LABOUR INPUTS FOR GDP OF THE CZECH REPUBLIC (1970 – 1990)

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Abstract

As the important parts of our project aimed at estimates of historical series of gross domestic product (GDP) for 1970 – 1990 we consider labour inputs. We focus on wages paid to workers in the Czech economy because wages are a necessary part of income approach to GDP. The project is built on the basis of input-output tables that were officially published. The problem of the socialist statistical system, called Material Product System (MPS) was the scope. MPS was focused on material sphere and therefore it did not cover non-material sphere like renting, education, health, defence etc. The estimates of wages are based on selected tables for on non-material sphere

Key words: MPS, GDP, labour, inputs

JEL Code: E23, E24, J30

Introduction

Labour inputs are the most important economic inputs analysed according to many perspectives. This paper deals with the labour inputs as macroeconomic variable affecting gross domestic product (GDP). Beside many similar analyses, this paper is aimed at Czech economy in the period of socialism (1970 – 1990). It is shown the share of wages in productive sphere and in non-productive sphere with comparison to current economic reality. These estimates are part of the project for GDP reconstruction for the Czech Republic for 1970 – 1990. The availability of time series of GDP will allow new economic analyses and analyses of time series. The crucial point is that the Czech Republic was a part of Czechoslovakia and estimates of GDP were not compiled. Socialist statistical system of macroeconomic aggregates was based on the idea of productive sphere (Arvay, 1992). Only productive sphere covering production of physical goods and some companies' services created value added. Non-productive sphere like education, health, public transport etc. was

dependent on productive sphere and did not create value added[1]. Estimates of macroeconomic indicators in nowadays terms (like GDP) were compiled by Federal Statistical Office of Czechoslovakia for total Czechoslovakia only. Therefore there were not data for both republics. When we started to deal with this issue, we had to overcome several difficulties. The first was social changes in 1990 when many skilled experts left the office. Then division of the country in 1993 caused other problems with data and staff. Finally, catastrophic floods in 2002 destroyed statistical library.

All our estimates are based on available data obtained from different libraries and private collections (Sixta, Fischer 2010). We also contacted experts who were responsible for international comparison projects in the past.

1   Methodology

The key concept of current methodology (national accounts) is to cover all market activities and selected non-market. The distinction is given by so-called 50% criterion; it means that if sales are lower then 50% of current cost (covering compensation of employees, intermediate consumption, consumption of fixed capital and other net taxes on production) the unit is regarded as other non-market producer (ESA 1995). Output of such producer is measured by costs. These producers usually cover services like education, health, public administration, defence etc. Beside that, there own-account producers like individual housing construction and imputed rent. Methodology used by 1989 (1990) was called Material Product System (MPS) and the concept of production and value added was based on material products and services for companies. Therefore services like public transport or telecommunication services used by households were not part of value added and national income. The transition from MPS to system of national accounts (SNA) is based on following steps:

1. Global product - created production within the concept of MPS

2. Methodical adjustments of global product (insurance services, banking services, non-material production of households, non-material sphere output)

3. Output = 1 + 2

4. Material part of intermediate consumption

5. Non-material part of intermediate consumption

6. Intermediate consumption = 7 + 8

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[1] Details of the methodology of comparisons can be found in "Comparisons of the System of National Accounts and the System of Balances of the National Economy".

7. Gross value added = 3 – 6

8. Taxes on products – sales tax

9. Subsidies - interventions in purchases

10. Gross domestic product at purchasers' prices = 7 + 8 - 9

Transition form MPS data to SNA data is based on published figures on global product, national income and input-output tables. Input-output tables are available for 1973 and 1987 for the Czech Republic at purchasers' prices. These years (1973, 1987) are directly transformed from MPS to SNA. For other years, simplified method will be used (Sixta, Fischer 2011). The following table 1 shows input-output table for the Czech Republic.

Tab. 1 SIOT, Czech Socialist Republic 1973, current prices, CSK mil.

Industry	Intermediate consumption (IC)				TOTAL (IC)	Personal consump.	Social consump.	Investment + inventories	Export	Transfers with Slovakia	Losses and differences
	Agric.	Industry	Constr.	Services							
Agricul.	20 837	34 629	129	60	55 655	11 673	1 866	2 742	1 575	-1 249	1 553
Industry	17 602	302 596	28 775	23 864	372 838	121 141	24 006	36 826	73 255	4 130	-1 502
Constr.	503	2 706	1 923	2 306	7 437	697	7 455	54 440	918	-70	-101
Services	2 690	39 115	6 414	9 420	57 638	8 963	1 650	1	18 037	0	-214
Total IC	41 631	379 045	37 242	35 650	493 568	142 473	34 977	94 008	93 785	2 811	-263
Depreciation	2 626	14 687	1 241	7 132	25 686						
Wages	20 058	52 079	14 066	23 427	109 630						
Other net production	4 558	30 481	9 343	14 014	58 396						
Profit	-2 013	48 590	7 097	917	54 591						
Sales tax	99	38 469	1	0	38 568						
Gross value added	25 329	184 306	31 747	45 490	286 872						
Output	66 960	563 351	68 989	81 141	780 440						
Import	6 854	67 342	1 787	4 934	80 918						
Resources	73 814	630 694	70 776	86 075	861 358						

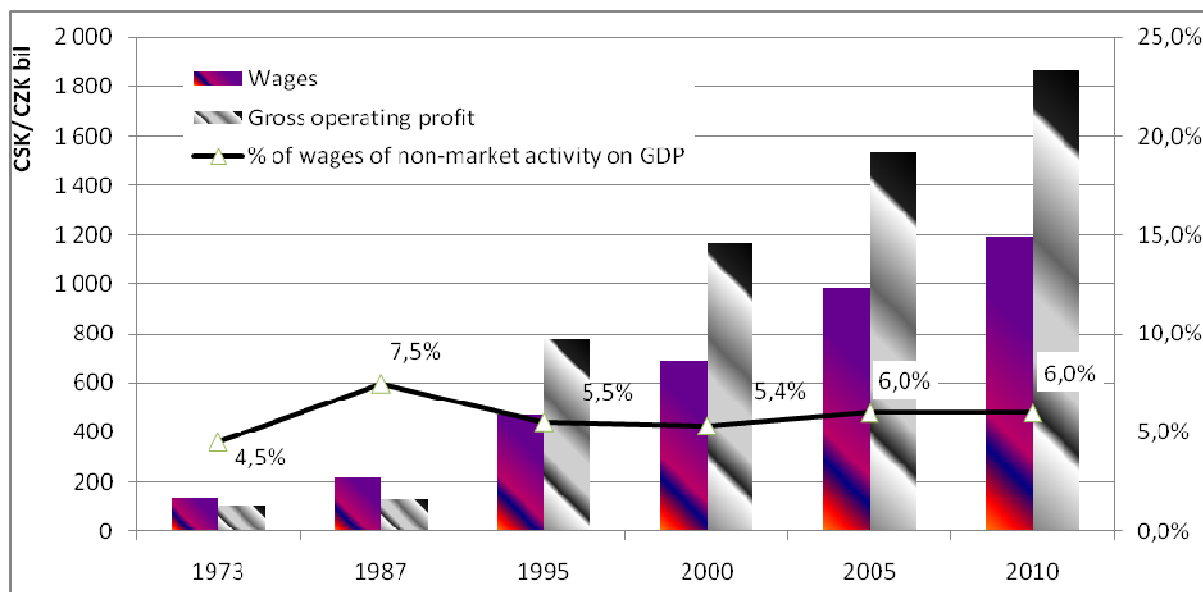Source: Czech Statistical Office

2 Labour Inputs and Income Approach to GDP

Labour inputs are described in the so-called third quadrant of input-output table (row wages). This third quadrant describes so-called income approach to GDP. According to MPS methodology, there were covered wages for material sphere only. It means that a lot of intellectual-based activities were not covered. We adjusted original input-output table for the differences between MPS and SNA[2]. At first, it is necessary to add activities regarded as non-productive to output and intermediate consumption. Subsequently, we solved the structure of value added (third quadrant). Wages for non-material sphere were about 57 000 CSK mil. in 1987. Due to the lack of financial data for 1973, we estimated wages for 1973 for about 26 000 CSK mil. Fig. 1 shows the share of wages (without social contributions) on GDP. It includes both productive and non-productive sphere. GDP from 1973 and 1987 is based on our provisional estimate; it is about 115% of national income based on MPS. It is clear that the economy was based on different income structure because wages took between 45% and 55% of GDP. That is enough in comparison with actual figures when the share of wages is between 30% and 33%. Naturally, the share of companies' operating profits (recorded as gross operating surplus in national accounts) was reversed. In 1973 and 1987 the share of gross operating surplus (GOS) on GDP was 35%, 25% respectively. Since 1995, the share of companies' profits was rising, GOS oscillates about 50%. Fig.1 also shows the share of wages in non-market units; it covers government units and non-profit institutions for 1995 onwards and for 1973 and 1987 there was non-market part of non-productive sphere.

Fig. 1: Labour input of gross domestic product

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[2] Details on compilation methodology can be found in "Methods of the Compilation of Sources and Uses of Global Product and National Income".

Source: Our estimates, Czech Statistical Office

Anyway, taking into account non-productive sphere and its wages, it is changing the picture of socialist economy. Between 1973 and 1987 the share of profits declined from 35% to 25% and the share of wages increased. Gross operating surplus was positive in 1973 and 1987 but when we take into account depreciation (represented by consumption of fixed capital), net operating surplus is negative in 1987. It means that the economy was developing worse when we count all activities that are productive from nowadays perspective.

3 Industrial Structure of labour Inputs

Labour input can be analysed according to the industrial structure of units which are paying employees. Only one complex and comprehensive approach can be found in national accounts that combine labour force survey and business statistics. Currently, the main revision of national accounts in recent time took place in 2011 and new data were published in September 2011. The revision itself brought a new classification of industries (CZ-NACE based on NACE rev.2) and changes in balance of human resources.

For the possibility of comparisons, we transformed original MSP data in socialist classification to currently used CZ-NACE. Of course, the comparability is not perfect but it is possible to describe some main tendencies. We have to take into account, that socialist statistics was based on pure kind of activity unit and current Czech national accounts are based on main activity. Contrary to it, companies in nowadays world usually try to establish more legal units specified for different purposes to limit their market risks. This reduces the risk of significant secondary output.

When analysing industrial structure of wages, there are clear several changes. At first, the change of the structure of economy and it orientation and at the second, labour productivity was significantly increased in last two decades. Our experimental estimates of wages (see Tab. 2) were compiled in current methodology of national accounting and they were prepared in CZ-NACE for 1973 and 1987. Finally, we will prepare annual figures for all the years between 1973 and 2010. In nominal values, total amount of wages paid in agriculture were not far from wages paid in 1995. In 1973 and 1987 wages in agriculture took 15.2%, respectively 11.4%. In 1995, wages in agriculture accounted 4.6% and in 2010 2% only, see Tab. 3. Different development is seen in manufacturing because even today, the Czech Republic has a large share of manufacturing; it can not be compared with the period of socialism. The share of wages 1973 declined from 34.9% to 25.5%. Opposite development can be seen in services, among all, interesting development is in education where the share of wages increased from 3.2% in 1973 to 6.6% in 2010.

Tab. 2: Wages in the Czech economy, CZK/CSK mil.

	CZ-NACE code	1973	1987	1995	2000	2005	2010
	Total	131 697	218 941	472 893	690 272	982 271	1 195 151
A	Agriculture, forestry	20 058	25 042	21 850	25 575	25 372	24 289
B	Mining	4 836	7 951	12 463	13 215	12 577	12 882
C	Manufacturing	45 932	73 127	125 101	193 952	272 050	304 984
D_E	Energy, water	1 272	3 490	12 609	19 217	26 523	28 482
F	Construction	12 475	20 305	47 787	50 027	63 235	80 492
G	Trade	11 310	16 413	50 883	76 970	112 032	142 344
H_J	Transport + com, hotels +rest., IT	12 117	17 017	49 397	84 159	125 614	160 411
K	Banking and instance	396	952	14 512	25 229	31 829	40 530
L_N	Renting, business ser., research	7 806	17 424	31 198	48 788	76 159	102 301
O	Public administration and defence	5 582	13 409	44 268	66 198	96 227	115 740
P	Education	4 216	10 126	30 204	40 061	64 968	79 343
Q	Health and social care	3 637	8 737	24 037	34 137	56 236	78 225
R_U	Other services	2 060	4 949	8 584	12 744	19 449	25 128

Source: Our estimates, Czech Statistical Office

Expected development is found in trade and banking. Especially high wages in banks and the development of banking sector meant that wages amounts to 3.4% of total wages in 2010; it can be hardly compared with the share 0.3% in 1973.

Tab. 3: Wages in the Czech economy, %

	1973	1987	1995	2000	2005	2010

	Total	100.0	100.0	100.0	100.0	100.0	100.0
A	Agriculture, forestry	15.2	11.4	4.6	3.7	2.6	2.0
B	Mining	3.7	3.6	2.6	1.9	1.3	1.1
C	Manufacturing	34.9	33.4	26.5	28.1	27.7	25.5
D_E	Energy, water	1.0	1.6	2.7	2.8	2.7	2.4
F	Construction	9.5	9.3	10.1	7.2	6.4	6.7
G	Trade	8.6	7.5	10.8	11.2	11.4	11.9
H_J	Transport + com, hotels +rest., IT	9.2	7.8	10.4	12.2	12.8	13.4
K	Banking and instance	0.3	0.4	3.1	3.7	3.2	3.4
L_N	Renting, business ser., research	5.9	8.0	6.6	7.1	7.8	8.6
O	Public administration and defence	4.2	6.1	9.4	9.6	9.8	9.7
P	Education	3.2	4.6	6.4	5.8	6.6	6.6
Q	Health and social care	2.8	4.0	5.1	4.9	5.7	6.5
R_U	Other services	1.6	2.3	1.8	1.8	2.0	2.1

Source: Our estimates, Czech Statistical Office

Analysis of wages in economy could be complemented by number of workers (employees). Although labour statistics was developed in Czechoslovakia, it is not easy to get consistent data. Interest was put on legal form of employment (in socialist sector, cooperative sector etc.). Producing of employment data in persons will require similar data reconstruction as financial indicators like output.

Conclusion

Our project is aimed at GDP reconstruction for period of socialism and labour inputs expressed as wages are important part of it. Income approach to GDP containing wages and profits is a useful quality check of GDP estimation. Labour inputs are based on historical input-output tables that were transformed to current classification (CZ-NACE) and adjusted for conceptual differences between socialist standard MPS and current standard SNA. It was very demanding to find suitable data due to the transformation of economy, floods in 2002 and long time distance from socialism. Moreover, there are currently only a few experts who were working on transformation of national income to gross domestic product within international comparison programmes.

This year (2011) is the second year of our project and we are currently working on current prices estimates and next year (2012) we intend to establish deflation. Data on GDP including output approach, expenditure approach and income approach will be useful for economic analyses. Finally, these estimates will be consistent with official figures issued by the Czech Statistical Office covering period 1990 onwards.

Acknowledgment

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