

This PDF is a selection from an out-of-print volume from the National Bureau of Economic Research

Volume Title: International and Interarea Comparisons of Income, Output, and Prices

Volume Author/Editor: Alan Heston and Robert E. Lipsey, editors

Volume Publisher: University of Chicago Press

Volume ISBN: 0-226-33110-5

Volume URL: <http://www.nber.org/books/hest99-1>

Publication Date: January 1999

Chapter Title: Multilateral Comparison of the Baltic Countries, 1993: An Informal Report

Chapter Author: Seppo Varjonen

Chapter URL: <http://www.nber.org/chapters/c8392>

Chapter pages in book: (p. 251 - 259)

---

# 8 Multilateral Comparison of the Baltic Countries, 1993: An Informal Report

Seppo Varjonen

The Baltic countries—Estonia, Latvia, and Lithuania—formed Subgroup C within the Group II comparisons for 1993. The comparisons were based on the Group II A product lists, and they were linked to Group II A and to Group I through Austria.

Statistics Finland acted as the coordinating agency for the Baltic comparison, checking and coordinating price collection and making all the necessary calculations. Finland, however, did not participate in the comparisons.

The main difference between the Baltic comparison and the Group II A comparison was that the Baltic comparison was not a star system of bilateral comparisons but a multilateral EKS comparison comprising four countries, namely, Austria and the three Baltic countries. The multilateral method was applied at each stage of work, including the calculation of reference parities and the productivity adjustment for nonmarket services.

The other basic difference between the Baltic comparison and the Group II A comparison was that the parities for consumer goods and services were calculated by identifying representative and nonrepresentative products (i.e., asterisked and nonasterisked products) and using this information in the calculation in the same way as in the Group I comparison.

The work was carried out in close cooperation with the Austrian Central Statistical Office (ACSO) in order to guarantee comparability with the Group II A comparison.

In what follows, the comparison work is not thoroughly described. Instead, attention is focused on the methodological differences between the Group II A comparison and the Baltic comparison and what can be learned from the experience gained.

Seppo Varjonen was responsible for the Baltic PPP comparison while working in Statistics Finland. He is now working in the Transition Economies Division of the OECD.

## 8.1 Organization of the Baltic Comparison

Five workshops were held during the project. These workshops replaced the bilateral meetings held by Austria with each of its partner countries. The group meetings provided an opportunity to discuss ways to improve the comparability of data supplied by the countries.

Before starting the price collection, a Finnish expert visited each Baltic country in order to prepare the item selection and practical price collection work.

The fourth workshop dealt mainly with the results of price surveys. The price data supplied were checked in the light of the first approximations of the price-level indexes. A first check had been made in Finland, and the countries had replied to written questions. After clarifications as to which discrepancies could be neglected, and after removing errors, the countries agreed to find comparable prices to be included in the comparison.

The way the Baltic countries would be compared with other countries was also discussed. One possibility was to use price data from Poland and Belarus to strengthen the link to Group II A. Especially the Polish prices for consumer goods and durables seemed in many cases to be comparable with those of the Baltic countries. Prices from Poland and Belarus were used as background material when prices were analyzed.

## 8.2 Price Surveys and Quality of Price Data

The price surveys were based on Group II A, but some items were added to the lists and specified tightly in order to strengthen the comparability of prices.

As usual, price data for consumer goods and services are partly based on price surveys conducted by countries and partly on national CPIs. In Estonia, as much as 40 percent of prices are taken from CPI data files. In other Baltic countries, the share was around 20 percent.

For consumer goods and services, the overlap between the countries was relatively high (see tables 8.1 and 8.2).

In some cases, a country could not find any prices for a basic heading. The EKS methodology was then applied to prices at the next highest level and the result taken as a reference parity.

At the final stage of work, all consumer prices were checked, and quality corrections were made when necessary. The quality adjustments were made in accordance with the principles governing the bilateral comparisons with the other Group II countries and Austria. Data on adjustments made for prices in Poland were used as background material in the evaluation of adjustments needed.

Prices for machinery and equipment were the main problem areas in the comparison. Price data had to be gathered by special surveys in each country.

**Table 8.1** Total Number of Consumer Prices and, of Them, the Prices of Asterisked Products

	Estonia		Latvia		Lithuania	
	Total	Aster.	Total	Aster.	Total	Aster.
111 Food, beverages, and tobacco	153	139	144	138	152	113
112 Clothing and footwear	108	96	75	66	93	62
113 Gross rents, fuel and power	32	26	17	16	23	20
114 Furniture, fixtures, household operation	126	103	101	68	124	74
115 Medical care and health	29	27	14	11	28	25
116 Transport and communication	45	37	33	28	53	34
117 Recreation, entertainment, education	58	40	62	41	65	50
118 Miscellaneous goods and services	51	49	47	36	51	44
Total	602	517	493	404	589	422

**Table 8.2** Total Number of Consumer Prices and, of Them, Adjusted Prices

	Estonia		Latvia		Lithuania	
	Total	Adj.	Total	Adj.	Total	Adj.
111 Food, beverages, and tobacco	153	15	144	13	152	7
112 Clothing and footwear	108	10	75	14	93	11
113 Gross rents, fuel and power	32	0	17	0	23	1
114 Furniture, fixtures, household operation	126	10	101	12	124	8
115 Medical care and health	29	0	14	0	28	0
116 Transport and communication	45	17	33	14	53	18
117 Recreation, entertainment, education	58	0	62	5	65	0
118 Miscellaneous goods and services	51	2	47	1	51	2
Total	602	54	493	59	589	47

This information was not easily obtained because 1993 was a transition period in the Baltic countries.

There were large discrepancies in terms of quality of data available, and only a small number of price quotations were submitted by the countries owing to the exceptional circumstances prevailing in 1993. In 1993, investments were cut to the minimum, and the equipment that entered the countries was often secondhand or obtained as a result of humanitarian aid.

As in Group II A, there was little overlap among equipment prices, and the inventory in the Austrian database showed that only a few products priced by the Baltic countries were priced by some Group II A countries. The Austrian database also showed that the dispersion of price ratios within the same basic heading was very wide. To avoid the risk of basing the comparison on too few prices, it was necessary to break the comparison rules and use exchange rates as price parities.

Price parities for construction could be calculated without any major problems.

Inflation was slowing down in the Baltic countries in 1993 but was still quite high. The yearly inflation figures in the latter part of 1993 were around 50 percent in Estonia and Latvia and higher in Lithuania. That 1993 was a year of transition and the statistical standards prevailing in these countries during that year influenced the comparability of results to some extent.

### **8.3 Results and the Influence of Differences in Methods on the Comparability with Group II A Countries**

As explained above, the main differences between the methods applied in the Baltic subgroup and those applied in Group II A were the use of the asterisked products in the calculation of parities and the multilateral processing of the data. In the following, it is shown by a set of tables how much the volume results differ from the results that would have been obtained had the Baltic countries been treated in the same way as any other country in Group II A.

Table 8.3 describes the results when the same methodology is applied to the Baltic group as is applied to the Group II A countries. Table 8.4 describes the actual treatment of the Baltic countries in the comparison. Tables 8.5 and 8.6 show how much the different methodology has influenced the volume results.

The tables show that the different approach applied by the Baltic group has only a minor influence on the results. When the asterisked characteristics of products are taken into account, there is a tendency to get slightly higher volumes for the Baltic countries. It should be noted that the tendency is strongest for Lithuania, which submitted more prices than the other Baltic countries.

When interpreting the test results of the importance of representativity, it should be also noted that the Austrian list was quite strictly followed in the Baltic comparison. The results could be different if more prices outside the Austrian list would have been used.

The multilateral processing of Baltic countries has even less influence on overall results. This is not surprising since the EKS method changes the bilateral parities as little as possible. The advantage of the use of multilateral data processing has been indirect—the countries have had the opportunity to compare prices directly at each stage of work and at each level of detail of data.

### **8.4 Comparison of Nonmarket Services and the Productivity Adjustment**

In Group II A, methods applied for measuring purchasing power parities (PPPs) and volumes for nonmarket services differ somewhat country by country depending on the availability of base data. Mostly, volumes for the compensation of employees are based on the number of employees (or, for some countries, PPPs are calculated on the basis of wage comparisons), which are then

Table 8.3

**Indexes of Real Value per Capita of Final Expenditure  
on GDP for the Baltic Group by Group II A Methodology**

	Austria	Estonia	Latvia	Lithuania	
1	Final consumption of population (national)	100	25.0	19.5	29.1
2	Food, beverages, tobacco	100	43.4	36.3	50.7
3	Food	100	44.1	37.3	63.6
4	Bread and cereals	100	41.9	49.3	117.1
5	Meat	100	46.3	34.6	77.1
6	Fish	100	67.4	70.4	64.5
7	Milk, cheese, and eggs	100	67.8	61.7	88.2
8	Oils and fats	100	36.4	32.0	67.6
9	Fruits, vegetables, potatoes	100	41.6	32.4	26.6
10	Other food	100	30.3	20.0	37.7
11	Beverages	100	30.0	36.8	12.7
12	Nonalcoholic beverages	100	5.4	3.9	4.4
13	Alcoholic beverages	100	38.6	47.4	15.2
14	Tobacco	100	84.4	20.4	19.3
15	Clothing and footwear	100	14.2	10.2	24.2
16	Clothing	100	13.1	9.0	25.3
17	Footwear	100	18.6	14.0	21.9
18	Gross rents, fuel and power	100	33.4	25.8	49.3
19	Gross rents	100	20.7	17.1	35.9
20	Fuel and power	100	71.0	49.1	85.3
21	Household equipment and operation	100	6.0	3.7	6.0
22	Furniture	100	3.0	1.8	4.1
23	Household textiles	100	4.7	5.7	9.2
24	Appliances	100	6.7	1.7	3.9
25	Other household goods and services	100	12.4	10.3	12.6
26	Medical care	100	17.5	13.9	19.6
27	Transport and communication	100	9.7	6.9	.0
28	Transport equipment	100	3.0	.6	2.2
29	Operation of equipment	100	9.9	4.2	4.8
30	Purchased transport services	100	24.4	40.0	36.1
31	Communication	100	23.8	13.0	40.5
32	Recreation, education	100	37.3	25.6	35.3
33	Equipment for recreation	100	8.3	4.2	4.1
34	Recreational, cultural services	100	21.5	7.5	6.5
35	Books, newspapers, magazines	100	86.7	17.0	43.1
36	Education	100	64.0	58.9	77.8
37	Miscellaneous goods & services	100	9.1	5.1	8.7
38	Restaurants, cafés, hotels	100	7.7	3.9	3.6
39	Other goods and services (including nonprofit institutions)	100	12.8	7.5	16.2
40	Net purchases abroad	-100	-1.8	.6	.4
41	Collective consumption of government	100	30.3	25.6	20.0
42	Gross fixed capital formation	100	9.2	5.1	8.6
43	Construction	100	12.2	7.5	17.7
44	Residential buildings	100	3.1	10.0	20.1
45	Nonresidential buildings	100	25.1	9.5	19.5
46	Other construction etc.	100	5.7	3.7	12.6
47	Machinery and equipment	100	6.5	3.2	3.2
48	Transport equipment	100	1.3	7.1	4.8
49	Nonelectrical machinery	100	7.0	2.5	3.4
50	Electrical machinery	100	10.9	1.1	.8
51	Changes in stocks	100	72.0	-112.0	-42.9
52	Balance of imports and exports	100	-13.8	52.8	-23.5
53	Gross domestic product	100	19.4	16.1	18.8

*Note:* Each country has been compared bilaterally with Austria without taking the representativity of products into account. The results are based on EKS processing for all sixteen Group II countries. Austria = 100.

Table 8.4

**Indexes of Real Value per Capita of Final Expenditure on GDP  
for the Baltic Group by Methodology Used in the Comparison**

	Austria	Estonia	Latvia	Lithuania	
1	Final consumption of population (national)	100	25.7	19.7	29.8
2	Food, beverages, tobacco	100	45.6	36.4	52.3
3	Food	100	46.2	36.7	62.6
4	Bread and cereals	100	53.5	46.5	115.4
5	Meat	100	45.5	34.7	72.2
6	Fish	100	72.8	67.7	64.3
7	Milk, cheese and eggs	100	67.8	61.6	88.3
8	Oils and fats	100	36.4	32.0	67.6
9	Fruits, vegetables, potatoes	100	42.1	32.2	28.5
10	Other food	100	31.9	19.5	37.1
11	Beverages	100	32.4	40.8	17.6
12	Nonalcoholic beverages	100	6.1	3.5	4.3
13	Alcoholic beverages	100	41.7	55.2	22.0
14	Tobacco	100	84.3	20.4	19.3
15	Clothing and footwear	100	15.3	10.1	24.5
16	Clothing	100	14.3	9.4	26.1
17	Footwear	100	18.9	13.0	21.2
18	Gross rents, fuel and power	100	33.5	27.0	50.4
19	Gross rents	100	21.3	18.5	37.7
20	Fuel and power	100	69.1	47.6	86.1
21	Household equipment and operation	100	6.9	3.8	6.6
22	Furniture	100	3.5	1.6	3.9
23	Household textiles	100	5.1	5.8	10.4
24	Appliances	100	7.7	2.2	4.6
25	Other household goods and services	100	14.8	10.9	15.3
26	Medical care	100	17.0	15.7	18.6
27	Transport and communication	100	9.8	6.4	6.9
28	Transport equipment	100	3.1	.7	2.1
29	Operation of equipment	100	10.2	4.0	4.5
30	Purchased transport services	100	26.8	37.3	35.2
31	Communication	100	21.9	13.2	40.8
32	Recreation, education	100	36.8	24.9	36.2
33	Equipment for recreation	100	8.0	4.4	4.4
34	Recreational, cultural services	100	22.3	6.7	6.3
35	Books, newspapers, magazines	100	71.5	12.7	28.8
36	Education	100	63.6	58.1	80.0
37	Miscellaneous goods & services	100	9.3	5.2	9.1
38	Restaurants, cafés, hotels	100	8.0	3.9	3.7
39	Other goods and services (including nonprofit institutions)	100	12.8	7.8	16.8
40	Net purchases abroad	-100	-1.8	.6	.4
41	Collective consumption of government	100	29.3	25.9	20.9
42	Gross fixed capital formation	100	8.9	5.3	8.6
43	Construction	100	11.2	8.1	17.7
44	Residential buildings	100	3.1	10.0	20.1
45	Nonresidential buildings	100	24.7	9.9	18.8
46	Other construction etc.	100	4.3	4.5	13.4
47	Machinery and equipment	100	6.6	3.2	3.2
48	Transport equipment	100	1.3	7.3	4.8
49	Nonelectrical machinery	100	7.0	2.5	3.4
50	Electrical machinery	100	10.9	1.1	.8
51	Changes in stocks	100	76.5	-110.9	-42.3
52	Balance of imports and exports	100	-13.8	52.8	-23.5
53	Gross domestic product	100	19.5	16.3	19.1

*Note:* PPSs are calculated multilaterally within the Baltic group taking the representativity of products into account. The results are based on the EKS processing of all sixteen Group II countries. (Table is the sum of tables 8.3, 8.5, and 8.6.) Austria = 100.

**Table 8.5 Influence on Results Incorporating Representativity of Products**

		Austria	Estonia	Latvia	Lithuania
1	Final consumption of population (national)	0	.4	.6	.7
2	Food, beverages, tobacco	0	1.1	1.3	1.5
3	Food	0	1.0	.2	-.8
4	Bread and cereals	0	3.7	1.6	5.2
5	Meat	0	-.3	-.1	-5.3
6	Fish	0	4.6	-.1	-2.9
7	Milk, cheese, and eggs	0	.0	-.1	.0
8	Oils and fats	0	.0	.0	.0
9	Fruits, vegetables, potatoes	0	.3	.0	1.6
10	Other food	0	1.5	.3	-1.4
11	Beverages	0	1.8	9.4	4.2
12	Nonalcoholic beverages	0	.0	.0	.0
13	Alcoholic beverages	0	3.1	14.9	5.9
14	Tobacco	0	.0	.0	.0
15	Clothing and footwear	0	.7	.1	.1
16	Clothing	0	.7	.4	.1
17	Footwear	0	.5	-1.0	-.9
18	Gross rents, fuel and power	0	-.1	.6	3.8
19	Gross rents	0	.0	.7	5.1
20	Fuel and power	0	-.8	.0	.0
21	Household equipment and operation	0	.9	.2	.6
22	Furniture	0	.3	-.3	-.2
23	Household textiles	0	.4	.2	.8
24	Appliances	0	.9	.4	1.1
25	Other household goods and services	0	2.6	1.2	1.8
26	Medical care	0	.0	.8	.0
27	Transport and communication	0	-.5	-.1	7.5
28	Transport equipment	0	.0	.0	.0
29	Operation of equipment	0	-1.0	-.1	.2
30	Purchased transport services	0	.0	.0	1.1
31	Communication	0	-1.4	.0	-.2
32	Recreation, education	0	.9	.6	-.4
33	Equipment for recreation	0	-.3	.5	.2
34	Recreational, cultural services	0	-.2	-.3	-.6
35	Books, newspapers, magazines	0	6.6	-.1	-16.4
36	Education	0	.1	.1	.1
37	Miscellaneous goods & services	0	.1	.2	.4
38	Restaurants, cafés, hotels	0	.0	.3	.0
39	Other goods and services (including nonprofit institutions)	0	.2	.2	1.1
40	Net purchases abroad	0	.0	.0	.0
41	Collective consumption of government	0	.2	.3	.3
42	Gross fixed capital formation	0	.0	.0	.0
43	Construction	0	.0	.0	.0
44	Residential buildings	0	.0	.0	.0
45	Nonresidential buildings	0	.0	.0	.0
46	Other construction etc.	0	.0	.0	.0
47	Machinery and equipment	0	.0	.0	.0
48	Transport equipment	0	.0	.1	.0
49	Nonelectrical machinery	0	.0	.0	.0
50	Electrical machinery	0	.0	.0	.0
51	Changes in stocks	0	1.0	-2.9	-.5
52	Balance of imports and exports	0	.0	.0	.0
53	Gross domestic product	0	.2	.3	.4



**Table 8.6 Influence on Results When Price Parities of the Baltic Countries Are Estimated Multilaterally**

		Austria	Estonia	Latvia	Lithuania
1	Final consumption of population (national)	0	.3	-.3	-.2
2	Food, beverages, tobacco	0	1	-1.1	0
3	Food	0	1.1	-.7	-.3
4	Bread and cereals	0	7.8	-4.3	-6.3
5	Meat	0	-.5	.2	.5
6	Fish	0	.9	-2.3	2.7
7	Milk, cheese and eggs	0	0	0	.1
8	Oils and fats	0	0	0	0
9	Fruits, vegetables, potatoes	0	.2	-.3	.3
10	Other food	0	.2	-.7	.8
11	Beverages	0	.7	-3.3	.7
12	Nonalcoholic beverages	0	.7	-.3	-.1
13	Alcoholic beverages	0	.4	-4.2	1
14	Tobacco	0	-.1	0	0
15	Clothing and footwear	0	.4	0	.4
16	Clothing	0	.5	-.1	.6
17	Footwear	0	-.2	.1	.2
18	Gross rents, fuel and power	0	.3	.6	-1.7
19	Gross rents	0	.9	1.6	-3.5
20	Fuel and power	0	-2.1	-1.3	.6
21	Household equipment and operation	0	.1	0	0
22	Furniture	0	.1	.1	0
23	Household textiles	0	0	-.1	.3
24	Appliances	0	.2	.1	-.4
25	Other household goods and services	0	-.1	-.6	.5
26	Medical care	0	-.6	.9	-.9
27	Transport and communication	0	.7	-.4	-.4
28	Transport equipment	0	0	-.3	-.2
29	Operation of equipment	0	1.4	-.2	-.5
30	Purchased transport services	0	.8	-1.8	-.6
31	Communication	0	-.6	.2	.1
32	Recreation, education	0	-.1	-1.1	.9
33	Equipment for recreation	0	0	-.3	.1
34	Recreational, cultural services	0	-.1	-.3	.2
35	Books, newspapers, magazines	0	-21.1	-4.5	1.9
36	Education	0	-.5	-1.3	2
37	Miscellaneous goods & services	0	.1	-.1	-.1
38	Restaurants, cafés, hotels	0	.3	-.2	0
39	Other goods and services (including nonprofit institutions)	0	-.1	.1	-.2
40	Net purchases abroad	0	0	0	0
41	Collective consumption of government	0	-1.3	0	.6
42	Gross fixed capital formation	0	-.4	.2	0
43	Construction	0	-.9	.6	0
44	Residential buildings	0	0	0	0
45	Nonresidential buildings	0	-.3	.5	-.7
46	Other construction, etc.	0	-1.3	.8	.9
47	Machinery and equipment	0	0	0	0
48	Transport equipment	0	0	.1	-.1
49	Nonelectrical machinery	0	0	0	0
50	Electrical machinery	0	0	0	0
51	Changes in stocks	0	3.5	4	1.1
52	Balance of imports and exports	0	0	0	0
53	Gross domestic product	0	-.1	-.1	-.1

corrected by taking into account the differences in general productivity levels between countries. The general productivity level of a country is measured by comparing the ratio of value added in real values to the number of employees in market industries (excluding agriculture). General productivity adjustment was used in all other nonmarket services except education, where special adjustments were developed.

Methods used in the Baltic comparison of nonmarket services do not essentially differ from those used generally in Group II A. Number of employees was used as a volume indicator, which was then corrected by the productivity adjustment. Measurement on the basis of wage data was not possible in any Baltic country.

The Baltic comparison differed in method from Group II A only when dealing with education. In the Baltic comparison, the volume indicator for the compensation of teaching staff was simply the number of teachers. In Group II A, the volume at the university level of education was the number of teachers corrected by the student/teacher ratio (leading to the outcome that the volume equals the number of students) and at other levels of education the number of teachers corrected by the teacher/pupil ratio.

The productivity-level index compared to Austria was 0.22 for Estonia, 0.18 for Latvia, and 0.16 for Lithuania. Use of the indexes for adjusting the volumes of nonmarket services (excluding education) decreased the GDP volumes by about three units (where Austria = 100), or by about 15 percent of the GDP of the Baltic countries.

The productivity level is certainly lower in Group II countries than in Group I on average, and it can be concluded that, in order to obtain more realistic results, productivity adjustments are necessary. But what is the right amount of adjustment, and is it possible to improve the estimation?

One possibility is to improve the measurement of adjustment coefficients by eliminating the influence of different production structures on the result. Preliminary tests done for OECD countries show that estimating value added/number of employees ratios by industry and using these instead of the ratio obtained from the total of market industries may result in the lower dispersion of adjustments. However, it is obvious that the use of any reference productivity-level index is not suitable for all countries and cannot replace a direct estimation of productivity levels.