

Data, Intangible Capital, and Economic Growth in Canada

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A critical feature of the digital economy is the explosion of data that is collected, stored, and used to generate knowledge and/or increase revenues by businesses and governments. According to the economic principle, the activities such as the collection and analysis of data that generate income in the future should be classified as investment. However, much of the expenditures for data collection, data storage and data science are classified as consumption either for final use or for intermediate consumption, not as investment in the current system of national accounts.

Corrado, Hulten and Sichel (2005) have developed a framework for measuring and integrating intangible knowledge capital in the system of national accounts in order to better understand trends and sources of economic growth. The estimates using that framework show that intangible capital is as important as tangible capital (equipment and structures) for the growth in labour productivity in the advanced economies. Business and industries have increased their share of investment in intangible knowledge capital over time. As data can be viewed a form of intangible capital, the framework of Corrado, Hulten and Sichel can be and has been used to examine the contribution of data capital to economic growth (Corrado, et al. 2022; Goodridge, P., J. Haskel, and H. Edquist, 2022).

National statistical agencies have explored data sources and methods for estimating the value of data and other intangibles and examined the effect of including them in the national accounts on macro aggregates such as GDP, investment, and productivity. Statistics Canada (2019a, 2019b) and the U.S. BEA (Rassier, Kornfeld, and Strassner, 2019) presented a framework for measuring data as investment and prepared preliminary estimates. Baldwin, Gu, and Macdonald (2012) used the framework of Corrado, Hulten Sichel (2005) to estimate intangible capital and its contribution to economic growth for Canada.

This paper will provide more recent estimates of data and intangible capital for Canada and integrate them in the national accounts. This is done to examine the effect of such integration on the trends in macro estimates such as GDP, investment, and productivity, and to examine to what extent the recent weakness in investment in physical capital and weak productivity growth as documented in Fay et. al. (2017) and Ollivaud, et. al. (2016) can be attributed to the exclusion of much of data capital and intangible capital in the national accounts.

As intangible assets and data assets are often not sold on the markets, there is not market valuation of those assets. In the absence of market valuation, the current practice in the national accounts is to estimate the value of those assets using the cost of inputs used to produce those assets. The paper will adopt this cost-based approach for estimating the value

of intangibles and data assets and highlight methodological and data challenges that must be overcome for that approach.

References

Baldwin, J.R. W. Gu, and R. Macdonald (2012), “Intangible Capital and Productivity Growth in Canada,” Statistics Canada.

Corrado, C., C. Hulten, and D. Sichel (2005), “Measuring Capital and Technology: An Expanded Framework,” in C.

Corrado, J. Haltiwanger, and D. Sichel (eds), *Measuring Capital in the New Economy*, Studies in Income and Wealth No. 65, University of Chicago Press, Chicago, IL, 11–46

Corrado, C, J, et al. (2022), “Data, Intangible Capital, and Productivity,” paper presented to NBER/CRIW Conference on Technology, Productivity and Economic Growth.

Fay, Robert, Justin-Damien Gu enette, Martin Leduc, and Louis Morel (2017), “Why Is Global Business Investment So Weak? Some Insights from Advanced Economies,” Bank of Canada Review, 2017 Spring

Goodridge, P., J. Haskel, and H. Edquist (2022), “We See Data Everywhere except in the Productivity Statistics,” *Review of Income and Wealth*, Vol. 68. No. 4.

Ollivaud, P., Y. Guillemette and D. Turner (2016), "Links between Weak investment and the Slowdown in Productivity and Potential Output Growth across the OECD", OECD Economics Department Working Papers, No. 1304, OECD Publishing, Paris, <https://doi.org/10.1787/5jlwvz0smq45-en>.

Rassier, D. G., R. J. Kornfeld, and E. H. Strassner (2019), “Treatment of Data in National Accounts,” Technical report, Paper prepared for the BEA Advisory Committee.

Statistics Canada (2019a), “Measuring Investment in Data, Databases and Data Science: Conceptual Framework,” Technical report, Statistics Canada.

Statistic Canada (2019b), “The Value of Data in Canada: Experimental Estimates,” Technical report, Statistics Canada.