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Indicators of Cyclical Recessions
and Revivals in Canada

W. A. Beckett

Application of the National Bureau Method to Canadian Data

THIS paper presents preliminary results of a study designed to test, in a Canadian setting, some of the techniques of business cycle measurement and analysis developed by the National Bureau of Economic Research. An attempt has been made to duplicate and analyze, for Canada during the postwar period, the National Bureau's twenty-one highly conforming indicators of recessions and revivals, together with their related diffusion indexes. In pursuing this objective, NBER concepts and techniques have been followed as closely as possible, although with the resources available it was not possible to make a comprehensive analysis of Canadian data along the lines pursued by the National Bureau. We have worked primarily with twenty of the twenty-one highly conforming indicators. These may not necessarily be the processes with the highest conformity to Canadian business cycles. Rather, our limited objective was to discover how these particular series behaved in another country and for a different time period. (The National Bureau selection of indicators was made on the basis of prewar data for the United States.)

The concept of the reference cycle has been employed, and turning points in Canadian business have been tentatively selected on the basis of general economic analysis supplemented by scrutiny of a wider selection of time series (e.g. national accounts data, trade statistics, etc.) than are embraced in this report.

The twenty series used here have all been seasonally adjusted, except for new orders and the bank rate on day-to-day loans, using the new Census Method II.[1] Specific cycles have been marked off in these individual series according to standard practice,[2] except that as a guide the Spencer fifteen-month weighted moving average generated by the

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NOTE: This study was prepared while the author was a member of the staff of the Department of Trade and Commerce, Ottawa, Canada.

[1] Julius Shiskin and Harry Eisenpress, *Seasonal Adjustments by Electronic Computer Methods*, Technical Paper 12, New York, NBER, 1958. See also Shiskin, *Electronic Computers and Business Indicators*, reprinted here, Chapter 17.

[2] Burns and Mitchell, *Measuring Business Cycles*, pp. 56ff.

seasonal adjustment program has been used in place of shorter averages.[3] Average leads and lags have been calculated by comparing specific with reference cycles.

Finally, five general diffusion indexes based on the twenty indicators were calculated. In selecting various moving averages for this purpose, the ratios of irregular to cyclical movements (see note 3) were used instead of the average duration of run as in the appendix to Moore's Occasional Paper 31 (reprinted here, Chapter 20). The relationship between average duration of run and $\bar{I}/\bar{C}$ for American series was examined, as well as the $\bar{I}/\bar{C}$ ratios for both the Canadian and American data.[4]

Thus, it can be seen that the analysis in this report carries only part of the way. The major conclusions are restricted to the twenty statistical indicators. Work is going forward on additional indicators and diffusion indexes of selected aggregates such as production, employment, profit margins, and so on. Measures such as cycle relatives, patterns, and indexes of conformity have not been calculated for the Canadian data. Finally, the period under consideration is restricted to the postwar period, when only two mild contractions were evident in the two countries. However, limited examination of prewar data confirms the general conclusions reached here.

Despite these limitations, the results thus far have been highly encouraging. The factual data below seem to support the following general conclusions.

1. In the postwar period, aggregate economic activity in Canada displays a type of fluctuation conforming to the definition of business cycles; recurrent cycles of expansion and contraction are observable in many economic activities within the aggregate.[5]

2. Reference cycles occur in Canada at about the same time as they do in the United States, but the amplitude of cycles, both in aggregates and in many specific series, is much smaller in Canada. Seasonal amplitudes, on the other hand, are relatively larger in Canada.

3. Among the twenty time series selected, there seems to be a reasonable degree of conformity to the business cycle.

4. In general, the same activities that lead reference cycle turning points in the United States also lead in Canada and by about the same

[3] See the papers cited in note 1 for more detail on the nature of Spencer curves, related measures of irregular movements, and months for cyclical dominance (MCD). Method II permits the decomposition of time series into trend-cycle (C), seasonal (S), and irregular movements (I). Average measures of these, as well as the ratios of one to another, are printed out. These are extremely useful additions to the tool kit of time series analysis.

[4] See Table 10.5.

[5] Some question can be raised as to whether 1948–49 should be identified as a business cycle contraction. See comment below in connection with the discussion of the movement of the diffusion indexes.

TABLE 10.1

End Product Demand Patterns, Canada and United States, 1953–55

	Amount			Percentage of Total GNE IV 1955	Change		
	II 1953	III 1954	IV 1955		II 1953 to III 1954	III 1954 to IV 1955	II 1953 to IV 1955
CANADA (MILLION DOLLARS, SEASONALLY ADJUSTED ANNUAL RATE)							
Consumer expenditure	15,040	16,040	17,256	62.4	+1,000	+1,216	+2,216
Government expenditure	4,436	4,504	4,832	17.5	+68	+328	+396
Gross domestic investment	4,832	4,616	5,728	20.7	−216	+1,112	+896
Total final demand	24,308	25,160	27,816		+852	+2,656	+3,508
Inventory change, total	+400	−520	+796		−920	+1,316	+396
Change in business inventories	+500	−392	+512		−892	+904	+12
Net foreign balance	−580	−272	−1,068		+308	−796	−488
Residual error	+204	+4	+96		−200	+92	−108
Gross national expenditure	24,332	24,372	27,640	100.0	+40	+3,268	+3,308
Gross national product excl. agriculture	22,760	23,292	26,224	94.9	+532	+2,932	+3,464
UNITED STATES (BILLION DOLLARS, SEASONALLY ADJUSTED ANNUAL RATE)							
Consumer expenditure	230.8	237.9	259.5	64.6	+7.1	+21.6	+28.7
Government, total	86.6	75.8	78.1	19.4	−10.8	+2.3	−8.5
Defense	54.3	42.1	40.6	10.1	−12.2	−1.5	−13.7
Gross domestic investment	51.4	51.3	62.0	15.4	−0.1	+10.7	+10.6
Total final demand	368.8	365.0	399.6		−3.8	+34.6	+30.8
Inventory change, total	+4.5	−5.4	+3.1		−9.9	+8.5	−1.4
Change in business inventories	+5.4	−4.9	+6.1		−10.3	+11.0	+0.7
Net foreign investment	−3.3	−0.7	−0.8		+2.6	−0.1	+2.5
Gross national expenditure	369.9	358.8	401.9	100.0	−11.1	+43.1	+32.0
Gross national product excl. agriculture	357.8	347.1	390.5	97.2	−10.7	+43.4	+32.7

margin; the same general correspondence applies to roughly coincident and lagging indicators.

5. Diffusion indexes based on Canadian statistical indicators trace out a time path very similar to those for the United States; these indexes lead the reference cycle turning points.

6. Finally, the indicators and diffusion indexes have proved extremely helpful in current economic analysis and in short-term forecasting.

Now this rather general correspondence in the behavior of the indicators and diffusion indexes in Canada and the United States may not be surprising in view of the many similarities between the two countries. Both are "nations that organize their work mainly in business enterprises." They are closely tied together by social and cultural as well as economic bonds; common ownership or control in many fields is supplemented by a common economic intelligence in others. Trading relations are of course extremely important, with each being the other's best customer.

But if there are similarities, there are also differences. Canada is a much smaller country, and it is growing more rapidly. Canada's dependence on foreign trade is much greater. In the United States, agriculture is relatively less important, manufacturing relatively more important. Resource development has been more pronounced in Canada in the period under review. There are differences in market size, in plant size, and hence in economies of scale (and even these differ among industries and over time). Differences exist in the structure and operation of financial institutions and in the role of government.

The list of similarities and differences is a long one. Some of these are revealed in Table 10.1 and Chart 10.1, which show the behavior, for a recent period, of gross national product and its components, together with industrial production and unemployment. The statistical material on the twenty indicators throws further light on the impact of the above-mentioned factors on cyclical timing and amplitude. There is a strong suggestion that some traditional views on the international transmission of cycles are in need of revision.

To illustrate: it has been contended that Canadian business cycles originate abroad, in Canada's major trading areas, and are transmitted here with a time lag (usually set at about six months). The data below show that, for the postwar period, business cycle turning points in Canada and the United States coincide almost perfectly (Table 10.2). Scattered evidence for the interwar period does not support the time lag theory. This suggests that domestic forces (which have a counterpart abroad), such as inventory and fixed capital investment, are at work as well as external forces.

Again, it has been argued that United States business cycles are transmitted abroad, to her major suppliers, with an increased amplitude.

CHART 10.1

Gross National Product, Industrial Production, and Unemployment, United States and Canada, 1952–55

Gross National Product (excluding farm income)

Indexes of Industrial Production

Indexes of Unemployment
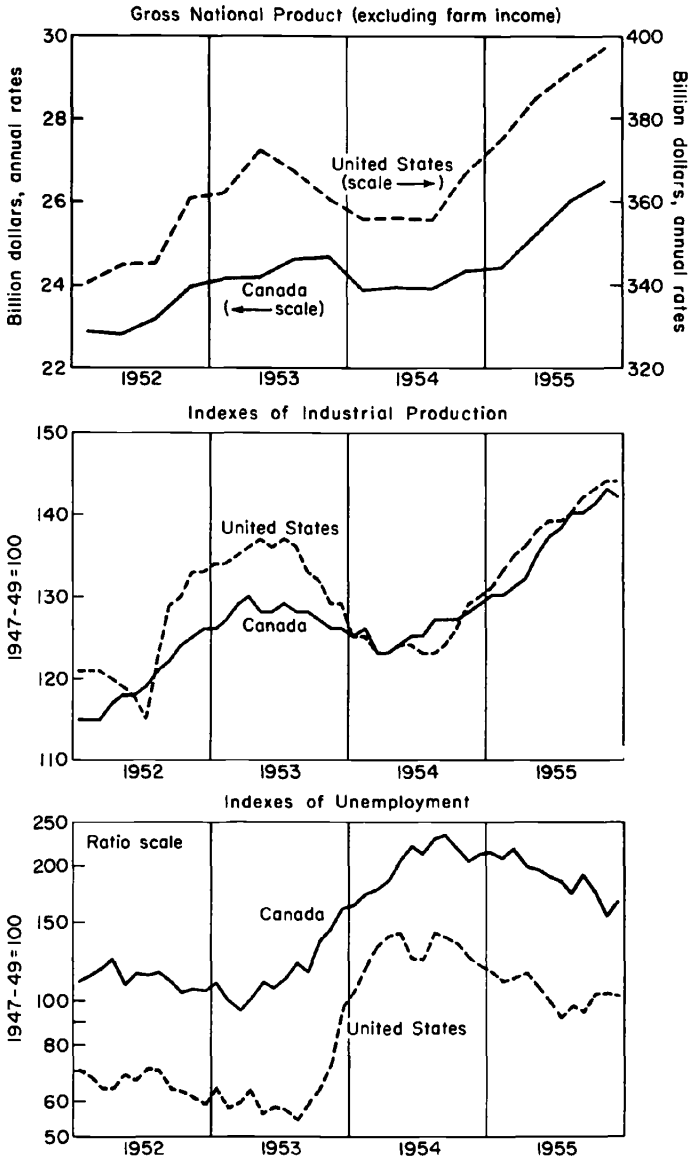
All data are seasonally adjusted.

TABLE 10.2

Postwar Business Cycle Turning Points,
Canada and United States

	Business Cycle Peaks	Business Cycle Troughs
Canada	October 1948	October 1949
	July 1953	June 1954
United States	November 1948	October 1949
	July 1953	August 1954

This, it is contended, is due to the traditionally greater volatility in United States inventories and imports than in domestic activity; and the cycle is further aggravated in Canada through the operation of the export multiplier.[6]

The findings here (Chart 10.1) show the contrary, i.e. that cyclical amplitudes in Canada have been considerably less than those in the United States during the two recent adjustments; evidence from the prewar period, again, is in line with this experience.[7] An important factor operating to dampen cyclical amplitudes has been the greater volatility in *Canadian* imports than in domestic activity and a consequent relative stability in inventories. Moreover, Canada reveals the strong growth trend of a younger country with rapidly developing basic resource industries.

The Behavior of Statistical Indicators

To provide a detailed examination of the statistical material, Table 10.3 lists the twenty-one indicators and Table 10.4 summarizes the timing characteristics of these indicators in Canada and the United States. In addition, to assist understanding, the sources and nature of the data are shown. Two sets of average lead and lag intervals are given for the American series: one covers the interwar period, the other the postwar period. The timing of the Canadian (postwar) data at each turn is recorded in Table 10.4.

The Canadian data are also plotted on Charts 10.2, 10.3, and 10.4. Here, according to NBER practice, shaded areas represent periods of general business contraction, and unshaded areas, periods of expansion. The dots identify specific cycle peaks and troughs in individual series.

[6] See E. Marcus, *Canada and the International Business Cycle,* New York, 1954. Also a paper by the same author, "Inventory Fluctuations and U.S. Imports," presented at the American Statistical Association annual meeting, December 1955. Another view is that of V. W. Malach, *International Cycles and Canada's Balance of Payments,* Toronto, 1945.

[7] For data and interpretation on the prewar period, see G. Rosenbluth, "Changes in Canadian Sensitivity to United States Business Fluctuations," and E. J. Chambers, "Canadian Business Cycles since 1919: A Progress Report," papers presented at the twenty-ninth annual meeting, Canadian Political Science Association, Ottawa, June 1957.

TABLE 10.3

Twenty-one Indicators of Revivals and Recessions, Canada and United States

United States	Canada
A. *Leading Indicators* (with sources)	
1. Business failures, liabilities, industrial and commercial, inverted (Dun & Bradstreet, Inc., seasonally adjusted)	1. Commercial failures, liabilities, inverted (D.B.S.—Commercial Failures, assignments made under the Bankruptcy and Winding Up Acts, seasonally adjusted)
2. Industrial common stock price index (Dow-Jones & Co. Inc.)	2. Industrial common stock price index (D.B.S. Prices and Price Index)
3. New orders, durable goods, value (Department of Commerce, seasonally adjusted)	3. New orders, durable goods (D.B.S., not seasonally adjusted)
4. Residential building contracts (F. W. Dodge Corporation, seasonally adjusted)	4. Contract awards, residential, in 1949 dollar values (McLean Building Reports, seasonally·adjusted)
5. Commercial and industrial building contract awards (F. W. Dodge Corporation, seasonally adjusted)	5. Contract awards, commercial and industrial, in 1949 dollar values (McLean Building Reports, seasonally adjusted)
6. Average hours worked per week, manufacturing (BLS, seasonally adjusted)	6. Average hours worked per week, manufacturing (D.B.S. Manhours and Hourly Earnings, seasonally adjusted)
7. New Incorporations, number (Dun & Bradstreet, Inc., seasonally adjusted)	7. not available
8. Wholesale price index, 28 basic commodities (BLS)	8. Wholesale price index, industrial materials (D.B.S. Prices and Price Indexes, seasonally adjusted)
B. *Coincident Indicators* (with sources)	
9. Employment in nonagricultural establishments (BLS, seasonally adjusted)	9. Index of employment, industrial composite (D.B.S. Employment and Payrolls, seasonally adjusted)
10. Unemployment, inverted (Department of Commerce, seasonally adjusted)	10. Persons without jobs and seeking work, inverted (D.B.S. The Labor Force, seasonally adjusted)
11. Corporate profits after taxes, quarterly (Department of Commerce, seasonally adjusted)	11. Corporate profits after taxes, quarterly (D.B.S. Corporate Profits, quarterly, seasonally adjusted)
12. Bank debits, outside New York City (FRB, seasonally adjusted)	12. Checks cashed in clearing centers, excluding Montreal and Toronto (D.B.S. Checks Cashed in Clearing Centers, seasonally adjusted)
13. Freight carloadings (Association of American Railroads, seasonally adjusted)	13. Freight carloadings (D.B.S. Freight Carloadings, seasonally adjusted)

TABLE 10.3 (concluded)

United States	Canada
B. *Coincident Indicators* (continued)	
14. Index of industrial production (FRB, seasonally adjusted)	14. Index of industrial production (D.B.S., seasonally adjusted)
15. Gross national product, quarterly (Department of Commerce, seasonally adjusted, at annual rates)	15. Gross national product, excluding agriculture, quarterly (D.B.S. National Accounts, seasonally adjusted, at annual rates)
16. Wholesale price index, excluding farm products and foods (BLS)	16. Wholesale price index, excluding animal and vegetable products (D.B.S. Prices and Price Indexes, seasonally adjusted)
C. *Lagging Indicators* (with sources)	
17. Personal income (Department of Commerce, seasonally adjusted, at annual rates)	17. Personal income excluding farm income, quarterly (D.B.S. National Accounts, seasonally adjusted, at annual rates)
18. Sales by retail stores, value (Department of Commerce, seasonally adjusted)	18. Retail sales, value (D.B.S. Retail Trade, seasonally adjusted)
19. Consumer instalment debt (FRB, seasonally adjusted)	19. Consumer instalment debt, quarterly (Bank of Canada, seasonally adjusted)
20. Bank rate on business loans, quarterly (FRB, seasonally adjusted)	20. Interest rate on day-to-day loans (Bank of Canada)
21. Manufacturers' inventories, book value in current prices (Department of Commerce, seasonally adjusted)	21. Manufacturers' inventories, book value in current prices (D.B.S., Inventories and Shipments, seasonally adjusted)

NOTE: BLS = Bureau of Labor Statistics
D.B.S. = Dominion Bureau of Statistics
FRB = Federal Reserve Board

Chart 10.5 depicts five simple diffusion indexes based on various combinations of the indicators, and Chart 10.6 shows the same indexes in cumulated form.

An examination of these data suggest, in a general way, that the same processes that traditionally lead the business cycle in the United States also lead the Canadian business cycle, and by about the same margin. Again, those processes which turn in rough coincidence with general business activity in the United States behave similarly in Canada. The same holds true generally for the lagging indicators. These findings can be discerned in the measures provided in Table 10.4, as discussed below.

The variation between average leads and lags for Canada for the postwar period and for the United States for the (longer) prewar period is in the same direction and affects the same processes as a comparison of prewar and postwar United States data. Table 10.4 itself reveals the

TABLE 10.4

Lead or Lag of Twenty-one Indicators of Cyclical Revivals and Recessions,
and Five Diffusion Indexes, Canada and United States

	LEAD (−) OR LAG (+) IN MONTHS					
	Prewar Average, at Business Cycle		At Postwar Business Cycle			
	Peaks[a]	Troughs[a]	Peak 1948	Trough 1949	Peak 1953	Trough 1954
A. *Leading Series*						
1. Business failures (inverted)						
United States	−10.1(14)	−7.5(15)	N/C	−6	−28	−6
Canada	n.a.	n.a.	N/C	N/C	N/C	−4
2. Industrial stock prices						
United States	−5.9(16)	−6.3(16)	−30	−4	−6	−11
Canada	n.a.	n.a.	−4	−4	−21	−8
3. New orders						
United States	−6.7(3)	−2.5(4)	−5	−3	−6	−9
Canada	n.a.	n.a.	N/C	N/C	N/C	N/C
4. Residential building contracts						
United States	−8.7(6)	−4.5(6)	−30	−9	N/C	N/C
Canada	n.a.	n.a.	N/C	N/C	N/C	N/C
5. Commercial and industrial building contracts						
United States	−5.2(5)	−1.7(6)	−32	−2	N/C	N/C
Canada	n.a.	n.a.	N/C	N/C	N/C	N/C
6. Average work-week, mfg.						
United States	−3.8(4)	−2.8(5)	N/C	−4	−7	−4
Canada	n.a.	n.a.	N/C	N/C	−1	C
7. New incorporations						
United States	−2.5(17)	−3.5(19)	−30	−6	N/C	N/C
Canada	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
8. Wholesale prices, basic commodities						
United States	−2.2(11)	−1.5(12)	−10	−4	−29	N/C
Canada	n.a.	n.a.	−2	−2	−27	+2
B. *Coincident Series*						
9. Employment						
United States	−0.2(12)	−2.7(12)	C	C	−1	−1
Canada	n.a.	n.a.	C	+4	−2	+3
10. Unemployment (inverted)						
United States	+2.0(1)	+1.0(2)	−6	C	+1	C
Canada	n.a.	n.a.	−19	+6	−4	+2
11. Corporate profits						
United States	−1.5(4)	−1.8(5)	−6	+1	−2	−9
Canada	n.a.	n.a.	n.a.	n.a.	−5	−7
12. Bank debits						
United States	+2.3(14)	−4.1(16)	−3	−2	N/C	N/C
Canada	n.a.	n.a.	N/C	N/C	−6	+3
13. Carloadings						
United States	+3.4(14)	−3.6(14)	−21	C	−31	C
Canada	n.a.	n.a.	−6	+3	−26	−1

TABLE 10.4 (concluded)

|	LEAD (−) OR LAG (+) IN MONTHS					
	Prewar Average, at Business Cycle		At Postwar Business Cycle			
	Peaks^a	Troughs^a	Peak 1948	Trough 1949	Peak 1953	Trough 1954
B. *Coincident Series* (continued)						
14. Industrial production						
United States	+1.2(12)	−3.9(13)	−1	C	C	C
Canada	n.a.	n.a.	N/C	N/C	−3	−3
15. Gross national product						
United States	+2.5(2)	+0.7(3)	C	+1	−2	−9
Canada	n.a.	n.a.	N/C	N/C	N/C	N/C
16. Wholesale price index, excluding farm and foods						
United States	−0.8(5)	+3.7(6)	C	−3	N/C	N/C
Canada	n.a.	n.a.	+5	−2	−24	+2
C. *Lagging Series*						
17. Personal Income						
United States	+1.8(4)	−3.4(5)	−1	C	N/C	N/C
Canada	n.a.	n.a.	N/C	N/C	N/C	N/C
18. Retail sales						
United States	+4.6(5)	+1.8(5)	N/C	N/C	C	−7
Canada	n.a.	n.a.	N/C	N/C	+3	C
19. Consumer debt (end of month)						
United States	+4.5(2)	+3.5(2)	N/C	N/C	N/C	N/C
Canada	n.a.	n.a.	N/C	N/C	+8.5	+3.5
20. Bank rate on business loans						
United States	+5.5(4)	+12.2(6)	+7	+5	+5	+7
Canada	n.a.	n.a.	n.a.	n.a.	n.a.	+8
21. Inventories (end of month)						
United States	+6.5(2)	+7.5(2)	+3.5	+1.5	+2.5	+1.5
Canada	n.a.	n.a.	N/C	N/C	+6.5	+6.5
D. *Diffusion Indexes*						
Leading series						
United States	−10.4(5)	−9.2(5)	−15	−10	−13	−15
Canada	n.a.	n.a.	−16	−5	−6	−10
Coincident series						
United States	−5.2(5)	−7.4(5)	−6	−4	−3	−10
Canada	n.a.	n.a.	−5	+2	−5	−7
Lagging series						
United States	n.a.	n.a.	−3	C	−2	C
Canada	n.a.	n.a.	+4	−4	+1	−1
Combined series						
United States	n.a.	n.a.	−15	−10	−6	−10
Canada	n.a.	n.a.	−13	−4	−6	−8
Leading and coincident series (leading series shifted forward)						
United States	−6.2(5)	−7.4(5)	−12	−6	−9	−11
Canada	n.a.	n.a.	−12	−1	−5	−6

a Number of business cycle turns covered is given in parentheses.

N/C = no cycle or no corresponding turn

C = coincident

NOTE: For fuller titles of the U.S. and Canadian series, see Table 10.3.

CHART 10.2

Seven Leading Series, Canada, 1947–57
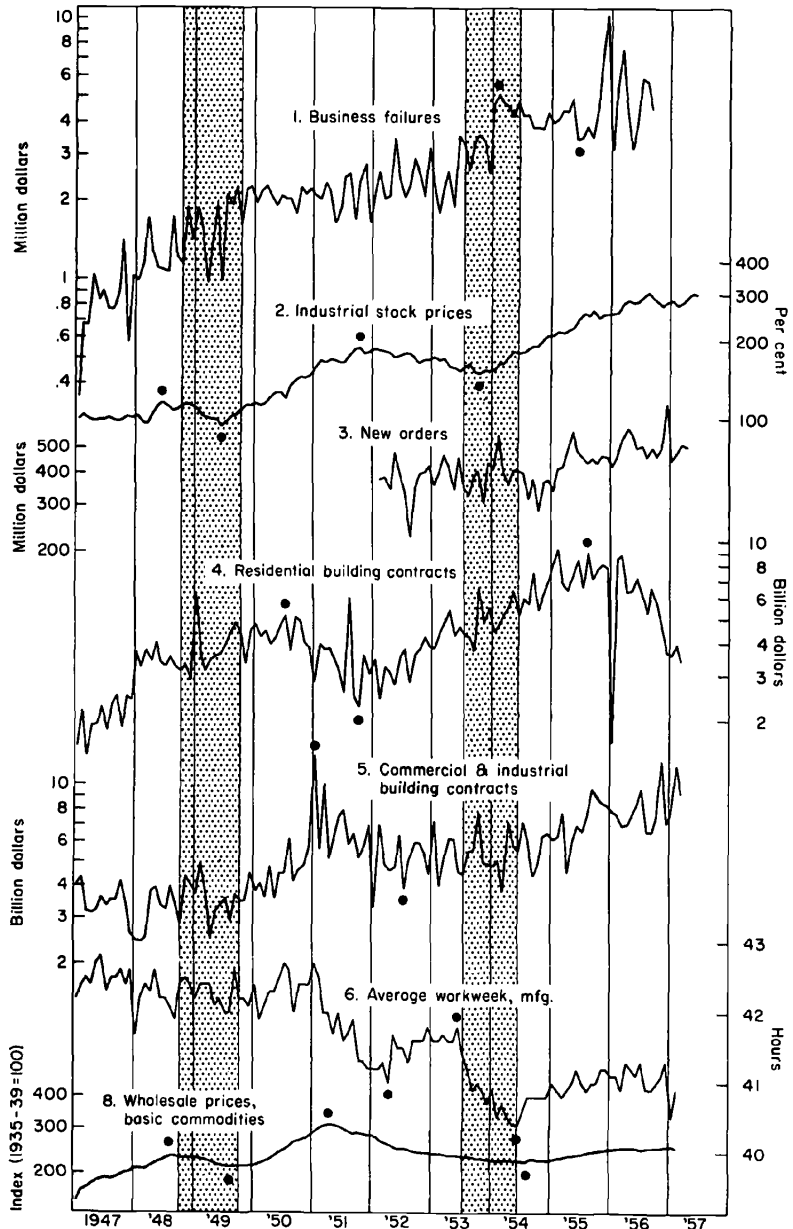
Ratio scales used throughout except for curve 6.
Shaded areas represent business contractions; unshaded areas, expansions.
Dots identify peaks and troughs of specific cycles.

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CHART 10.3
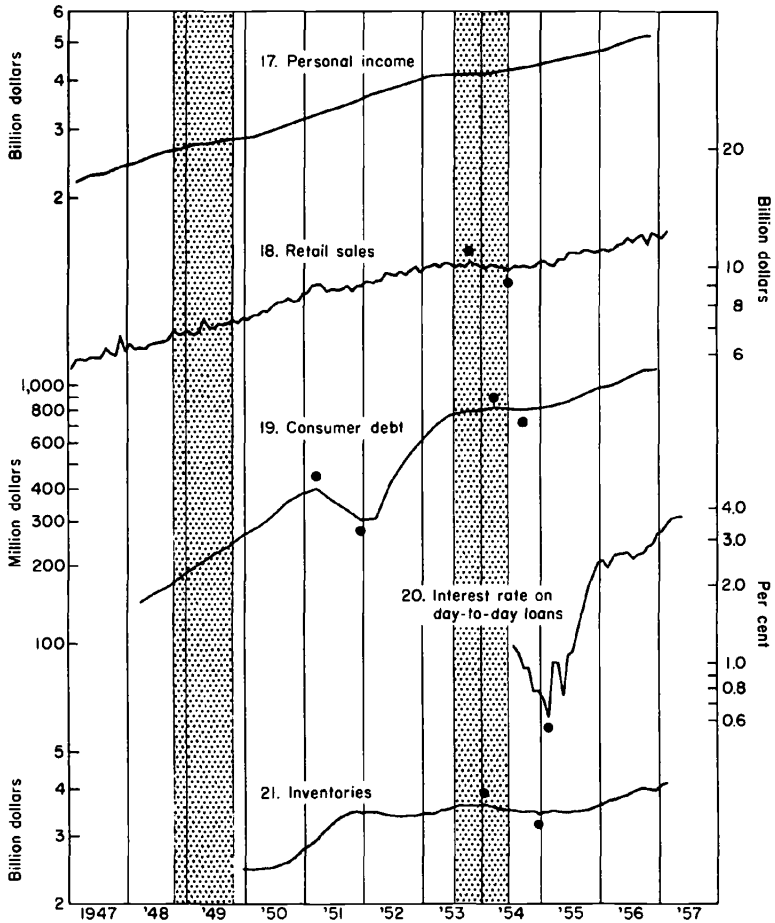
Eight Roughly Coincident Series, Canada, 1947–57
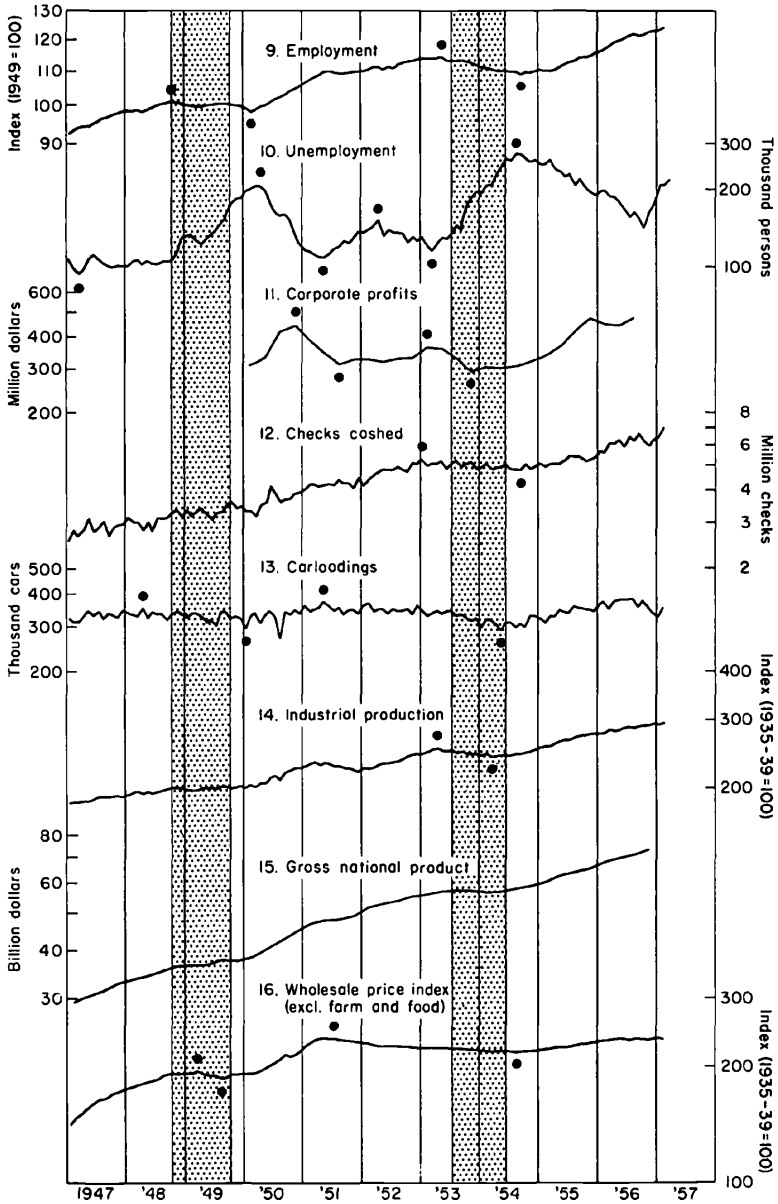
Ratio scales used throughout.
Shaded areas represent business contractions; unshaded areas, expansions.
Dots identify peaks and troughs of specific cycles.

CHART 10.4

Five Lagging Series, Canada, 1947–57

Ratio scales used throughout.
Shaded areas represent business contractions; unshaded areas, expansions.
Dots identify peaks and troughs of specific cycles.

close timing of specific cycle peaks and troughs for the same processes for the two countries. Particularly noticeable are the movements in prices and in the coincident series generally. The long lead in prices, a departure from prewar average experience, for both countries in the postwar period is a reflection of the Korean War and its aftermath.

Some differences between Canadian and American experience may be

CHART 10.5

Simple Diffusion Indexes, Canada, 1947–55

Percentage
expanding
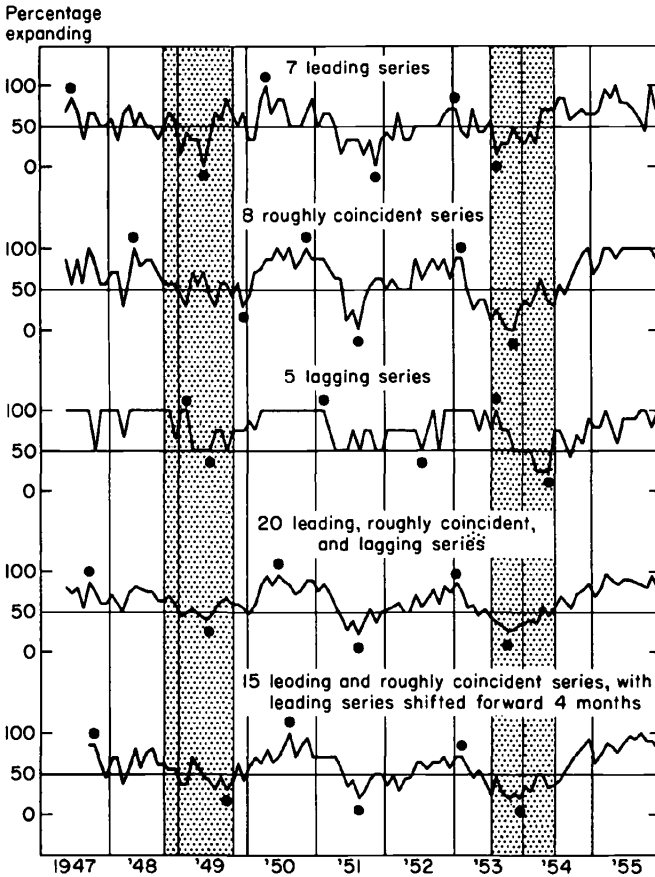
Computed from directions of change in centered moving averages applied to each seasonally adjusted indicator; the number of rising indicators is taken as a percentage of the total number in the group.

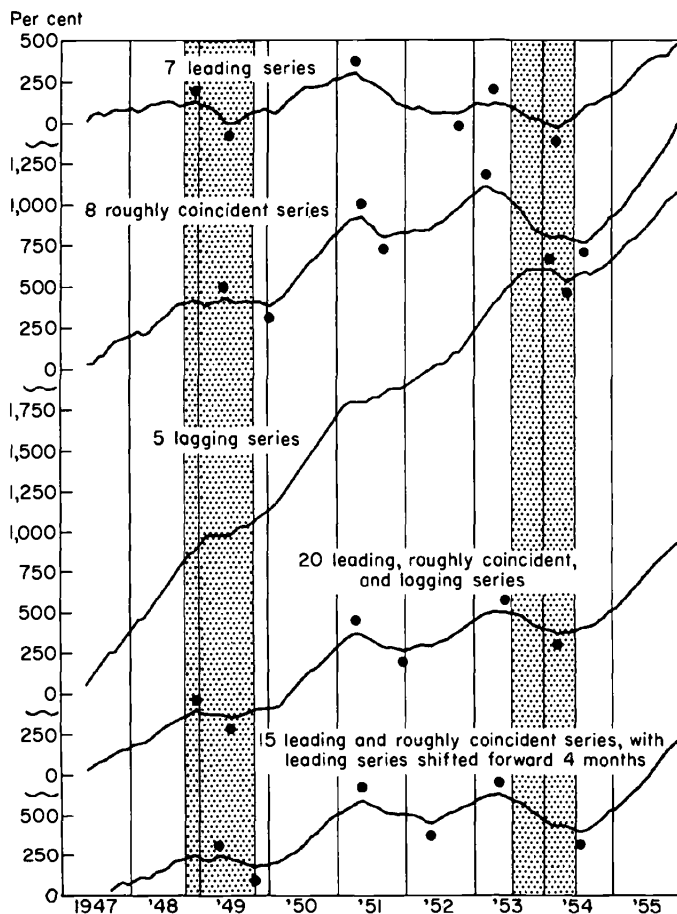Shaded areas represent business contractions; unshaded areas, expansions.

Dots identify peaks and troughs of specific cycles.

noted. First, it was necessary to make some modifications in the Canadian data. Commercial failures include what are termed personal bankruptcies (originating in the province of Quebec) and these tend to inflate the series and aggravate its irregular component. A test run, excluding Quebec, revealed somewhat better conformity, but this adjustment was available on a quarterly basis only.

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CHART 10.6

Cumulated Diffusion Indexes, Canada, 1947–55

Per cent

Shaded areas represent business contractions; unshaded areas, expansions.
Dots identify peaks and troughs of specific cycles.

The Canadian series on new orders for durable goods was not available for a sufficiently long period to permit an appropriate seasonal adjustment, and it was thus not feasible to mark off specific cycles. (In calculating the diffusion indexes new orders were smoothed with a centered twelve-month moving average.)

For the two contract award series, floor space figures were not available; in their place, deflated dollar values of contracts awarded have been used. The irregular component in both these series (see Table 10.5)

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is considerably greater than for their United States counterparts. Part of the reason for this may be that large individual awards constitute a greater proportion of the total in Canada than in the United States.

A number of the indicators have behaved in very systematic fashion. These include average weekly hours in manufacturing, employment, checks cashed (bank debits), industrial production, and retail sales. For most of these series, the basic data in the two countries are highly comparable and the cyclical timing conforms well.

Unemployment, although a coincident indicator, has displayed a slight tendency to lead at the peaks and lag at the troughs in Canada. Freight carloadings have shown the same tendency. Both series are characterized by a level or downward secular trend over the period studied (i.e. when unemployment is taken invertedly). In the case of unemployment, a stable long-term *rate* implies a secularly rising number of unemployed. The trend in freight carloadings is related no doubt to competing forms of transport—air, trucking, pipelines—which have grown apace in Canada during the postwar period. In either case, the data suggest that cyclical weaknesses will show up earlier and last longer in processes where the long-term trend is not upward, at variance with most other measures of the economy.

In Canada, corporate profits revealed a clear lead for the one cycle for which the data are available. Corporate profits in the United States behaved similarly in the 1953–54 recession. This is a series that might be expected to lead, on a priori grounds, though analysis of United States data for the interwar period leaves the issue in doubt.[8] Further work on aggregate profits, profit margins, profits diffusion, and on industry detail might be revealing and useful.

No specific cycles were marked off for gross national product or personal income (both exclude the farm sector). As can be seen from the charts, neither showed more than a slight retardation during the two postwar adjustments. Indeed, their behavior underlines the mildness of Canada's postwar recessions. The impact of both cycles fell most heavily on the commodity-producing industries. The declines there were offset within these two aggregates by continued growth in the services. Built-in stabilizers, coupled with rising tendencies in most factor prices, have also had their impact on personal incomes.[9]

The levels of both consumer instalment debt outstanding and manufacturers' inventories have displayed clear lags like their American counterparts. In place of the bank rate on business loans, we have used for Canada

[8] See T. Hultgren, *Cyclical Diversities in the Fortunes of Industrial Corporations,* and G. H. Moore, *The Diffusion of Business Cycles* (reprinted here, Chapters 11 and 8). See also Chapters 3 and 12.

[9] Cf. Daniel Creamer, *Personal Income During Business Cycles,* Princeton for NBER, 1956.

TABLE 10.5

Average Monthly Amplitudes of Seasonal, Cyclical, and
Irregular Components of Selected Indicators,
Canada and United States

	CANADA							Moving Average Periods[a] (months)
	$\overline{CI}$	$\overline{I}$	$\overline{C}$	$\overline{S}$	$\overline{I}/\overline{C}$	$\overline{I}/\overline{S}$	$\overline{S}/\overline{C}$	
Leading Series								
1. Business failures (inverted)	n.a.	21.5	3.7	16.6	5.8	1.3	4.5	7
2. Industrial stock prices	2.4	1.7	1.5	1.3	1.1	1.3	0.9	2
3. New orders								12[b]
4. Residential building contracts	n.a.	16.9	2.8	21.8	6.0	0.8	7.7	7
5. Commercial and industrial building contracts	n.a.	19.7	3.2	13.2	6.2	1.5	4.2	7
6. Average workweek, mfg.	0.7	0.6	0.1	1.8	4.5	0.3	13.1	4
7. New incorporations								
8. Wholesale prices, basic commodities	1.3	0.6	1.1	0.4	0.6	1.6	0.4	1
Coincident Series								
9. Employment	0.5	0.3	0.4	1.2	0.7	0.2	2.9	2
10. Unemployment (inverted)	4.8	3.5	2.9	14.1	1.2	0.3	4.9	3
12. Bank debits	4.4	4.3	0.9	7.1	4.7	0.6	7.8	6
13. Carloadings	n.a.	3.6	0.7	5.1	5.1	0.7	7.3	6
14. Industrial production	0.9	0.6	0.6	2.1	1.0	0.3	3.4	2
16. Wholesale price index excluding farm and foods	0.7	0.3	0.6	0.2	0.5	1.3	0.4	1
Lagging Series								
17. Personal income	0.8	0.3	0.7	1.6	0.4	0.2	2.2	3
18. Retail sales	n.a.	1.9	0.7	7.1	2.9	0.3	10.7	4
19. Consumer debt	3.3	2.5	2.7	3.3	0.9	0.8	1.2	3
21. Inventories (end of month)	n.a.	0.4	0.7	0.7	0.5	0.5	0.9	1

[a] SELECTION OF MOVING AVERAGES

	Canada			United States	
$\overline{I}/\overline{C}$ Ratio	Moving Average (months)	Series	Average Duration of Run (mos.)	Moving Average (months)	Series
0.0–0.6	1	8, 16, 20, 21	4.0 or more	1	19, 21
0.7–1.1	2	2, 9, 14	3.3–3.9	2	9, 14, 16, 17
1.2–2.5	3	10, 11*, 15*, 17*, 19*	2.8–3.2	3	8, 11*, 15*, 20*
2.6–3.5	4	6, 18	2.3–2.7	4	6, 18
3.6–4.5	5	none	1.9–2.2	5	10, 13
4.6–5.5	6	12, 13	1.7–1.8	6	1, 3, 4, 5, 7, 12
5.6 or more	7	1, 4, 5	1.5–1.6	7	none

* Quarterly series.

the interest rate on day-to-day loans which became available only recently. This series lagged behind the 1954 trough by eight months.

Let us pause briefly here and summarize the behavior of the Canadian indicators in terms of the criteria of a good cyclical indicator set forth by the National Bureau. Other things being equal, a series was considered more useful as an early indicator of revivals:[10]

[10] See Mitchell and Burns, Chapter 6.

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				UNITED STATES			Moving Average Periods (months)	Average Duration of Run in $\overline{CI}$ (months)
$\overline{CI}$	$\overline{I}$	$\overline{C}$	$\overline{S}$	$\overline{I}/\overline{C}$	$\overline{I}/\overline{S}$	$\overline{S}/\overline{C}$		
16.0	15.1	3.1	9.8	4.9	1.5	3.2	6	1.6
1.9	1.4	1.2	1.0	1.2	1.4	0.8	4	2.4
5.2	4.6	2.0	5.9	2.3	0.8	3.0	6	1.9
8.2	7.7	2.6	11.1	3.0	0.7	4.3	6	1.7
13.3	12.8	2.8	10.3	4.5	1.2	3.6	6	1.6
0.4	0.3	0.2	0.5	1.7	0.6	3.0	4	2.6
4.4	4.2	1.2	8.7	3.5	0.5	7.3	6	1.5
2.1	1.4	1.3	1.2	1.1	1.1	1.0	3	2.8
0.4	0.2	0.3	0.8	0.7	0.2	2.8	2	3.6
5.2	3.8	2.8	9.3	1.4	0.4	3.3	5	2.6
3.2	3.0	0.8	6.1	4.0	0.5	8.0	6	1.4
3.2	2.9	1.1	5.1	2.7	0.6	4.6	5	1.8
1.1	0.7	0.7	2.3	1.0	0.3	3.2	2	3.6
0.4	0.2	0.4	0.2	0.4	0.7	0.6	2	8.3
0.8	0.5	0.6	4.4	0.9	0.1	7.8	2	2.7
1.9	1.7	0.6	6.7	3.0	0.2	11.9	4	1.7
1.7	0.3	1.6	0.7	0.2	0.4	0.4	1	13.8
0.9	0.2	0.9	0.4	0.3	0.7	0.4	1	11.3

b New orders series not seasonally adjusted, smoothed with centered 12-month average.
NOTE: For fuller titles of the U.S. and Canadian series, see Table 10.3. The analysis has not been applied to series 3 (new orders, Canada), 11 (profits), 15 (GNP), or 20 (interest rates). Data for series 7 (new incorporations) are not available for Canada. .

1. The longer its average lead at past revivals.
2. The more uniform are these leads in occurrence and length.
3. The closer its specific cycles come to having a one-to-one correspondence with business cycles.
4. The more clearly defined its specific cycles.
5. The less intense its erratic movements in comparison with the amplitude of its specific cycles.
6. The fewer the changes in the direction of its month-to-month movements.
7. The smaller and more regular the seasonal variations that have to be "eliminated" before the specific cycles can be studied.
8. The larger the number of past revivals covered by the series.
9. The farther back in time any irregularities in conformity to business cycles revivals occurred.
10. The broader the range of activities represented by the series.
11. The more stable the economic significance of the process represented.

Although phrased in terms of revivals and leading series, the criteria can readily be applied to recessions and to coincident or lagging series.

Because of the short period (1947–55) covered in the data here, it has been impossible to test for criteria (1), (8), or (9). No attempt has been made to construct a measure on which to assess criterion (3). About thirteen of the Canadian indicators have clearly defined specific cycles in the postwar period. About half reveal reasonably uniform timing —of course, for one or two cycles only. (Again, limited examination of interwar data supports this conclusion.) Six series have irregular movements that are large relative to cyclical amplitudes (larger indeed than the corresponding United States indicators).[11] By and large, most Canadian series have a larger seasonal variation than the comparable American data. These latter two factors are not such big disadvantages now that reasonably good quality measures of seasonality and irregularity are available on an electronic computer program. Most of the series are broadly representative (criterion 10) and significant (criterion 11). On balance, only about half of the indicators in Canada are free from one or more major shortcomings (although experience with a longer period for some of the indicators would doubtless improve this rating).

In view of these rather severe limitations and the other considerations mentioned above, it is significant that when the indicators are aggregated into the diffusion indexes shown in Charts 10.5 and 10.6, the results are strikingly similar to those obtained for the United States.

First, a word on the construction of these indexes. The cyclical significance of given month-to-month (or quarter-to-quarter) changes will vary among individual seasonally adjusted series depending on the extent of irregular movements. Before determining the number of series undergoing expansion or contraction, it is useful to smooth these irregularities from the data with moving averages of varying length in order to achieve reasonable comparability. There are a number of alternative measures which might be employed as a guide in selecting these moving averages. Moore has used a concept termed the average duration of run. In constructing this measure, a record is made of both the direction of a change in a given month and the number of months the series has been moving in that direction. That is, a rise in one month following a decline is counted as $+1$, a continued rise in the second month $+2$, and so forth with arbitrary limits of 6. (Declines are counted as -1, -2, and so on.) The behavior of a given series over a long period can be summarized in the average duration of run. The higher this average, the smoother the series and the more significant are month-to-month movements.

In this paper, a somewhat analogous measure has been used, the ratio

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[11] See Table 10.5.

of irregular to cyclical amplitude ($\bar{I}/\bar{C}$ ratio), developed by Shiskin as part of Method II. This measure is inversely related to the average duration of run; the lower the $\bar{I}/\bar{C}$ ratio, the smoother the series. These various measures for both Canadian and American series are shown in Table 10.5. In summary, at the bottom of the table is the scheme on which the moving averages were selected.

In general, $\bar{I}/\bar{C}$ ratios are somewhat larger in Canada because of a relatively large irregular and in some cases because of a small cyclical component. Some series, commercial failures and the two on contract awards, have been smoothed with longer (seven-month) moving averages. Other modifications from Moore's averages include a one-month average for the wholesale price and the interest rates series (the former seems to be smoother than the United States index and the latter is a quarterly series in the U.S.), and quarterly smoothing for personal income and consumer instalment debt (these are available monthly for the United States but only quarterly for Canada). These and other differences can be seen most readily in Table 10.5. This table also reveals that series with a large cyclical amplitude in the United States have the same characteristic in Canada—e.g. unemployment, business failures.

A rise in the moving average for a given series is designated as a plus, a decline as a minus, and no change is credited half to the plus count and half to the minus. The number of pluses (included halves) expressed as a percentage of the total number of indicators provides the percentage expanding. The cumulated net percentage expanding is calculated by cumulating from month to month the net difference between the percentage expanding and the percentage contracting. As long as more series are rising than falling, the cumulated curve will rise; it begins to decline when the number falling exceeds the number rising, and so on. Both the simple and the cumulated diffusion indexes have been calculated for the leading series, for the roughly coincident indicators, for the laggers, for the three groups in combination, and finally for the leaders and coincident series with the former shifted forward in time four months; this latter adjustment is based on the observed average lead of the leading series over the coincident series for the United States.

There are a number of points worth noting about the behavior of these several diffusion indexes. First, in general, they trace out a path that is strikingly similar to the National Bureau's indexes for the United States. The index of leading series is slightly more erratic in Canada. This may be because the Canadian index is based on seven, instead of eight, series and because the relatively high $\bar{I}/\bar{C}$ ratio in some of the Canadian leaders may be only partly offset by the longer moving averages employed. Despite these limitations, the index of leaders reveals a specific cycle (and some subcycles that have not been fully examined yet) which

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clearly turns ahead of the swings in general business activity. The long lead on the 1954 trough is particularly noteworthy.

In general, the diffusion index based on leading series has turned ahead of the four other diffusion indexes. The leading series turned earliest at the 1948 peak, at the 1949 trough, and at the 1954 trough. However, the leading series index turned in the same month as the combined series at the 1953 peak, and led the coincident series and the fifteen leading and coincident series by only one month. (These individual leads, based on the simple diffusion indexes, are shown in Table 10.4). During the subcycle that occurred in 1951–52, the leading series led at the peak but lagged behind the other series at the trough. On balance, this gives the leading series about a 60 or 70 per cent success record.

Again, the diffusion index based on the coincident series has an 80 per cent success record, following the movement in the leading series in five out of six cases. However, at all of the major turning points except 1949, the roughly coincident index reached a peak or trough before the reference cycle turning dates.

The behavior of the lagging series index has been even more regular: it lagged behind the leading series at all major turning points and behind the coincident series in every case but one. The diffusion index for lagging series has tended to turn at about the same time as the general turns in business, with a short lead at the general turn at the 1949 trough and again at the 1954 trough. This strength in the lagging indicators at business cycle troughs again underlines the very mild nature of Canada's postwar adjustments.

Thus, our simple measure of the scope of expansion and contraction reveals the path of the "unseen cycle" which leads the turns of general business activity. But we must know more about it. How does one use these indexes? How does one distinguish between a "false start," such as late 1947, and a real decline, such as 1953? How does one interpret the differences between early 1951 and 1953? Is the diffusion index for the leading series very helpful when it spends as much time below 50 per cent as it does above? To answer these questions is to demonstrate the use of these measures, but this must be accompanied by a clear statement of their many limitations.

The Use of Indicators and Diffusion Indexes for Forecasting

One point is clear: the indexes did, at least, correctly herald the two recessions and revivals experienced in the postwar period. They further revealed a change in the nature of the expansion that occurred in 1951–52. Let us illustrate the use of the indicators and diffusion indexes for short-term forecasting by the 1953–55 period. In the text that follows the times

specified do not allow for the reporting lags inherent in the raw data, which are sometimes quite long.

In January 1953, six months before the peak in general business activity was reached, the diffusion index based on twenty indicators had reached a peak of 87 per cent expanding. This became a peak only because of the subsequent decline and, as we shall see, it was not possible to identify it until a few more months had passed. As Charts 10.5 and 10.6 show, there was little to concern the analyst at this time. All of the co-incident and lagging indicators were rising and only two of the leading series—industrial and commercial contracts and wholesale prices of industrial materials—were falling. Five out of seven expanding leaders indicated a reasonably healthy situation, although not as strong as in some prior periods, such as early 1950.

In February, three additional series reversed their direction—stock prices, carloadings, and general wholesale prices. In March, commercial failures, average hours worked in manufacturing, corporate profits, and checks cashed joined the declining group of series. By April there was clear evidence of a peak having been reached in the coincident series index, the combined index, and in the leaders and coincident series combined. In May, only nine out of nineteen series were expanding, in June—ten, and in July—eight. Thus, between January and July, in the short space of six months, nine sensitive indicators had experienced a sustained reversal of direction. The forces of expansion had given way to the forces of contraction.

This picture is much more sharply drawn than one that might have been obtained from studying rates of change in some major aggregates. Thus, between January and July, employment fluctuated within a range of 1 per cent; unemployment (seasonally adjusted) rose by only 5,000 on a base of 130,000; industrial production was down by less than a point from its April peak. (A diffusion index, based on the components of industrial production, however, had reached a peak back in December 1952 and had crossed the 50 per cent line in April.) Gross national product actually rose by $250 million between the first and second quarters. Nothing in these figures would have given one cause for concern. However, the sharp movements that occurred in four of the five diffusion indexes correctly foreshadowed the events to come. Specific cycle peaks occurred in employment in May, unemployment in March, industrial production in April, and the gross national product in the third quarter.

Here we see how useful was Mitchell's proposition on the cumulative nature of the business cycle. The diffusion indexes point up dramatically how the processes of contraction begin while expansion is still dominant and how the contraction spreads or diffuses until it becomes the pre-dominant force. The diffusion of activity among the components of the

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major economic aggregates is at its maximum sometime before the peak in these aggregates and it is in the vicinity of a general business peak that the diffusion indexes move most rapidly.

Again, the diffusion indexes can throw some light on the probable duration of the decline as well as on its possible magnitude. Three months after the peak, only 25 per cent of the indicators were rising. Three of the four laggers were still rising. There was some evidence of recovery among the leading indicators, evidence which became much clearer six months after the peak or midway in the decline. The picture presented here suggested strongly that the decline would be more than a pause for breath, but that it would be limited in both duration and magnitude.

By March 1954, three months before the end of the general recession, all of the diffusion indexes except the lagging series had passed their troughs. Expansion was under way while contraction was still dominant. The percentage of rising indicators rose from 37 in March to 57 in April, 49 in May, and 57 in June when once more the balance had swung to expansion. It is worth noting parenthetically that a year-to-year comparison of most of the major aggregates would have suggested continued deterioration. Employment, profits, and industrial production were still below .their levels of the previous year and unemployment substantially above it, although most had passed their individual troughs on a seasonally adjusted basis.

The behavior of the diffusion indexes through late 1954 and most of 1955, in comparison with earlier periods, threw much light on the vigor of the expansion which was under way. For most of 1955, nearly 90 per cent of the indicators were registering increases—a sustained level that had not previously been reached in the period shown here, except for a few months in 1950. As events have proven, the 1955 boom was stronger than either 1953 or 1950–51.

A number of important questions remain, some practical and some theoretical. First, the discerning reader may accept our description of the 1953–55 period, but he will certainly want to know how to distinguish a false start from the real phenomenon. In particular, he will want to know why we have shaded in a recession in 1948–49 but not in 1951. The answers to these pertinent questions will help us demonstrate the limitations of the indicator and diffusion approach.

First of all, we shall turn to late 1947 and early 1948. The combined diffusion index had fallen from 87 per cent expanding in September 1947 irregularly to 50 per cent in March 1948. Did this not suggest a cyclical peak in the offing? On the basis of the indexes alone, one could say no. The drop did not carry as far as 50 per cent, except for a single month. The forces of expansion remained dominant although its scope was

reduced. The diffusion indexes correctly mirrored movements in employ-ment and production, both of which dipped very slightly in early 1948. But neither the magnitude nor the duration of these drops was sufficient to warrant using the word "recession." The reader will note that con-firmation of movements in the indexes has been sought in the movements in selected indicators and in a wider framework of analysis. This points up one of the limitations of the indexes *per se:* they cannot be used in iso-lation; they are an aid to analysis but not a substitute for it.

By May 1948, the diffusion index of the coincident series had re-bounded to 100 per cent and the index based on the twenty combined series had returned to 81.3 per cent. At this point, the leading series index indicated continued weakness and in September 1948 it crossed the 50 per cent line. The roughly coincident series followed this develop-ment and by October 1948 had fallen to 57 per cent. Subsequently, weakness developed in the lagging series and the combined index fell below 50 per cent in January of 1949 and, except for a single month, remained there until June 1949.

There is some question as to whether 1948–49 should be counted as a reference cycle according to National Bureau concepts. The absence of data for five series, and in particular for manufacturers' inventories and new orders for durable goods, makes the problem difficult. Limited weakness was evident in total employment and industrial production (see Charts 10.2–10.5). Unemployment rose steeply through 1949 to its early winter peak in 1950. Stock prices fell from mid-1948 to mid-1949 as did both wholesale price series. With the exception of unemployment, these movements were not exceptionally large. While the diffusion indexes did cross the 50 per cent line, they did not fall far below it nor did they remain there for very many months.

It should be pointed out, however, that there were certain special factors operating to insulate Canada from cyclical movements in the North American economy as a whole. Direct import controls in the period 1948–50 had limited the extent to which inventories could be built up. Thus, the extent to which stocks got out of line with final sales in Canada was much smaller than in the United States during the same period. However, the weakness abroad did react unfavorably on particular industries—logging is an outstanding example—and new investment was slowed somewhat, particularly in industries related to primary resource development. However, commodity production in secondary manu-facturing industries was in a relatively favorable position with a protected home market characterized by strong consumer demand, and little weakness was evident here. Adding up all these factors, it is clear that a cyclical movement distinguished most of 1949 from other periods before and after.

Special factors, however, also distinguish 1948–49 from the later recession in 1953–54. The limitations of the diffusion indexes as such become even clearer when we examine the 1951 period. Here the indexes display a movement that is as sharp and almost as protracted as in 1948–49. And yet we do not regard this as a recession because the reference cycle should be determined from a wider framework. Following are some of the factors involved in this assessment of broader considerations. Gross national product dipped for only a single quarter and then resumed a rapid increase. Unemployment, which had more than doubled in the 1948–50 period, rose by 39 per cent. The declines in production and employment were modest and of limited duration. Finally, a general analysis of this period revealed that there were two dominating factors: prices and inventories. Prices fell rather steeply following the excesses immediately after the Korean period. The substantial build-up in inventories, which had been made possible by the removal of the direct controls that had limited the growth of inventories before 1948–49, ceased. Both the inventory and price movements occurred at a time when all other aspects of final demand were strong. The correction in 1951 thus amounted to a type of rolling readjustment and did not cumulate as in 1953–54, nor react as unfavorably on either investment or unemployment as in 1948–49. All this suggests again that we must examine not just the indexes, but also their component indicators, and that a rounded interpretation must use other data and other techniques.

In 1953–54, on the other hand, the indexes moved more sharply and fell to lower levels. By November 1953, the index of combined series had fallen close to its lowest level of the period covered. Employment and production had fallen more steeply than in any previous period and unemployment had risen more steeply. These events had been preceded by downward movements in the indexes as early as six months before the peak. To round out the interpretation of this period, it was necessary to understand that the inventory adjustment would take place at a time when weakness was evident in some aspects of final demand, notably investment, government purchases, and exports.

Thus, we conclude that the diffusion and indicator approach to current analysis is a valuable supplement, particularly in the early stages of identifying cyclical movements, but it is only a supplement. It is not an easy, inexpensive short cut to understanding, but rather a valuable addition to a kit containing many other tools.

A Tentative Theoretical Explanation of Timing Indicators

The reader will appreciate that until now most of the argument has been based on the results of empirical study and reasoning from historical analogue. But there must be a logic or theory inherent in the consistent

behavior of these indicators. The sequential relations among the indicators have been firmly established by the empirical evidence developed by the NBER. Moreover, confirmation of these relations appears to be reasonably well documented for Canada for the postwar period.

But what of the causal connections between processes ? If it is important and helpful for the analyst to know that certain indicators consistently lead the business cycle and that others lag just as consistently, it is equally if not more important to know why.

A complete explanation, of course, would presuppose not only a larger sample of indicators, but would constitute in effect a rounded theory of the business cycle. Indeed, the formulation of such a theory has long been the object of Mitchell and his successors at the National Bureau (not to mention the researchers in many other schools of thought). Such an ambitious project cannot be encompassed in this short paper. However, it may be useful to offer some very tentative suggestions that may serve as a guide to a fuller theory.

Let us first try to trace the relations among the fluctuations in these "many economic activities." There are two major questions about the leading processes: Why do they lead ? Why do they rise and fall ? To the second question, we shall return later. In reply to the first, we may discern three groups within the leading indicators.

One group contains leading indicators that reflect businessmen's expectations about the profitability of business. These processes are organically related to the second group of investment decisions below. In this first group, we would place commercial failures, industrial stock prices, corporate profits (possibly), and profit margins (certainly). Current, and hence prospective, profits have implications for business deaths and births. These, in turn, are reflected in later cycles in production and employment. Sustained movements may impair or bolster business confidence and lead to changes in investment decisions which again lead movements in production and employment.

A second group contains leading series that represent major business decisions about future production. Here we find new business incorporations, contracts awarded for industrial and commercial buildings and for housing, and new orders for durable goods. The fact that these series are leaders appeals to common sense. A period of time must lapse between the awarding of a contract or the placement of an order for equipment and the actual production of the goods in question. There may be developmental work—the preparation of plans and designs. Administrative detail must be arranged, labor hired, and materials assembled. The actual value of production may rise from a small beginning to a peak rate and then taper off as the contract or order is completed. Thus it may be several months before a decision to invest is fully reflected

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in actual production. As awards rise and fall in cyclical succession, future production must reflect these changes to a greater or lesser degree. The extent of the lead may vary and respond to changes in structure over time, but the lead will remain as one useful guide to short-term trends.

A third group contains advance indicators of conditions in the labor market. Businessmen may wish to observe emergent trends for some time before making costly adjustments in staff size. Varying of hours of work permits an interim assessment before a change in the number of persons on the payroll becomes necessary. Thus, changes in hours of work typically precede those in employment, or in unemployment.

Finally, the patterns in profits, investment, inventories, and new orders tend to show up very early in sensitive commodity prices. Here market forces are important and immediate determinants of prices, in contrast to the situation for prices in which there is an element of administrative lag, such as interest rates or wage rates.

In short, the leading indicators are, by and large, measures of processes or decisions which are logically taken before goods are actually produced or labor utilized. Thus, cycles in production and employment are reflected earlier in cycles among the leading indicators. The question still remains, what causes the leaders to turn up and down, and to this we shall return presently.

In the coincident group of indicators are found those broad measures of economic activity which almost by definition constitute the business cycle: employment and unemployment, total output and transactions, commodity production including the transportation of goods, and the general price level. In varying combinations, these processes are used as measures of over-all business activity and must necessarily turn coincidentally with it. Further, they reflect, with a lag, pronounced cyclical movements in the leading indicators.

The lagging series are of two types. The most important group contains those that represent costs to business—personal income (largely labor income) and its associated expenditure and interest rates. (Others laggers of a similar nature include wage rates, hourly earnings, and labor costs per unit of output.) These series continue to rise after production and employment turn down. Wages are insensitive downward, particularly in response to small changes in demand, because of the organized structure of the labor market. The price of money remains high after the peak of the cycle partly because of administered rigidities in the money market and partly because the demand for money to finance inventories lags.

The second group contains lagging indicators that are measures of stocks—of goods in inventories and of consumer credit outstanding (including also currency in circulation and money holdings). Other researchers have shown the relation between the flow aspect of a process

and the stock aspect of the same process.[11] If the flow measure of an indicator turns coincidentally, then the stock measure will tend to lag. For example, new consumer debt incurred is a roughly coincident indicator, but this is consistent with the fact that the amount outstanding will continue to rise, but at a slower rate, after new debt incurred begins to turn down. In addition, the lag in consumer debt may in part be related to the corresponding income lag. Similarly, the work of Abramovitz suggested that inventory investment is a coincident series and this implies that the stocks of goods held will lag behind. In the case of inventories, time is required to adjust production to sales. For example, a slower increase in sales leads to an actual accumulation of inventories—other things being equal. Many goods are sold on long-term contracts or originate in distant foreign sources. Adjustments here take time.

To put the final block in place, a word must be said about the causal relations between laggers and leaders. Here the cumulative and continuous nature of the business cycle is revealed. It has been noted that shortly after the lagging series turn up, the leaders turn down and vice versa. Rising costs and slower increases in volume lead to shaved profit margins. The financing of burdensome stocks creates additional problems. Expectations dim, commercial failures rise, and stock prices and new incorporations fall. The attempt to reduce inventories is soon reflected in drops in new orders and sensitive commodity prices. Hiring slows down, layoffs rise, and hours decrease as overtime is eliminated and some short-time instituted. If confidence becomes sufficiently impaired, major business decisions to invest may drop.

Subsequently, the declines in leading indicators become reflected in coincident series: in production, employment and prices. These, along with rising unemployment, help to relieve (cost) pressures, and the subsequent reduction in inventories brings them more into line with current sales. Both of these factors lead to improvement in profit ratios. The mere cessation of inventory liquidation means that new orders will rise and commodity prices will become firmer. These, in turn, lead to longer hours and increased hiring. A firmer tone supports stock prices; failures begin to drop; more new businesses are formed and investment decisions begin to strengthen. Thus, shortly after the laggers turn down, the stage is set for the leaders to turn up and the cycle is in an expansion phase again.

The above discussion is, of course, both telescopic and tentative. It is offered as the type of explanation that can be formulated to "explain" the cumulative and continuous nature of business cycles. It might be added that, incomplete as it is, there is nothing in such a description that would be inconsistent with an economic theory of induced investment,

[12] See M. Abramovitz, *Inventories and Business Cycles*, New York, NBER, 1950.

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nor is there a wide gulf between the twenty-one indicators and many of the variables in current econometric models.

In summary, we have attempted to depict the behavior of the twenty-one highly conforming indicators and their diffusion indexes for Canada for the postwar period. In general, and despite limitations in time and method, we feel that the test has been a useful one. We conclude from these statistical data that the experience of the NBER indicators has been confirmed for another country and another time and that indicators are useful for assessing emergent recessions and revivals. We have attempted to show, with reference to the 1953–54 period, how the indicators and diffusion indexes can be used for current analysis and short-term forecasting. We have tried to bring out some of the similarities and differences in Canadian and American behavior which should suggest further research. Finally, we have implied that the whole approach rests on more than just an empirical base.

Encouraged by these tentative results, we regard further work in this field as important and useful. Extending the analysis to an earlier period to cover more cycles, scrutiny of a wider sample of indicators, further statistical processing of the data along NBER lines (i.e. the calculation of indexes of conformity and cyclical patterns), construction of diffusion indexes for selected aggregates, and a search for a more detailed explanation—all these would add materially to the usefulness of the study and to a fuller understanding of cyclical processes in Canada, as well as of the international transmission of cycles.

PART TWO

Cyclical Behavior of Types of Leading Indicators