Recent Developments in the Quantification of Canadian Economic History

by Peter J. GEORGE and Ernest H. OKSANEN *

In an earlier paper, [1] we discussed recent methodological developments in the quantification of economic history, and illustrated our analysis with references to several important studies of United States economic development.

The quantitative approach has found application to traditional problems in Canadian economic history including two standard items, the "Age of Disappointment" and the "Wheat Boom." This recent work has given cause for partial reassessment of traditional interpretations, and we will examine these studies in some detail. We will also comment upon some other interesting recent projects. [2]

I. — THE "AGE OF DISAPPOINTMENT."

The period 1873 to 1896 has traditionally been referred to as the "Days of Trial" (Skelton) or a "Time of Troubles" (Careless), as "disappointing" (Mackintosh), as "a prolonged period of marking time" (Easterbrook and Aitken). The economic objectives of Confederation, and the "national policy" (railway, immigration and settlement, and tariff policies) designed [3] to implement these objectives, were only partially fulfilled before 1900. Although the Canadian Pacific Railway was completed by late 1885, and the protective tariff structure was established between 1879 and 1887, Western settlement proceeded slowly, immigration was exceeded by emigration, and the rate of growth of manufacturing seemed to lag well behind the United States. O. J. Firestone, however, has interpreted Canadian economic development during the period as

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[1] Peter J. GEORGE and Ernest H. OKSANEN, "Recent Methodological Developments in the Quantification of Economic History," *Histoire sociale/Social History*, 3 (April, 1969), 5-31.

[2] These studies all incorporate aspects of economic theory and are quantitative in nature although they do not make much use of "econometric methods."

[3] We have chosen not to deal with the question of whether the "national policy" was designed *ex ante* as the vehicle to implement the economic programme of Confederation, or was simply rationalized *ex post* as an appropriate vehicle.

"remarkably rapid" while paying special attention to the growth of the manufacturing and services industries,[4] and Gordon Bertram has argued that

> the last three decades of the nineteenth century were periods of substantial growth, increasing specialization in industry geographical location, and increasing specialization in the production of firms.[5]

Which of these interpretations is most appropriate? Are there grounds for reconciling these two apparently contradictory views?

The traditional view of Canada's economic difficulties during the "Great Depression" of the late nineteenth century was based on several indicators. In the first place, considerable stress was placed on population movements and the slow rate of population growth. Income differentials between North America and Europe induced immigration into both Canada and the United States, but Canadian immigration and homestead policies, developed during the 1870's, were unsuccessful in stemming the flow of emigrants from Canada towards the United States where incomes were higher yet. In fact, immigration was exceeded by emigration in each decade from 1860 to 1900, and Canadian population grew by less than the natural rate of increase.[6] Secondly, because of the failure of the immigration and homestead policies, the new staple base which was expected to arise from the rapid settlement of the West did not materialize. Homesteads were few before 1900, although there were occasional small-scale, short-lived land booms (for example, in the Winnipeg area in 1882 and 1883). The volume of per capita Canadian exports remained roughly constant through the period, and the relative importance of the export

[4] O. J. FIRESTONE, *Canada's Economic Development, 1867-1953*, Income and Wealth Series VII (London, 1958), *passim*; also, "Development of Canada's Economy, 1850-1900," in *Trends in the American Economy in the Nineteenth Century*, National Bureau of Economic Research, Studies in Income and Wealth, Volume 24 (Princeton, 1960), pp. 217-252.

[5] Gordon W. BERTRAM, "Economic Growth in Canadian Industry, 1870-1915 : The Staple Model and the Take-Off Hypothesis," *Canadian Journal of Economics and Political Science*, XXIX (May, 1963), 161.

[6] The data on net migration developed by N. Keyfitz and D. McDougall are summarized in M. C. URQUHART and K. H. BUCKLEY, eds., *Historical Statistics of Canada* (Toronto, 1965), p. 22.

Insufficient attention has been paid to regional variations in population growth : for example, Ontario's population increased by an arithmetic average rate of 1.5 per cent a year, from 1.62 million in 1871 to 2.11 million in 1891, whereas the population of the Maritime Provinces increased only at an annual rate of 0.7 per cent, from .77 million to .88 million. Both areas grew very slowly during the 1890's, Ontario reaching a population of only 2.18 million in 1901 and the Maritimes .89 million. See *Historical Statistics*, p. 14.

sector to total output declined.[7] K. H. Buckley has characterized this period as one of "secular depression," punctuated only by brief upswings,[8] and the work of E. J. Chambers attests to the frequency and severity of recessions in 1874-79, 1882-84, 1887-88, 1890-91, 1893-94, and 1895-96.[9]

However, several quantitative studies have been completed during the last few years, which afford an opportunity for a reassessment of the "Age of Disappointment." Firestone laid much of the groundwork for reassessment by publishing estimates of Canadian gross national product by decade from 1851 to 1921. His series demonstrate that the period 1870 to 1900, far from being one of poor economic performance, was one of substantial economic growth. Gross national product grew at a compound annual rate of 3.2 per cent from 1851 to 1900, at 3.0 per cent from 1871 to 1890, and at 3.2 per cent from 1891 to 1900. In per capita terms, GNP increased at a compound annual rate of 1.6 per cent over the whole period, at a rate of 1.6 per cent from 1871 to 1890, and at a rate of 2.2 per cent from 1891 to 1900.[10] In fact, in per capita terms, Canadian GNP grew more rapidly than that of the United States in one decade, the 1880's. However, despite substantial economic growth in Canada between 1870 and 1900, this period was one of slower growth than either the 1850's or the first decade of the twentieth century. Firestone also developed estimates of the extent to which the distribution of value added by sectors had changed over the last half of the nineteenth century.[11]

Gordon Bertram's work substantiates the conclusion that considerable growth took place in the manufacturing sector, with the gross value of manufacturing output having increased at an estimated annual compound

[7] The flat trend in exports per capita is not sufficient evidence of secular depression. In fact, there were significant capital inflows associated primarily with railway construction during the 1880's, and a distinct improvement in Canada's commodity terms of trade during the entire period. See P. HARTLAND, "Canadian Balance of Payments since 1868," in *Trends in the American Economy*, pp. 717-755.

[8] Kenneth BUCKLEY, *Capital Formation in Canada : 1896-1930* (Toronto, 1955), p. 5. Excessive reliance upon the behaviour of price indexes in isolation can give a misleading impression of economic performance during this period. For these indexes, see *Historical Statistics*, pp. 291, 293-294, for example.

[9] Edward J. CHAMBERS, "Late Nineteenth Century Business Cycles in Canada," *Canadian Journal of Economics and Political Science*, XXX (August, 1964), 391-412.

[10] FIRESTONE, "Development of Canada's Economy, 1850-1900," pp. 222-223.

[11] *Ibid.*, p. 225. — Factors such as the rate of growth of GNP and per capita GNP and the shifts in the sectoral composition of output would necessarily be overlooked in work of a strictly qualitative kind. Firestone's systematic quantitative investigation of national and sectoral output represents a significant contribution to the understanding of Canadian economic development.

rate of 4.6 per cent between 1870 and 1890.[12] Not only did secondary manufacturing, and more especially tertiary industry, grow relative to primary production over the period, but there was also considerable diversification from the earlier dependence on processing primary products. It is interesting that by 1870, before the "national policy" tariffs against imports of iron and steel products, these already ranked first in value added in manufacturing.[13]

Consistent with the relatively rapid growth of secondary and tertiary industry is the finding of Chambers and Bertram that a considerable rural-urban shift in population occurred in central Canada during this period, together with an increasing concentration of industry in urban centres.[14]

The period also saw significant additions to the stock of social overhead capital in Canada. For instance, the transcontinental railway was completed, the rail network in central Canada extended and integrated, and the St. Lawrence waterway was further improved.

Despite stagnation in some regions, notably the Maritimes, significant economic development occurred elsewhere. The West was opened to settlement, and Ontario and Quebec experienced sizable increases in population, growth in manufacturing output, and significant rural-urban population shifts.

However, while the standard interpretation of the period 1873 to 1896 as an "Age of Disappointment" has been subjected to considerable revision, certain aspects of the traditional arguments have been confirmed. For example, data constructed by Keyfitz and McDougall on net migration support the view that Canadian population grew less rapidly than the natural rate of increase, and Penelope Hartland's work on Canadian exports confirms that real exports per capita did not rise over the period.

Recent work also suggests a re-examination of the importance often attributed to the "national policy." Even if we accept the assumption that the "national policy" was politically necessary, we may still question

12 BERTRAM, "Economic Growth in Canadian Industry, 1870-1915," pp. 170-171.
13 *Ibid.*, p. 176.
14 Edward J. CHAMBERS and Gordon W. BERTRAM, "Urbanization and Manufacturing in Central Canada, 1870-90," in CANADIAN POLITICAL SCIENCE ASSOCIATION, *Conference on Statistics, 1964*, ed. by S. OSTRY and T. K. RYMES (Toronto, 1966), pp. 225-258.

the argument that it was either a necessary or a sufficient condition for economic development. In fact, Firestone's and Bertram's work on manufacturing suggest that the tariff of 1879 did not "create" a domestic Canadian industrial sector, but simply reinforced trends which can be discerned as early as the 1850's. Nor did the "national policy" apparently do much to reverse or reduce the disparity in Canadian and United States growth rates. Per capita GNP in Canada grew more rapidly than in the United States in the 1880's, but the more rapid rate of growth of the United States in the next decade undermines the significance of the "national policy" as a "catch-up" device. [15] It was not until the 1900's that aggregate and per capita GNP began to grow rapidly. However, we must not overlook the fact that United States gains during 1900 to 1910 were very large in percentage terms, let alone in absolute size, and that the buoyancy of the American economy persisted longer into the second decade.

The "national policy" was a short-run failure in the sense that the new staple base arrived only after 1900, but it is possible to defend the traditional interpretation if one argues that the post-1900 upsurge in Western settlement and wheat exports was a direct result (with a substantial time lag) of the "national policy." However, it is at least as plausible that other factors were the key ones, including the rise in the world price of wheat, the closing of the United States frontier, changes in production and distribution costs influenced by falling freight rates, the development of new strains of wheat, and the diffusion of dry-farming techniques originally developed in the United States. [16]

We have, then, the traditional interpretation of the period 1870 to 1900 as an "Age of Disappointment," while much recent work suggests that the period was one of substantial economic gains. In some respects the data are consistent with both interpretations. The consistency of the two views has been disguised by the use of different criteria of economic

[15] The idea of employing a protective tariff to promote increases in per capita income in Canada in order to reduce Canadian-American income differentials is strongly criticized by J. H. YOUNG, *Canadian Commercial Policy* (Ottawa, 1957), and by J. H. DALES, *The Protective Tariff in Canada's Development* (Toronto, 1966). In fact, Young has estimated the cost of the Canadian tariff as about 4 per cent of GNP in 1956. See YOUNG, *Canadian Commercial Policy*, pp. 72-73.

[16] One could argue that the groundwork laid by the "national policy," especially by the railroad and land policies, eased and accelerated the process of Western agricultural expansion after 1900, but this would not imply that the "national policy" was a prerequisite of the "wheat boom."

performance. Thus, while Canada seems to have made substantial economic gains, including significant developments in the volume and diversity of manufacturing output, many of the problems of the Canadian economy highlighted by the "Disappointment" thesis were quite real. During most of the period Canada did grow slowly relative to the United States, whether measured in terms of aggregate or per capita GNP. The tendency of traditional writers to focus attention on net migration statistics is partially justified by this fact, for population movements from Canada to the United States presumably represented a response to higher incomes. To the extent that Confederation (and the "national policy") was premissed on developing a new staple base in the West and upon a rapidly growing population, the period was one of disappointment. On the other hand, Confederation also looked to the construction of a transcontinental railway and to growth in secondary manufacturing, and here marked gains were made before 1900. Consequently, the validity of certain of the contentions of the "Disappointment" thesis cannot obviate the fact that substantial economic growth occurred in Canada during the last three decades of the nineteenth century.

II. — THE "WHEAT BOOM."

To proponents of the staples thesis, the period from 1900 to 1913 has long been regarded as "undeniably an example of a classic staple boom." [17] In the literature of Canadian economic history, wheat has come to epitomize the potential developmental impact which can be realized from the rise of a staple :

> The production of wheat on the Canadian prairie provided the basic economic opportunity in the economic development of Canada from 1896 to 1930. This opportunity attracted labour and capital to the direct exploitation of virgin land resources and induced investment throughout the economy in major secondary and tertiary industries... greater by many times than the investment on the agricultural frontier itself. [18]

[17] Melville H. WATKINS, "A Staple Theory of Economic Growth," *Canadian Journal of Economics and Political Science*, XXIX (May, 1963), 157.

The discussion of the "wheat boom" has frequently included commentary on the second wave of expansion of wheat production and exports during the 1920's. However, historians have usually emphasized the earlier period, because of the marked improvement of the economy compared with the period of the "Great Depression" and because the sudden rise of the wheat sector was felt to represent the culmination, although belated, of the economic aspects of the "national policy."

[18] BUCKLEY, *Capital Formation in Canada*, p. 4. Chapter 2 of Buckley's book presents an excellent summary of various aspects of the "wheat boom." Other standard treatments are found in Vernon C. FOWKE, *The National Policy and the Wheat Economy* (Toronto, 1957), chapter 5, and W. A. MACKINTOSH, *The Economic Background of Dominion-Provincial Relations* (Toronto, 1964), chapter 4.

The literature focused both on the direct contribution of wheat to GNP and on its indirect ("linkage") effects in promoting immigration and developing secondary and tertiary industry. The discussion has generally been couched in rather impressionistic terms, with the contribution of the wheat sector to growth rates discussed on the basis of somewhat casual empiricism and with unsubstantiated conclusions about the direction of causation. Although the growth of many sectors of the economy accelerated more or less simultaneously during the first decade of the twentieth century, the temporal correlation among these events does not necessarily imply that the "wheat boom" was a *necessary* condition of Canadian economic growth at this time. But until recently there had been no attempt to cast the traditional account of the impact of the "wheat boom" into a more rigorous and testable form. [19]

What evidence can be introduced to confirm the traditional interpretation ? In the first place, there are data which support the conclusion that 1900 to 1913 was a period of very substantial growth in the national economy. For example, population increased from 5.37 million in 1901 to 7.21 million in 1911, and the increase was associated with a positive and high net migration. [20] Secondly, Firestone's estimates demonstrate that constant dollar GNP increased by 72 per cent between 1900 and 1910, to $3.1 billion. In per capita terms GNP reached $434, an increase of 26 per cent. [21] Finally, constant dollar exports increased significantly during the decade and still more rapidly between 1910 and 1913. Capital inflows were also substantial. [22]

Moreover, coincident with the upward trend in overall growth was the impressive rate of growth of the Prairie wheat sector. [23] The substantial

19 Edward J. CHAMBERS and Donald F. GORDON, "Primary Products and Economic Growth : An Empirical Measurement," *Journal of Political Economy*, 74 (August, 1966), 315-332. Also see John H. DALES, John C. MCMANUS and Melville H. WATKINS, "Primary Products and Economic Growth : A Comment," and CHAMBERS and GORDON, "Rejoinder," in *ibid.*, 75 (December, 1967), 876-885.

20 *Historical Statistics*, pp. 14, 22.

21 O. J. FIRESTONE, *Canada's Economic Development, 1867-1953*, pp. 60, 276.

22 *Historical Statistics*, pp. 158-159, 173, 294.

23 Statistical data concerning the wheat economy of the Prairie Provinces are summarized in FOWKE, *The National Policy and the Wheat Economy*, chapter 5, and in BUCKLEY, *Capital Formation in Canada*, chapter 2.

The population of the three provinces increased from 419,512 in 1901 to 1,328,121 in 1911, and in Saskatchewan and Alberta alone from 164,300 to 866,750. Homestead entries and land sales increased sharply during the decade reaching a peak at the end of the decade. The number of farms increased from 55,200 in 1901 to 199,200 in 1911; the area of improved farms increased from 15.4 million acres to 57.7 million acres, and the

increases in the wheat crop were followed by an appreciable rise in the volume of wheat and flour exports, and in export earnings. The wheat sector also was viewed as providing a domestic market for eastern manufacturers under the umbrella of the "national policy" tariff. Through this medium the indirect effects of the "wheat boom" were allegedly transmitted to the industrial East.

Despite their apparent support for the traditional interpretation, the above data tell us only that during 1900 to 1913 there was, within the context of a rapidly growing economy, a rapidly expanding export sector based chiefly upon wheat. The correlation between the growth of the wheat sector and overall economic growth, together with the view of the "national policy" as a device for integrating the national economy, led to the argument that the "wheat boom" was a *necessary* condition of the Canadian boom. The Chambers and Gordon model represents the first attempt to isolate and measure the effect of the wheat sector on the growth of the national economy, and focuses upon the effect of wheat on per capita income.[24] They have constructed a simple two-sector static model with which they attempt to estimate the increase in current dollar national income as a rent paid to land, the specialized resource in the production of wheat in the West. The rise in Canadian per capita income over the period 1901-11 was found to be 23 per cent, and 8.4 per cent of this increase was attributable to the wheat sector in their crudest model, and 5.2 per cent in their more complex model. In other words, Canadian per capita income was, at most, 1.9 per cent higher in 1911 than in 1901 as a result of the "wheat boom," and more likely only 1.2 per cent higher.[25] Despite a certain amount of controversy engendered by their

area under field crops from 3.6 to 17.7 million acres. Prairie farm investment (land, buildings, machinery, livestock) increased from $231 million in 1901 to $1,789 million in 1911. Wheat output in the prairies reached a decadal high of 208.4 million bushels in 1911, while total Canadian output increased from 55.6 million bushels in 1901 to 230.1 million in 1911.

[24] One of the central issues in a critique of the Chambers and Gordon approach is the argument that traditional interpretations of the "wheat boom" were not centered on its effects on *per capita* income, but on the effect of wheat on the growth of aggregate GNP and population. Chambers and Gordon reply that explanations of the course of *per capita* income should be a matter of particular concern to economic historians (CHAMBERS and GORDON, "Rejoinder," pp. 882-883).

[25] CHAMBERS and GORDON, "Primary Products and Economic Growth," pp. 320, 328. — The estimated contribution of the wheat sector was developed as a *maximum* contribution. See Appendix A, p. 329. Both Chambers and Gordon and their critics imply that 5.2 per cent of the increase in per capita income over the decade represents a small contribution. See *ibid.*, pp. 320, 327-328, for example, and DALES, MCMANUS, and WATKINS, "Comment," p. 879. However, it is not clear what constitutes a "large" or "small" contribution. In

study, Chambers and Gordon have introduced a new element into the literature on the "wheat boom," namely the application of a formal economic model together with an attempt to empirically test its implications.

The growth of the Prairie wheat sector was not the only important feature of economic development during the first decade of the twentieth century. Marked increases in agricultural production in Central Canada occurred during the decade, stimulated largely by the growing domestic market.[26] A rapid development took place in the production and export of minerals from Ontario and British Columbia.[27] The development of hydroelectric capacity in Ontario and Quebec made an important direct contribution to industrialization during that period and provided an important input into both secondary manufacturing and the rapidly growing pulp and paper industry.[28] The gross value of Canadian manufacturing output increased at the remarkable compound annual rate of 6.0 per cent over the decade, and growth was particularly rapid in the iron and steel and the transportation equipment industries.[29] Together with the development of the wheat economy, these were the most significant features of the 1900-1913 boom. Some of these developments, such as the concurrent rise of other export staples, bear no obvious relationship to the growth of the wheat sector, but the increased rate of growth of manufacturing output has been related to the "wheat boom" as a derived demand emanating from expanding wheat production.[30] The growth of secondary and tertiary industry was stimulated also by other expanding exports and by the growth of non-export activities. Economic growth is too complex to permit complete reliance on the staples approach. In essence,

ranking the "social savings" attributable to various innovations, R. P. Thomas and D. D. Shetler have placed the innovations precipitating the Canadian "wheat boom" second only to the introduction of the railroad to the United States, and ahead of such innovations as the use of the steamship in United States international trade, and the development of hybrid corn in the United States. See Robert P. THOMAS and Douglas D. SHETLER, "Railroad Social Saving : Comment," *American Economic Review*, LVIII (March, 1968), p. 188. See also the commentary by Marc NERLOVE, "Railroads and American Economic Growth," *Journal of Economic History*, XXVI (March, 1966), 112.

26 CHAMBERS and GORDON, "Primary Products and Economic Growth," p. 322, note 12.

27 Data on the growth of minerals production and exports are summarized in *Historical Statistics*, pp. 412-414, 418-424.

28 See John H. DALES, *Hydroelectricity and Industrial Development — Quebec 1898-1940* (Cambridge, Mass., 1957), *passim*, and especially chapter 8.

29 BERTRAM, "Economic Growth in Canadian Industry, 1870-1915," pp. 171, 181.

30 Bertram writes, for example, that "in view of its growth, linkages, and income effects, the propulsive sector in the period 1896-1914 appears to have been wheat..." (*ibid.*, p. 180). A discussion of this statement follows on pp. 180-181.

Chambers and Gordon have made an impressive first step in reassessing the significance of the "wheat boom" for growth in per capita income and output.[31]

III. — OTHER RECENT STUDIES.

The following brief survey is not intended to be exhaustive. We have somewhat arbitrarily selected several interesting studies published within the last five years.

(1) Analyses[32] of the Reciprocity Treaty between British North America and the United States from 1855 to 1866 have traditionally concluded that the Treaty greatly stimulated colonial economic growth. This assessment has recently been questioned by L. H. Officer and L. B. Smith[33] who analyze the Treaty's impact by both an aggregative approach, based on a modern theory of regional economic integration, and a disaggregative approach which focuses on trade in those commodity classes which were directly affected by the Treaty.

Their aggregative approach only partially supports earlier findings :

> The treaty had significant, once-and-for-all, trade-creating effects for both imports and exports but no substantial growth effects. Initial gains were maintained but not increased.... The major impact of Reciprocity was confined to the pre-Civil War period.[34]

Officer and Smith disaggregated total exports and imports to examine flows of lumber and agricultural products (which were duty-free under the Treaty) and considered the Treaty's navigation and revenue implications. The export trade in lumber products from British North America to the United States had already been growing rapidly before Reciprocity, grew throughout the period of the Treaty, and continued to grow after abrogation. The data were consistent with the conclusion that the Treaty had not significantly influenced the trade in lumber products.[35] The

31 Chambers and Gordon posed the following "counterfactual conditional" : "If wheat expansion had not occurred during the decade 1901-11, Canada would have experienced a substantially slower rate of per capita income growth" (CHAMBERS and GORDON, "Rejoinder," p. 881). They were interested in *per capita* income, and the "counterfactual" which remains to be examined involves the growth in *aggregate* national income.

32 D. C. MASTERS, *The Reciprocity Treaty of 1854* (London, 1937); S. A. SAUNDERS, "Reciprocity Treaty of 1854 : A Regional Study," *Canadian Journal of Economics and Political Science*, II (February, 1936), 41-53.

33 L. H. OFFICER and L. B. SMITH, "The Canadian-American Reciprocity Treaty of 1855 to 1866," *Journal of Economic History*, XXVIII (December, 1968), 598-623.

34 *Ibid.*, p. 605.

35 *Ibid.*, p. 613.

effect of the Treaty on the trade in agricultural goods varied among commodities. Reciprocity apparently had little impact on trade in livestock, wool, and barley. The development of the cheese industry was undoubtedly hindered by Reciprocity, and its expansion was delayed until after abrogation. The trade in wheat, oats, and flour doubled during the Treaty's existence, but this was largely a trade of "convenience" with only small welfare gains to British North America.[36] Finally, the anticipated increase in traffic on the St. Lawrence canals with the advent of free trade and the entry of American shipping did not materialize, and especially after 1860 the St. Lawrence route and Montreal continued to lose ground to the Erie Canal, American railroads, and New York City.

The conclusion reached by Officer and Smith is that Reciprocity by no means provided the sole basis of British North American prosperity during the period 1855 to 1866, and they suggest that the real impetus to growth came from railway investment during the mid-1850's and later from the inflation[37] and increased demand for colonial products in the Civil War and Reconstruction United States. Moreover, they concluded that abrogation of the Treaty brought no real distress to British North America. A short-run decline occurred in trade between the colonies and the United States compared with the 1865 peak, but the extent of decline is exaggerated by the 1865 trade figures which reflect commodity flows in anticipation of abrogation.

(2) In the context of his research on regional economic growth Alan Green estimated that Gross Value Added (GVA) increased nationally more rapidly between 1890 and 1910 than between 1910 and 1929, that per capita output increased at a higher average rate in the earlier subperiod, and that per worker output increased at the same rate in both sub-periods.[38] The rise of British Columbia and the Prairie Provinces to economic importance is reflected in the sharp increase in the contribution of these regions to national GVA from 8 per cent in 1890 to 28 per

[36] *Ibid.*, pp. 613-619.

[37] Canadian prices were rising about 7 per cent a year during 1861 to 1865 compared with annual increases in United States prices of about 25 per cent. See *ibid.*, p. 603, and Table 5, p. 604.

[38] Alan G. GREEN, "Regional Aspects of Canada's Economic Growth, 1890-1929," *Canadian Journal of Economics and Political Science*, XXXIII (May, 1967), 232-245. Green computed GVA by Province in per capita and per worker terms for 1890, 1910, and 1929.

cent in 1929.[39] Regional disparities increased between 1890 and 1910, largely as a result of high growth rates in per capita output in Ontario and British Columbia.[40]

Related work by Marvin McInnis has been concerned with regional, rather than provincial, income differentials for the later period, 1910-11 to 1960-62.[41] Marked convergence of regional differentials was observed for the decade 1910-11 to 1920-21,[42] and subsequent stability in the relative positions of the regions.[43] The studies of Green and McInnis suggest that the ranking of regional incomes has tended to remain roughly constant since 1890.

(3) In addition to work on the dating of reference cycle turning points in Canada,[44] Keith Hay has carried out an historical analysis of the Canadian money supply and its role in the business cycle, using monetary data and reference cycle data to assess the applicability of a monetary theory of the cycle[45] developed by Milton Friedman and Anna Schwartz.[46] He found that the data are at best consistent with only a partial acceptance of a monetary theory of the Canadian cycle. The money supply does not appear to have been a significant determinant of upswings,

[39] Most of the increase in the relative positions of the Prairie Provinces and British Columbia was concentrated in the period 1890-1910.

[40] The relatively high growth rate in Ontario and the surprisingly lower growth rate in the Prairie Provinces have implications for the standard interpretation of the "wheat boom." For example, these findings are consistent with the hypothesis that the indirect effects on the Ontario economy of growth in the wheat sector were more significant than the direct contribution of wheat to increases in per capita national output.

[41] Marvin McINNIS, "The Trend of Regional Income Differentials in Canada," *Canadian Journal of Economics*, I (May, 1968), 440-470.

[42] Whereas Green discovered a divergence in regional incomes from 1890 to 1910, McInnis reports the convergence of British Columbia and the Prairie Provinces towards the national average between 1910-11 and 1920-21. See GREEN, "Regional Aspects of Canada's Economic Growth," pp. 241-242, and McINNIS, "The Trend of Regional Income Differentials in Canada," pp. 445-447.

[43] From 1920 to the present, the Maritimes and Quebec maintained a roughly constant level below the national average; there has been a slight relative increase in Ontario's position, and a slight worsening in that of British Columbia.

[44] Keith A. J. HAY, "Early Twentieth Century Business Cycles in Canada," *Canadian Journal of Economics and Political Science*, XXXII (August, 1966), 354-365. Hay's article, together with two papers by E. J. Chambers, give a complete reference cycle for Canada from 1870. See Edward J. CHAMBERS, "Canadian Business Cycles since 1919 : A Progress Report," *ibid.*, XXIV (May, 1958), 166-189, and "Late Nineteenth Century Business Cycles in Canada," *ibid.*, XXX (August, 1964), 391-412.

[45] Keith A. J. HAY, "Money and Cycles in Post-Confederation Canada," *Journal of Political Economy*, 75 (June, 1967), 263-273. In this paper, Hay analyzes the relationship between money stock and the reference cycle with the aid of simple statistical concepts (means and standard deviations of leads and lags of money stock and the reference cycle, rank correlations of changes in the money supply and other economic indicators).

[46] Milton FRIEDMAN and Anna SCHWARTZ, *A Monetary History of the United States, 1867-1960*, National Bureau of Economic Research, Studies in Business Cycles, No. 12 (Princeton, 1963).

a finding which tends to confirm the historical role of real factors such as investment in plant and equipment, exports, and immigration. The data on contractions did suggest an important role for the money supply, as well as a significant connection between the Canadian cycle and variations in the Canadian money supply relative to the American. [47]

(4) Peter George's study [48] of the Canadian Pacific Railway was suggested by Fogel's work on the Union Pacific. George attempted to estimate the private rate of return on CPR investment, and to ascertain the amount and necessity of Government subsidies to the Company. Data on construction expenditures and reported net earnings were employed to calculate a private rate of return for the first decade of operation, 1886-1895. The value in 1885 of subsidies paid to the Company (including estimated values of railway constructed by the Government and turned over to the Company, of cash subsidies, of the land grant, of tax exemptions, and of the remission of import duties on construction materials) was estimated and an estimate was computed of the *ex post* "required" subsidy. [49] *Ex post*, the Company was awarded "excessive subsidies." [50]

(5) In *The Protective Tariff in Canada's Development*, [51] John Dales has attempted to test the hypotheses that the tariff has been "protective," that it has increased aggregate GNP and reduced per capita GNP. From his theoretical model he deduces that an effective protective tariff policy can lead simultaneously, in the tariff-erecting country, to an increase in GNP by inducing continued growth in the protected sector, and to a

[47] More recently, Hay's work has centered on the determinants of the money supply ("high-powered" money, currency ratio, and reserve ratio), the factors affecting secular and cyclical adjustment of these determinants, and the role of money in the transmission of cyclical disturbances from the United States to Canada. See Keith A. J. HAY, "Determinants of the Canadian Money Supply, 1875-1958," Manuscript No. 2, Carleton Economic Papers (May, 1968) presented to the Canadian Economics Association, Annual Meeting, June 1968.

[48] Peter J. GEORGE, "Rates of Return in Railway Investment and Implications for Government Subsidization of the Canadian Pacific Railway: Some Preliminary Results," *Canadian Journal of Economics*, I (November, 1968), 740-762.

[49] "Required" subsidy was defined as "that capital grant, paid by the Government in 1885, sufficient in amount to allow Company net earnings to yield the normal rate of return on privately contributed capital" (*ibid.*, p. 759).

[50] The minimum estimates of "excessive" subsidy in 1885 were $61 million, $40 million, and $34 million when the normal rate of return on investment was assumed to be 6, 8 and 10 per cent respectively. The conclusion that subsidies were "excessive" was reinforced by the direction of biases in the estimates of the value of subsidies actually paid to the Company and in the estimates of the *ex post* "required" subsidy. A complete answer to the question of whether the CPR was excessively subsidized would require examination of the *ex ante* situation governing the bargain made between the Company and the Government in the autumn of 1880. Such an examination was not feasible with the available data.

[51] John H. DALES, *The Protective Tariff in Canada's Development* (Toronto, 1966).

reduction in per capita GNP (below the free trade alternative) over time.[52] He then tested the implications of his model with respect to the Canadian tariff and its apparent effects on the economy since 1870.

He assumed that "Canadian manufacturing has been more highly protected than American manufacturing,"[53] and that "time has had identically proportional effects on the Canadian and American economies."[54] The two countries have similar economic environments and have been affected over time by similar exogenous forces. Both have simultaneous access to new technologies and ideas. Acceptance of this assumption, Dales argues, leads to an *a priori* expectation that the relative performance of the two economies will be stable.

There are, of course, differences between the two countries in, for example, resource endowments. Dales contends that technological changes have enhanced the value of the Canadian resource base relative to that of the American since 1900, leading to an upward trend in Canadian-American "relatives."[55] Also, the high official tariffs in the two countries have differed in their effectiveness. Dales in fact argues that the United States tariff has not been effective, which allows him to use the United States as a "free trade control" for analyzing the impact, on the Canadian economy, of the effective Canadian tariff. There have, finally, been differences in immigration especially since the 1920's.

The time series of "relatives" for population, GNP, and GNP per capita show that "over a thirty-year period [since 1926] Canada has grown relative to the United States in terms of population and Gross National Product, but ... [not] in terms of Gross National Product per capita."[56]

[52] *Ibid.*, chapters 2, 3.

[53] *Ibid.*, p. 80, ft. 2. He demonstrates empirically the validity of this proposition in chapter 5.

[54] *Ibid.*, p. 83.

[55] Canadian-American relatives were calculated for several series : population, GNP, GNP per capita, and value added in agriculture, in primary manufacturing, and in secondary manufacturing. These relatives were plotted as time series from 1870 to 1955. An uptrend in a series shows that the relative has moved in Canada's favour. Either the Canadian series has increased more rapidly than the American or it has fallen less rapidly. A downtrend in a series shows that the relative has moved in favour of the United States. If the relative performance of the two economies was stable, then the time series of the relatives would display no trend.

[56] *Ibid.*, p. 116. — "The tariff increases Gross National Product in Canada by increasing the resources of labour and capital domiciled in Canada — which is why historians think it is a "good thing"; at the same time it reduces Gross National Product per capita in Canada by reducing the efficiency of the economy — which is why theorists condemn it as a 'bad thing'" (*ibid.*, p. 7).

Dales concludes that the Canadian tariff explains a considerable part of the per capita GNP differential between the United States and Canada : [57]

> "Something" in the Canadian economy keeps the Canadian standard of living abnormally low relative to the American standard of living and to growth in Canadian Gross National Product. Theory shows that effective protectionism in an open economy tends to produce just such results. [58]

(6) Harvey Lithwick's examination of Canadian economic growth [59] emphasized the measurement of factor contributions to the rate of growth of GNP and comparisons of Canadian and United States growth. The average annual rates of growth of both aggregate and per capita GNP were higher in Canada in the period 1926 to 1956 than in the United States in a similar period, 1929 to 1957. Aggregate GNP in Canada grew at an average compound rate of 3.9 per cent compared with 2.9 per cent in the United States. In per capita terms, the respective rates were 2.0 per cent and 1.7 per cent, [60] despite the more rapid population growth in Canada (an average of 1.8 per cent annually, compared with 1.2 per cent). [61]

Lithwick's findings concerning relative factor contributions to growth rates may be summarized briefly. First, although population growth was higher in Canada, the contribution of labour (with an attempt to adjust for changes in "quality") to economic growth was greater in the United States. The quantity of labour input grew faster in Canada, although labour force participation rates fell relative to the United States, and despite the greater reduction in weekly hours worked. The crucial difference was the far greater increase in the "quality" of labour in the United States, largely attributed to a better-trained labour force. Secondly, the capital stock grew more rapidly in Canada, because of higher savings rates in Canada and because of a tendency for substantial amounts of American savings to be invested in capital formation abroad (especially

57 John Young's estimate of the cost of the tariff was 4 per cent of Canadian GNP in 1956. See footnote 15 above. In Dales' opinion, this is an underestimate since Young measured only the "cash cost," that is, the increase in prices caused by the tariff. The tariff also has "social" costs, for it can reduce money incomes, delay the adoption of cost-reducing innovations in the protected sector, and so forth. See *ibid.*, pp. 124-125.

58 *Ibid.*, pp. 130-131.

59 N. H. Lithwick, *Economic Growth in Canada : A Quantitative Analysis*, Canadian Studies in Economics, No. 19 (Toronto, 1967). The study covers three periods : for Canada, 1891-1910, 1910-1926, and 1926-1956, and for the United States, 1889-1909, 1909-1929, and 1929-1957. Most emphasis is placed on analyzing and comparing factor shares in the latest periods.

60 *Ibid.*, pp. 53-54, 62. The rate of growth of Canadian GNP was lower than that of the United States for the two earlier sub-periods, however.

61 *Ibid.*, p. 9.

in Canada). Capital, as a factor of production, made a larger contribution to growth in Canada than in the United States. The rate of growth of Canadian GNP exceeded that of the United States over the period covered, and the unexplained "residual," not attributable to either capital or labour input, was larger in Canada. In other words, productivity increase and technological change, which are subsumed within the residual, appear to have played a more important role in Canada. Part of the larger residual in Canada appears to be a result of interindustry shifts of resources, especially the movement of resources from agriculture into manufacturing,[62] whereas the principal interindustry shifts had been completed in the United States by 1909.

In short, the United States experienced a declining secular rate of growth in GNP over each sub-period studied, whereas Canada's growth rate was higher during 1926-56 than in the second sub-period and also higher than the United States' 1929-57 rate.

(7) John La Tourette's comparison of trends in capital-output ratios in the United States and Canada[63] was concerned to determine whether the pattern of secular decline in the American ratio has been duplicated in Canada. The comparison of ratios was based upon estimates of "potential output."[64]

La Tourette's empirical findings are divided into two periods, 1926-41 and 1946-65. American capital requirements per unit of output were higher than the Canadian in 1926, but both countries' capital-output ratios began to decline around 1930. The rate of decline was higher in the United States and consequently the United States' ratio was only slightly above the Canadian by 1941. The United States' capital-output ratio was

[62] See A. MADDISON, "Productivity in an Expanding Economy," *Economic Journal*, LXII (September, 1952), 584-594, and G. D. SUTTON, "Productivity in Canada," *Canadian Journal of Economics and Political Science*, XIX (May, 1953), 185-201 for early discussions of this "shift effect," and LITHWICK, *Economic Growth in Canada*, chapter 3.

[63] John E. LA TOURETTE, "Trends in the Capital-Output Ratio: United States and Canada 1926-65," *Canadian Journal of Economics*, II (February, 1969), 35-51.

The capital-output ratio measures capital requirements per unit of output. La Tourette reports findings for aggregate ratios covering the entire business sector (defined to include farm, manufacturing, and non-manufacturing activities). Our discussion focuses on his Variant I.

[64] "Potential output" in a year represents an estimate of "full employment" output. The full employment rate of unemployment was assumed to be 3.0 per cent for Canada, and 4.0 per cent for the United States. Basing the estimates of the capital-output ratio on potential output eliminates the effect of fluctuations in current output which make it extremely difficult to identify short-period trends within the longer period. See *ibid.*, pp. 42-43.

still slightly higher in 1946; it rose in the early post-war period, reaching a peak in 1948 and declined thereafter. The net trend for this ratio was significantly negative. The Canadian capital-output ratio tended to rise in the post-war period and did not reach a peak until 1962, with the result that the Canadian ratio was higher than the American in the 1960's. [65]

IV. — CONCLUSION.

This survey of recent developments in Canadian economic history makes clear the wide variety of approaches encompassed by the adjective "quantitative." Though the more advanced econometric techniques have as yet found little use in Canadian history, the studies that have been done cast interesting and sometimes original perspectives upon many facets of economic development during the last decades of the nineteenth century and through the first half of the twentieth century.

[65] *Ibid.*, pp. 48-51.

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