

NON-EXHAUSTIVENESS OF ESTIMATES OF GROSS FIXED CAPITAL FORMATION (GFCF)

Introduction

The calculation of GFCF has long tradition in The Republic Statistical Office of Serbia. The applied methodology is partially harmonized with ESA 95 and SNA 93. We constantly try to improve the survey on GFCF. Since 1966, for the social ownership, data have been collected from all enterprises and institutions in the country, using the Annual Investment Report on Fixed Assets - full coverage. For the private sector and physical entities' investments, data were estimated until 2004, using additional data on construction statistics, import of machinery, number and size of dwellings. Since 2004 we have introduced the new sampled annual survey for privately owned legal persons. In 2006, these two surveys have been merged and maximally harmonized with national accounts requirements. It is also possible to observe the non-response rate. For small-size enterprises (less than 50 employees) the survey is based on stratified sampling. Full coverage is applied for large and medium-size enterprises

The implementation of the statistical business register should significantly enhance the exhaustiveness of this survey and the coverage control because up to now we were not able to establish for sure, on the basis of the administrative register, in case of non-response, whether the reporting unit in the reference period actually did not make investments or whether it was the result of a lack of accuracy of the register. Also, starting 2006, we will have also data on purchases of non-financial assets from financial statements for comparing on the individual level.

All these have limited our capacities to identify all non-exhaustiveness types and to select adequate adjustment methods as recommended in the *General Guidelines: Eurostat Approach*. By applying the tabular approach to the GFCF as expenditure aggregate and by comparing different sources used, we have tried to complete the analytical tables derived primarily from production side.

Non-exhaustiveness adjustments for GFCF (N1-N7)

We have used non-exhaustiveness adjustments obtained from production side to establish to what extent the corrected, enlarged value added would now influence the increase of investments. With non-exhaustiveness adjustment type N1, we have used, as an indicator, the already defined difference between full-time employment from LFS and the number of employees from financial statements and existing statistical survey on entrepreneurs by activities, which multiplied with average investments, per employee, gives the total value of GFCF. Besides full-time employment, data from LFS on hours worked (FTE) have shown that the coefficient between FTE and employment from financials statements and survey on entrepreneurs amounts to 1.56 in construction activity. Those additional hours worked in relation to full-time can be explained by the expansion of individual construction, where workers are recruited without any labor contract and receive daily wages for a whole day work (usually 12 hours) or after work completed. We assume that they are recruited for non-market household production or own-account construction and this kind of activity falls under type N3. Since 2006 the number of building permits and the number of licenses for finished new dwellings has been introduced as indicator of the construction activities on the level of municipalities. Obtained data could be used in order to estimate the total value of fixed capital formation in dwellings in the future period.

The average investments, per producer, by activities (registered legal person or registered entrepreneur) have been applied on the registered but not surveyed part in the cases of non-exhaustiveness adjustments N4 and N5. One should not expect that investments have also to be calculated for all units for which it has been established, on the production side, that they were active and participated in value added formation, but if we take into account average investments of all producers in one activity, not only those which had expenditures on fixed capital, the obtained results can be acceptable.

One can act similarly in establishing non-exhaustiveness adjustment type N6. The level of correlation that exist between the output or value added and GFCF has been used as an assumption to obtain coefficients of GFCF adjustments by activities in relation to the already defined total adjustment of value added as a consequence of underreporting by businesses.

Finally, the last type N7 adjustment as a minimum for possible part of non-exhaustiveness related to the handling of non-response. The activities that should be covered here are those for which appropriate non-response adjustments have been made by national accountants. For the first time in 2006 we have information on non-response rate (refusal and those that can not locate) from Annual Investment report survey related to large and medium-size enterprises. The activities of small-size producers that are not in the survey frame have been covered by the grossing up procedures and adjustments for non-response should not be made. The same rate by activities has been applied on previous year results.

The following table shows different types of non-exhaustiveness as a percentage of the total adjustment for GFCF.

**GFCF exhaustiveness adjustment by relative importance of types, %
Republic of Serbia**

Non-exhaustiveness type	N1	N3	N4	N5	N6	N7	Total
2003	16.5	29.8	20.9	3.8	23.9	5.2	100.0
2004	15.4	35.9	22.8	1.2	18.9	5.8	100.0
2005	14.6	42.6	19.3	1.6	16.1	5.1	100.0

The largest exhaustiveness adjustment was made to NACE sections F - construction, G - Wholesale and retail trade; repairs and D - Manufacturing.

**GFCF exhaustiveness adjustment by activity, %
Republic of Serbia**

NACE section	2003	2004	2005
A. Agriculture	0.19	0.13	0.14
B. Fishing	0.00	0.00	0.00
C. Mining and quarrying	0.02	0.02	0.02
D. Manufacturing	0.58	0.60	0.56
E. Electricity, gas and water supply	0.06	0.09	0.08
F. Construction	2.21	2.50	3.05
G. Wholesale and retail trade; repair	1.43	1.02	0.80
H. Hotels and restaurants	0.05	0.03	0.04
I. Transport, storage and commun.	0.25	0.20	0.14
J. Financial intermediation	0.18	0.24	0.26
K. Real estate, renting and busin. act.	0.22	0.08	0.16
L. Public administration	0.37	0.20	0.17
M. Education	0.09	0.09	0.10
N. Health and social work	0.01	0.14	0.11
O. Other services	0.13	0.06	0.16
Total GFCF adjustment as % of GDP	5.79	5.42	5.79

Republic of Serbia

Summary of GFCF adjustments, for the year 2003, in mill. din.									
Sectors/Nace sections	Type of non-exhaustiveness adjustment							Total	
	N1	N2	N3	N4	N5	N6	N7	Absolute	% of GDP
1	2	3	4	5	6	7	8	9	10
A. Agriculture				539.0	1611.0	55.4	68.4	2273.8	0.19
B. Fishing				4.0		13.8	0.0	17.8	0.00
C. Mining and quarrying				242.0		4.6	38.7	285.3	0.02
D. Manufacturing				3290.0	837.0	2388.2	241.7	6756.8	0.58
E. Electricity, gas and water supply				225.0		0.0	495.1	720.1	0.06
F. Construction	2870.1		20195.9	619.0		2126.8	36.3	25848.1	2.21
G. Wholesale and retail trade; repair	7074.5			2888.0	113.0	6682.7	43.1	16801.3	1.43
H. Hotels and restaurants	306.2			101.0		177.6	2.5	587.3	0.05
I. Transport, storage and commun.				2488.0		368.4	20.4	2876.8	0.25
J. Financial intermediation	447.0			289.0	3.0	9.1	1359.0	2107.1	0.18
K. Real estate, renting and busin. act.				213.0		2328.9	54.1	2596.0	0.22
L. Public administration				3186.0		0.0	1121.3	4307.3	0.37
M. Education	11.8			29.0		1008.0	26.7	1075.4	0.09
N. Health and social work				15.0		25.6	24.4	65.0	0.01
O. Other services	476.3			14.0		1008.0	8.4	1506.7	0.13
Total:	11185.9		20195.9	14142.0	2564.0	16197.1	3540.0	67824.9	5.79
Percentage of total adjustment	16.5		29.8	20.9	3.8	23.9	5.2	100.0	
GFCF adjustment as % of GDP	0.95		1.72	1.21	0.22	1.38	0.30		5.79

Republic of Serbia

Summary of GFCF adjustments, for the year 2004, in mill. din.									
Sectors/Nace sections	Type of non-exhaustiveness adjustment							Total	
	N1	N2	N3	N4	N5	N6	N7	Absolute	% of GDP
1	2	3	4	5	6	7	8	9	10
A. Agriculture				787.0	542.0	497.7	89.0	1915.7	0.13
B. Fishing				4.0		0.0	0.0	4.0	0.00
C. Mining and quarrying				230.0		10.6	48.8	289.4	0.02
D. Manufacturing				4346.0	312.0	3672.2	311.0	8641.2	0.60
E. Electricity, gas and water supply				548.0		0.0	689.2	1237.2	0.09
F. Construction	3694.4		27874.6	830.0		3361.5	42.0	35802.4	2.50
G. Wholesale and retail trade; repair	6370.2			3211.0	77.0	4842.4	55.4	14555.9	1.02
H. Hotels and restaurants	224.4			52.0		217.4	3.0	496.8	0.03
I. Transport, storage and commun.				2902.0		0.0	28.2	2930.2	0.20
J. Financial intermediation	1285.1			763.0	3.0	0.0	1364.8	3415.9	0.24
K. Real estate, renting and busin. act.				85.0		1068.3	54.9	1208.2	0.08
L. Public administration				1194.0		0.0	1703.0	2897.0	0.20
M. Education				761.0		487.0	36.8	1284.8	0.09
N. Health and social work				1970.0		1.0	34.4	2005.4	0.14
O. Other services	350.7			17.0		487.0	7.5	862.2	0.06
Total:	11924.9		27874.6	17700.0	934.0	14645.0	4468.0	77546.4	5.42
Percentage of total adjustment	15.4		35.9	22.8	1.2	18.9	5.8	100.0	
GFCF adjustment as % of GDP	0.83		1.95	1.24	0.07	1.02	0.30		5.42

Republic of Serbia

Summary of GFCF adjustments, for the year 2005, in mill. din.									
Sectors/Nace sections	Type of non-exhaustiveness adjustment							Total	
	N1	N2	N3	N4	N5	N6	N7	Absolute	% of GDP
1	2	3	4	5	6	7	8	9	10
A. Agriculture				600.0	1333.8	478.6	107.8	2520.2	0.14
B. Fishing				3.0		7.3	0.0	10.3	0.00
C. Mining and quarrying				190.0		38.2	53.7	281.9	0.02
D. Manufacturing				5023.0	237.4	4171.5	358.6	9790.6	0.56
E. Electricity, gas and water supply				711.0		0.0	713.8	1424.8	0.08
F. Construction	7191.8		43130.2	984.0		2112.2	46.5	53464.7	3.05
G. Wholesale and retail trade; repair	3584.7			2870.0	80.3	7473.0	64.6	14072.6	0.80
H. Hotels and restaurants	472.5			91.0		174.0	4.4	741.9	0.04
I. Transport, storage and commun.				2477.0		0.0	27.2	2504.2	0.14
J. Financial intermediation	1231.2			1397.0	3.0	0.0	1900.8	4532.0	0.26
K. Real estate, renting and busin. act.				1108.0		1522.2	88.9	2719.1	0.16
L. Public administration				1197.0		0.0	1720.1	2917.1	0.17
M. Education	178.6			948.0		523.1	42.2	1691.9	0.10
N. Health and social work				1837.0		0.0	30.6	1867.6	0.11
O. Other services	2165.9			80.0		523.1	12.2	2781.2	0.16
Total:	14824.6		43130.2	19516.0	1654.5	17023.3	5171.5	101320.0	5.79
Percentage of total adjustment	14.6	0.0	42.6	19.3	1.6	16.8	5.1	100.0	
GFCF adjustment as % of GDP	0.85		2.46	1.11	0.09	0.97	0.30		5.79

Finally if we sum up the results for the entire reference period, the total exhaustiveness adjustment does not show significant changes in relation to GDP, and it amounts to 5.42% in 2004 to 5.79% in 2003 and 2005. Also, N3 grew in 2005 because, based on the LFS results, the total number of hours worked increased in construction, and therefore in FTE employment used for correction.

GFCF exhaustiveness adjustment by type, % of GDP

Republic of Serbia

Non-exhaustiveness type	N1	N3	N4	N5	N6	N7	Total
2003	0.95	1.72	1.21	0.22	1.38	0.3	5.79
2004	0.83	1.95	1.24	0.07	1.02	0.3	5.42
2005	0.85	2.46	1.11	0.09	0.97	0.3	5.79

Additional adjustments have not been made for other expenditure components. Data on exports and imports of goods are obtained from external trade statistics based on customs data, while exports and imports of services are taken from the Balance of Payments from the National bank of Serbia, without any adjustment.

During the last years the deficit in external trade of Serbia is especially notable. Economic and social problems of the population and low standard of living are, to a great extent, overcome by remittances from abroad. The data from the Balance of Payments indicate that the amount of remittances constantly grows. It is an estimate of the National Bank of Serbia that more than twice as much money is brought into the country, through unofficial channels and in "pockets and envelopes", as is officially registered. The estimate was made on the basis of transactions in exchange offices, new savings in hard currency and on a correction of the data about purchase of hard currency from foreign tourists which is, under the methodology, considered to be income from tourism.

Remittances from abroad

Republic of Serbia

	2001	2002	2003	2004	2005
Estimated remittances in mill USD	1168	1484	1780	2520	2904
in % of GDP	9.9	9.4	8.7	10.3	11.1
in % of import	24.0	23.0	20.7	20.3	23.3
in % of net export	50.5	44.9	40.5	36.2	51.4
per capita in USD	156	198	238	338	390
Registered part in mill USD from BoP	405	520	780	990	1183
in % of GDP	3.4	3.3	3.8	4.0	4.5
in % of import	8.3	8.1	9.1	8.0	9.5
in % of net export	17.5	15.8	17.8	14.2	20.9
per capita in USD	54	69	104	133	159
Unregistered part in mill USD	763	964	1000	1530	1721
in % of GDP	6.5	6.1	4.9	6.2	6.6
in % of import	15.6	14.9	11.7	12.3	13.8
in % of net export	33.0	29.2	22.8	22.0	30.5
per capita in USD	102	129	134	205	231

Remittances as additional income of households contribute to their consumption or savings and represent an important source of investments, so that could be used for further non-exhaustiveness adjustment from expenditure side.

Flows related to tourist expenditure from BoP should be treated with caution, as there are some indications that these figures could be underestimated. The main aim of carrying out ad hoc survey during the second phase of the project is obtaining necessary indicators for estimates of the household income from abroad, number of our relatives living abroad as well as the household expenditure on traveling abroad. That information could be used in the future work for coverage adjustment of tourist services and for estimation of non-registered part of remittances in the cooperation with the National Bank.

If the results of the above mentioned survey show that non-registered remittances actually reach the amount estimated by the National Bank, the latter can be included in BoP and national accounts.

Conclusion and future work

Depending on the analysis of the results and the control of the current coverage, but of the improved survey on GFCF for 2006, we expect better results and more reliable estimations of the non-exhaustiveness adjustment for this year. Also, we consider that it would be preferable to impute data for each non-respondent on a case by case basis than on the aggregated level. Imputation may be based on data from the financial statements-balance sheets about acquisitions of tangible and intangible assets during the year.

Based on the calculation for 2006, one can make certain corrections for backward years, when we did not have consistent data sources, which could have enabled for such estimations to be carried out the same way, and for the results to be comparable and sufficiently reliable in order to be included into official national accounts.

With regard to export-import data adjustment, if the results from ad-hoc above mentioned survey show that non-registered remittances from abroad actually reach the amount estimated by the National Bank, the latter can be included in national accounts.

Eurostat's Tabular Approach of Exhaustiveness
Table 1 Summary of GVA Adjustments: Expenditure Approach, 2003

Republic of Serbia								mill.din.	
Components	Type of non-exhaustiveness adjustment							Total	
	N1	N2	N3	N4	N5	N6	N7	Absolute	% of GDP
1	2	3	4	5	6	7	8	9	10
Household final consumption expenditure	14026.0	11636.1				25696.0	8079.0	59437.1	5.07
Final consumption of general government							492.6	492.6	0.04
Gross fixed capital formation	11185.9		20195.9	14142.0	2564.0	16197.1	3540.0	67824.9	5.79
Export and imports							57585.4	57585.4	4.92
Total	25211.9	11636.1	20195.9	14142.0	2564.0	41893.1	69697.0	185340.0	15.82

Eurostat's Tabular Approach of Exhaustiveness
Table 1 Summary of GVA Adjustments: Expenditure Approach, 2004

Republic of Serbia								mill.din.	
Components	Type of non-exhaustiveness adjustment							Total	
	N1	N2	N3	N4	N5	N6	N7	Absolute	% of GDP
1	2	3	4	5	6	7	8	9	10
Household final consumption expenditure	21766.0	14413.2				30303.0	10222.0	76704.2	5.36
Final consumption of general government							549.5	549.5	0.04
Gross fixed capital formation	11924.9		27874.6	17700.0	934.0	14645.0	4468.0	77546.4	5.42
Export and imports							89323.5	89323.5	6.24
Total	33690.9	14413.2	27874.6	17700.0	934.0	44948.0	104563.1	244123.6	17.06

Eurostat's Tabular Approach of Exhaustiveness
Table 1 Summary of GVA Adjustments: Expenditure Approach, 2005

Republic of Serbia								mill.din.	
Components	Type of non-exhaustiveness adjustment							Total	
	N1	N2	N3	N4	N5	N6	N7	Absolute	% of GDP
1	2	3	4	5	6	7	8	9	10
Household final consumption expenditure	20161.0	17900.5				41951	14635.0	94647.5	5.41
Final consumption of general government							627.8	627.8	0.04
Gross fixed capital formation	14824.6		43130.2	19516.0	1654.5	17023.3	5171.5	101320.0	5.79
Export and imports							114814.4	114814.4	6.56
Total	34985.6	17900.5	43130.2	19516.0	1654.5	58974.3	135248.7	311409.8	17.79