

A Comparison of Official and EUKLEMS estimates of MFP Growth for Canada

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January 12, 2012

The Canadian data in the EU KLEMS database is now updated to more recent years: value-added MFP to 2010 and gross output-based MFP to 2008. The data is consistent with the industry productivity data released in the Statistics Canada Daily on January 11, 2012. It consists of:

1. Core KLEMS database for 31 industries of the total Canadian economy;
2. Data on hours worked and labour compensation in 31 industries for 18 types of workers (2 gender, 3 education types and 3 age groups); and
3. Data on investment and capital stock in 31 industries for 4 types of asset (residential, non-residential, ICT M&E and non-ICT M&E).

The Canadian data on capital and labour inputs for EUKLEMS is constructed using the EUKLEMS methodology, which is slightly different from the one we used to construct KLEMS database that is released on Statistics Canada's CANSIM database. The main difference relates to: 1) the classification of assets and hours worked for constructing capital input and labour input; 2) user cost specification (whether including or excluding tax parameters); 3) depreciation rates; and 4) industry classification. The classification of assets and hours worked used in Statistics Canada's official estimate is more disaggregated than the one used for EUKLEMS. The user cost specification includes tax parameters in the official estimate while it does not in the EUKLEMS estimate. The depreciation rates for structures in the official estimate are higher than those used for EUKLEMS estimates while the depreciation rates for M&E are similar.

In addition, there are other differences in the estimation of capital and labour inputs. Capital input in the official MFP estimate includes produced assets (M&E and structures) as well as land and inventory, while capital input in the EUKLEMS includes produced assets only. Labour input in the official estimate does not consider the substitution of labour between genders while labour input in the EUKLEMS does. To construct labour input and capital input for the aggregate sectors such as the total business sector, the bottom-up approach is used in EUKLEMS. Capital and labour inputs are first constructed at the industry level and then aggregated across industries to derive aggregate capital and labour inputs in the EUKLEMS. For the official MFP estimate, the BLS practice is followed. The bottom-up approach is used for constructing aggregate capital input, but not for constructing aggregate labour input. The aggregate labour input in the official estimate is constructed by aggregating hours worked across different types (age, education, class worker of workers). The difference in two estimates of aggregate labour inputs reflects the effect of reallocation of labour across industries.

Those differences in the official and EUKLEMS estimates do not affect the trend in productivity growth. The Canadian productivity estimate in EUKLEMS and the official estimate show similar trends in labour productivity and multifactor productivity growth, as shown in Table 1.

There are some differences in the growth in labour composition in the official and EUKLEMS estimates. For the period 2000-2010, labour composition in the market sector increased at 0.2% per year in the EUKLEMS, while labour composition in the business sector increased at 0.5% per year in the official estimate. The sources of differences are presented in Table 2. The most important source of the difference is the level of details in the education categories used in the two estimates. Workers are disaggregated by three education categories in the EUKLEMS (0-8 years of schooling, secondary and post-secondary education below bachelor's degree, and bachelor's degree or above), while they are disaggregated by four categories in the official estimate (0-8 years of schooling, some or completed high school, post-secondary education below bachelor's degree, bachelor's degree or above). The share of workers with post-secondary below bachelor's degree increased in the Canadian business sector over time, while the share of workers with some or completed high school declined. Combining those two categories as is done in the EUKLEMS lowers the growth in labour composition.

The industries for the official estimate for Canada are classified according to the North American Industry Classification (NAICS 2007). The industries for the EUKLEMS are based on the European NACE classification. A concordance between the EUKLEMS industries and NAICS 2007 is presented in Table 3.

Table 1
Productivity Growth and Related Variables, Official vs. EUKLEMS Estimates

	1970- 1980	1980- 2000	2000- 2010
Official estimate for the business sector			
Multifactor productivity	0.1	0.3	-0.5
Labour productivity	2.1	1.6	0.8
Real GDP	4.3	3.1	1.6
Labour	2.8	2.2	1.4
Hours	2.2	1.5	0.8
Labor composition	0.6	0.6	0.5
Capital	6.4	3.9	3.1
EUKLEMS estimate for the market sector			
Multifactor productivity	0.7	0.5	-0.3
Labour productivity	2.3	1.8	0.9
Real GDP	4.4	3.3	1.7
Labour	2.4	1.7	1.0
Hours	2.2	1.4	0.8
Labour composition	0.2	0.3	0.2
Capital	6.3	4.6	3.4

Note. The market sector differs from the business sector. The market sector excludes the rental housing and the education and health care sector, while the business sector includes the rental housing, business sector share of the health and education sectors.

Table 2
The Sources of Differences in Labour Composition Growth in EUKLEMS and Official Estimates

	1970- 1980	1980- 2000	2000- 2010
EUKLEMS estimate for the market sector	0.2	0.3	0.2
Official estimate for the market sector	0.6	0.6	0.5
<u>EUKLEMS minus official estimates</u>	<u>-0.4</u>	<u>-0.3</u>	<u>-0.3</u>
<u>Effects of:</u>			
Labour reallocation across industries in EUKLEMS	0.1	-0.1	0.0
Substitution between genders in EUKLEMS	-0.2	-0.1	0.0
Fewer education categories in EUKLEMS	-0.2	-0.1	-0.2
Fewer age categories in EUKLEMS	-0.1	-0.1	0.0
<u>Sum</u>	<u>-0.3</u>	<u>-0.4</u>	<u>-0.2</u>

Note. The market sector differs from the business sector. The market sector excludes the rental housing and the education and health care sector, while the business sector includes the rental housing, business sector share of the health and education sectors.

Table 3

Concordance between EUKLEMS Industries and NAICS 2007

EUK	EU KLEMS industries	EUK	NAICS 2007
31			
1	AGRICULTURE, HUNTING, FORESTRY AND FISHING	AtB	11
2	MINING AND QUARRYING	C	21
3	FOOD , BEVERAGES AND TOBACCO	15t16	311+312
4	TEXTILES, TEXTILE , LEATHER AND FOOTWEAR	17t19	313+314+315+316
5	WOOD AND OF WOOD AND CORK	20	321
6	PULP, PAPER, PAPER , PRINTING AND PUBLISHING	21t22	322+323+3346+5111
7	Coke, refined petroleum and nuclear fuel	23	324
8	Chemicals and chemical	24	325
9	Rubber and plastics	25	326
10	OTHER NON-METALLIC MINERAL	26	327
11	BASIC METALS AND FABRICATED METAL	27t28	331+332
12	MACHINERY, NEC	29	333+3352
13	ELECTRICAL AND OPTICAL EQUIPMENT	30t33	(334 excl. 3346)+3351+3353+3359
14	TRANSPORT EQUIPMENT	34t35	336
15	MANUFACTURING NEC; RECYCLING	36t37	337+339
16	ELECTRICITY, GAS AND WATER SUPPLY	E	22
17	CONSTRUCTION	F	23
18	Motor vehicle trade, retail sales of fuel and motor repairs	50	8111
19	Wholesale trade	51	41
20	Retail trade and repair of household goods	52	44+45+8112+8113+8114
21	HOTELS AND RESTAURANTS	H	72
22	TRANSPORT AND STORAGE	60t63	48+493+5615
23	POST AND TELECOMMUNICATIONS*	64	491+492+5151+5152+5170+5191
24	FINANCIAL INTERMEDIATION	J	52
25	Real estate activities	70	531
26	Renting of m&eq and other business activities	71t74	532+5112+5142+541+55+533
27	PUBLIC ADMIN AND DEFENCE; COMPULSORY SOCIAL SECURITY	L	Government (excl. public health and education)
28	EDUCATION	M	61+public education
29	HEALTH AND SOCIAL WORK	N	62+public health
30	OTHER COMMUNITY, SOCIAL AND PERSONAL SERVICES	O	512+562+71+812+813+(561 excl. 5615)
31	PRIVATE HOUSEHOLDS WITH EMPLOYED PERSONS	P	814

* Post and telecommunications includes broadcasting (NAICS 515) and other information services (NAICS 5191).