national economy in between Q3 2009 and Q3 2010

Activity of the national economy	Q3 2009 / Q4 2009	Q4 2009 / Q1 2010	Q1 2010/ Q2 2010	Q2 2010 / Q3 2010
Agriculture → Agriculture	0.962	0.962	0.984	0.969
Agriculture → Other activity of the national economy	0.005	0.007	0.009	0.017
Agriculture → Jobless ¹⁾	0.033	0.031	0.007	0.014
Industry → Industry	0.971	0.962	0.983	0.983
Industry → Other activity of the national economy	0.001	0.005	0.001	0.004
Industry → Jobless ¹⁾	0.028	0.034	0.016	0.013
Services → Services	0.981	0.972	0.982	0.975
Services → Other activity of the national economy	0.000	0.000	0.001	0.002
Services → Jobless ¹⁾	0.019	0.028	0.016	0.023
Jobless ¹⁾ → Agriculture	0.000	0.001	0.002	0.001
Jobless ¹⁾ → Industry	0.011	0.008	0.013	0.010
Jobless ¹⁾ → Services	0.018	0.016	0.017	0.017
Jobless ¹⁾ → Jobless ¹⁾	0.970	0.975	0.968	0.973

¹⁾ Jobless persons include economically inactive persons and the unemployed.

Source: CZSO — LFSS

Probabilities of transitions by respective sectors of the national economy just confirm the aforementioned conclusions. At the end of 2009 the probability of job loss was significantly higher in persons working in the secondary sector; during 2010, however, the situation turned around. In comparison of Q3 and Q4 2009 the probability of job loss in persons of the secondary sector was 0.028 and those of the tertiary sector was only 0.019. On the contrary, between Q2 and Q3 2010 the probability of job loss in the secondary sector was 0.013 and that in the tertiary sector was 0.023. Probabilities of transitions from one sector of the national economy into another one were relatively low. The mentioned trend was entirely marginal primarily in the services sector when not more than 1 % of the employed left for another sector of the national economy during a quarter. Because of a relatively low total number of persons working in the primary sector the highest probability of transition was right in this sector yet this meant a relatively low number of persons there.

5 STATUS IN EMPLOYMENT

The drop in economic performance in 2009 brought, besides the fall in the secondary sector, also a drop in the number of persons employed in the position of employees (incl. members of producer coopera-

tives). A relative decrease in the number of persons in the position of employees during the year showed namely in the year-on-year comparison. For example, in Q3 2009 the number of employees, including members of production cooperatives, was reduced against that in Q3 2008 by 117.5 thousand persons. The number of the self-employed in the main job, including family workers, on the contrary, increased by 24.6 thousand persons in Q3 2009 compared to the corresponding period of 2008 and their share in the total employment rose by 0.8 percentage point to give 16.9 % compared to the previous year.

It is clear, on the basis of these state quantities, that at the end of 2009 the decrease in the number of labour force was still the highest in the category of employees. Between Q3 and Q4 2009 the number of employees that lost job was 97.0 thousand persons; between Q4 2009 and Q1 2010 this number was already 127.0 thousand persons. In similar way as the development in respective sectors of the national economy an essential change to the employment structure by the status in employment occurred during 2010. By the end of Q1 2010 the employee sector recorded a substantial loss because during Q1 2010 it absorbed solely 82.3 thousand persons, who had no job in Q4 2009. In comparison of Q1 and Q2 2010 the labour market absorbed 111.4 thousand employees, who had no job, also due to generally better conditions for employment, and, on the contrary, mere 64.8 thousand employees lost their job in this period.

Table 12 Transitions on the labour market: by status in employment in between Q3 2009 and Q3 2010 (in thousand persons)

Status in employment	Q3 2009 / Q4 2009	Q4 2009 / Q1 2010	Q1 2010 / Q2 2010	Q2 2010 / Q3 2010
Self-employed ¹⁾ → Self-employed ¹⁾	838.3	823.0	833.6	841.1
Self-employed ¹⁾ → Employee	3.5	6.4	2.3	7.9
Self-employed ¹⁾ → Jobless ²⁾	11.3	18.3	11.1	6.2
Employee → Self-employed ¹⁾	5.7	7.8	3.5	6.4
Employee → Employee	3 851.0	3 833.4	3 853.9	3 875.5
Employee → Jobless ²⁾	97.0	127.0	64.8	85.7
Jobless ²⁾ → Self-employed ¹⁾	3.7	16.1	18.2	15.4
Jobless ²⁾ → Employee	113.8	82.3	111.4	92.5
Jobless ²⁾ → Jobless ²⁾	3 851.7	3 861.6	3 877.2	3 845.3

¹⁾ Incl. family workers.

²⁾ Jobless persons include economically inactive persons and the unemployed.

Source: CZSO — LFSS

The development in the self-employed category was completely different because their number increased relatively as well as in absolute figures in 2009. On the contrary to the employees the entirely low number of the self-employed persons moved into the employee position or terminated business activities (14.8 thousand persons) between Q3 and Q4 2009. There was no essential labour outflow from the position of the self-employed even in the respective quarters of 2010. On the other hand, the number of the self-employed did not show any marked growth during 2010 because the principal increase on the self-employed number occurred already in the first half of 2009.

The given conclusions also confirm probability of transition by the status in employment. The share of persons, who lost the status of the self-employed over one quarter, has been falling under the limit of 2 % over a long term. It was higher (2.9 %) between Q4 2009 and Q1 2010 when a portion of the self-employed terminated their business activities by the end of the year. The share of employees, who lost the status of the employee in between Q3 and Q4 2009, was 2.6 % and similarly as in the case of the self-employed this share was the highest between Q4 2009 and Q1 2010 when it went up to 3.4 %.

Table 13 Probability of transition on the labour market: by status in employment in between Q3 2009 and Q3 2010

Status in employment	Q3 2009 / Q4 2009	Q4 2009 / Q1 2010	Q1 2010 / Q2 2010	Q2 2010 / Q3 2010
Self-employed ¹⁾ → Self-employed ¹⁾	0.983	0.971	0.984	0.983
Self-employed ¹⁾ → Employee	0.004	0.008	0.003	0.009
Self-employed ¹⁾ → Jobless ²⁾	0.013	0.022	0.013	0.007
Employee → Self-employed ¹⁾	0.001	0.002	0.001	0.002
Employee → Employee	0.974	0.966	0.983	0.977
Employee → Jobless ²⁾	0.025	0.032	0.017	0.022
Jobless ²⁾ → Self-employed ¹⁾	0.001	0.004	0.005	0.004
Jobless ²⁾ → Employee	0.029	0.021	0.028	0.023
Jobless ²⁾ → Jobless ²⁾	0.970	0.975	0.968	0.973

¹⁾ Incl. family workers.

²⁾ Jobless persons include economically inactive persons and the unemployed.

Source: CZSO — LFSS

6 FLEXIBLE EMPLOYMENT CONTRACTS

The respondent point of view, taking into account commonly worked time by the respondent, is the decisive aspect in defining working time under the employment contract in the LFSS. The working time of the employment contract became a principal subject of discussions during the economic depression. The move to a shorter working time could contribute to the retaining of the levels of employment and unemployment. On the other hand, companies could mostly get rid of employees with shorter working time in the time of the economic depression.

From the future development point of view the usage of part-time jobs appears, especially in the case of mothers with little children, as a suitable instrument for harmonising of family life and work. The Czech Republic may, concerning this, consult ample experience of numerous Western European countries, which employment policies have been striving to accept this phenomenon for already a long time (Mejstřík, 2005). The choice of working time undoubtedly improves the potential of having family and work duties orchestrated. The expanding of possible shorter working time employment contracts seems advantageous concerning future trends connected mostly to the population ageing. Maintaining of a certain employment level can be achieved just by the increased employment rate in mothers with children, old-age pensioners, or students (Mejstřík and Nývlt, 2006).

Despite slight absolute and relative increases in the number of part-time employment contracts, mostly in the first half of 2010, the spread of these working time employment contracts remained relatively low when in Q2 2010 solely 5.7 % persons in the main employment was working part-time of the total number of employees. Moreover, in Q3 2010 the share of part-time contracts decreased to 5.5 %. The completely negligible number of persons with a part-time employment, who lost their job, contributed right to a slight increase in the number of part-time jobs in the first half of 2010. If Q3 and Q4 2009 are compared, probability of leaving the job in persons with a part-time employment was 0.069; in the comparison of Q1 and Q2 2010 it was mere 0.019. Conversely, the probability level of leaving the job in persons working full-time was relatively stable. It can be stated on the basis of these data that the reduction of working time in the national economy in 2009 also found its consequence in laying-off persons working part-time and a gradual growth in the number of these jobs appeared as conditions on the labour market were improving during 2010.

The hiring for the fixed-term employment contract has become a principal issue due to changes to the labour market. The increasingly used fixed-term employment contracts bring a certain higher flexibility to the labour market, on one hand, and enable the young to obtain their first work experience in simpler man-

Table 14 Probability of transition on the labour market: by the type of the employment contract in between Q3 2009 and Q3 2010

Type of the employment contract	Q3 2009 / Q4 2009	Q4 2009 / Q1 2010	Q1 2010 / Q2 2010	Q2 2010 / Q3 2010
Full-time → Full-time	0.979	0.970	0.983	0.985
Full-time → Part-time	0.001	0.001	0.001	0.002
Full-time → Jobless ¹⁾	0.020	0.029	0.016	0.014
Part-time → Full-time	0.021	0.022	0.043	0.031
Part-time → Part-time	0.910	0.926	0.937	0.863
Part-time → Jobless ¹⁾	0.069	0.052	0.019	0.106
Jobless ¹⁾ → Full-time	0.024	0.019	0.027	0.022
Jobless ¹⁾ → Part-time	0.006	0.006	0.005	0.005
Jobless ¹⁾ → Jobless ¹⁾	0.970	0.975	0.968	0.973

¹⁾ Jobless persons include economically inactive persons and the unemployed.

Source: CZSO — LFSS

ner, for instance. Yet, on the other hand, a substantial spread of fixed-term employment contracts may lead to substantially adverse effects in society. If the employee cannot find a job under an indefinite employment contract following certain work experience acquired, then it may affect their decision to establish their own household, or may lead to the postponing of childbirth in the family to a later time.

In general, the indicator by working time of the employment contract is surveyed merely for the employees. A person may, during one quarter, work under the same type of employment contract for all the time, or may change the employment contract, or may cease to be an employee. In majority of cases this means the employee has lost job, yet quite exceptionally the person has been able to acquire the status of the self-employed. Because validity of fixed-term contracts is related to the end of the calendar year it is no surprise there is a relatively high probability of loss of the fixed-term job if Q4 2009 and Q1 2010 are compared when 24.1 % employees terminated their fixed-term contracts, of which 12.7 % were transferred under indefinite employment contracts. A relatively high number of employees under fixed-term contracts (10.5 %), who ceased to be employees, occurred also between Q3 and Q4 2009; on the contrary, the lowest number of such employees was between Q1 and Q2 2010 (5.5 %). Likewise in the case of

Table 15 Probability of transition on the labour market: by duration of the employment contract in between Q3 2009 and Q3 2010

Duration of the employment contract	Q3 2009 / Q4 2009	Q4 2009 / Q1 2010	Q1 2010 / Q2 2010	Q2 2010 / Q3 2010
Fixed term → Fixed term	0.854	0.759	0.893	0.835
Fixed term → Indefinite	0.042	0.127	0.052	0.065
Fixed term → Other ¹⁾	0.104	0.113	0.055	0.100
Indefinite → Fixed term	0.003	0.001	0.002	0.002
Indefinite → Indefinite	0.979	0.973	0.984	0.983
Indefinite → Other ¹⁾	0.019	0.026	0.014	0.015
Other → Fixed term	0.013	0.010	0.014	0.014
Other → Indefinite	0.011	0.008	0.010	0.007
Other → Other ¹⁾	0.976	0.982	0.977	0.979

¹⁾ Other includes the self-employed and jobless persons.

Source: CZSO — LFSS

part-time employment contracts this indicates that in 2009 the self-employed frequently dealt with the economic depression by means of laying-off persons working under part-time employment contracts, or did not extend fixed-term employment contracts.

CONCLUSION

In the course of 2009 and 2010 the labour market was often affected by quite contradictory trends. In 2009 the labour market was influenced by falling economic performance and, conversely, at the beginning of 2010, especially in Q2 2010, basic indicators of the employment and unemployment levels were improving. Negative trends on the labour market led to the fact that by the end of 2009 a higher number of persons of the employed category moved into the one of the unemployed than vice versa. The turn of 2009 and 2010 was, in addition, characteristic for the leave of a substantial number of persons into the economic inactivity while this decrease was not compensated in full by counter current transition from the category of economically inactive persons into the category of the employed. The labour outflow from the secondary sector and from the group of employees was the most important. The decline in the economic performance was demonstrated predominantly by laying off persons having flexible employment contracts, that means persons working under a part-time employment contract and persons with a fixed-term employment contract, respectively. The group of persons in the position of the self-employed retained high stability over the entire reference period when quite a negligible number of the self-employed became employees, or jobless persons.

The total increase in the number of the employed in 2010 was caused by a significant growth of the number of the formerly unemployed, who found jobs between Q1 and Q2 2010. It was, first of all, the secondary sector, which largely contributed to improved conditions in the labour market. This was demonstrated in the low number of persons who lost jobs in industry between Q1 and Q2 2010. Furthermore, improvements in conditions in the labour market showed influence in the spread of flexible employment contracts right in time of seasonal jobs. Unfortunately, the turn of Q2 and Q3 2010 already indicated halting of favourable trends on the labour market.

References

- ATKINSON A. B. and MICKLEWRIGHT J. Unemployment Compensation and Labor Market Transitions. *Journal of Economic Literature*, Vol. 29, No. 4 (Dec. 1991), pp. 1679–1727.
- CZSO. *Formování a rozpad domácností z výsledků výběrových šetření pracovní sil* (Formation and dissolution of households from the results of the labour force surveys). Prague: Czech Statistical Office, 2006.
- CZSO. *Přechod do důchodu podle výsledků ad hoc modulu 2006* (Transition to retirement according to the results of ad hoc module 2006). Prague: Czech Statistical Office, 2007.
- CZSO. *Ročenka statistiky trhu práce 2010* (Labour Market Statistics Yearbook 2010). Prague: Czech Statistical Office, 2010.
- CZSO. *Trh práce v ČR 1993–2009* (Labour market in the Czech republic 1993–2009). Prague: Czech Statistical Office, 2010.
- KAISER L. C. Female Labor Market Transitions in Europe. *IZA Bonn, DIW Berlin and EPAG*, Discussion Paper, No. 2115. May 2006.
- MEJSTŘÍK B. *Organizace práce a uspořádání pracovní doby* (Work organization and working time arrangements). Prague: Czech Statistical Office, 2005.
- MEJSTŘÍK B. and NÝVLT O. *Vztah rodinného a pracovního života* (Relations between family and work life). Prague: Czech Statistical Office, 2006.
- SCHMITT J. *Labour-market transitions and the measurement of labor-market capacity* (Paper prepared for meeting of the project on “New Cross-National Architecture for Labor-Market Statistics”). Bellagio, Italy, 23–27 September 2002.

Reducing Respondents' Burden in the Czech Statistical Office from Respondents' Point of View

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Abstract

Respondents of statistical surveys are usually divided into two groups — institutions and households. Respondents of business and institutional statistics area should provide the Czech Statistical Office annually with approximately 1 100 000 statistical forms. Respondents from households should give interviews in about 350 000 cases. Respondents' willingness to cooperate depends significantly on their perceptions of responsibility towards state, as well as on common social and economic situation.

Since 2005 the Czech Statistical Office has strongly focused on the project called Redesign of Statistical Information System. Reducing respondents' burden is one of the main priorities of this project. We describe methodological and technological experience mainly from the field of data collection as well as current situation and next steps to be taken in the area of correspondence and remote data collection that prevails in business statistics.

Keywords

Statistics, respondents survey, administrative burden, respondents' burden, data collection technology

JEL code

Z00

INTRODUCTION

Since 2005 Czech Statistical Office has focused strongly on the project called Redesign of Statistical Information System. Reducing respondents' burden is one of the main priorities of this project. Each item of the statistical questionnaires was analysed separately during 2007 and 2008. Conclusions from this analysis lead into modified questionnaires for surveys in calendar year 2009. Corresponding application software with reduced number of variables was also implemented in 2009. Following the range of contents and scope of surveyed statistical variables the survey system SBS 2009 (Structural Business Statistics) and STS 2009 (Short Term Statistics) was implemented respecting also the principle of negative co-ordination of respondents' selection which brings reduction of respondent' burden per unit. The result of the CZSO priority task brought reduction of respondents' burden of the statistical surveys by 23 %. The statistical respondents' burden share is less than 1 % of the total administrative burden of enterprises.

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1 STATISTICAL PROCESSING

Statistical processing includes data collection, capture, editing, imputations, corrections and estimation procedures. The area of statistical processing in the CZSO is divided by prevailing processes and methods of data collection and respondents type into field survey departments and statistical processing departments. Field survey departments employ mainly personal interviews or contact with the respondent for the surveys in the households, price statistics and farm surveys. Statistical processing departments secure the data processing for businesses, governmental and non-profit institutions. The data is collected by the correspondence method when the paper (mail surveys) or electronic forms are used.

Methods of statistical processing

For processing of the input data the following modern methods currently applied by statistical institutions in Europe and all over the world are used to a different extent:

1. Electronic questionnaires with interactive controls (CAPI — Computer Assisted Personal Interviewing) which are used for personal and phone interviews with respondents (this applies to 65 % of standard household surveys and 100 % of consumer price surveys).
2. Electronic data collection takes place locally at respondent's place. Collected data sets are submitted to the CZSO for processing by e-mail or through data box (28 % cases of questionnaires for which the electronic data collection is available).
3. Optical character recognition (OCR) of paper questionnaires and reports makes 4 % of the total number of reports and questionnaires.

1.1 Surveys

In 2009 Czech households were addressed by standard survey types, i.e. Family accounts statistics, Labour Force Survey, Tourism Sample Survey, Information Technology Sample Survey and Survey on Income and Living Conditions (EU-SILC). In selected 62 000 dwellings 378 000 interviews were conducted with individual household members (in continual surveys also repeated interviews are included).

Businesses performing their activities in the Czech Republic were addressed by the CZSO in 2009 according to the Statistical Survey Programme that established the reporting duty 121 surveys compiled by the CZSO. The forms of those surveys cover the needs of inputs for individual statistics respondents. The forms differ not only in terms of their content in general, but they respect also the economic activity, financial sector and size of the respondent. For almost 95 000 of selected units the total of 822 000 questionnaires were processed including the questionnaires of monthly and quarterly periodicity.

1.2 Changes of statistical processing

In 2009 the Statistical Processing Section introduced an important change in the data processing and work organization with the aim to increase productivity, effectiveness and quality in statistical surveys processing. Staff number, number of departments as well as the number of managerial staff was reduced. Number of employees of individual departments was optimised in proportion to the volume of processed statistical surveys and to the number of employees managed by one supervisor. Statistical processing of field surveys was secured by creating the network of universal interviewers. In connection with the change of the respondents' reporting duty, the structure of statistical forms, technological environment of main and dislocated data centres and with the introduction of negative co-ordination in selection of samples and composition of reports from the aspect of surveyed statistical variables it was also necessary to change and debug new application software for input and central statistical processing. The Czech Statistical Office launched a new website www.vykazy.cz for respondents of statistical surveys to obtain all necessary information and reference for submitting of statistical questionnaires and electronic data

collection with the aim to simplify the respondent's search for information on statistical questionnaires, methodological, organizational and technical information. It also includes contacts to all processing units. In 2009 a feedback of this website was evaluated through the Respondents' survey.

2 RESPONDENTS' SURVEY IN 2004, 2006 AND 2009

Czech Statistical Office is using electronic questionnaires in business and institutional statistics for more than ten years. For their further enhancement it is essential to learn about capabilities and burdens on respondents' side to adjust used technology accordingly. The first Respondents' Survey was held in the third and fourth quarter of 2004. Next one was held in the first and second quarter of 2006 and the latest one in the second quarter of 2009. The first survey included 16 questions, the second one 11 and the third one 9. So number of questions was reduced. The CSO assumes to carry out such survey approximately once in three years or before or after key changes in the Statistical Informational System which might cause a significant impact on respondents. Considering the results of 2004 Survey Open Questions were included into Surveys in 2006 and 2009. These Open Questions enabled to provide written comment by the respondents.

2.1 Sample Size and Response

In 2009 the sample size was 5 000 respondents and the response made 23 % — the lowest from all three cycles. In 2004 were 10 965 respondents addressed and the response was nearly 48 %. In 2006 the sample size was 22 050 respondents and the response was rather low — only 30 %. An interesting fact to point out — The Open Question was filled in 43 % of received responses in 2009.

2.2 Data Collection Design

In 2004 the respondents were contacted in three ways. The first one was as an attachment to Short Term Statistics questionnaire (2 870 respondents), the second one was as a letter sent to a group of SBS respondents (4 000 recipients) and the third one was as an email sent to a group of SBS respondents as well (4 095 recipients).

In 2006 respondents were approached within annual statistical questionnaires (SBS) supported by a brief request for cooperation. The CSO aimed not to address respondents with any additional questionnaire. The results of survey were greatly influenced by the fact that those questionnaires were the most demanding as of their scope and requirements of completing.

In 2009 only a random subsample of SBS respondents was used.

It is an interesting comparison that in 2004 there were 52 % questionnaires submitted by internet and 48 % by mail and in 2006, but there were only 17 % questionnaires submitted by internet and 87 % by mail.

2.3 Respondent Survey Results

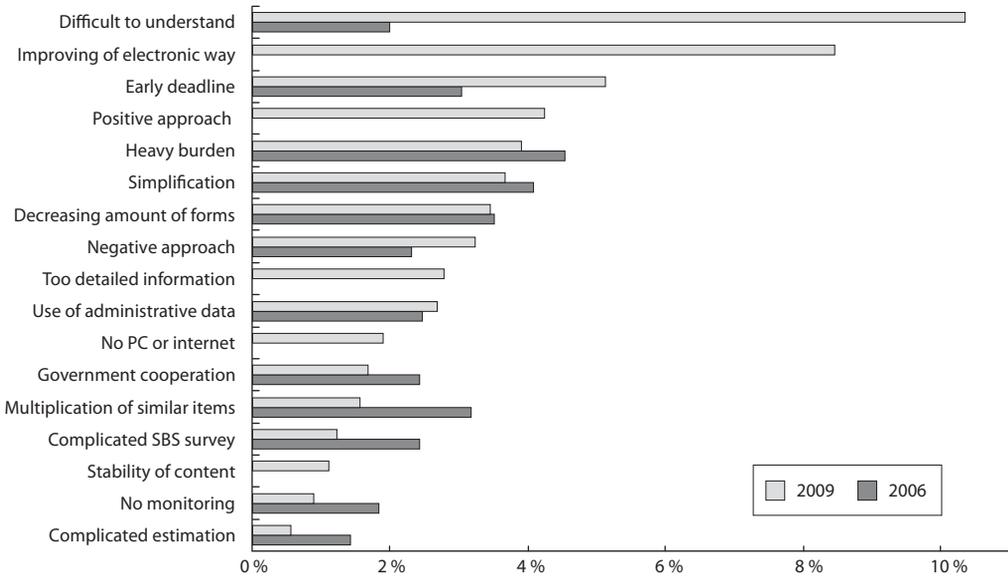
It was difficult to compare the results of Questionnaires despite the similarity of some questions. The main obstacle is the inconsistency of the groups of respondents. However, it was, after all, possible to compare some responses and evaluate the comments from Open Questions. In 2009 the response was the lowest, so the results of the questionnaire were the least representative, but considering the respondents' comments it brought the highest information value from the responded group.

Respondents very often expressed their wish not to be respondents any more. There are frequent requests to be excluded from the sample. In 2009 the comments were more constructive, with actual cases taken. Even some appraisal was received. Along with the development of information society the respondents did "grow-up". They understood that there was no sense just to oppose or generalize about everything (such responses as "good for nothing, useless, SW does not work, forms are stupid, etc.). Respondents showed increasing interest to share their both positive and negative experience. This should be consi-

dered a good result of such type of survey using Open Questions. This positive change in respondents' attitude was boosted by more focused questions and by growth of discussion forums on internet as well.

Comments were compiled to 17 groups, which are sorted in the Figure 1 by decreasing frequency.

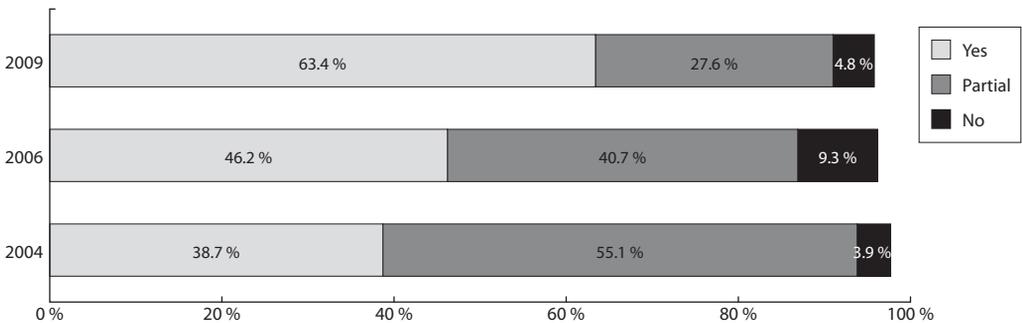
Figure 1 Respondents needs and expectations (survey results)



Source: Own construction

Detailed clarification is given to topics according to respondents' burden or where technological solution could be found.

Figure 2 Satisfaction with statistical forms



Source: Czech Statistical Office, own construction

2.3.1 Unintelligible, especially explanatory notes! In 2009 — 1st place, in 2006 — 10th place

Persons assigned to complete statistical forms are not specialized to fill forms. For some companies it is “expensive” as they have to pay additional fee to their outsourced accountants or tax advisors. The ex-

planatory note is perceived as unintelligible especially in case when persons assigned to complete it do not understand it, because it is not their standard work. Simply, respondents expect explanatory notes as a bridge between their knowledge or data sources and statistical needs.

2.3.2 Improve EPV. In 2009 — 2nd place, in 2006 — not applied

Results show that EPV (Electronic off-line forms for respondents) has a positive response and that it is widely discussed. Respondents found the main deficiency of EPV in necessity to install it to their own PC that is very often disabled either by their employer or their firewall. And subsequently to install each form. System of data checking seemed to be an “impregnable castle” and required a lot of effort to get through as respondents admitted.

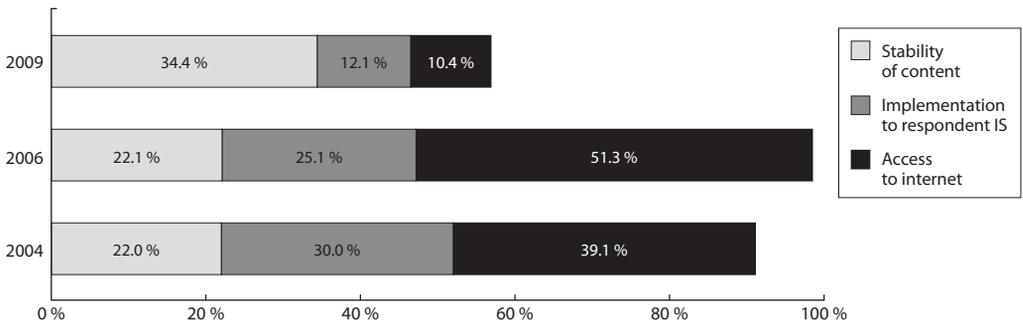
An interesting suggestion was to use previous year data to avoid repeatedly entering the same information.

An electronic reminder about forthcoming deadline of form submission would be very welcomed in current electronic world.

An eager wish is make EPV similar to Excel sheets. The main disadvantages of EPV were found in slow and poorly structured browsing, impossibility of dividing form into several spreadsheets or tables to get them filled by co-workers and compiling them back into form. There was also found a lack of possibility to create own checking mechanism as well as copying already filled in information. The system of data checking is perceived as useless — only checking if the pages were browsed and totals calculated accurately.

Direct access to EPV on CSO website without required installation would be welcomed. One of the variant is to stop current EPV and replace it by PDF forms for off-line providing of statistical data and by web forms for on-line data entry and editing.

Figure 3 Opportunity to enhance electronic way



Source: Czech Statistical Office, own construction

2.3.3 Unsuitable deadlines. In 2009 — 3rd place, in 2006 — 5th place

These comments are given mainly in relation to the short term statistics (monthly a quarterly forms), because the respondents deadlines for providing statistical office with statistical forms are given earlier than VAT deadline, respondents prefer to use accounting figures to estimates when filling in statistical forms.

2.3.4 Heavy burden. In 2009 — 5th place, in 2006 — 1st place

This is a remarkable progress. Respondents noticed that some forms were “thinner” and they appreciated it. Despite of all effort it was not possible to simplify everything and at the same time. But it was a good start. Alas it is still true that completing of forms takes more than one working day of the accountant. So

for some companies it is “expensive” as they have to pay additional fee to their outsourced accountants or tax advisors. The form is perceived as a burden especially in case when person assigned to complete it does not understand it (incorrect assignment within the company). But the unintelligible explanatory notes should be taken in consideration as well. One of the important respondents’ opinion was preference of number or volume of statistical forms. Preference of more questionnaires with fewer items decreased from 23.1 % in 2004 to 15.6 % in 2006. Preference of fewer questionnaires with more items slightly increased from 23.7 % in 2004 to 25.9 % in 2006.

2.3.5 To use the data from balance sheets and from profit and loss statements.

In 2009 — 10th place, in 2006 — 6th place

This is a wishful thinking of those who remember from previous times that the CSO was able to collect automatically a lot of required data directly from balance sheets and profit and loss statements Or to get data from Tax offices. Currently data is collected from both these sources but in a very limited volume.

2.3.6 No access to PC and / or internet. In 2009 — 11th place, in 2006 — not applied

10 % of respondents who submitted their questionnaire in 2009 on paper had no PC and / or internet access. Many respondents had both PC and internet access available but did not use them because they had not tried to explore EPV. Overall the paper questionnaires are considered more user friendly comparing to EPV.

2.3.7 Cooperation within state authorities. In 2009 — 12th place, in 2006 — 8th place

This response remains on the same place. Respondents require CSO to cooperate with other institutions within state authorities. This includes Social Insurance Office, Health Insurance companies, Tax offices, ministries, municipalities etc. Different authorities require very often the same or very similar data but to be filled into different questionnaires. This is found to be a redundant work.

2.3.8 Duplicities. In 2009 — 13th place, in 2006 — 4th place

Reducing of duplicities in statistical forms was one of the targets of the survey content analyse in 2007 and 2008. As the results of respondent survey show this goal was achieved successfully.

2.3.9 Laborious completing of annual forms. In 2009 — 14th place, in 2006 — 7th place

The main hurdle is still found in the size of form together with poor structuring and lack of continuity. No particular form is mentioned most likely due to fact that in 2009 this questionnaire was sent separately while in 2006 it was attached to P5-01.

For EPV the main disadvantage was found in slow and poorly arranged browsing, as well as missing feature to copy same data to other part of form.

2.3.10 Keep the structure of form unchanged. In 2009 — 15th place, in 2006 — not applied.

Frequent changes in structure of form disable to use work aids developed by respondents for previous versions. Especially conscientious respondents create mostly in Excel supporting work aids to make sure that the form is filled in correctly. It was pointed out that very often when the form is “enhanced or improved” some explanatory note disappear. The frequent changes in used terms are considered unfavourable because they do not reflect accounting terminology. The preference of electronic and paper questionnaires had evolved as follows:

- Preference of paper questionnaires doubled from 30.9 % in 2004 to 62.0 % in 2006.
- Preference of electronic questionnaire slightly decreased from 42.7 % in 2004 to 35.9 % in 2006.

CONCLUSION

Simple, intelligible and user-friendly statistical questionnaires make the core of the statistical data quality. From the technological point of view the respondents' burden could be reduced mainly through easily accessible electronic statistical questionnaires with simple manageability and readily available technical and methodological support provided by the statistical office. Considering the progress of information society it is essential to develop instantly respondents' input channels for data collection of statistical information as an electronic form or an interface. There are also specific groups of respondents which prefer traditional paper form to electronic way of data collection. From the respondents' point of view their burden could be reduced or not increased mainly through using administrative sources and stability of structure, content and periodicity of statistical requirements, which are transformed to statistical forms with appropriate deadlines.

References

- CZSO. *Annual report 2007* [online]. Prague: Czech Statistical Office, 2008. [cit. 17.11.2010] <[http://www.czso.cz/eng/redakce.nsf/i/annual_report_2007/\\$File/ar2007.pdf](http://www.czso.cz/eng/redakce.nsf/i/annual_report_2007/$File/ar2007.pdf)>.
- CZSO. *Annual report 2008* [online]. Prague: Czech Statistical Office, 2009. [cit. 17.11.2010] <[http://www.czso.cz/eng/redakce.nsf/i/annual_report_2008/\\$File/ar2008.pdf](http://www.czso.cz/eng/redakce.nsf/i/annual_report_2008/$File/ar2008.pdf)>.
- CZSO. *Annual report 2009* [online]. Prague: Czech Statistical Office, 2010. [cit. 17.11.2010] <[http://www.czso.cz/eng/redakce.nsf/i/annual_report_2009/\\$File/ar2009.pdf](http://www.czso.cz/eng/redakce.nsf/i/annual_report_2009/$File/ar2009.pdf)>.
- CZSO. *Anketa pro respondenty statistických zjišťování — 2004* (Poll for respondents of the statistical surveys — 2004) [online]. Prague: Czech Statistical Office, 2004. [cit. 17.11.2010] <[http://www.czso.cz/csu/redakce.nsf/i/anketa_respondentu_2004/\\$File/Anketa_resp_2004.pdf](http://www.czso.cz/csu/redakce.nsf/i/anketa_respondentu_2004/$File/Anketa_resp_2004.pdf)>.
- CZSO. *Anketa respondentů 2006* (Respondents Poll 2006) [online]. Prague: Czech Statistical Office, 2006. [cit. 17.11.2010] <[http://www.czso.cz/csu/redakce.nsf/i/anketa_respondentu_2006/\\$File/Anketa_resp_2006.pdf](http://www.czso.cz/csu/redakce.nsf/i/anketa_respondentu_2006/$File/Anketa_resp_2006.pdf)>.
- CZSO. *Informace o výsledcích Anket respondentů 2009* (Information about the results of the respondents Polls 2009) [online]. Prague: Czech Statistical Office, 2009. [cit. 17.11.2010] <[http://www.czso.cz/csu/redakce.nsf/i/anketa_respondentu_2009/\\$File/Anketa_resp_2009.pdf](http://www.czso.cz/csu/redakce.nsf/i/anketa_respondentu_2009/$File/Anketa_resp_2009.pdf)>.
- CZSO. *Porovnání Anket respondentů z let 2004 a 2006* (Comparison of the respondents Polls 2004 and 2006) [online]. Prague: Czech Statistical Office, 2006. [cit. 17.11.2010] <http://www.czso.cz/csu/klasifik.nsf/i/anketa_respondentu_2006_vysledky>.
- MAKALOUŠ I. and KONEČNÝ F. Globální architektura statistického informačního systému ČSÚ (Global architecture of the statistical information system of the Czech Statistical Office). *Statistika*, 2008, 2, pp. 89–109.

Recent Publications and Events

New Publications of the Czech Statistical Office

Household Income and Living Conditions 2010. People and Society.

Prague: Czech Statistical Office, 2011.

Expenditure and Consumption of Households Included in the Household Budget Survey in 2010.

People and Society. Prague: Czech Statistical Office, 2011.

Prosperity of the Czech Households from 1995 to 2010. Prague: Czech Statistical Office, 2011.

Economic Results of the Industry of the Czech Republic from 2006 to 2009.

Prague: Czech Statistical Office, 2011.

External Trade of the Czech Republic in 2010. Prague: Czech Statistical Office, 2011.

Electronic versions are available at: www.czso.cz.

Scientific Life

Want to know more about national accounting? The OECD manual *Understanding National Accounts* by François Lequiller and Derek Blades (Paris: OECD, 2006). This publication introduces national accounting in a comprehensible form by explaining basic macroeconomic aggregates and presenting lots of practical examples. The e-book is available at the official OECD website: www.oecd.org.

Conferences

The 58th World Statistics Congress of the International Statistical Institute (ISI) was held in Dublin, Ireland on August 21–26, 2011. Program details, list of participants, and other information on the event are available at: www.isi2011.ie.

From 19th to 21st August 2011, on the occasion of the 58th World Statistics Congress of the International Statistical Institute (ISI) in Ireland, young statistician's satellite meeting held place in the picturesque campus of more than 400 years old Trinity College in Dublin. The ISI Young Statisticians Meeting (YSI 2011), attended also by young statisticians from the Czech Republic and Slovakia (O. Chochola, MFF UK, L. Pastorek and T. Vintr, FIS VSE) was aiming at active involvement of early career statisticians through poster presentations of their research and participating in the lectures of leaders in the statistic discipline. The meeting covered broad and diverse lecture topics, reflecting the ISI's all encompassing character and gave the opportunity to build scientific bonds with young colleagues in their respective fields in an informal and heartening environment. More at: www.scss.tcd.ie/conferences/YSI2011.

The 14th International Scientific Conference Applications of Mathematics and Statistics in Economy (AMSE) was held in Łódź, Poland from 31 August to 3 September 2011. You can find conference papers as well as other information at: www.amse.ue.wroc.pl.

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[for a book] HICKS, J. *Value and Capital: An inquiry into some fundamental principles of economic theory*. Oxford: Clarendon Press, 1939.

[for chapter in an edited book] DASGUPTA, P., et al. Intergenerational Equity, Social Discount Rates and Global Warming. In PORTNEY, P. et WEYANT, J., eds. *Discounting and Intergenerational Equity*. Washington, D.C.: Resources for the Future, 1999.

[for a journal] COASE, R.H. The Problem of Social Cost. *Journal of Law and Economics*. 1960, 3 (October), pp. 1–44.

[for an online source] CZECH COAL. *Annual Report and Financial Statement 2007* [online]. Prague: Czech Coal, 2008. [cit. 20.9.2008]. <<http://www.czechcoal.cz/cs/ur/zprava/ur2007cz.pdf>>.

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Design and layout: Ondřej Pazdera

Typesetting: Jana Chocholoušová

Print: Czech Statistical Office

All views expressed in the journal of Statistika are those of the authors only and do not necessarily represent the views of the Czech Statistical Office, the Editorial Board, the staff, or any associates of the journal of Statistika.

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