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Human Capital: Satellite Account

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Outline

- Measuring human capital.
- Accounting for human capital in the SNA
- Results: Canadian Human Capital Satellite Account
- Conclusions and challenges

Motivation



- Including human capital within the national accounts provides data users with:
 - an assessment of the role that skills and knowledge acquired through education and training have on economic and productivity growth;
 - a comparison of investment in human capital with other types of investment such as investment in machinery and equipment, structures and research and development to provide an examination of their relative importance for economic growth; and
 - information on the evolution of national wealth and economic sustainability

Measuring Human Capital



- Including investment in human capital in the national accounts raises a number of challenges such as:
 - how human capital is to be measured:
 - e.g. the methodology for valuing human capital (e.g cost-based approach versus lifetime income approach)
 - e.g. the choice of an appropriate price deflator for human capital investment
 - e.g. the choice of an appropriate depreciation rate for human capital
 - where the asset is produced;
 - how human capital is to be recorded through the sequence of accounts in the SNA

Measuring Human Capital



- Two approaches to measuring human capital:
 - Cost based approach – reflecting the total expenditures on education and training.
 - Income based approach – reflecting expected lifetime income. Under this approach, assumptions about the progress of lifetime income are applied to the age and education characteristics of a population
- The Canadian human capital satellite account presents both sets of estimates.

Measuring Human Capital

Cost based approach



- Investment in human capital represents total expenditures on formal education and formal training.
- After applying the appropriate deflator, the cost-based approach produces an estimate of human capital investment in constant prices which can be accumulated to derive a human capital stock using the perpetual inventory method.
- A major advantage in using the cost of production approach is its ability to delineate what the investment streams are.

Measuring Human Capital

Cost based approach (formal education)

- Both direct costs (input costs) by governments, NPISHs and households are included as well as indirect costs (imputed labour compensation of student time) which represent what would have been earned by the students engaged in education.
 - GDP increases by the value of imputed labour compensation of students, thus expanding the production boundary.
 - Investment increases by the sum of direct and indirect costs of formal education and consumption decreases by the direct costs of education.
 - For national income, labour income increases by the value of imputed labour compensation of students. Capital income does not change.

Measuring Human Capital

Cost based approach (formal training)

- The integration of formal training differs between the corporate sector and non-corporate sector as a result of the difference in their treatment in the current SNA.
 - For governments and NPISH it represents a reclassification of transactions from final consumption expenditures to investment (does not alter GDP).
 - For corporations it represents a reclassification of transactions from intermediate consumption to investment (increases GDP) plus the indirect costs of what would have been earned and produced by the workers on job-related training.

Measuring Human Capital

Cost based approach



	1981	1990	2000	2010
Total costs of education and training	35.5	81.4	123.5	296.0
Total costs of education	29.9	70.7	107.7	272.2
Direct costs by households	1.5	3.6	7.6	13.0
Direct costs by governments	20.4	37.8	46.7	75.2
Earnings forgone	8.0	29.3	53.4	184.0
Total costs of training	5.7	10.7	15.8	23.8
by business sector	4.2	7.9	12.1	17.6
by governments	1.5	2.8	3.7	6.3

Measuring Human Capital

Income approach



- The gross flow of investment under the income-based approach is larger than that from the cost-based approach.
- This extra value of human capital investment will be added to aggregate income and expenditure variables in a satellite account.
- The extra value of human capital investment is recorded as mixed income as there is insufficient information to break it down into gross operating surplus or to other activities performed by households.

Measuring Human Capital

Income approach



Investment in Human Capital	1981	1990	2000	2005
Investment in human capital, income-based estimate	248.2	451.6	438.4	489.7
Investment in human capital, cost-based estimate	35.5	81.4	106.2	206.4
GOS / mixed income for human capital investment	212.6	370.2	332.2	283.3

Recording human capital in the sequence of accounts



- Who 'owns' human capital?
 - The satellite account assumes that the household sector controls and reaps primary economic benefits from human capital.
 - Therefore, human capital must be recorded in the household sector capital account and balance sheet to reflect the ownership of the asset.

Recording human capital in the sequence of accounts



- Who produces human capital?

- Two options:
 - to look upon the relevant activities in the sector paying for the produced services as producing a non-capital market output that is transferred to the households where it is used as intermediate consumption into the production process of households producing their own human capital.
 - to look upon the relevant activities in the sector paying for the produced services as producing a capital output, and subsequently transferring these outputs, via capital transfers, to the households;

Recording human capital in the sequence of accounts



- If the household is seen as ‘producing’ human capital flows then the education and training are reflected as current transfers from the government, NPISH and corporate sector.
 - Initial expenditures on human capital financed by businesses, governments and NPISHs are transferred to the household sector through a current transfer.
 - These are reflected as intermediate consumption of households in the production of human capital. The household sector therefore produces human capital which subsequently recorded as investment by the household sector.
 - The current transfer increases household disposable income. It also increases human capital investment of the household sector which now includes the value of human capital investment that is financed by the government but that benefits household sector.

Recording human capital in the sequence of accounts



- If the government, corporate and NPISH sectors are seen as producing human capital flows then the education and training are reflected as capital transfers.
 - Initial expenditures on human capital are entered as investments according to the sectors that finance them (businesses, governments, households and NPISHs).
 - The value of the human capital stock created by the expenditures is then transferred to the household sector through a capital transfer (Kendrick, 1976).
 - Disposable income is not affected with capital transfer, but gross saving (including capital transfers) is raised in the recipient sector and decreased in the originating sectors.



A human capital satellite account for Canada

Canadian Human Capital Satellite Account



■ Sources and Methods

- Data for direct costs of education from the CSNA.
- Data for indirect costs of education is estimated from the data base used to estimate human capital. The value of student time is the same as the one for individuals working.
- Data on indirect costs of training. It is equal to participation rate in training times duration of training times hourly labour compensation per worker.
- Direct costs of training is more difficult to derive.
- Price deflators for human capital investment: CPI
- Depreciation: 4% for investment in education; 25% for training (Mincer, Heckman, O'Mahony)

Human capital as % of GDP (cost approach)



	2010
Total costs of education and training	17.8
Total costs of education	16.4
Direct costs by households	0.8
Direct costs by governments	4.5
Earnings forgone	11.1
Total costs of training	1.4
by the business sector	1.1
by governments	0.4

Extended economic accounts, 2010

	Official	Adjusted	Abs. change	% change
<u>Generation of income account</u>				
Resources				
Value-added	1,662.8	1,864.4	201.6	12.1
Uses				
Compensation of employees	839.4	1,030.1	190.7	22.7
Gross operating surplus	460.7	471.6	10.9	2.4
Gross mixed income	193.4	193.4		
Taxes less subsidies on production	170.4	170.4		
Statistical discrepancy	-1.1	-1.1		
<u>Redistribution of income account</u>				
Resources				
National income, gross	1,630.5	1,832.1	201.6	12.4
Uses				
Net current transfer to non-residents	3.3	3.3		
National disposable income, gross	1,627.2	1,828.8	201.6	12.4
Net lending/net borrowing	-65.0	-65.0		

Extended economic accounts, 2010

	Official	Adjusted	Abs. change	% change
<u>Use of income account</u>				
Resources				
National disposable income, gross	1,627.2	1,828.8	201.6	12.4
Uses				
Consumption	1,305.1	1,210.7	-94.4	-7.2
Gross saving	322.1	618.1	296.0	91.9
<u>Capital account</u>				
Resources				
Gross saving	322.1	618.1	296.0	91.9
Plus: national net capital transfers	-0.1	-0.1		
Uses				
Capital formation, gross	388.1	684.1	296.0	76.3
Net lending/net borrowing	-65.0	-65.0		

Results: Income based approach



- Investment in human capital from education is estimated as the impact of education on the NPV of life-time labour market income.
- Investment in training could be estimated as the impact of training on the NPV of lifetime labour market income. This estimate is more difficult to derive since first we would need to isolate estimates of incomes of individuals with and without trainings, assume they have the same education. Since this estimate has not been developed for Canada, the cost-based estimate of training investment was used in the income based approach.

Results: Integration of income estimate



- The effect is much larger when the income-based approach is used as a result of the difference between income-based and cost-estimates of education investment.
- In 2005, GDP increases by 30%, capital formation increases by 150%, and final consumption decreases by 7% using the income based approach to measuring human capital.

Conclusion



- It is feasible to construct human capital satellite accounts using the data from the National Accounts and additional data on participation in training and education.
- Human capital satellite account expands the asset and production boundaries of the SNA. As a result, it involves a large adjustment to macro aggregates.

Challenges



- Structure of human capital in the sequence of accounts: location of its production; current vs. capital transfer.
- Estimation of costs of training
- Deflators and depreciation for human capital
- The source of the difference between the two estimates of human capital