

THE UNIVERSITY OF MANITOBA

DOCK STRIKES AND THEIR IMPACT
ON CANADIAN WHEAT TRADE

by

MOHAMMED AFAQUE AHMED

A thesis

submitted to the Faculty of Graduate Studies
in partial fulfillment of the requirements for the degree
of MASTER OF SCIENCE

DEPARTMENT OF AGRICULTURAL ECONOMICS

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ABSTRACT

DOCK STRIKES AND THEIR IMPACT ON CANADIAN WHEAT TRADE

By Mohammed Afaque Ahmed

Major Advisor: O. P. Tangri

The major purpose of this study was to determine analytically and statistically the effects, if any, of dock strikes on Canada's wheat exports. To date, however, such an analysis focusing on the effects of dock strikes on Canada's wheat exports has been conspicuous by its absence. The author felt that such a study could have implications for grain producers, policy makers, and dock workers. This was thought to be so because in recent years some dock strikes have completely blocked the shipment of grains, thereby, creating serious implications for the agricultural sector.

Since this study to the author's best knowledge is the first of its kind, he decided to start by first examining the trends and patterns in Canadian wheat exports as well as the trends in dock strikes during the past two decades. The analysis was further extended to examine the important features of dock strikes and their relationships with economic and noneconomic factors. Finally, this study attempted to establish a relationship between dock

strikes and possible losses in Canadian wheat exports, and to determine the critical duration of a strike that is likely to adversely affect Canada's wheat exports.

The major findings of this study are:

1. During the last two decades, 1955-1975, Canada's position as a leading exporter of wheat has deteriorated, and that she has lost her leading position to the U.S. as a wheat exporter.

2. During the same period, a major shift occurred in the Canadian wheat market from Western Europe (especially the United Kingdom) towards the Asian countries such as Japan and China; however, during recent years even in these markets Canada is losing grounds to the U.S.

3. The factors responsible for such shifts in Canadian wheat exports identified were: the quality of wheat, the export price of wheat, Canadian Wheat Board policies, transportation problems, and delivery schedules.

4. During the period, 1947-1975, the frequency of dock strikes has been relatively stable; however, severity (i.e. impact) of these strikes has increased rapidly. The increase in the severity of dock strikes is revealed by the fact that average man-days lost per year due to dock strikes during the last ten years, 1965-1975, have tripled compared to those during the previous years, 1947-1965.

5. Dock strikes follow a seasonal pattern. To test the presence of seasonality in dock strikes, the data were tested for i) Monthly Variation (January, February...,

December) and ii) Seasonal Variations (Fall, Winter, Spring and Summer). The analysis of variance technique was used which confirmed that the frequency of dock strikes is influenced both by months and seasons.

6. The regression model developed to explain how changes in certain economic and institutional/structural factors (such as employment, wage rates, CPI, union membership and a sudden increase in the level of wheat exports) may induce a high level of dock strike activity revealed that the yearly percentage change in wage rate and CPI and percentage changes in the number of unionized workers were statistically significant.

7. Among the factors influencing the duration of dock strikes, the regression analysis revealed that the variables CPI and the proportion of dock strikes called for noneconomic reasons were significant with negative signs.

8. The statistical relationship set up to explain the variations in Canadian wheat exports revealed that the export price of wheat is an important determinant, and higher price of Canadian wheat could be responsible in Canada's wheat exports between 1951-1974.

9. The dock strikes during 1951-1974 have adversely affected Canada's wheat exports.

10. Dock strikes involving 100 workers and lasting for more than three to four weeks could cause statistically significant losses in Canada's wheat exports.

To the author's knowledge, this study is the first of its kind in as much as it has attempted to estimate quantitatively the effects of dock strikes on Canadian wheat exports. Consequently, some of the limitations of data and of the conclusions based on those data were inescapable. Therefore, the findings of this study should be treated more as being indicative than definitive.

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CHAPTER 1

INTRODUCTION

Background and Problem

In recent years many groups, governments and individuals have expressed concern about dock strikes which have at times effectively blocked the shipment of grain. The dock workers strikes at the eastern and western Canadian ports have caused export losses in the agricultural sector which have amounted to millions of dollars. In the increasingly competitive international trade in grain, changes in any factor affecting price, quality or delivery of the commodity may produce large gains or losses to the country experiencing such changes. The frequent dock workers strikes at major Canadian ports have created the concern that due to uncertain deliveries from Canada, the buyers of Canadian wheat might turn to our competitors, such as Australia and the U.S.A. The dock workers strikes in the U.S. during June 1971, for example, had turned Japan and other customers to Canada and Australia. Such shifts in the source of supply may be temporary or permanent, since agricultural products lack, what might be called, "market permanency". They are sold on a strictly competitive basis involving price, quality, and delivery schedules. Seasonality, the

uncertainty of weather, and other external factors influencing grain make the problem even more complex.

Canadian agricultural exports have consistently made a substantial contribution to the Canadian economy in general and to the Prairie region in particular. Wheat has been the most important commodity and has constituted about 50 percent of the total value of Canadian agricultural exports.

To maintain Canada's competitive position in the world grain market, and to provide timely deliveries to our consumers abroad, a systematic analysis of dock strikes would seem to be highly important. To date, however, such an analysis focusing on the effects of dock strikes on Canada's wheat exports has been almost conspicuous by its absence.

Objectives of the Study

The present study is primarily directed towards an enquiry of the impact of dock strikes on the level of wheat exports. The ultimate purpose is to interpret information in relation to various measures that might be adopted to assist all those involved in the various facets of the grain industry. In order to attain the basic objectives, it is necessary to formulate several specific objectives. These are:

1. To review and analyze the trends and patterns of world trade in wheat and wheat flour over the period 1955-1975,

2. To review and analyze the trends and patterns of dock strikes at major Canadian ports for the period 1947-1975,
3. To examine the relationship between economic and noneconomic factors and dock strikes, and to evaluate factors influencing duration of dock strikes,
4. To develop a model for evaluating the impact of dock strikes on shifts in exports of wheat, and to determine the critical duration of the strikes which is likely to cause relatively lasting (or permanent) shifts in exports,
5. To derive implications for 1, 2, 3 and 4 above.

Scope of Study

The present study begins by reviewing the trends of the world trade in wheat and flour in the past two decades. Then the performance of Canadian exports, especially of wheat, is examined with a view to delineating the problems relevant to grain exports. Efforts are made to evaluate the impact of dock strikes, if any, on shifts in Canadian wheat exports. The main emphasis, however, is on establishing a statistical relationship between dock strikes and possible losses in international wheat trade, and to determine the critical duration of a strike that is likely to cause such shifts in Canada's wheat exports.

World trade in wheat and wheat flour is reviewed in Chapter 2. This provides a picture of the trend and the importance of the various markets and competitors in the world wheat trade.

Dock strikes, their trends, union involvement, duration, major related issues, and seasonality are discussed in Chapter 3.

Chapter 4 analyzes the relationship between economic and institutional factors and dock strikes. This chapter further attempts to isolate factors which could influence the duration of dock strikes.

In Chapter 5, an attempt is made to explain the factors influencing the level of variation in Canadian wheat exports, and to determine the critical duration of a dock strike which is likely to cause relatively "permanent" shifts in wheat exports.

The last chapter provides a summary, conclusion, implications and limitations of this study. Some suggestions for further research on this subject are also noted.

CHAPTER 2

INTERNATIONAL TRADE IN WHEAT AND WHEAT FLOUR

Wheat and the Canadian Economy¹

This chapter examines the relative importance of agricultural exports to the Canadian economy. One of the major agricultural commodities that Canada has been exporting is wheat and wheat flour. During the last two decades the value of wheat and wheat flour exported has centered around one half of the value of total agricultural exports--ranging from approximately 42 percent in 1973 to nearly 66 percent in 1964 (Table A1, Appendix A). Along with population growth and economic development world demand for agricultural products and especially of wheat has increased, but Canada has not been able to keep pace with the growth in international trade in wheat. In the last two decades, Canadian exports of wheat in terms of her share in the total world exports have declined.

A detailed examination of the pattern of Canadian agricultural exports (Table 1) indicates that income from agricultural exports as a percentage of total exports has

¹Some of the analysis in this section draws upon and extends an earlier work by Sol. Sinclair, Canadian Wheat and the Japanese Economy, Canada-Japan Trade Association, Feb. 1961.

TABLE 1

CANADIAN AGRICULTURAL EXPORTS AS A PERCENTAGE OF TOTAL
EXPORTS OF CANADA (000's \$)

Year	<u>Total Export</u>	<u>Total Agricultural Export</u>		<u>Wheat and Wheat Flour Export</u>		
	\$	\$	% of total export	\$	% of total export	% of total agricultural export
1955-1960	29,018,073	5,635,911	19.4	2,913,679	10.0	51.7
1961-1965	35,351,484	7,001,173	19.8	4,227,887	12.0	60.4
1966-1970	65,302,574	7,636,633	11.7	3,953,211	6.1	51.8
1971-1974	92,935,948	10,935,002	11.8	5,205,412	5.6	47.6

SOURCE:

Derived from Canada Department of Agriculture, Canada's Trade in Agricultural Products (Ottawa: Economics Branch), annual.

declined from 19.4 percent in 1955-1960 to 11.8 percent in 1971-1974. Along with the decline in value of agricultural exports, income from the export of wheat and wheat flour has also declined from 10.0 percent to 5.6 percent during the same period. This decline in the export of wheat may be due to such factors as quality, price, transportation, international trade policy and the loss of goodwill or confidence on the part of our customers abroad. These factors are discussed later in this chapter as well as in Chapter 5.

As noted above, the decline in the relative importance of agricultural exports, and especially of wheat and wheat flour is accompanied by an increase in total exports as a percentage of the G.N.P.

As shown in Table 2, agriculture export's contribution to Gross National Product dropped from 2.8 percent in 1955-1960 to 2.4 percent in 1971-1974. Wheat and flour export's contribution dropped from 1.5 percent in 1955-1960 to 1.0 percent in 1971-1974, although total Canadian export rose from 14.5 percent to 20.3 percent during the same time period. This decline in the value of export of agricultural commodities can be explained, at least partly, by the fact that during the last two to three decades Canada has changed from what was essentially an agricultural economy to an industrial economy. This increase in the value of Canadian total export as a percentage of G.N.P. and the decline in the value of export of

TABLE 2

CANADIAN EXPORTS AS A PERCENTAGE OF GROSS NATIONAL PRODUCT

Year	Total G.N.P. (in million \$)	Export as percentage of Gross National Product		
		All exports %	Agriculture %	Wheat and Flour %
1955-1960	200,311	14.5	2.8	1.5
1961-1965	232,045	15.2	3.0	1.8
1966-1970	366,020	17.8	2.1	1.1
1971-1974	612,099	20.3	2.4	1.0

SOURCE:

Derived from i) Government of Canada, Economic Review (Finance Branch) April, 1976.

ii) Canada Department of Agriculture, Canada's Trade in Agricultural Products (Ottawa: Economics Branch), annual.

agriculture and wheat and wheat flour is evident from Table 2A, Appendix A. However, agriculture continues to make an important contribution to Canada's economy in general and to the Prairies economy in particular. Despite the decline in the relative importance of agricultural export and especially in that of wheat and flour, Prairie wheat sales have constituted more than 30 percent of the farm cash receipts for the Prairie Provinces during the last decade.

Trends in Canadian Wheat and Wheat Flour Exports²

Canadian wheat exports have not kept pace with the growth in international trade in wheat. In the last decade, i.e. during 1955-1965 period, the average annual world shipment of wheat and wheat flour was 1,738 million bushels, reaching a peak of an average of 2,200 million bushels during 1971-1975. This is almost twice the annual world shipment during the 1950's.

Canadian annual shipment of wheat and wheat flour during the decade 1965-1975 averaged 440 million bushels as against an annual average of 350 million bushels in the decade 1955-1965, an increase of 26 percent over the last ten years. However, during the years 1963-1964 to 1966-1967 and 1971-1972 to 1972-1973 Canadian exports of wheat reached an all time high of an average of about 550

²Sinclair, op. cit., pp. 4-12.

TABLE 3

EXPORTS OF WHEAT AND WHEAT FLOUR BY PRINCIPAL EXPORTERS
(IN MILLION BUSHELS)

CROP YEAR	EXPORTING COUNTRIES										Total
	Canada		U.S.A.		Australia		Argentina		Others		
	Annual Average	%	Annual Average	%	Annual Average	%	Annual Average	%	Annual Average	%	
1955-1960	294	23.38	450	35.80	97	7.72	94	7.48	322	25.62	1,257
1960-1965	385	21.90	717	40.78	224	12.74	98	5.57	334	19.00	1,758
1965-1970	416	21.17	705	35.88	237	12.06	127	6.46	480	24.43	1,965
1970-1975	466	21.19	941	42.79	274	12.46	73	3.32	445	20.24	2,199

SOURCE:

The Canadian Wheat Board, Annual Report 1974-1975, (Winnipeg, 1976).

million bushels (Table 3A-Appendix A). Part of the increase during this period was due to serious crop failure in the U.S.S.R. and, consequently, unprecedented large sales of Canadian wheat to that country.

The increased world exports of wheat and flour appears to originate mainly in the U.S. For example, the export of U.S. wheat and flour went up from an annual average of 450 million bushels during 1955-1960 to an annual average of 941 million bushels during 1970-1975, an increase by 100 percent (Table 3). Further, the review of Table 3A in Appendix A reveals that the share of U.S. wheat and flour exports as a part of the world total demand has rapidly increased in the decade 1965-1975. The share of U.S. export of wheat and flour relative to total world demand reached an all time high of about 50 percent during the last three years: 1972-1973, 1973-1974 and 1974-1975 (Table 3A-Appendix A).

The Canadian share of exports of wheat and flour has declined in the decade 1965-1975 as compared to the previous decade 1955-1965. Australia, which is the third largest wheat exporter, has shown a slow but steady increase in her exports of wheat. Although the Australian share in the world wheat and flour export has dropped from all time high of about 18 percent during 1970-1971 to 9 percent during 1973-1974, the data presented in Table 3 on the trends in exports by the principal exporters suggest that Canada is losing her wheat market to the U.S. and

Australia. Argentina's export of wheat and flour has declined as a part of world demand. Other exporting countries such as those in the E.E.C. have constituted 20 percent to 30 percent in the world exports of wheat and flour during the decades 1955-1975, and their trend has been relatively stable.

In light of the above, it is pertinent to ask: why Canada's share in the world wheat and flour market is slipping relative to that of Australia and the U.S. This is a serious issue for the Canadian wheat producers, because it implies that although Canadian wheat has an international reputation for its high quality, its demand has not increased in the same proportion as has the total world demand for wheat. To answer this question one has to examine the historical market for Canadian wheat and flour and the shift in the market during the decade 1965-1975.

A review of Canadian exports of wheat and flour reveals several significant facts (Table 4). During the decade 1955-1965 about 60 to 70 percent of total wheat export was destined to Europe and especially the U.K. which was the major consumer (32 percent) of Canadian wheat until 1960. During the decade, 1965-1975, however, there was an important shift in the destination of wheat exports. In Asia, Japan and Communist China started emerging as the main importers of Canadian wheat. Europe, excluding the U.K., also imported significant amounts (30 percent) of Canadian wheat during the decade 1965-1975.

TABLE 4

EXPORT OF CANADIAN WHEAT AND WHEAT FLOUR BY SELECTED AREAS
(IN 000'S BUSHELS)

Crop Year	U.K.		Europe (excluding U.K.)		U.S.A.		North Central America (excluding U.S.A.)		South America		Africa		Asia		Total
	Annual Average	%	Annual Average	%	Annual Average	%	Annual Average	%	Annual Average	%	Annual Average	%	Annual Average	%	Annual Average
1955-1960	93,363	31.75	102,936	35.01	6,204	2.11	8,289	2.82	7,303	2.48	6,904	2.35	69,049	23.48	294,048
1960-1965	85,013	18.86	196,386	43.56	1,996	10.44	19,192	4.26	8,915	1.98	6,969	1.55	132,348	29.36	450,819
1965-1970	63,532	16.43	111,722	28.89	739	0.19	22,599	5.84	9,426	2.44	16,354	4.23	162,383	41.99	386,755
1970-1975	47,176	10.31	141,817	31.00	866	0.19	25,587	5.59	27,028	5.91	21,031	4.60	193,958	42.40	457,463

SOURCE:

The Canadian Wheat Board, Annual Report 1974-1975, (Winnipeg, 1976).

A close examination of Table 4A, Appendix A, reveals that during the decade 1965-1975 Canada exported 40 to 50 percent of her total wheat exports to Asia. A detailed examination of the literature reveals a large market for Canadian wheat in Communist countries, particularly China and Eastern Europe and, of course, the U.S.S.R. in 1963-1964 and 1966-1967. During the 1950's, the U.S.S.R. was also an exporter of wheat and had captured some of the market in Eastern European countries. But during the period 1963-1975, due to bad weather the U.S.S.R. has been a sporadic importer of wheat from Canada.

In view of the growing importance of the Japanese and Chinese markets for Canadian wheat in Asia, it seems advisable to examine these markets in detail. A close examination of Table 4a shows that the U.S. and Canada dominated the Japanese market for wheat in the decade 1965-1975. Australia's share in the Japanese market during the same period has varied from 10 percent to 22 percent with the exception of the years 1968-1969 and 1971-1972 during which it was as high as about 30 percent. Canada had captured about 35 percent during 1965-1967, but in recent years (1970-1975) it has lost ground to the U.S.--a decline from 35 percent to about 20-25 percent. The U.S. supplied about 60 percent of the Japanese demand during 1970-1975. Despite the decline in shipments to

TABLE 4a

EXPORTS OF WHEAT AND WHEAT FLOUR BY MAJOR EXPORTERS TO JAPAN AND CHINA (000 METRIC TONS)
1964-1965 to 1974-1975

Crop Year	Canada to				U.S.A. to				Australia to				Total For All Wheat Exports to	
	Japan Total	%	China Total	%	Japan Total	%	China Total	%	Japan Total	%	China Total	%	Japan	China
1964-1965	1,433	39.97	1,758	34.34	1,689	47.11	-	0	433	12.08	2,320	45.31	3,585	5,120
1965-1966	1,285	35.77	2,053	32.39	1,943	54.09	-	0	364	10.13	1,971	31.10	3,592	6,338
1966-1967	1,620	36.97	2,477	49.29	2,331	53.19	-	0	431	9.84	2,163	43.04	4,382	5,025
1967-1968	1,098	27.88	1,367	32.89	2,225	56.50	-	0	612	15.54	2,416	58.13	3,938	4,156
1968-1969	1,247	28.68	2,127	56.28	1,839	42.29	-	0	1,171	26.93	1,396	36.94	4,349	3,777
1969-1970	1,068	23.92	1,830	36.31	2,382	53.36	-	0	980	21.95	2,336	48.53	4,464	5,040
1970-1971	1,029	21.76	2,346	64.10	2,878	60.87	-	0	821	17.36	1,310	35.79	4,728	3,660
1971-1972	1,388	27.56	2,967	100.00	2,195	43.58	-	0	1,454	28.87	-	0	5,037	2,967
1972-1973	1,364	24.52	4,374	82.70	3,377	60.72	591	11.17	717	12.89	324	6.13	5,562	5,289
1973-1974	N.A	N.A	N.A	N.A	N.A	N.A	N.A	N.A	N.A	N.A	N.A	N.A	N.A	N.A
1974-1975	1,187	22.56	2,366	43.05	3,079	58.51	1,496	27.22	963	18.30	1,244	22.63	5,262	5,496

SOURCE: Derived from International Wheat Board Council, Review of the World Wheat Situation, (London), annual.

N.A = not available

Japan, Canada during the last five years has supplied an average of 1.25 million metric tons of wheat annually to Japan.

In Asia, another main importer of Canadian wheat that has emerged during the decade 1965-1975, is China. Table 4a reveals that during the period 1965-1972 China's wheat market was dominated by Canada and Australia. At times (eg. 1971-1972) China has bought her entire import requirements of wheat from Canada. Australia has been competing with Canada in the Chinese market, but so far Canada has fared better than Australia in the market.

In recent years (starting with 1972-1973), the U.S. has also entered the Chinese market and has increased her share from 11.2 percent in 1972-1973 to 27.2 percent in 1974-1975. Due to the presence of the U.S. in the Chinese wheat market both the Canadian and Australian shares have declined considerably. Canada has lost her dominant position to the U.S. and the Australian share has declined sharply. It appears that the U.S. has been as successful in selling her wheat to a non-Communist country such as Japan, as to the Communist countries such as the U.S.S.R. and China. The U.S., for one reason or another, seems to have been able to dominate all the export markets for wheat. Their recent contract with the U.S.S.R. to export wheat for the next three years leaves little export potential (within the U.S.S.R.) for other exporting countries.

The above analysis reveals that Canada has lost her leading position as an exporter of wheat to the U.S. This decline in Canada's share in the total world export of wheat may be associated with such factors as quality, export price, Canadian Wheat Board policies, and other factors to be discussed in the following section.

Factors Affecting Canadian Trade in Wheat and Wheat Flour

The foregoing analysis reveals that Canada's competitive position in most of the wheat importing countries has deteriorated. The factors which could be responsible are the quality, pricing, Canadian Wheat Board policies, government assisted export programs, export subsidies, market development, and transportation and delivery schedules. Not all these factors can be examined in detail here; however, a theoretical discussion focusing on the effects on wheat exports of some of these variables are presented in this section. A statistical analysis of some of these factors is undertaken in Chapter 5 of this study and the empirical results are also discussed in that chapter.

Ample evidence exists which shows that Canadian wheat is a high quality wheat. Over the years, Canada's Manitoba Wheat has developed a world wide reputation for "quality or strength of protein". However, during the recent five years, 1971-1975, in the light of new milling techniques and the demand in the new, expanding, and

changing markets, the top quality of Canadian wheat is said to be no longer an advantage for Canada. As a matter of fact, it is argued by critics that one reason for Canada's slow increase in its wheat exports relative to the U.S. is that the U.S. has made an adjustment by a wheat diversification program, i.e. it is in a transition into the production of lower quality high yield utility wheat.³ Canada's seeded percentage of utility wheat today in comparison to that of total wheat acreage sown is only 3.5 percent, whereas, in the U.S. it has gone as high as 70 percent.

The question of wheat quality was also raised in the discussions of the Seventh Annual Meeting of the Canada Grains Council during April 1976.⁴ However, the issue remains unresolved, since others argue that on the basis of high quality of wheat Canada has sold wheat in the past and that, despite new milling techniques and the preferences in the new markets, Canada is able to sell all the quality wheat she produces.

A comparative study of export prices of wheat in the three major countries reveals that during the last two decades, 1955-1975, the average export price of wheat

³T. Saunders, "Do We Grow Too Much Quality of Wheat?" Winnipeg Free Press, dated September 29, 1976, p. 53.

⁴Ibid., p. 53.

in Canada has been higher than that of the U.S. and Australia (Table 4b, Figure 1). The export price of wheat per metric ton has risen slowly in all the exporting countries, but in recent years 1973-1975, prices in all the exporting countries have doubled and tripled over those during 1955-1972. This rapid increase in the world price may be due to a rising cost of production and increased demand in the world market.

Some authors have calculated the cost advantage enjoyed by the Canadian producers using producer prices for a given time period in the past. The estimate based on the 1964-1965 crop year shows that Canada had a cost advantage of 31 cents a bushel over the U.S., 22 cents over Argentina and about 7 cents a bushel over Australia.⁵ There is also other evidence which supports that from an export standpoint, Canadian farmers have the advantage of having low basic producer costs⁶. Since price is an important determinant of export, it would seem as if the tendency toward a higher price of Canadian wheat relative to that of Australia and the U.S. may be one of the major

⁵G. A. MacEachern and D. L. MacFarlane, The Relative Position of Canadian Agriculture in World Trade (Alberta: Conference on International Trade and Canadian Agriculture, January, 1966), pp. 34-35.

⁶G. Trant, D. MacFarlane and L. Fischer, Trade Liberalization and Canadian Agriculture (Toronto: University of Toronto Press, 1968), p. 10.

TABLE 4b

WHEAT EXPORT PRICES IN SELECTED COUNTRIES
(1955-1974)

Year	Export Price in U.S. Dollars per Metric Ton		
	Canada	U.S.A.	Australia
1955	64.95	64.11	58.87
1956	63.36	62.39	53.38
1957	62.75	64.93	56.07
1958	62.18	63.59	60.55
1959	64.28	63.21	56.31
1960	63.84	62.15	55.64
1961	65.36	65.16	55.10
1962	69.91	66.58	57.71
1963	67.97	65.69	58.74
1964	69.69	66.17	58.72
1965	65.62	60.09	58.25
1966	67.54	62.10	57.35
1967	72.11	64.11	62.19
1968	68.72	61.59	59.08
1969	70.70	60.06	59.16
1970	61.30	58.02	54.90
1971	64.45	62.13	53.59
1972	67.24	64.37	58.33
1973	98.22	107.98	66.14
1974	199.45	176.18	150.88

NOTE:

Prices are obtained from dividing total value by total quantity exported.

SOURCE:

1. D. Leung, The Concept of Effective Subsidy and its Application to the Flour Milling Industry. Unpublished M.Sc. thesis, University of Manitoba, 1973, Table #3, p. 10.
2. Food and Agriculture Organization, Trade Year Book (Rome: F.A.O.), annual.
3. United Nations, Commodity Trade Statistics (New York, N.Y.: Publishing Service, United Nations), annual.

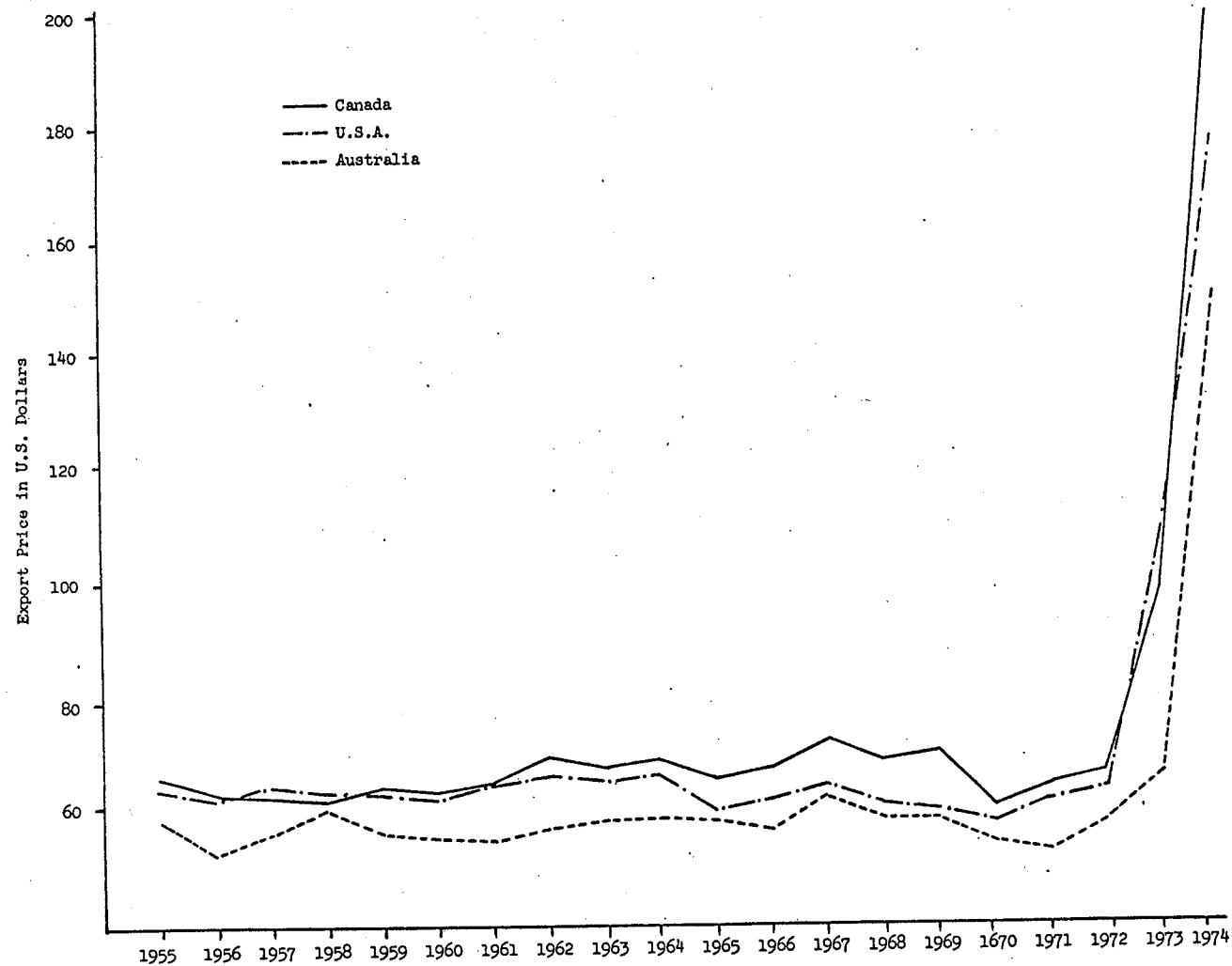


Figure 1
Export Price of Wheat in U.S. Dollars per Metric Ton, 1955-1974

factors that has contributed to the slow down in the increase of wheat exports during the last decade or two.

Export subsidies and other programs of government assistance export which have existed in the U.S. might have also had a dampening effect on the commercial exports from Canada and other countries in a number of markets that would otherwise have been supplied through regular commercial purchases.⁷ However these export subsidies, and other government assisted export programs in the U.S. are now being gradually phased out and are being replaced by dollar sales on long-term credit terms.

Transportation and delivery schedules are also important factors and at times have caused shifts in Canada's export position in the world market. Many importing countries lack facilities to store large quantities of grain. A delay in delivery schedules or a failure to maintain a consistent flow of grain to importing countries tends to reduce exports. Consequently, shipping strikes which block exports could have more serious effects on agricultural exports than on finished goods.

⁷S. C. Hudson, Future Market Outlets for Canadian Wheat and Other Grains, Special Study #11, Ec22-2/11, (Ottawa: Economic Council of Canada, 1970), p. 207.

CHAPTER 3

HISTORICAL ANALYSIS OF DOCK STRIKES 1947-1948 to 1974-1975

Trends in Dock Strikes

The quantitative analysis of any phenomenon distributed over time needs a homogenous series of data. In the case of dock strikes, it was possible to construct a time series covering twenty-eight years of experience with respect to strikes at major Canadian ports. These time series data have been put to various statistical tests to reveal some important features of dock strikes. First of all, it was subjected to a "smoothing" process by the use of moving averages. This suggested that five year periods best indicate the cycle of dock strikes by reducing the random fluctuations in dock strike phenomenon (Table 5, Figure 2). An examination of the behaviour of dock strikes suggested that for analytical purposes the whole period 1947-1948 to 1974-1975 (henceforth noted, for simplicity as 1947-1975) should be sub-divided into three parts; first, 1947-1955 which was at first a period of slow decline and then a rapid increase in the dock strikes activity; second, 1956-1963 which was again a period of slow decline followed by a rapid increase; third, 1964-1975 which was initially a period of rapid decline and then a spectacular rebound in dock strikes. This would

TABLE 5

FREQUENCY OF DOCK STRIKES, NUMBER OF WORKERS INVOLVED AND THEIR TRENDS
(1947-1975)

Crop Year	Frequency	3 Yr. Moving Average	5 Yr. Moving Average	7 Yr. Moving Average	Frequency		# of Workers Involved	No. of Workers Involved	
					Trend Value	Deviation of Actual from Trend		Trend Value	Deviation of Actual from Trend
1947-1948	10	-	-	-	3.93	6.07	892	- 275	1,167
1948-1949	5	5.67	4.00	3.71	3.97	1.03	1,812	11	1,801
1949-1950	2	2.67	2.40	2.57	4.02	-2.02	1,506	296	1,210
1950-1951	1	1.67	2.20	2.29	4.06	-3.06	850	582	268
1951-1952	2	1.67	2.20	2.57	4.11	-2.11	342	867	- 525
1952-1953	2	2.67	2.60	3.14	4.15	-2.15	86	1,153	-1,067
1953-1954	4	2.67	3.00	4.00	4.20	-0.20	579	1,438	- 859
1954-1955	2	3.00	3.60	3.86	4.24	-2.24	95	1,723	-1,628
1955-1956	3	3.00	4.40	4.43	4.29	-1.29	2,481	2,009	472
1956-1957	4	4.00	4.20	4.57	4.33	-0.33	1,531	2,294	- 763
1957-1958	5	5.67	5.20	4.71	4.38	0.62	804	2,580	-1,776
1958-1959	8	4.67	5.00	5.43	4.42	3.58	2,281	2,865	- 584
1959-1960	1	5.67	4.80	5.86	4.47	-3.47	27	3,151	-3,124
1960-1961	8	4.00	5.00	6.43	4.51	3.49	4,344	3,436	908
1961-1962	3	5.00	6.40	6.71	4.56	-1.56	857	3,721	-2,864
1962-1963	4	5.33	7.20	6.14	4.60	-0.60	582	4,007	-3,425
1963-1964	9	7.00	7.20	5.57	4.65	4.35	16,644	4,292	12,352
1964-1965	8	9.67	6.80	5.71	4.69	3.31	6,479	4,578	1,901
1965-1966	12	7.67	5.20	4.71	4.74	7.26	9,331	4,863	4,468
1966-1967	3	5.67	4.60	4.00	4.78	-1.78	4,454	5,149	- 695
1967-1968	2	2.00	2.60	2.86	4.83	-2.83	3,028	5,434	-2,406
1968-1969	1	2.67	2.60	3.43	4.87	-3.87	150	5,719	-5,569
1969-1970	5	2.67	3.20	4.14	4.92	0.08	8,991	6,005	2,986
1970-1971	2	3.33	4.20	4.67	4.96	-2.96	248	6,290	-6,042
1971-1972	3	3.00	4.60	4.60	5.01	-2.01	3,875	6,576	-2,701
1972-1973	4	4.67	5.25	5.25	5.06	-1.06	6,968	6,861	107
1973-1974	7	6.00	6.00	6.00	5.10	1.90	12,875	7,147	5,728
1974-1975	7	7.00	7.00	7.00	5.15	1.85	8,092	7,432	660

SOURCE:

Derived from Labor Canada, Strikes and Lock Outs in Canada (Ottawa), annual.

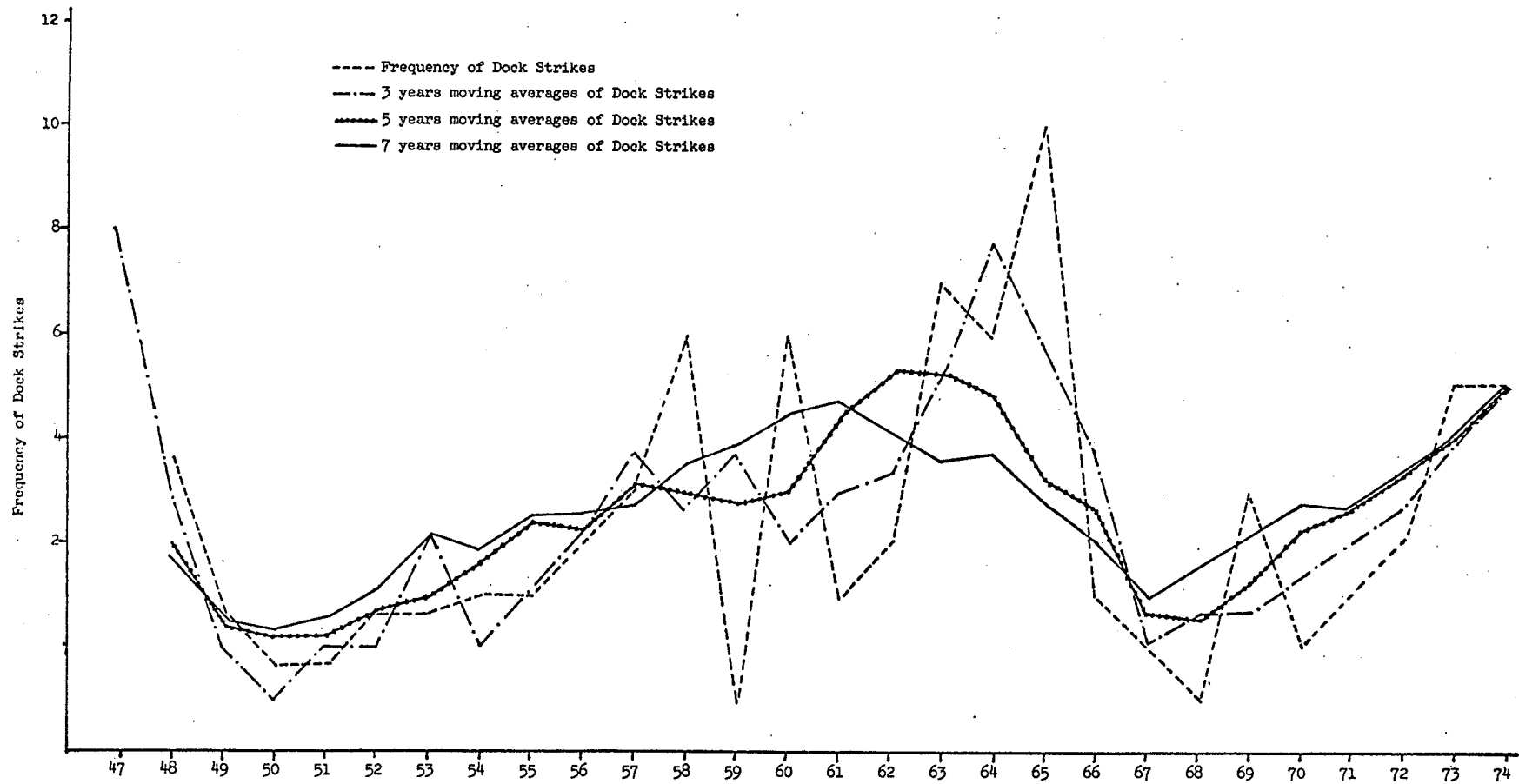


Figure 2

Frequency of Dock Strikes and their Moving Averages, 1947-1974

seem to suggest that the movement of dock strikes in its broader aspects is a random factor combined with the operation of cyclical movement.

Although the broad outline of dock strikes is clear, a detailed analysis was undertaken to determine whether there is a general tendency and secular trend in dock strikes. A straight line, $y = a + bx$, was fitted to the data on frequency of dock strikes against the time trend. The trend reveals that with the increased degree of organization in the labour sector, the frequency of dock strikes during the decade 1965-1975 declined in comparison with the period 1947-1965, which was a period of slow but persistent upward movement in strikes. Consequently, grievances in the 1965-1975 decade were settled more frequently through union-management negotiations rather than strikes. The trend over the entire twenty-eight year period of 1947-1975, however, reveals a slight upward movement, suggesting some long run stability in the frequency of dock strikes. Moreover, similar analysis of the number of workers involved showed a continuous and marked upward movement in the trend (Table 5). The difference in their rate of growth is significant. (For the frequency of strikes, the rate of growth = 0.04515, for number of workers involved, rate of growth = 226.) This leads to the tentative conclusion that while the severity (or impact) of dock strikes is increasing, their frequency is increasing less rapidly. The increase

in severity is further revealed by Table 6 which shows that the average number of man-days lost per year due to strikes during the last ten year period examined, 1965-1975, have more than tripled as compared to the man-days lost during the previous years (increasing from an annual average of 24,220 man-days in the 1947-1965 period to an average of 82,199 man-days a year during 1965-1975).

A close look at the frequency distribution of dock strikes over the period 1947-1975 discloses further that the early and mid-nineteen sixties were a period of noticeable turbulence in terms of dock strikes. About 37 percent of the total dock strikes over the 1947-1975 period occurred between 1960-1966. In fact, this coincided with the contract that Canada had signed to deliver wheat to the U.S.S.R. During that period, the U.S.S.R. suffered a serious crop failure due to bad weather and had to import wheat from Canada and the U.S.

Further analysis of dock strikes by the number of workers involved reveals that about 50 percent of the total dock strikes involved less than 200 workers (Table 6a, Figure 3). However, the table also reveals that the average number of workers involved per strike was 787 during the period examined.

Geographic Patterns in Dock Strikes

A study of the geographic distribution of dock strikes in terms of their occurrence at major Canadian

TABLE 6

NUMBER OF DOCK STRIKES, WORKERS INVOLVED
AND MAN-DAYS LOST BY YEAR
(1947-1975)

Crop Year	Number of Strikes	Number of Workers Involved	Number of Man-days Lost	Number of Workers /Strike
1947-1948	10	892	9,757	89
1948-1949	5	1,812	37,645	362
1949-1950	2	1,506	37,518	753
1950-1951	1	850	2,825	850
1951-1952	2	342	775	171
1952-1953	2	86	140	43
1953-1954	4	579	8,834	145
1954-1955	2	95	710	48
1955-1956	3	2,481	12,400	827
1956-1957	4	1,531	36,726	383
1957-1958	5	804	39,781	161
1958-1959	8	2,281	64,510	285
1959-1960	1	27	410	27
1960-1961	8	4,344	19,090	543
1961-1962	3	857	24,120	286
1962-1963	4	582	1,370	146
1963-1964	9	16,644	69,150	1,849
1964-1965	8	6,479	88,190	810
1965-1966	12	9,331	126,300	776
1966-1967	3	4,454	54,450	1,485
1967-1968	2	3,028	11,160	1,514
1968-1969	1	150	1,800	150
1969-1970	5	8,991	160,550	1,798
1970-1971	2	248	6,360	124
1971-1972	3	3,875	128,600	1,292
1972-1973	4	6,968	59,616	1,742
1973-1974	7	12,875	24,800	1,839
1974-1975	7	8,092	248,358	1,156

SOURCE:

Derived from Labor Canada, Strikes and Lock-Outs
in Canada (Ottawa), annual.

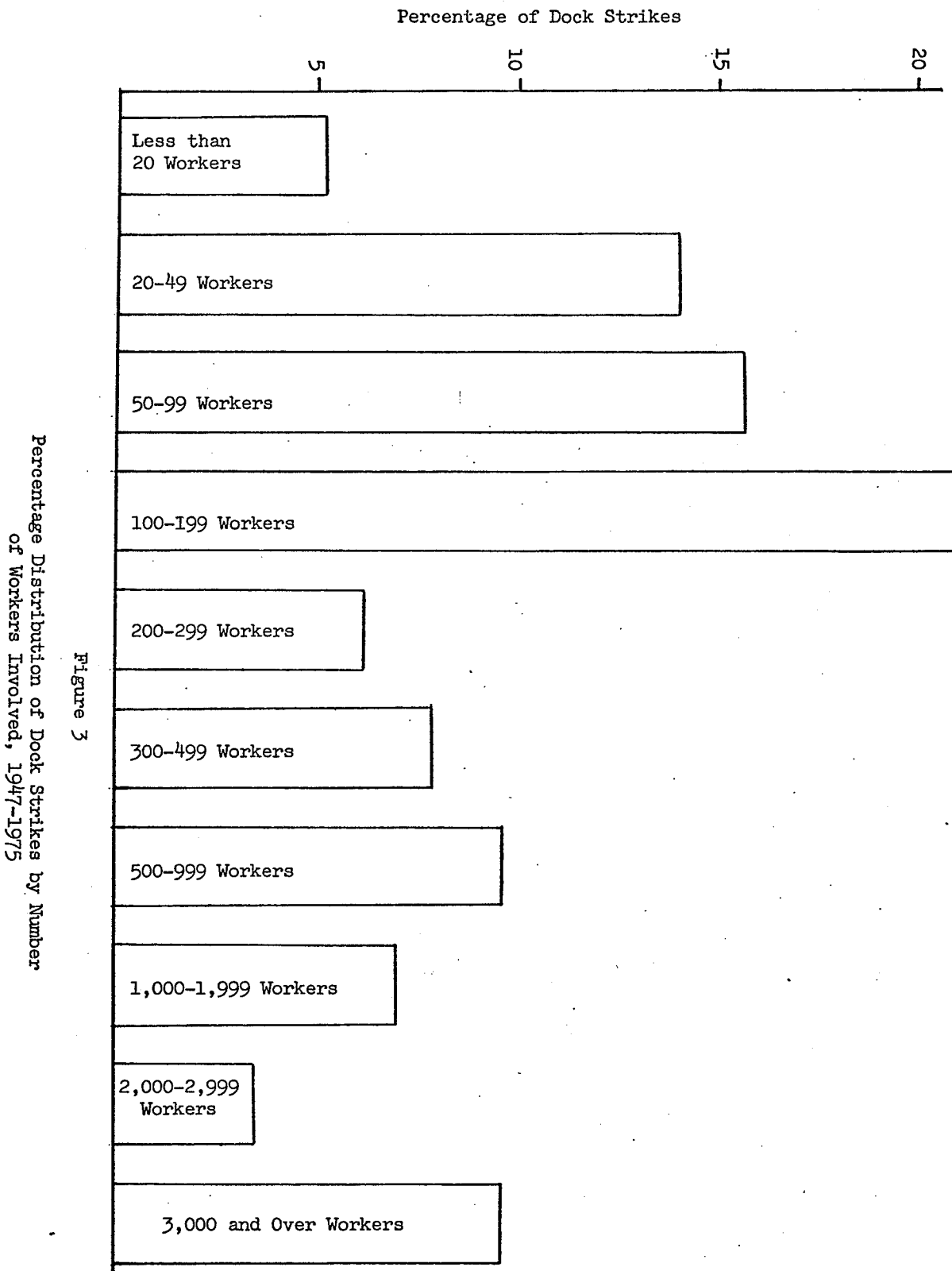
TABLE 6a

DOCK STRIKES BY NUMBER OF WORKERS INVOLVED
(1947-1975)

Number of Workers	Number of Strikes	%	Number of Man-Days Lost	Number of Man-Days Lost/Strike
Less than 20	6	4.80	1,018	170
20 - 49	16	12.80	8,244	515
50 - 99	18	14.40	11,431	635
100 - 199	26	20.80	37,249	1,433
200 - 299	8	6.40	20,790	2,599
300 - 499	13	10.40	108,610	8,355
500 - 999	13	10.40	187,175	14,398
1,000 - 1,999	8	6.40	162,920	20,365
2,000 - 2,999	5	4.00	173,178	43,295
3,000 - 4,999	12	9.60	581,230	48,436

SOURCE:

Derived from Labor Canada, Strikes and Lock Outs
in Canada (Ottawa), annual.



ports during 1947-1975 reveals that the frequency of strikes is distributed almost evenly at each port, but that the strikes varied a great deal in their severity in terms of the duration and the number of workers involved at different ports. Specifically, the St. Lawrence and Pacific Coasts were hit by strikes which involved 42.5 percent and 33.1 percent of the total workers reported on strike during 1947-1975 respectively. These were followed by Atlantic and Lakehead ports involving 13.4 percent and 11.0 percent respectively. As to the man-days lost, 36.1 percent of the total man-days lost during 1947-1975 as reported at the Pacific Coasts, which was followed by 28.4, 26.6 and 8.9 percent at St. Lawrence, Atlantic and Lakehead ports respectively (Table 7, Figure 4).

A further examination of the geographic pattern of the dock strikes also reveals that during 1961-1966, the increase in the number of strikes was limited primarily to the Lakehead port and St. Lawrence River ports. The distribution of dock strikes at major ports further reveals that the ports of Vancouver, Montreal and Quebec have experienced more frequent strikes than other ports during 1971-1975 (Table 8, 8a). During this period (1971-1975), Vancouver, Montreal and Quebec have accounted for 80 percent of the total man-days lost. However, Lakehead did not experience any significant loss in man-days during the same period, but had lost about 90

TABLE 7

DOCK STRIKES AT MAJOR CANADIAN PORTS
(1947-1975)

Major Ports	Strikes Number	%	Workers Involved Number	%	Man Days Lost Number	%
Pacific Coast	32	23.19	31,092	33.06	371,980	26.56
Lakehead	37	26.81	10,361	11.02	124,344	8.88
St. Lawrence	38	27.54	39,991	42.52	506,210	36.14
Atlantic Coast	31	22.46	12,611	13.41	398,069	28.42

SOURCE:

Derived from Labor Canada, Strikes and Lock Outs in Canada (Ottawa), annual.

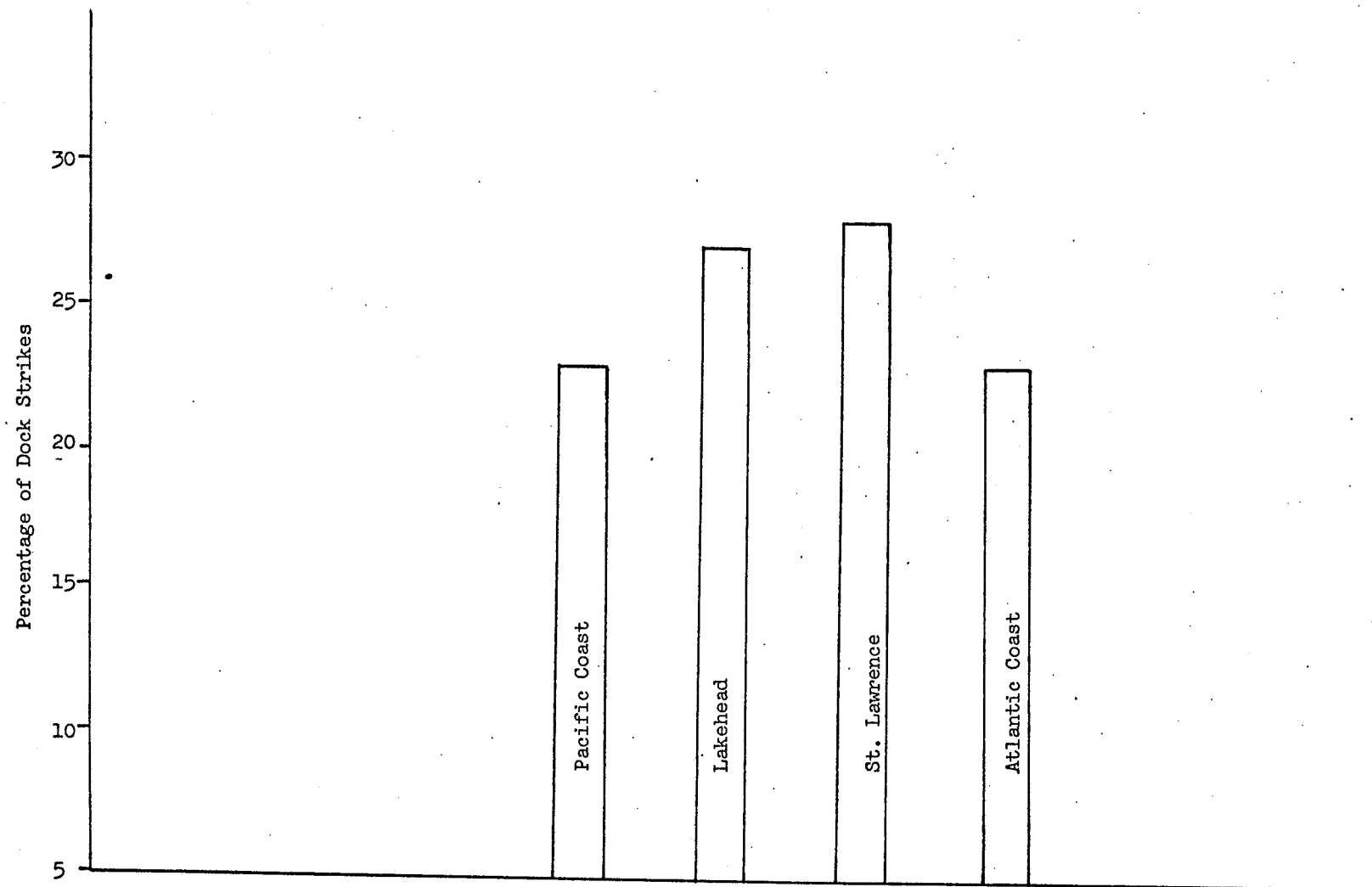


Figure 4

Percentage Distribution of Dock Strikes
by Major Canadian Ports, 1947-1975

TABLE 8
NUMBER OF DOCK STRIKES AT MAJOR CANADIAN PORTS BY YEAR
(1947-1975)

Crop Year	Pacific Coast			Manitoba Churchill	Thunder Bay	Great Lakes		Montreal	St. Lawrence		Quebec City	St. John	Atlantic Coast	
	Vancouver	Victoria	Prince Rupert			Sarnia	Kingston, Prescott & Hamilton		Sorel	Three Rivers			Halifax	Charlton
1947-1948	3	-	-	-	3	-	-	1	-	2	-	1	8	1
1948-1949	1	-	-	-	-	-	1	1	-	1	1	-	2	-
1949-1950	-	-	-	-	-	-	-	-	-	-	-	1	-	-
1950-1951	1	-	-	-	-	-	-	-	-	-	-	-	-	-
1951-1952	-	-	-	-	-	-	-	-	1	1	-	-	-	-
1952-1953	1	-	-	-	-	-	-	-	-	1	-	-	-	-
1953-1954	1	-	-	-	1	-	3	-	-	-	-	-	1	-
1954-1955	-	-	-	-	-	-	1	-	-	-	1	-	-	-
1955-1956	1	-	-	-	-	-	-	-	-	1	-	1	-	-
1956-1957	-	-	-	-	-	-	-	-	-	-	2	1	-	-
1957-1958	2	-	-	-	-	-	2	1	-	1	-	-	-	-
1958-1959	5	-	1	-	-	-	1	-	-	-	-	-	-	-
1959-1960	1	-	-	-	-	-	-	-	-	-	-	-	-	-
1960-1961	1	-	-	-	2	-	2	1	-	1	-	1	-	-
1961-1962	-	-	-	-	-	-	2	-	-	1	-	-	-	-
1962-1963	-	-	-	-	-	-	3	-	1	-	-	-	-	-
1963-1964	3	-	-	-	1	-	1	2	-	2	-	3	-	-
1964-1965	1	-	-	-	-	-	3	1	-	-	-	2	-	1
1965-1966	-	-	-	-	-	-	8	1	-	1	-	1	-	-
1966-1967	1	-	-	-	-	-	1	-	-	-	-	-	-	1
1967-1968	-	-	-	-	-	-	-	1	1	-	-	-	-	-
1968-1969	-	-	-	-	1	-	-	-	-	-	-	-	1	-
1969-1970	4	-	-	-	-	-	-	-	-	-	1	-	-	-
1970-1971	-	-	-	-	-	-	-	-	-	-	2	-	-	-
1971-1972	1	-	-	-	-	-	-	-	-	-	-	-	1	1
1972-1973	-	1	-	-	-	-	-	-	-	-	-	-	-	-
1973-1974	1	-	-	-	-	-	2	2	-	-	-	2	1	-
1974-1975	3	1	1	-	-	-	2	5	-	1	3	-	-	-

SOURCE: Derived from Labor Canada, Strikes and Lock Outs in Canada (Ottawa), annual.

TABLE 8a

FREQUENCY OF DOCK STRIKES AT MAJOR CANADIAN PORTS BY YEAR

Crop Year	No.	Pacific Coast			No.	Great Lakes (Lakehead)			No.	St. Lawrence			No.	Atlantic Coast		
		# of Workers	# of Days Lost	# of Man-days Lost		# of Workers	# of Days Lost	# of Man-days Lost		# of Workers	# of Days Lost	# of Man-days Lost		# of Workers	# of Days Lost	# of Man-days Lost
1947-1948	3	415	47	6,950	3	255	122	16,030	3	307	125	16,126	10	876	173	38,935
1948-1949	1	1,500	140	37,550	1	15	3	45	3	1,797	141	37,650	2	1,700	140	210,050
1949-1950	-	-	-	-	-	-	-	-	-	-	-	-	1	6	3	18
1950-1951	1	850	7	2,825	-	-	-	-	-	-	-	-	-	-	-	-
1951-1952	-	-	-	-	-	-	-	-	2	342	4	775	-	-	-	-
1952-1953	1	22	2	30	-	-	-	-	1	64	2	110	-	-	-	-
1953-1954	1	412	27	8,500	4	579	32	8,834	1	412	37	8,500	1	412	27	10,918
1954-1955	-	-	-	-	1	55	4	110	1	40	22	600	-	-	-	-
1955-1956	1	328	55	16,000	-	-	-	-	1	2,100	8	8,000	1	53	1	53
1956-1957	-	-	-	-	-	-	-	-	2	896	43	24,450	1	451	2	1,015
1957-1958	2	521	73	21,340	2	99	155	725	2	236	75	12,001	-	-	-	-
1958-1959	6	1,884	24	40,570	1	47	141	6,640	-	-	-	-	-	-	-	-
1959-1960	1	27	15	410	-	-	-	-	-	-	-	-	-	-	-	-
1960-1961	1	325	13	4,230	4	335	36	1,430	2	3,546	8	13,210	1	140	2	240
1961-1962	-	-	-	-	2	781	57	23,010	1	76	15	1,110	-	-	-	-
1962-1963	-	-	-	-	3	570	6	840	1	12	44	530	-	-	-	-
1963-1964	3	7,621	6	16,540	2	3,921	7	13,840	4	11,521	15	48,340	3	3,844	75	27,450
1964-1965	1	109	6	600	3	770	6	1,400	1	3,500	1	2,500	3	2,100	150	83,690
1965-1966	-	-	-	-	8	1,518	7	1,980	2	7,650	30	123,930	1	44	7	290
1966-1967	1	4,180	13	52,900	1	174	8	1,450	-	-	-	-	1	100	1	100
1967-1968	-	-	-	-	-	-	-	-	2	3,028	19	11,160	-	-	-	-
1968-1969	-	-	-	-	1	1,142	42	47,960	-	-	-	-	1	150	17	1,800
1969-1970	4	8,660	70	158,890	-	-	-	-	1	331	5	1,660	-	-	-	-
1970-1971	-	-	-	-	-	-	-	-	2	248	52	6,360	-	-	-	-
1971-1972	2	3,500	32	43,900	-	-	-	-	-	-	-	-	1	400	3	350
1972-1973	2	3,590	28	43,790	-	-	-	-	1	3,275	59	127,850	-	-	-	-
1973-1974	1	103	4	310	1	100	1	50	2	338	33	3,980	3	1,535	56	20,460
1974-1975	2	3,645	31	60,440	-	-	-	-	4	3,547	220	185,218	1	900	6	2,700

SOURCE:

Derived from Labor Canada, Strikes and Lock Outs in Canada (Ottawa), annual.

thousand man-days during 1960-1970. The analysis of dock strikes data also reveals that the period of 1963-1966 and 1969-1970 accounted for more than 50 percent of the total man-days lost during the last twenty-eight years. The data also shows that the port of Churchill (Manitoba) did not experience a single strike during the entire period 1947-1975, examined for this study. Churchill is opened for a brief period in summer and is the busiest port during that time.

Union Involvement, Durations and Major Issues in Dock Strikes

A chronological study of union involvement in dock strikes reveals that until 1956 there existed one major organized union, namely, the Seamen's Union. Other dock workers such as Stevedores, Freight handlers and River pilots, did not appear to be organized. However, the data revealed that during the late fifties there was a reorganization among dock workers. The Seamen's Union merged with Seafarers International Union, S.I.U. (AFL-CIO). The Stevedores and Freight handlers, joined the International Longshoremen's Association, I.L.A. (AFL-CIO/CLC). The unions of officers like the Deck officers, the Shipping officers, have strengthened by joining together. At present there are three main unions at the dock sites: i) the Longshoremen's Union (I.L.A.), ii) the Seafarers International Union (S.I.U.) and, iii) the Marine Engineers and Merchant Service Guild Association.

The details of the union involvement in dock strikes are revealed by Table 9 and Figure 5 which show that during the 1947-1975 period under examination, 59.2 percent of the total dock strikes as called by the International Longshoremen's Union (I.L.A.) which accounted for 80.7 percent of the total dock workers involved in strikes, and 80 percent of the total man-days lost at docks. This was followed by the Seafarers International Union (S.I.U.), accounting for 27.5 percent of the total dock strikes, involving 12.8 percent of the dock workers involved in strikes, and 13.6 percent of the total man-days lost.

Durations: The analysis of dock strikes by duration reveals that a large portion, about 29 percent, of dock strikes were of two to four days duration; 14 percent lasted for about five to nine days, and another 14 percent lasted for only one day. While strikes lasting from ten to fifty-nine days represented a significant portion (34 percent) of the total, only a small percentage (11 percent) of the total strikes continued beyond fifty-nine days. Nevertheless, strikes in this group included almost 37 percent of all the man-days lost during the period 1947-1975 (Table 10, Figure 6).

Dock strikes of brief durations were markedly more prevalent during the late forties and early fifties when labor was relatively less organized. Certain additional aspects of duration that are related to some underlying issues and timing are also discussed.

TABLE 9

DOCK STRIKES BY UNION INVOLVED
(1947-1975)

Unions	Strikes		Workers Involved		Man-Days Lost	
	Number	%	Number	%	Number	%
	<u>120</u>	<u>100.0</u>	<u>77,390</u>	<u>100.0</u>	<u>1,022,532</u>	<u>100.0</u>
Seafarers International Union (S.I.U.) (AFL-CIO)	33	27.50	9,912	12.81	139,068	13.60
International Longshoremen's Association (I.L.A.) (AFL-CIO/CLC)	71	59.17	62,438	80.68	820,598	80.25
Canadian Marine Officers Union (AFL-CIO/CLC)	5	4.17	1,735	2.24	46,980	4.59
Canadian Merchant Service Guilds						
Others not unionized	11	9.17	3,305	4.27	15,526	1.52

SOURCE:

Derived from Labor Canada, Strikes and Lock Outs in Canada (Ottawa), annual.

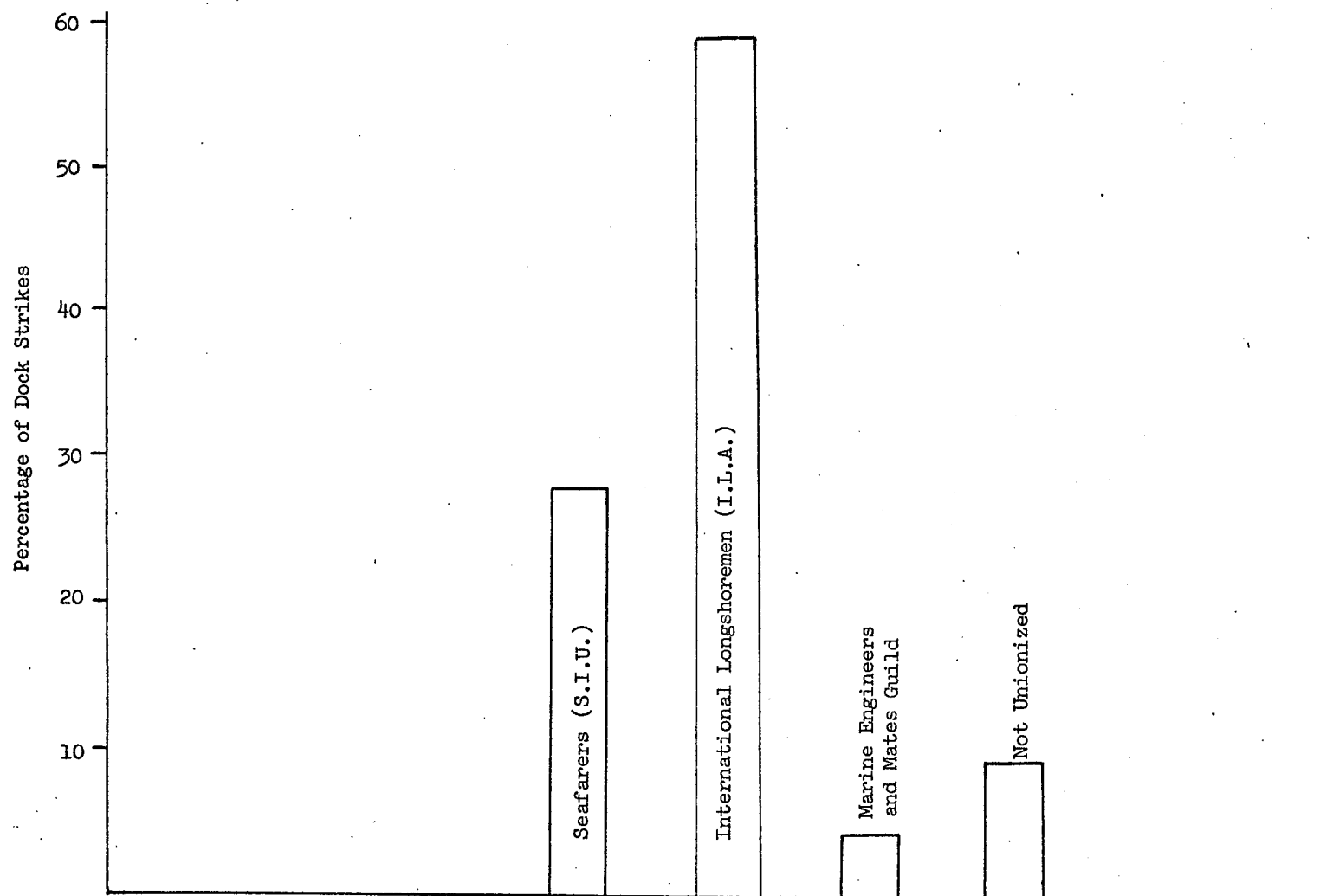


Figure 5

Percentage Distribution of Dock Strikes
by Union Involved, 1947-1975

TABLE 10
NUMBER OF DOCK STRIKES AND THEIR DURATION
(1947-1975)

Duration (Calendar days)	Strikes Total	%	Workers Total	Involved per/strike	Man-Days Lost Total	per/strike
1 Day	18	14.40	7,501	416.72	6,272	348.44
2-4 Days	36	28.80	21,946	610.44	52,073	1,446.47
5-9 Days	18	14.40	1,425,300	791.83	59,970	3,331.67
10-14 Days	7	5.60	4,931	704.43	37,298	5,328.29
15-29 Days	19	15.20	14,123	745.95	208,745	10,986.58
30-59 Days	16	12.80	14,517	907.31	439,330	27,458.13
60-89 Days	6	4.80	691,500	1,152.00	335,438	55,906.33
90-149 Days	4	3.20	2,459	614.75	145,207	36,301.75
150 Days & over	1	.80	47	47.00	6,440	6,440.00

SOURCE:

Derived from Labor Canada, Strikes and Lock Outs in Canada (Ottawa), annual.

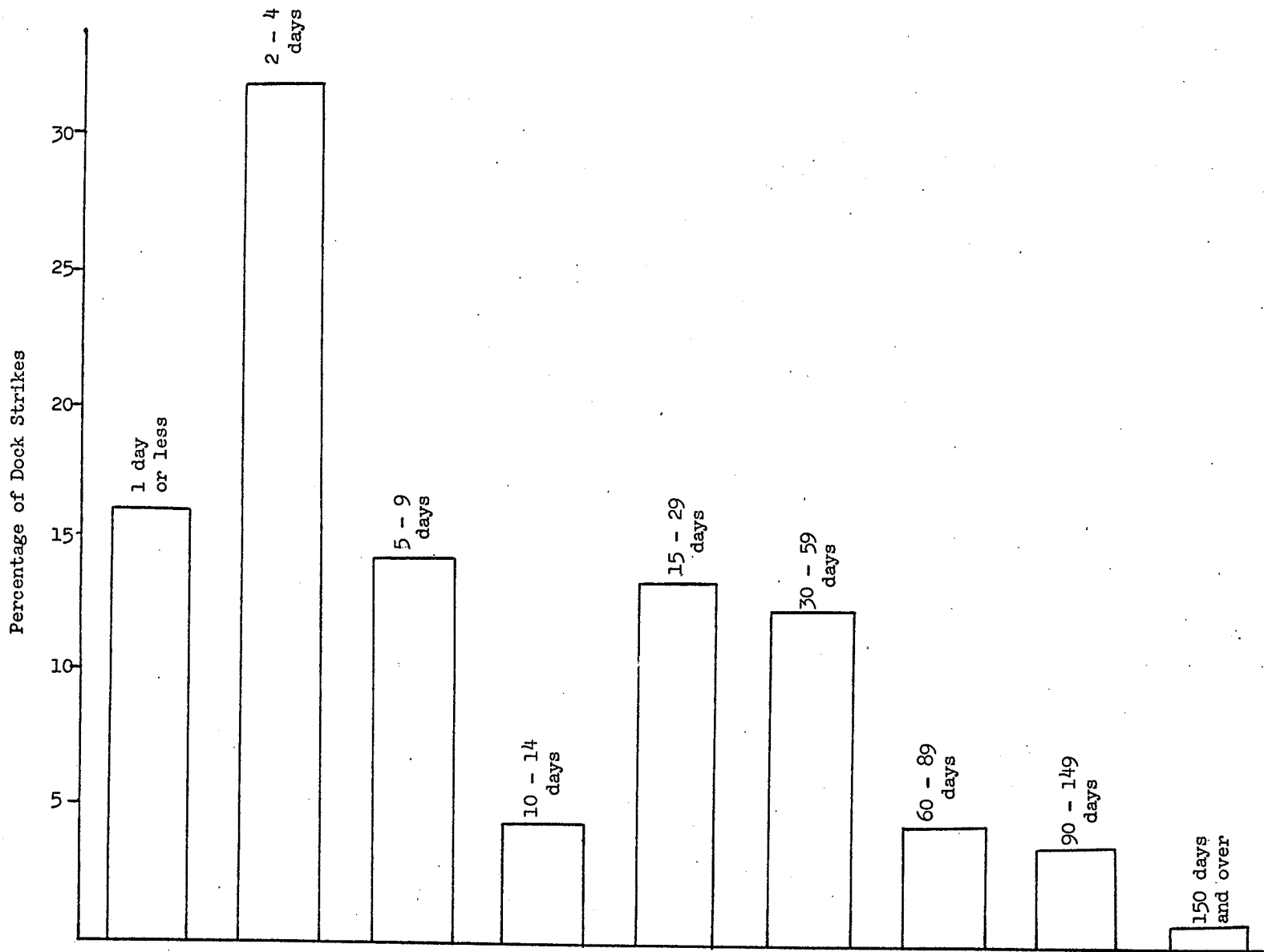


Figure 6
Percentage Distribution of Dock Strikes
by Durations, 1947-1975

Major Issues: Two major issues, namely, economic and related working conditions, have strongly influenced the frequency and duration of dock strikes. As seen from Tables 11, 11a and Figure 7 disputes over economic benefits, including wages and fringe issues, accounted for about 45 percent of total strikes with an average duration of three weeks and more than 50 percent of all the man-days lost. Issues related to working conditions such as job security, work assignments, shop conditions and work load accounted for 21 percent of the total strikes with relatively shorter durations (average of two weeks) and were responsible for only 13 percent of the total man-days lost. Noneconomic issues grouped as i) political, institutional and structural factors, and ii) personality, psychological, ethical and societal considerations accounted for 10 and 20 percent of total dock strikes respectively. Usually, the issues of a noneconomic nature were settled relatively quickly with an average duration of a week and one half.

Durations of dock strikes are also influenced by the time of the year (season) when the strike starts. As shown in Table 11b, the strike durations have varied from month to month. A strike starting during any time between March to October lasted for a relatively longer period than those strikes starting during November, December and February. Grouping of the months into seasons such as fall, winter, spring and summer reveals

TABLE 11
DOCK STRIKES BY MAJOR ISSUES AND DURATION (1947-1975)

Major Issues	1 Day	2-4 Days	5-9 Days	10-14 Days	15-29 Days	30-59 Days	60-89 Days	90 Days & Above
Economic ^a	6	11	10	3	15	10	2	1
Political, Institutional ^b and Structural	1	4	2	1	2	1	-	2
Personality, Psychological, Ethical and Societal ^c	12	11	1	1	-	-	-	1
Working Conditions ^d	5	6	4	2	2	7	-	2
Reasons not Known	2	1	1	-	1	-	-	-

^aInclude wages, hours and fringe benefits, etc.

^bIncludes union recognition, in sympathy with others, etc.

^cIncludes on job treatment by superior, discrimination or disciplinary action, etc.

^dIncludes job security, shop conditions, work load, etc.

SOURCE:

Derived from Labor Canada, Strikes and Lock Outs in Canada (Ottawa), annual.

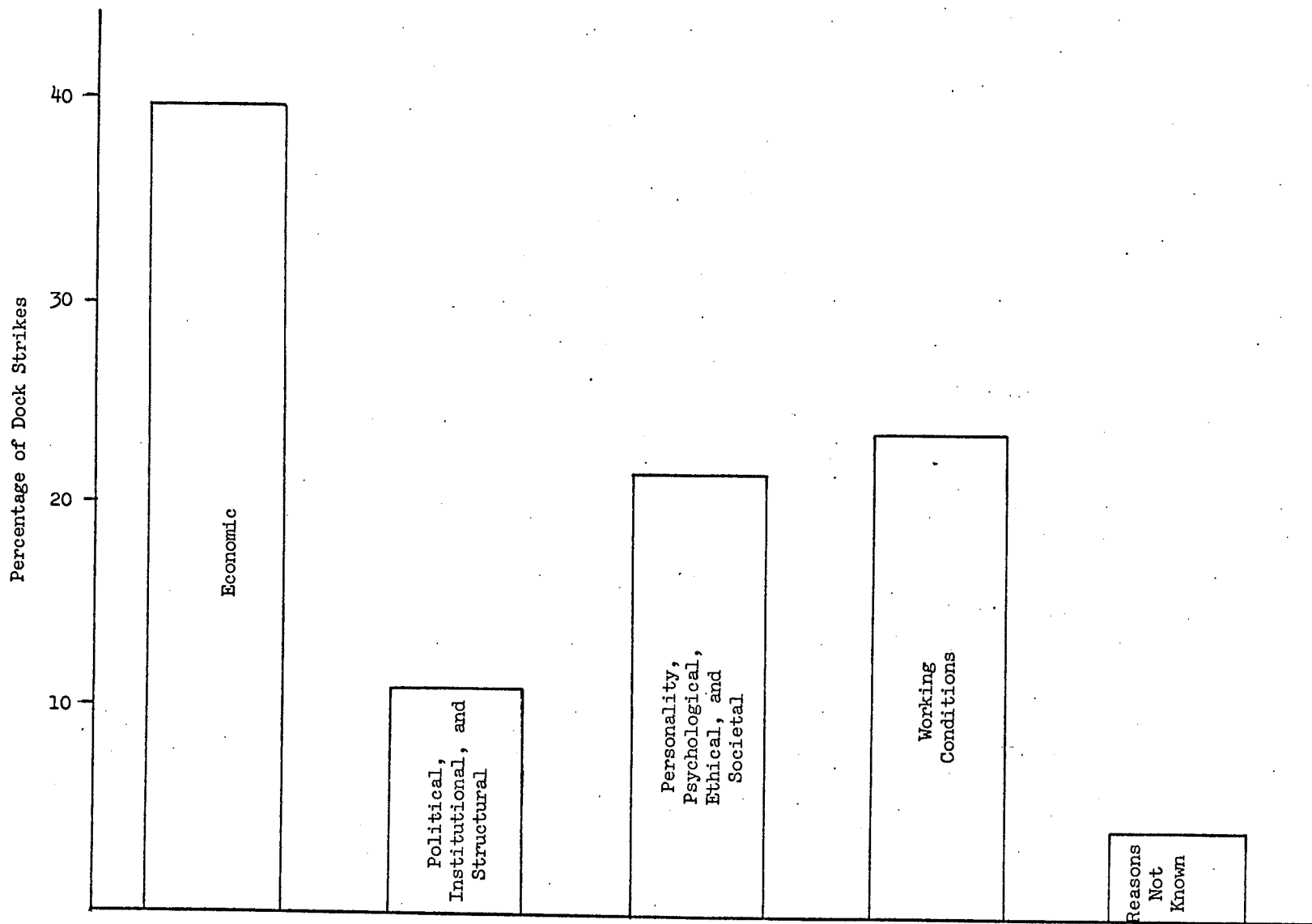


Figure 7

Percentage Distribution of Dock Strikes
by Major Issue, 1947-1975

TABLE 11a

DOCK STRIKES BY ISSUE, NUMBER OF WORKERS INVOLVED
AND MAN-DAYS LOST (1947-1975)

Major Issue	No. of Strikes /Issues	No. of Workers	No. of Workers /Strike	No. of Man-Days Lost	No. of Man-Days Lost /Strike
Economic ^a	58	60,331	1,040.2	787,379	13,575.5
Political, Institutional, & Structural ^b	13	11,180	860	110,240	8,480
Personality, ^c Psychological, Ethical and Societal	26	6,427	247.2	24,203	930.88
Working Conditions ^d	28	15,373	569.4	105,150	3,894.4
Reasons not Known	5	4,378	875.6	130,910	26,182

^aInclude: Wages, hours and fringe benefits, etc.

^bInclude: Union recognition, sympathy with others, etc.

^cInclude: On the job treatment by superior, discrimination or disciplinary action, etc.

^dInclude: Job security, shop conditions, work load, etc.

SOURCE: Derived from Labor Canada, Strikes and Lock Outs in Canada (Ottawa), annual.

TABLE 11b

NUMBER OF STRIKES AND DURATION BY STARTING MONTH
(1947-1975)

Starting Months	Stoppages Number	%	Average Duration	1 Day	2-4 Days	5-9 Days	10-14 Days	15-29 Days	30-59 Days	60-89 Days	90-149 Days
Jan.	0	0.00	0	-	-	-	-	-	-	-	-
Feb.	5	4.00	12	-	1	2	-	2	-	-	-
Mar.	10	8.00	31	1	1	2	1	2	1	1	1
Apr.	11	8.80	32	2	1	-	2	1	4	-	1
May	15	12.00	18	2	2	3	1	4	3	-	-
Jun.	12	9.60	22	1	7	-	-	2	-	1	1
Jul.	12	9.60	13	3	3	2	-	2	2	-	-
Aug.	11	8.80	16	2	2	2	-	3	2	-	-
Sept.	16	12.80	18	5	3	2	1	2	2	-	1
Oct.	13	10.40	19	3	6	1	-	-	2	-	1
Nov.	17	13.60	6	9	4	-	3	-	1	-	-
Dec.	3	2.40	2	2	1	-	-	-	-	-	-

SOURCE:

Derived from Labor Canada, Strikes and Lock Outs in Canada (Ottawa),
annual.

that a strike called during fall and summer lasted on the average for about 18 days, whereas a strike called during spring lasted for 32 days, and a strike called during winter had a duration of 5 to 6 days.

Another important feature to note about the dock strikes is that during the decade 1965-1975 economic issues were more dominant than noneconomic issues. In the fifties and early sixties, however, institutional and structural issues were more prevalent.

Seasonality in Dock Strikes: Statistical Analysis

That there is a pattern of seasonal variations in dock strikes is suggested by even the most cursory examination of monthly data (Table 12). The table reveals that 93 percent of dock strikes were called during the months of March to November. No strike was reported during the month of January in the last twenty-eight years.

The general pattern of seasonality is also clearly evident in Tables 11b, 12 and 12a and Figure 8, which summarize the number of dock strikes beginning in each month from August 1947 through July 1975. It may be observed that the number of disputes each month throughout the period varied from zero in January to seventeen in November. For the period as a whole under examination, strikes beginning in the early months of each year were relatively infrequent, and then increased rapidly from April onward till November. Since the month to month

NUMBER OF DOCK STRIKES BY STARTING MONTH AND YEAR (1947-1975)

Crop Year	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Yearly Total
* 1947-1948	-	-	3	-	1	2	-	-	5	1	1	2	15
1948-1949	-	-	1	-	-	-	1	1	-	-	1	-	4
1949-1950	-	-	-	-	1	-	-	-	-	-	-	-	1
1950-1951	-	-	-	-	-	-	-	1	-	-	-	-	1
1951-1952	-	-	-	-	-	1	-	-	-	1	-	-	2
1952-1953	-	-	-	-	-	-	1	-	-	1	-	-	2
1953-1954	-	-	-	-	-	1	2	-	1	-	-	-	4
1954-1955	-	-	-	1	-	-	-	-	-	-	1	-	2
1955-1956	-	-	1	-	-	-	1	-	-	1	-	-	3
1956-1957	-	-	-	-	-	1	-	2	1	-	-	-	4
1957-1958	-	-	-	1	1	1	-	-	-	-	1	-	4
1958-1959	-	-	-	-	1	1	-	1	1	-	-	1	5
1959-1960	-	-	-	-	-	-	-	-	-	-	-	-	0
1960-1961	-	-	-	1	2	-	-	-	2	1	2	1	8
1961-1962	-	-	-	-	1	-	2	-	-	-	-	-	3
1962-1963	-	-	-	1	-	-	-	-	-	1	2	-	4
1963-1964	-	-	-	2	-	1	2	-	1	2	1	-	9
1964-1965	-	1	-	1	-	1	-	1	1	3	1	-	9
1965-1966	-	1	-	3	1	2	-	1	-	1	3	1	12
1966-1967	-	-	-	-	-	-	1	-	-	-	2	-	3
1967-1968	-	-	-	-	1	-	-	-	-	-	1	-	2
1968-1969	-	-	-	-	1	-	1	-	-	-	-	-	2
1969-1970	-	1	1	-	1	-	-	1	1	-	-	-	5
1970-1971	-	-	-	-	-	-	1	-	1	-	-	-	2
1971-1972	-	-	-	-	1	-	-	-	1	1	-	-	3
1972-1973	-	-	-	-	-	1	-	1	-	-	1	-	3
1973-1974	-	1	2	1	-	-	-	-	1	-	1	-	6
1974-1975	-	-	3	-	2	-	-	2	-	-	-	-	7
Monthly Total	0	5	10	11	15	12	12	11	16	13	17	3	125

SOURCE:

Derived from Labor Canada, Strikes and Lock Outs in Canada (Ottawa); annual.

*This particular year includes strikes starting January 1947 to July 1948.

TABLE 12a

STRIKES BEGINNING IN EACH QUARTER
OF THE CROP YEAR
(1947-1975)

Crop Year	1 Aug.- Oct.	2 Nov.- Jan.	3 Feb.- Apr.	4 May- Jul.	Total
1947-1948	5	2	1	2	10
1948-1949	1	1	1	0	3
1949-1950	0	0	0	1	1
1950-1951	1	0	0	0	1
1951-1952	1	0	0	2	3
1952-1953	1	0	0	2	3
1953-1954	1	0	0	1	2
1954-1955	0	1	1	1	3
1955-1956	1	0	0	1	2
1956-1957	3	0	0	1	4
1957-1958	0	1	1	2	4
1958-1959	2	1	0	2	5
1959-1960	0	0	0	0	0
1960-1961	3	2	1	4	10
1961-1962	0	0	0	1	1
1962-1963	1	2	1	2	6
1963-1964	3	1	2	1	7
1964-1965	5	1	1	1	8
1965-1966	2	3	4	4	13
1966-1967	0	2	0	0	2
1967-1968	0	1	0	1	2
1968-1969	0	0	0	1	1
1969-1970	2	0	2	2	6
1970-1971	1	0	0	0	1
1971-1972	2	0	0	1	3
1972-1973	1	0	1	1	3
1973-1974	1	1	4	0	6
1974-1975	2	0	3	2	7
Totals	39	19	23	36	117

SOURCE:

Derived from Labor Canada, Strikes and Lock Outs in Canada (Ottawa), annual.

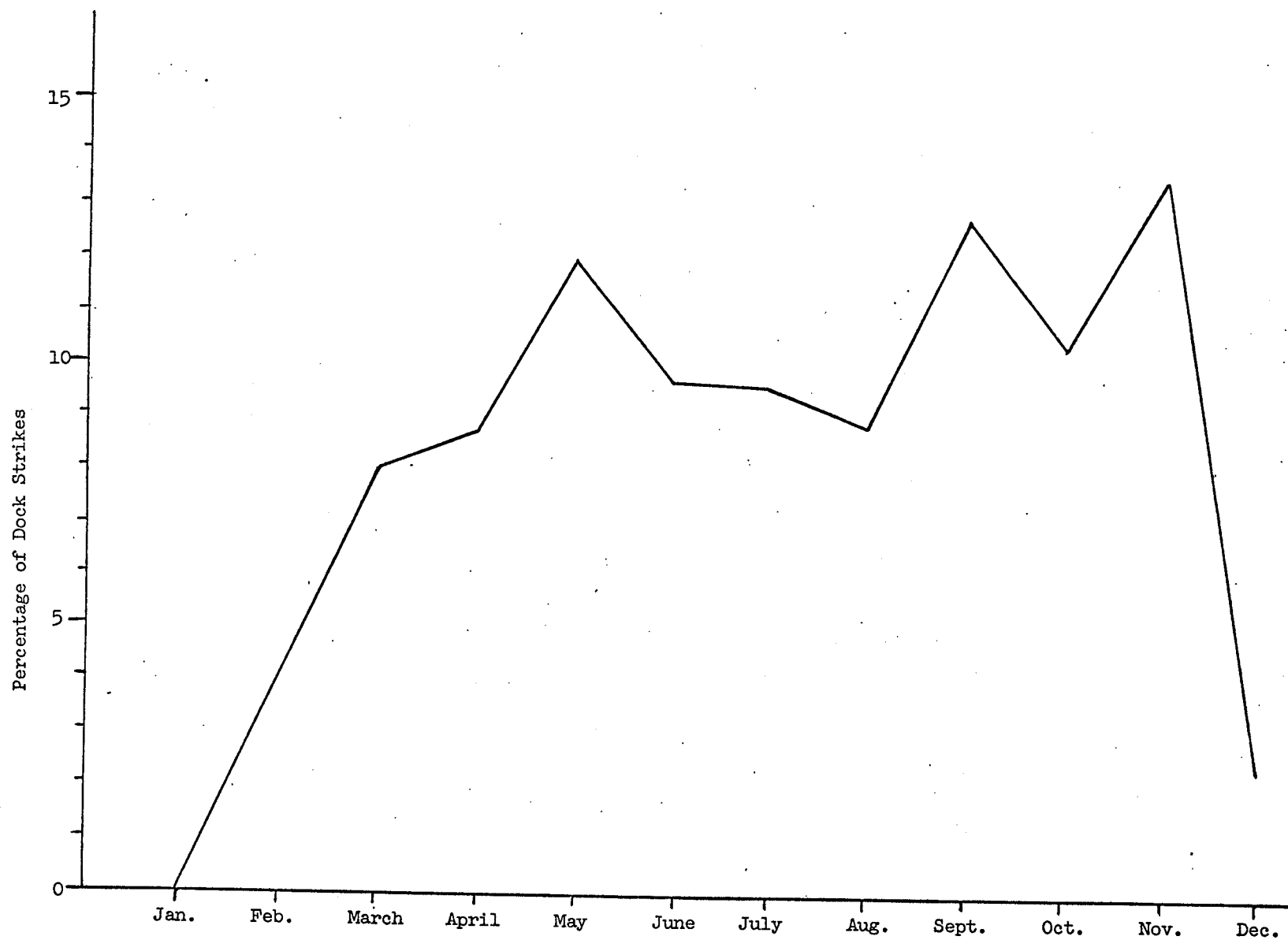


Figure 8

Percentage Distribution of Dock Strikes
by Months, 1947-1975

variation does not appear to be perfectly consistent, there may be a question whether the seasonal pattern is sufficiently marked to be really significant. To determine the significance of seasonality it was hypothesized that the probability of occurrence of a strike is equal for all months/seasons, and therefore, the analysis of variance test was run on the dock strikes data in Table 12. The procedure is not unusual in any respect and has been used for similar purposes by others.⁸ The technique of analysis of variance is the procedure by which the total variation embodied in the data is resolved into component variations due to independent factors.

In order to test the presence of seasonality, dock strikes data were tested for:

- i) Monthly variation (January, February, ..., December)
- ii) Seasonal variation (Fall, Winter, Spring and Summer).

Under the said hypothesis the following calculations were made:

$$\begin{aligned}
 1) \text{ Total Sum of Squares} &= \sum_{a=1}^{28} \sum_{b=1}^{12} x_{ij}^2 - \frac{x_{..}^2}{ab} \\
 &= 181 - 40.74 = 140.26
 \end{aligned}$$

⁸See for example, Dale Yoder, "Seasonality in Strikes," Journal of the American Statistical Associations, Vol. XXXIII, Dec. 1938, pp. 687-93.

$$2) \text{ Sum of squares due to year} = \frac{\sum x_{i.}^2}{a} - \frac{x_{..}^2}{ab}$$

$$= 64.25 - 40.74 = 23.51$$

$$3) \text{ Sum of squares due to months} = \frac{\sum x_{.j}^2}{b} - \frac{x_{..}^2}{ab}$$

$$= 51.32 - 40.74 = 10.58$$

x = Frequency of strikes

i = row or years

j = column or months

a = No. of years = 28

b = No. of months = 12

ANALYSIS OF VARIANCE TABLE

Source of Variation	D.F.	Sum of Squares	Mean Sum of Squares	F
Row (years)	27	23.51	.87	2.42**
Column (months)	11	10.58	.96	2.69**
Errors	297	106.17	.36	-
Total	335	140.26	-	-

The double asterisk indicates that the value of F is significant at 1 percent level. Thus tentatively we can conclude that the frequency of dock strikes is influenced by seasons, and that there exists a month to month variation in the pattern.

A similar analysis undertaken by grouping months into seasons (fall, winter, spring and summer), yields the following analysis of variance table.

ANALYSIS OF VARIANCE TABLE

Source of Variation	D.F	Sum of Squares	Mean Sum of Squares	F
Row (years)	27	70.53	2.61	3.00**
Column (crop season)	3	10.17	3.39	3.90*
Error	81	70.08	0.87	-
Total	111	150.77	-	-

The F Value for the crop season is significant at 5 percent level which again supports the belief that the pattern of dock strikes is influenced by the crop season. Therefore, the analysis effectively supports the conclusion that a monthly as well as quarterly pattern of seasonality exists in Canadian dock strikes.

Having established that there was a significant seasonal pattern in dock strikes, the strike data were further analyzed to test the difference between the monthly and seasonal averages, by the technique of "critical ratio".⁹ The formula used is denoted by the ratio $\frac{d}{\sqrt{6d}}$, where d is the difference between the means of

⁹Yoder, op. cit., pp.687-693.

the two monthly/seasonal series and σ_d is the standard error of the difference between the two series, which mathematically can be defined as,¹⁰

$$\sigma_d = \sqrt{\frac{\sum D_i^2 - \frac{(\sum D)^2}{n}}{n(n-1)}}$$

where:

D_i = difference between any two series
 n = number of observations.

The resulting critical ratios are tabulated in Table 13 and Table 14, which show significant differences both between months and between seasons. Twenty-five out of sixty-six inter-month critical ratios are above the five percent level. Similarly, four out of six inter-season critical ratios are above the five percent level. It would appear, therefore, that there are significant seasonal differences in the frequency of dock strikes.

¹⁰Robert Steel and James Torrie, Principles and Procedures of Statistics (New York: McGraw-Hill, 1960), pp. 78-79.

TABLE 13

CRITICAL RATIO $\frac{\sigma}{\sigma_d}$ BY CROP YEAR BY MONTH (1947-1975)

Month	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	Jul.
Aug.	-1.0302	.3720	-1.0302	3.4304**	3.3059**	1.8001*	.7686	.1890	.6814	.2537	.1965
Sept.		.3861	.3278	3.3001**	3.2169**	1.9866*	1.2710	.8172	.1710	.5928	1.0002
Oct.			.8117	2.6452**	3.3001**	1.9816*	.8409	.6476	.1824	.4930	.6814
Nov.				3.2169**	3.8626**	2.7138**	1.5132	2.2601**	.5499	1.0444	1.7602*
Dec.					1.4412	1.0820	1.5361	1.8664*	3.2866**	3.8725**	2.2952**
Jan.						2.4231**	2.1212**	2.5849**	4.1451**	3.9597**	3.0405**
Feb.							.7686	1.3074	1.6550	2.2601**	1.3074
Mar.								.3593	1.3621	.7502	.3861
Apr.									.8095	.5274	1.0003
May										.4019	.8914
June											.4646

SOURCE:

Derived from Table 12 (strike beginning in each month of the crop year).

**Significant at 1 percent level.

*Significant at 5 percent level.

TABLE 14

CRITICAL RATIO *d* BY CROP YEAR BY SEASON
d
 (1947-1975)

Season	Winter	Spring	Summer
Month	Nov.-Jan.	Feb.-Apr.	May-Jul.
Fall Aug.-Oct.	2.6797**	1.9214*	.4090
Winter Nov.-Jan.		.6796	3.2318 **
Spring Feb.-Apr.			1.9038 *

SOURCE:

Derived from Table 12a (strikes beginning in each quarter of the crop year).

** Significant at 1 percent level.

* Significant at 5 percent level.

CHAPTER 4

THE RELATIONSHIPS BETWEEN ECONOMIC AND NONECONOMIC FACTORS AND DOCK STRIKES^{*}

The objectives of this chapter are to examine and analyze the relationships between economic and noneconomic variables and the frequency of dock strikes, as well as, to isolate factors influencing the duration of dock strikes. For this purpose, this chapter has been divided into two sections. The first section discusses the conceptual relationships between economic and noneconomic variables and the frequency of dock strikes, it integrates these conceptual relationships in an analytical framework, and then tests them statistically. The second section examines the factors influencing variation in the duration of dock strikes, it attempts to relate these factors to the conceptual analytical model developed in the first section, makes necessary modifications in the model to render it suitable for explaining the variation in the duration of dock strikes, and finally tests these relationships empirically.

^{*}The analysis in this chapter relates to the period 1955-1975 calendar years.

Conceptual Relationships Between Economic Variables and Dock Strikes

The analysis in Chapter 3 has revealed that economic matters hold a prominent position in dock-labor disputes. More than 60 percent of the total dock strikes called during 1947-1975 involved economic and/or economic related issues. Economic theory suggests that issues such as the wage rate, unemployment rates and the consumer price index are likely to have a strong influence on the decision to strike. Table 15 and Figure 9 attempt to relate these economic measures (eg. unemployment rate, real wage rate) to the frequency of dock strikes.

A close examination of Table 15 and Figure 9 reveals that during the periods 1955-1961 and 1967-1975, an increase in the national unemployment rate was associated with an increase in the frequency of dock strikes, whereas, during the period 1962-1966 a decline in the unemployment rate was associated with an increase in the frequency of dock strikes. It may be recalled here, that the period 1962-1966 was noted in Chapter 3 as a period of turbulence in dock strikes which coincided with the high levels of wheat exports. Figure 9 also relates dock workers real wage rate (ratio of the money wage rate to consumer price index expressed in percentage) with the frequency of dock strikes. A close look at their movement, however, does not provide a clear indication of the nature of the relationship between the real wage rate and the

TABLE 15

NUMBER OF DOCK STRIKES, CONSUMER PRICE INDEX, UNEMPLOYMENT RATE,
AND WAGE RATE BY YEAR 1947-1975

Calendar Year	No. of Dock ¹ Strikes	Consumer ² Price Index 1971 = 100	National Unemployment Rate ³	Dock Workers	
				Money Wage ⁴ Rate/Weekly	Real Wage Rate/Weekly
1955	3	67.54	4.0	61.09	90.45
1956	4	68.52	3.2	66.39	96.89
1957	2	70.69	4.4	70.94	100.35
1958	6	72.56	6.7	70.81	97.59
1959	2	73.39	5.6	76.11	103.71
1960	5	74.29	6.6	79.51	107.03
1961	5	74.96	6.7	84.93	113.30
1962	4	75.86	5.4	85.43	112.62
1963	7	77.21	5.0	88.91	115.15
1964	9	78.56	4.2	95.27	121.27
1965	8	80.51	3.4	101.57	126.16
1966	10	83.51	3.1	109.19	130.75
1967	1	86.15	3.6	117.02	135.83
1968	2	90.03	4.2	126.42	140.42
1969	3	94.08	4.0	128.86	136.97
1970	5	97.23	5.9	147.63	151.84
1971	2	100.00	6.4	169.32	169.32
1972	2	104.80	6.3	179.56	171.34
1973	4	112.70	5.6	196.34	174.21
1974	6	125.00	5.4	226.11	180.89
1975	5	137.9	7.1	255.76	185.47

(Continued)

TABLE 15-continued

SOURCE:

- ¹Labor Canada, Strikes and Lock Outs in Canada (Ottawa), annual.
- ²Statistics Canada, Price and Price Index (Pub. in Economic Review, 1973).
- ³Canada Yearbook (1973).
- ⁴Statistics Canada, Unemployment and Payrolls (Labor and Price Div.)
Pub. 72-002.

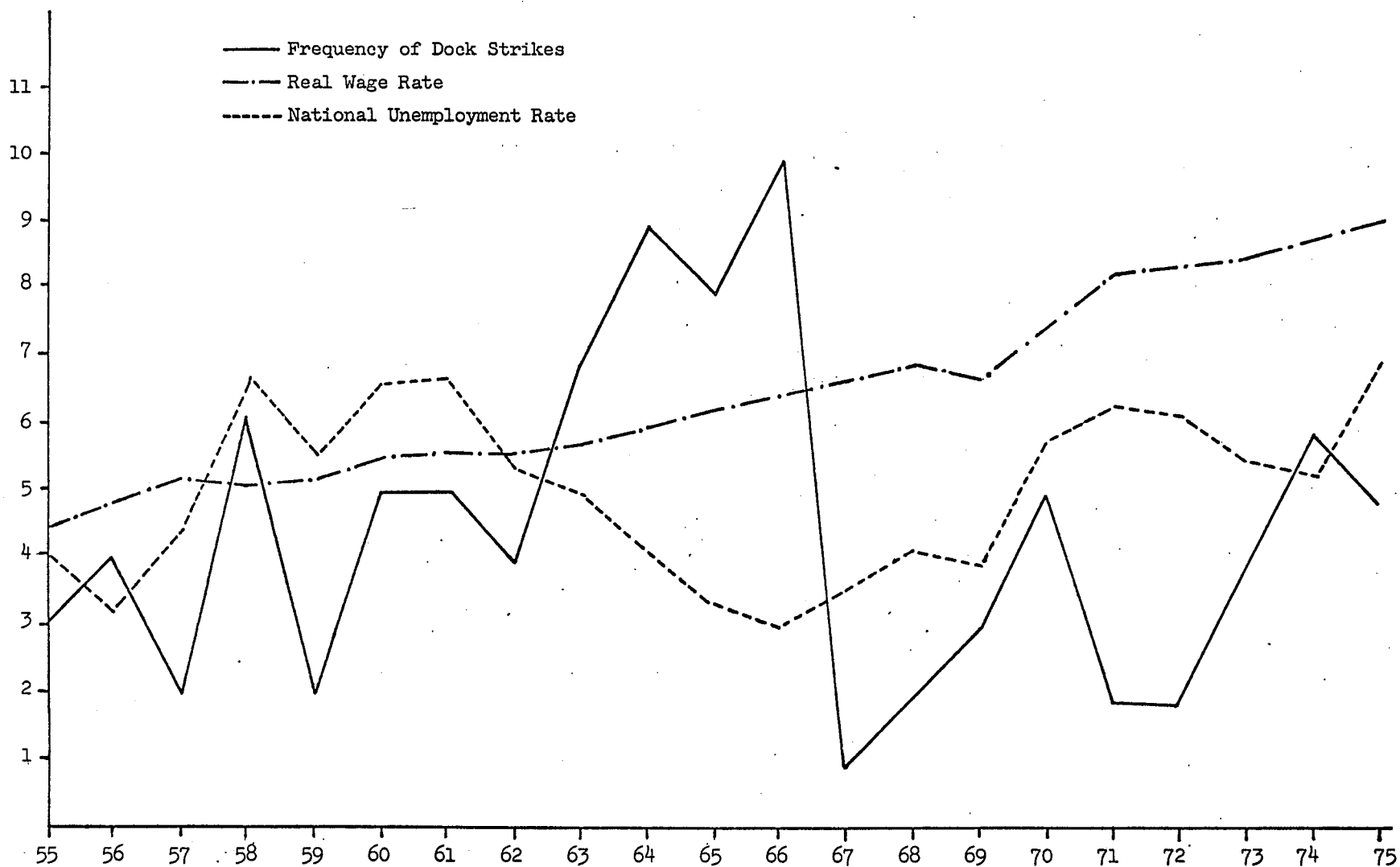


Figure 9

Economic Variables and the Frequency Distribution
of Dock Strikes, 1955-1975(A)

frequency of dock strikes. In such cases, where the nature of relationships between economic variables and the frequency of dock strikes was not evident from the graphs, alternative measures of those variables (such as yearly percentage change in wage rate, yearly percentage change in consumer price index, the difference between yearly percentage change in wage rate and consumer price index) were developed (see Table C1-Appendix C). These alternative measures of economic variables are also called "derived economic variables." Some of these derived economic variables are discussed later in this chapter while examining the regression results.

Researchers have advanced several hypotheses concerning the relationship between economic variables and strikes.¹¹ For this study, however, the nature of relationships between economic variables and dock strikes is hypothesized as follows:

¹¹Some of the studies dealing with this topic are: K. G. Knowles, Strikes: A Study in Industrial Conflict (Oxford: Basil Blackwell, 1952); and John Edwin Logan, An Analysis of the Effect of Compulsory Conciliation in Canada on Collective Bargaining and Strikes, unpublished Ph.D thesis, Columbia University, 1969. In this thesis the author tested the correlation between changes in economic variables and the level of workers involvement in strikes. He used Rank Correlation to determine whether or not there was a significant statistical relationship between employment, wage rate, and the level of workers involvement in strikes. The only economic variable noted to be significant in his study was yearly wage changes.

Wage Rate: The average wage rate of dock workers has been higher in comparison to that of other groups of workers. Furthermore, their (dock workers) wages have increased faster than those in other sectors of the economy (Table 16). The demand for an increase in wages in a particular sector or industry is not necessarily caused by a "low" wage rate. Such demands can also arise when the wage rate in that sector or industry seems to be low relative to wages in other industries or their counterpart in the U.S. Rapid wage increases might lead to expectations for further wage hikes. One might also expect a period of sudden change in the wage differentials to be associated with a high level of strike activity. However, regardless of the reasons for a demand for higher wages, when such demands for wage increase prevail in a particular sector, they can lead to a high level of strike activity in that sector of the economy. Such wage increases, in turn, can set the stage for inflationary pressures.

In the case of dock workers, often the period of high levels of strike activity has been associated with the periods of strong demands for Canadian wheat and other Canadian goods in the world market. At times, periods of high levels of dock strikes have coincided with the periods of prosperity and high levels of exports, because workers see a greater share in the profits as a justification for their demand for wage increases. For all these reasons, one must be careful in interpreting any statistical

TABLE 16

WEEKLY WAGE RATES AND THEIR RATES OF INCREASE
(1955-1975)

Calender Year	Dock Workers		All other workers	
	Av. Wage rate/ ¹ Weekly (in \$)	Yearly % Change in Weekly Wage Rate	Av. Wage rate ² Weekly (in \$)	Yearly % Change in Weekly Wage Rate
1955	61.09	8.78	60.87	2.57
1956	66.39	6.85	64.18	4.28
1957	70.94	- 0.18	67.70	4.55
1958	70.81	7.48	70.43	3.52
1959	76.11	4.47	73.47	3.93
1960	79.51	6.82	75.83	3.05
1961	84.93	0.59	77.12	4.60
1962	85.43	4.07	80.59	3.05
1963	88.91	7.15	83.41	3.50
1964	95.27	6.61	86.51	3.72
1965	101.57	7.50	91.01	5.20
1966	109.19	7.17	96.34	5.86
1967	117.02	8.03	102.76	6.66
1968	126.42	1.93	109.88	6.93
1969	128.86	14.57	117.78	7.19
1970	147.63	14.69	126.82	7.13
1971	169.32	6.05	137.64	8.53

Continued

TABLE 16-continued

Calendar Year	Dock Workers		All other workers	
	Av. Wage rate/ ¹ Weekly (in \$)	Yearly % Change in Weekly Wage Rate	Av. Wage rate/ ² Weekly (in \$)	Yearly % Change in Weekly Wage Rate
1972	179.56	9.35	149.21	8.41
1973	196.34	15.16	N.A.	N.A.
1974	226.11	13.11	N.A.	N.A.
1975	255.76	16.25	N.A.	N.A.

SOURCE:

¹Statistics Canada, Unemployment and Payrolls,
Cat. # 72-002.

²Statistics Canada, Canadian Statistical Review,
(Employment and Earnings).

N.A. = Not available.

association between demand for wage increases and the level of dock strikes. However, it is hypothesized that the higher the wage rate in a particular sector of the economy, the lower the strike activity in that sector.

Consumer price index: The CPI is one of the determinants of retail prices which, in turn, determine the workers cost of living. Insofar as high retail prices exert pressures on workers level of living, they might be expected to resist such pressures by striking. Wage-bargaining has been, therefore, related with the movement of the consumer price index. A comparison of movement of the wage rate of dock workers and the consumer price index, shows that the wage rate has increased faster than the consumer price index, which is particularly evident during the nineteen seventies (Figure 10). In general, however, it is hypothesized that an increase in the CPI is associated with a high level of strike activity.

Unemployment rate: A large increase in employment in a sector or sudden decrease in unemployment in that sector might foster a high level of strike activity, since in the tight labor market it becomes difficult for an employer to hire a new employee on short notice. In deciding whether or not to strike when the labor market is tight, workers would probably be much less concerned with being replaced during a strike or about losing their jobs, than they would be when unemployment is high. In recent years, however, the rising unemployment (along with a high rate

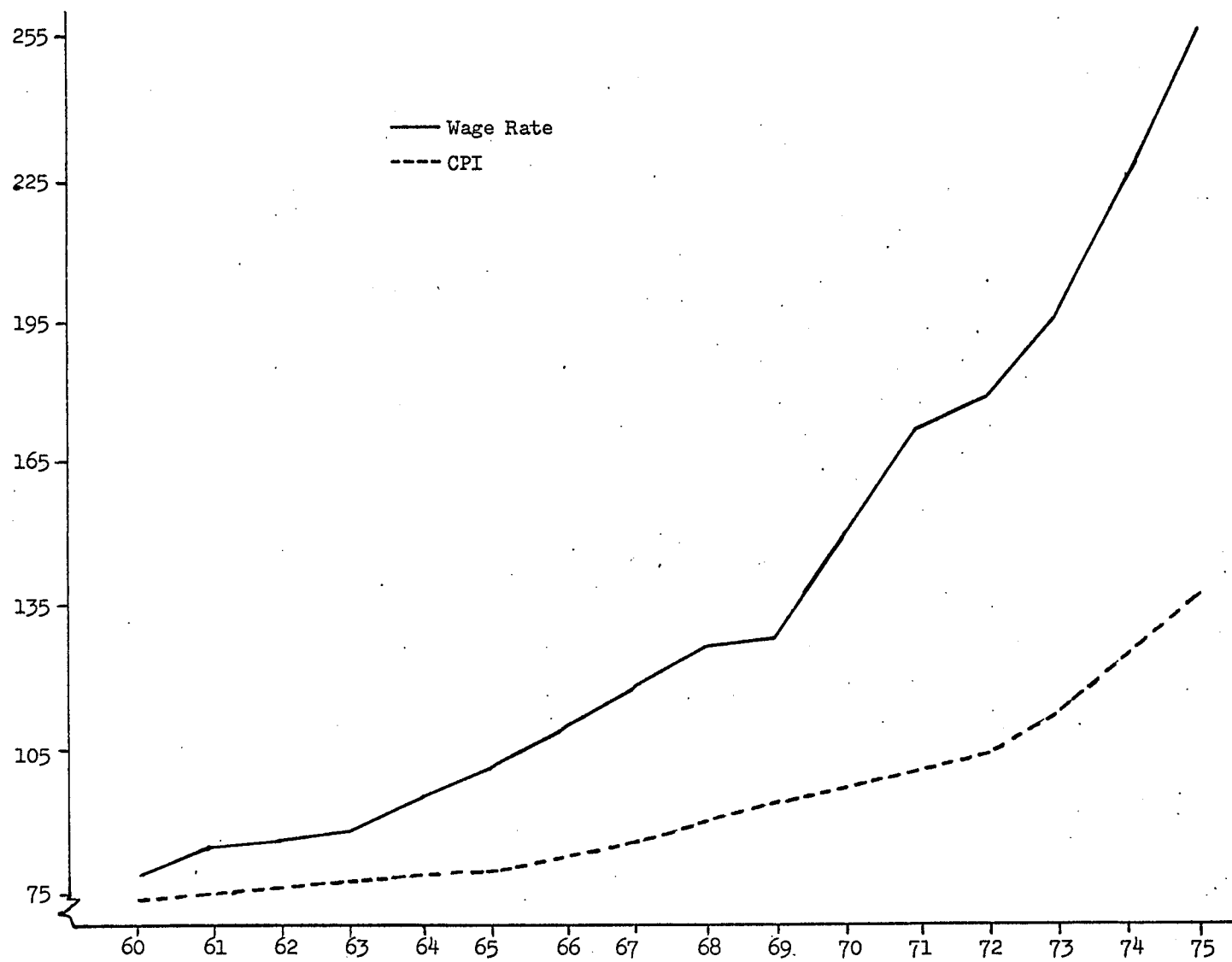


Figure 10

Consumer Price Index and the Dock
Workers Wage Rate, 1960-1975

of inflation) has also fostered the strike activity and a large work force involvement in the strikes. Although employment/unemployment statistics for dock workers are not available, the national unemployment rate can be used as a proxy variable to hypothesize that periods of rapid increase in the unemployment rate are associated with high levels of strike activity.

Noneconomic Factors and the Frequency of Dock Strikes

All strikes cannot be explained on purely economic grounds. Although certain labor disputes centre on economic matters exclusively, most strikes involve a combination of economic and noneconomic (or semi-economic) issues. Past experience with labor disputes has shown that noneconomic issues have often led to bitter and lengthy strikes. Noneconomic issues sometimes can be vague and difficult to identify. Hutchinson has classified noneconomic issues into ten groups.¹² However, they can be further grouped into four broader groups, namely:

- i) Political, institutional and structural,
- ii) Psychological, ethical and societal,
- iii) Competitive and technological,
- iv) Seasons and timing.

¹²G. John Hutchinson, Management Under Strike Conditions, Graduate School of Business, Columbia University (New York: Holt, Rinehart and Winston, Inc., 1966), pp. 7-10.

i) Political issues refer to the internal political problem which arises within and between the management and union as well as to the general political climate in the country. The current "wage and price control" program and government intervention in the past to terminate strikes by passing back-to-work legislation (eg. grain-handlers strike, September 1974) illustrate the type of political pressures that frequently emanate from the federal level. The institutional variables cover the internal goals of the union-management policies, plans and procedures. Structural factors deal with the structure of the organization, type of products, the size of the work force in the union and the location of industry.

ii) Psychological, ethical and societal factors in labor disputes appear frequently, eg. discrimination, disciplinary actions and corrupt practices. These are the issues which are not easily measured in quantitative terms and different individuals can assign them different weights.

iii) Competitive and technological variables refer to those forces under which the management (or industry) can lose or gain customers or good will in the market and the union can lose or gain union membership or develop distrust between the union executive and ordinary membership. In the context of dock strikes, competitive variables can be important in as much as Canada can lose

customers and good will for its grain and other products in the world market. Technological variables also exert a powerful effect on strike decisions and labor negotiations.

iv) The season and timing variables refer to climate and other considerations in the context of timing under which the strike decision is taken. Climatological factors have occasionally affected the outcome of a specific strike action. Timing factor also plays a role and sometimes a critical one in bargaining. Season and timing are particularly important with respect to the dock workers strikes. In Chapter 3, while examining the presence of seasonality in dock strikes, it was noted that the decision to strike is influenced by months and seasons. The influence of timing on dock strikes can be examined by using dummy variables and study their relationship with the phenomenon of dock strikes. For example, as noted in Chapter 3, the years of exceptionally high levels of grain exports have been also observed as years of excessive dock strikes. Consequently, the use of dummy variables such as 1 and 0 for years of high and ordinary levels of export, respectively, should pick up the effect, if any, of the levels of exports on the level of dock strikes.

In addition to the economic and noneconomic factors just discussed, the so-called personal factors such as age, sex, marital status, occupational skill and length of service of the worker also influence his or her

decision to strike. However the precise relationships between personal characteristics of the labor force and strike activity are not clear. The relationship can be hypothesized either way. For example, one can argue that younger workers are more militant and aggressive in comparison to older workers, and therefore, are more likely to go on strike. On the other hand, one can also argue that older employees can also be more militant because the immediate pay-off from a strike is larger and remote benefits small.

Some additional hypotheses, although not tested in this study due to data limitations, which would be worth testing if relevant data were available are stated below:

- 1) The higher proportion of female workers in a union is likely to be associated with a low level of strike activity, since women are generally known as being less aggressive (more passive), in comparison to their male counterparts.
- 2) The presence of a high proportion of single workers in a union will make the union more strike prone. The single workers have a lesser commitment than married workers and will feel lesser economic impact of a strike.
- 3) Occupational skill and length of service are likely to have negative relationships with strike activity, since the cost of displacement for an experienced worker with a long service is higher than that to an unskilled worker or a worker with a short service record. Due to non-availability of data on the demographic and socio-

economic characteristics of dock labor, it was not possible to test these relationships empirically.

Statistical Evaluation of Hypotheses

In the following section, an effort is made to develop an analytical model based on the conceptual classification scheme discussed above. This model is used to test if the available dock strikes data support or refute the conceptual relationships between dock strikes and some of the factors discussed above. Some of the non-economic factors discussed previously could not be hypothesized, since they could not be measured satisfactorily. Furthermore, due to the absence of information on the demographic and socio-economic status of dock labor, these variables are also omitted from the model specified below. Data limitations and implications of omitting some of these variables are discussed at the end of this chapter.

Model Specification

The basic statistical model used here is a single-equation regression relationship, which is specified as follows:

$$Y_t = f (W_t, U_t, CPI, O_t, D_t, T, e_t) \dots\dots\dots 4(i)$$

where:

Y_t = the frequency of dock strikes during the t^{th} year.

W_t = the weekly wage rate of dock workers during the t^{th} year.

U_t = the unemployment rate during the t^{th} year.

CPI = the consumer price index during the t^{th} year.

O_t = union membership as a percentage of labor force--a proxy variable for dock union membership as percentage of labor force.

D_t = dummy variable 1 or 0 (1 for the years 1963, 1965, 1967 and 1972 and 0 for other years).

T = trend variable.

e_t = random error.

Regression Results: To explain dock strikes, different measures of the occurrence of dock strikes during a year were developed, such as i) frequency of dock strikes--a count of the number of times the labor force went on strikes during a year. It is a simple measure of unrest in the labor sector. ii) Frequency of dock strikes per thousand workers involved--a measure of the degree of unrest in the labor sector and the severity of the problem. iii) Log of the frequency of dock strikes--considers a non-linear relationship between the frequency of dock strikes and the independent variables. These three measures were used separately as dependent variables. The specified equation was also tested for the form of the relationship between each of the dependent variables and the corresponding independent variables by taking logs of both sides of the equation. Alternative measures of independent variables were also developed (Table C1-Appendix C). The rationale of some of the economic variables was examined while discussing the conceptual relationship

between economic variables and dock strikes (pp. 58-68). However, the derived economic variables, such as, the yearly percentage change in wage rates, yearly percentage change in consumer price index, and the difference between the yearly percentage change in the wage rate and the consumer price index are more sensitive economic measures of the issues involved in strikes. These variables are likely to pick up the effect more effectively when used to explain the frequency of dock strikes.

Under the alternative hypothesis, a number of regression equations (about sixty) both in linear and non-linear forms and with alternative combinations of independent variables were derived and tested. The linear form with dependent variable "Frequency of Dock Strikes" provided a high R^2 and significant regression coefficients. In this section, only the equation with the highest R^2 value of 0.62 (significant at 5 percent level) and with the least standard error of the regression coefficient is discussed in detail (Table 17). The results of the other regression equations (both in linear and log-linear forms) which provided a reasonably close fit but were not chosen are summarized in Tables C3, C4-Appendix C. The basic purpose of this analysis, however, is to determine the importance of the hypothesized factors in explaining dock strikes.

Wage rates and dock strikes: Different wage series were constructed to determine if a statistically significant

TABLE 17

MULTIPLE REGRESSION EQUATIONS AND THEIR COEFFICIENTS FOR DOCK STRIKES
AND ECONOMIC/NONECONOMIC VARIABLES

Dependent Variable	Statistic	Independent Variables					Multiple R ²	F-Ratio	Durbin-Watson Statistics
		Unemployment rate	Yearly % Δ in CPI	Yearly % Δ in wage rate	Union Membership as % of Lab. Force	Dummy Variable			
Frequency of dock strikes	Regression coeffs. (b)	0.6044*	1.0808***	0.2709*	-1.7706***	1.4345*	0.62	4.64	2.86
	^a S.E.(b)	(0.4042)	(0.3415)	(0.1223)	(0.4164)	(0.9429)			

* Significant at 10 percent level.

** Significant at 5 percent level.

*** Significant at 1 percent level.

^a Standard errors are in parentheses.

relationship existed between the level of dock strikes activity and any of the wage measures. The best measure, i.e. a measure which gave a positive regression coefficient of 0.2709 significant at the 5 percent level, was the yearly percentage change in wage rates.

This result confirms the concept of "orbit of coercive comparison" developed by Professor Ross.¹³ According to this concept, workers' satisfaction with wages is not based on the nominal or real wage rates in their particular industry or sector, but rather on comparisons made with the wages of other workers in other industries or sectors of the economy to demand higher increases in their wage rates. This is known as "catch up" factor in wages and is said to lead to a vicious circle of wage-increase demands and strikes.

A close look at the frequency distribution of dock strikes and the yearly percentage changes in dock workers wage rates reveals that trends of their movements follow each other closely (Figure 11). However, a deviation from the trend is noted during 1967 and 1968. During 1967, an increase in wage rates was associated with a sharp decrease in the frequency of dock strikes, and conversely, during

¹³Arthur Ross, the Commissioner of the Bureau of Labor Statistics of the U.S., developed the concept in Trade Union Wage Policy (Berkeley: University of California Press, 1948), pp. 53-64.

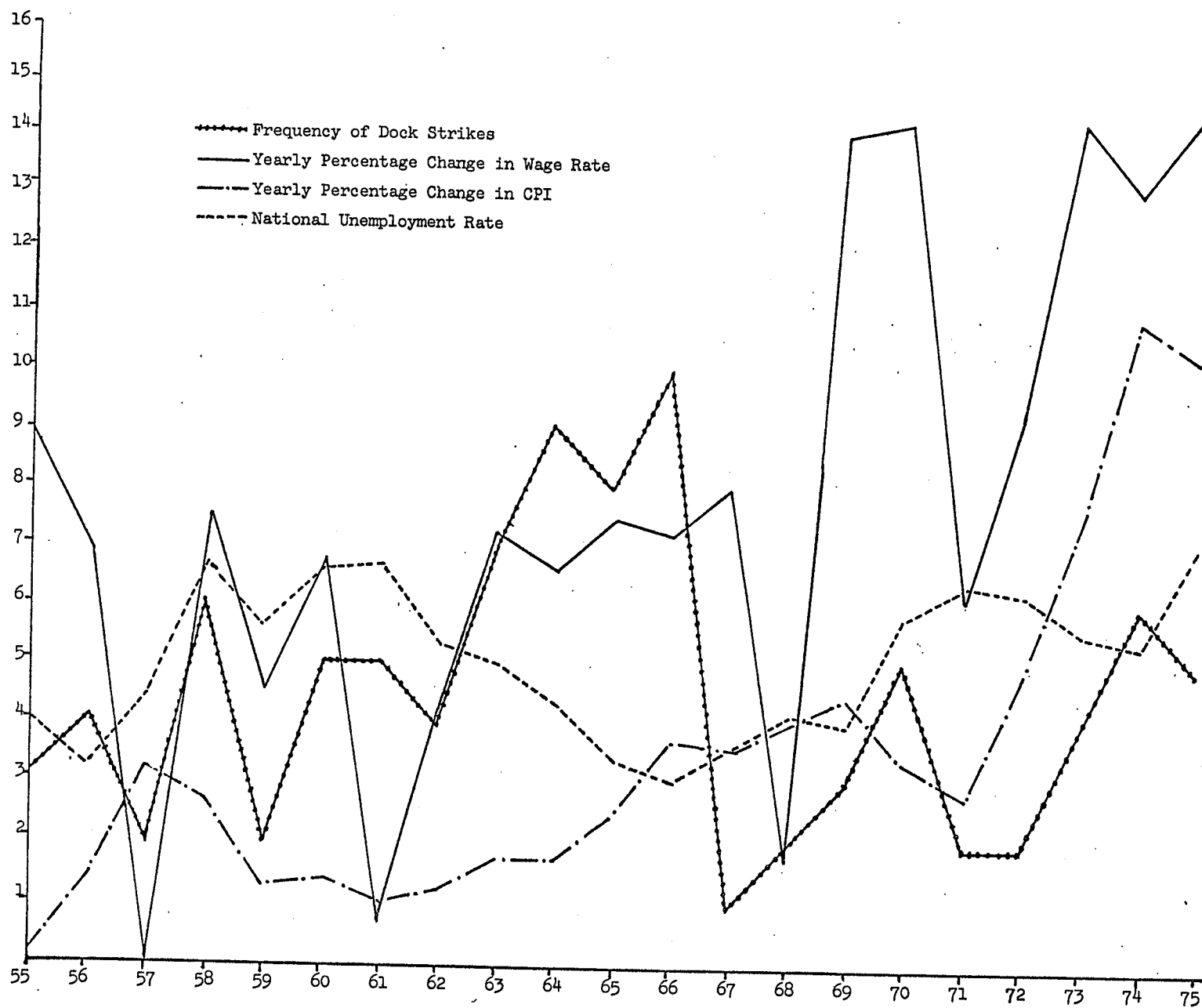


Figure 11

Economic Variables and the Frequency of Dock Strikes, 1955-1975, (B)

1968 a sharp decrease in the wage rate was associated with a slow increase in the frequency of dock strikes. The figure further reveals that during the nineteen seventies dock workers wage rates have increased at a much faster rate than did in the late fifties and sixties. .

Consumer price index and dock strikes: The yearly percentage change in the Consumer Price Index showed a relationship with the frequency of dock strikes. This variable had a positive regression coefficient of 1.088 and was found significant at a 5 percent level, which suggests that an increase in the rate of the Consumer Price Index in the past, has contributed to the strike activity.

An examination of Figure 11 which also relates the yearly percentage change in the Consumer Price Index to the frequency of dock strikes, reveals that throughout the entire period of 1955-1975 the Consumer Price Index increased at an increasing rate; the only exceptions being the periods 1957-1961 and 1970-1971 during which the increase was relatively slow. However, a reasonably close association between the unusual rapid increase in the rate of the Consumer Price Index and a reasonably high frequency of dock strikes during the nineteen seventies is evident from Figure 11.

Unemployment rate and dock strikes: Regression analysis of data showed some statistical association between the unemployment rate and the frequency of dock

strikes. The regression coefficient of 0.6044 was significant at 10 percent level with positive sign. The positive sign supports the hypothesis that the rising unemployment in recent years has also contributed to the strike activity.

The relationships between the unemployment rate and the frequency of dock strikes (Figure 11) were discussed at the beginning of this chapter while examining the conceptual relationship between economic variables and dock strikes (Figure 9 and its discussion). They are, therefore, not repeated here.

Union-membership and dock strikes: The analysis of data concerning the relationship between percentage changes in union membership and the level of strike activity yielded a regression coefficient of -1.7706 and was significant at 1 percent level. This supports the hypothesis that unionization among dock workers has decreased the frequency of dock strikes. Also, it confirms the same conclusion reached previously in Chapter 3, which was based on a historical analysis of the dock strikes data.

Dummy Variable: The dummy variable, used to measure the relationship between the high level of exports and the frequency of dock strikes has a regression coefficient of 1.4345 and it was noted to be significant at 10 percent level with a positive sign. This confirms the hypothesis that the years of high levels of wheat exports and dock

strikes have not been a matter of simple coincidence; rather there exists a close relationship between the two.

Trend variable: A trend variable was introduced to measure the secular trend as well as to pick up the effect of institutional/structural factors on dock strikes. The regression coefficient for this variable, although positive, was not found to be significant. However, it posed the problem of multicollinearity with the variable "union membership" and it is discussed in the following section.

Multicollinearity: The presence of multicollinearity in the model was tested by computing a correlation matrix (Table C2-Appendix C). The regression equation discussed above was found to have a correlation coefficient of 0.80 between the variable union-membership (as a percentage of labor force) and the trend variable. All other variables examined for the presence of multicollinearity were found not to pose such problems. Consequently, the trend variable was removed from the specification. Removal of the trend variable had no effect on R^2 , rather it decreased the standard errors of the regression coefficients a little, but not to the extent that it changed their levels of significance.

Auto-correlation: The problem of auto-correlation is inherent in any time series analysis, and especially in the case of omitted variables. The Durbin-Watson statistics was, therefore, used to test the presence of auto-correlation in the model. The test revealed that there

was no such auto-correlation.

Factors Influencing Variation in Duration of Dock Strikes

In the previous chapter it was argued that although the frequency of dock strikes has not increased substantially, the severity has increased considerably. It was concluded there, that it might be due to an increase in the average number of workers involved per strike, as well as, an increase in the average duration of strikes in the latter part of the nineteen sixties and early part of the seventies. In this section, an attempt is made to explain the factors responsible for the variation in the duration of dock strikes. In the prior section, the concern was why dock strikes occur, whereas, in this section the concern is with the determinants of their duration when they have occurred. Some of the factors leading to the decision to strike, and some of the factors influencing the variation in the duration of a strike are closely related and even overlap. However, the crux of the argument in this section hinges on how one looks at two stages of the strike activity: a) decision to strike, and b) if a strike is called, the decision to continue or when to call it off. Recognizing the interaction between these two stages of the decision, there seems enough variance between the two to consider an independent discussion of the possible economic and noneconomic variables from the point of view of explaining the variation in the duration of dock strikes.

In general, the duration of a strike can be explained by examining four sets of factors such as, i) personal factors of the labor force, ii) economic factors, iii) institutional/structural factors, and iv) seasons and timing.

i) Personal factors of the labor force and their relationships with strike activity have been discussed in the previous section. Personal characteristics of the labor force on strike and the duration of a strike are likely to have a relationship as hypothesized in the first section of this chapter. As mentioned before, due to lack of information, it is not possible to test these relationships empirically.

ii) Economic factors such as the wage rate, unemployment rate, and Consumer Price Index are also related to the duration of a strike. From the labor point of view, specifically, the economic factors would include such considerations as the absolute size of the earnings or the nominal wage (average gross weekly wages preceding the strike), the percentage change in wage rate over the preceding year, or the relative wage rate in comparison to some other related industry. The other important factor in explaining the variation in the duration of a strike would be strike pay for the members on strike, since it is substituted for the foregone wages due to the strike.

From the management point of view, it is crucial to measure not only the immediate economic impact of a strike, but also its long term effect. For example, the dock workers' strike of a prolonged duration might cause a long-run adverse shift in the world demand for Canadian wheat. These and other effects as well as their implications for policy are examined in Chapter 5.

A rising Consumer Price Index can also influence the duration of a strike, in the sense that workers living within the narrow margin of the difference between the wage rate and CPI cannot afford a strike for a longer duration. The variation in the duration of a strike is also influenced by the existing rate of unemployment as well as by the availability of alternative employment opportunities for the workers on strike. In a situation of a high unemployment rate and limited possibilities for alternative employment, the strike duration tends to be shorter.

iii) Institutional/structural factors: This category encompasses all those factors which are non-personal and non-economic and can influence the duration of a strike. Issues such as union recognition, discrimination, malpractices, technological changes, location of the industry, type of product of the industry, size and structure of the work forces and the union-management relationship can all be considered as institutional/structural factors that influence the duration of a strike.

iv) Seasons and timing variables are also important in determining the duration of a strike. In Chapter 3, the analysis of seasonality in dock strikes showed that there is a seasonal pattern in dock strikes. The analysis has further revealed that dock strikes duration is influenced by seasons.

Factors such as economic, institutional/structural and season/timing have been discussed at some length in the previous section in order to explain why dock strikes have occurred. In this section, however, the emphasis is on examining these variables from the standpoint of explaining whether and how they influence the duration of dock strikes. It was noted at the beginning of this section that some of the variables influencing the decision to strike, and some of the variables influencing the variation in the duration of a strike overlap and they cannot be quantified. In view of this and in view of the data limitations (to be discussed later in this chapter), the statistical model 4(i) set in the previous section is slightly modified here. These modifications are intended to make the model more suitable for explaining the variation in the duration of dock strikes. Conceptually, the model can be specified as follows:

$$Y_t = f \left(P_t, E_t, \frac{I_s}{E}, W_t, T, e_t \right) \dots\dots\dots 4(ii)$$

where:

Y_t = the average duration of a strike per year, i.e. number of days lost per strike,

P_t = demographic and personal characteristics of the labor force on strike,

E_t = Measure of Economic variable,

$\frac{I_s}{E}$ = Proportion of strikes called for noneconomic reasons, (I_s = number of strikes called for noneconomic reasons, i.e. institutional/structural factors, etc. and E = total number of strikes called during the t^{th} year),

W = Season and Timing variables,

T = Trend variable,

e_t = random error.

The above model cannot be used as specified due to the paucity of data on demographic and socio-economic status of the labor force on strike, and due to the problems involved in quantifying some of the institutional/structural, seasonal and timing variables discussed earlier. To make it workable, therefore, the model has to be modified. The omission of some important variable from the model, such as demographic and personal characteristics of the labor force, and seasonal and timing variables will pose some econometric problems. These are discussed at the end of this chapter. However, the working statistical model is specified as follows:

$$Y_t = f(W_t, U_t, CPI, O_t, X_t, \frac{I_s}{E}, T, e_t) \dots\dots\dots 4(\text{iii})$$

where:

Y_t = Average number of days lost per strike during a year,

W_t = wage rate,

U_t = unemployment rate,

CPI = Consumer Price Index,

O_t = union membership as percentage of labor force,

X_t = average number of workers per strike,

$\frac{I_s}{E}$ = proportions of strikes called for noneconomic reasons,

T = Trend variable,

e_t = random error.

Under alternative hypotheses, thirty different regression equations both in linear and non-linear forms and with different combinations of independent and dependent variables were regressed. The linear form provided the highest R^2 of value 0.49 (significant at 10 percent level), low standard error of regression coefficients, and less multicollinearity problem. Table C1-Appendix C contains the details of independent and dependent variables. With all the possible combinations of independent and dependent variables, only the regression coefficients of two variables, i) Consumer Price Index, and ii) proportion of strikes called for noneconomic reasons, were found significant with a negative sign at 5 percent level. The relationship between economic variables and duration of a strike was hypothesized while discussing the conceptual framework earlier in this section.

The signs of the noneconomic variables, such as, union membership as percentage of labor force, average number of workers involved per strike, and proportion of strikes called for noneconomic reasons were not hypothesized a priori. The relationships are ambiguous and the corresponding regression coefficients, a priori, can be argued to be positive or negative. For example, one could argue that the degree of unionization among workers will tend to shorten the strike duration in as much as the issues can be negotiated and settled quickly between union and management. In the absence of a union, lack of communication between employee and employer can prolong the strike duration. On the other hand, one might argue that because labor is organized it can take a stand on the issue and remain on strike until its demands are met and, hence, can increase the duration of strike.

Similarly, the other variable, i.e. the average number of workers involved in a strike, can be taken as a structural variable, and one can hypothesize that the greater the number of workers involved in a strike, the higher the pressure on the management to settle the strike. However, one can also argue the other way, i.e., the greater the number of workers on strike, the less the solidarity and unity among workers; therefore, the shorter the duration of a strike.

Again, with respect to the other variable, namely, the proportion of strikes called for noneconomic reasons

which is used as a measure of noneconomic variables. One can hypothesize in either direction: that noneconomic reasons can increase or decrease the duration of a strike. Since often noneconomic variables are vague and involve such issues as psychological, political and ethical, one can argue that they lead to a lengthy strike. On the other hand, one could argue that since these are noneconomic matters and they do not involve the economic (bread and butter) issues they would be settled quickly.

The trend variable is hypothesized to have a negative relationship with the duration of a strike. It is assumed that with the passage of time an understanding has developed between employee and employer through more communication and dialogues between union and management.

The results of the chosen equation are summarize in Table 18. The highest value of R^2 obtained for this model was 0.49. The results of the regression equations (both in linear and log-linear forms) which provided R^2 of value reasonably close to 0.49 and were not chosen are summarized in Tables C3,C4-Appendix C. As mentioned before, the analysis showed that the increase in the Consumer Price Index has forced the workers to settle the strike quickly. This supports the hypothesis put forward previously in this section: a rising Consumer Price Index can also influence the duration of a strike, in the sense that workers living within the narrow margin of the difference between the wage rate and the CPI cannot afford a strike for a longer

TABLE 18

MULTIPLE REGRESSION EQUATION AND THEIR COEFFICIENTS
FOR DURATIONS OF DOCK STRIKES AND ECONOMIC/
NON ECONOMIC VARIABLES

Dependent Variable	Statistics	Independent Variables					Multiple R ²	F-Ratio	Durbin-Watson Statistics
		Unemploy- ment rate	Consumer Price index	Proportion of strikes called for non econo- mic reasons	Average No. of Workers per Strike	Union member- ship as percen- tage of labor force			
Average duration of a dock strike	Regression coeffs(b)	2.0378	- 0.3939*	-39.2827**	0.0007	-0.9621	0.49	2.24	1.86
	^a S.e (b)	(3.2591)	(0.2048)	(16.4751)	(0.0034)	(3.7183)			

* Significant at 5 percent level.

** Significant at 1 percent level.

^a Standard errors are in parentheses.

duration (Page 53). The significant regression coefficient -39.2827 at the 1 percent level of the variable $\frac{I_s}{E}$, which is the measure of noneconomic variables, supports the hypothesis that noneconomic issues are settled quickly. The other variables in the model were insignificant which suggests that they do not influence the variation in the durations of dock strikes.

Multicollinearity and Auto-Correlation: The model as specified in equation 4(iii) posed the problem of multicollinearity (Table C2-Appendix C). Some of the variables, such as wage rates, union membership as a percentage of labor force, Consumer Price Index, and trend variables were interrelated. The final equation chosen, therefore, contains only those variables which showed no multicollinearity. The exclusion of some of these variables from the model did not affect the significance of the regression coefficients or the value of multiple R^2 to any great extent. The negative auto-correlation was noted to be insignificant, but the test was inconclusive for positive auto-correlation.

Limitation of Data Used

There were several data limitations which would circumscribe the results of this chapter. Some of these problems were caused by the nature of the data required. For example, some of the data needed were qualitative and could not, therefore, be quantified to test empirically.

The other problems were caused by the lack of desired data, which could be quantified but were not available for this study. These limitations and other problems faced in this study, as well as, their implications are discussed more fully in the concluding chapter of this study.

One major limitation of this analysis was the lack of data and/or a measurement scale for institutional and structural variables. Data for the union membership growth of dock workers, and dock workers union membership as a percentage of labor force were not available. The use of a proxy variable in such a case may not provide a good measure of the relationship to be investigated. The qualitative nature of noneconomic variables, the inherent measurement error in some economic data, and the absence of information on demographic and socio-economic status of dock labor also imply a cautious interpretation of the conclusion which one reached in this chapter.

Paucity of data on demographic, institutional/structural and other important factors associated with the high level of strike activity and/or average duration of a strike makes the statistical relationship specified incomplete. Specification error, i.e. the omission of important explanatory variables from the model, leads to biased regression coefficients, and inferences based on them are not as accurate as they might otherwise be, since

the estimate of the residual variance is biased upward.¹⁴
In short, these limitations tend to make the conclusions of this chapter somewhat less definitive. Consequently, the results of the analysis of this chapter should be viewed as being suggestive rather definitive.

¹⁴For details, see J. Johnston, Econometric Methods, (New York: McGraw-Hill Book Company, 1972) pp. 168-169.

CHAPTER 5

IDENTIFICATION AND ANALYSIS OF THE VARIABLES INFLUENCING VARIATION IN WHEAT EXPORTS^{*}

The major purpose of this chapter is to establish a statistical relationship, if any, between dock strikes and wheat exports, and to determine that duration of dock strikes which could cause shifts in Canadian wheat exports. A review of Canada's position in the international trade in wheat and wheat flour in Chapter 2, and analyses of different aspects of dock strikes in Chapters 3 and 4 suggest that there might exist a relationship between dock strikes and losses in wheat exports.

The analysis in Chapter 2 revealed that the Canadian share in the exports of wheat as a percentage of total world demand has declined. Factors responsible for such variations in Canadian wheat exports were identified and classified into two groups: i) qualitative factors, and ii) quantitative factors. Discussion regarding qualitative factors was centered around the variables, such as, quality of wheat, government trade policies, and the Canadian Wheat Board policies, while the discussion on

^{*}The analysis in this chapter relates to the period 1951-1952 to 1973-1974 crop years.

quantitative variables included factors such as pricing, demand, and delivery schedules. Specifically, the last section of Chapter 2 examined the variables and forces that influence the variation in wheat exports. This chapter seeks to relate these variables in a conceptual and analytical scheme that can be used to establish and explain the relationships between exports and the variables identified.

The Conceptual Economic Model

Conceptually, the relationship between exports of wheat and the variables mentioned above can be illustrated in a schematic model (Flow Chart, Figure 12). The flow chart is based on the hypothesis that the quantity of wheat exported during a year depends upon the export price of Canadian wheat, export price of wheat of other competitive exporting countries, total demand for wheat in the world market, stock of wheat in Canada lagged by one year and the efficient functioning of docks, since strikes on the docks during the shipping season could disrupt the flow of Canadian wheat exports in the world market. This variable is defined as the number of days lost per hundred workers due to strikes during a year and it measures the duration of a strike per hundred workers.

The conceptual analytical model is a single equation model, which considers quantity of wheat exported during a year as a function of the export price of wheat

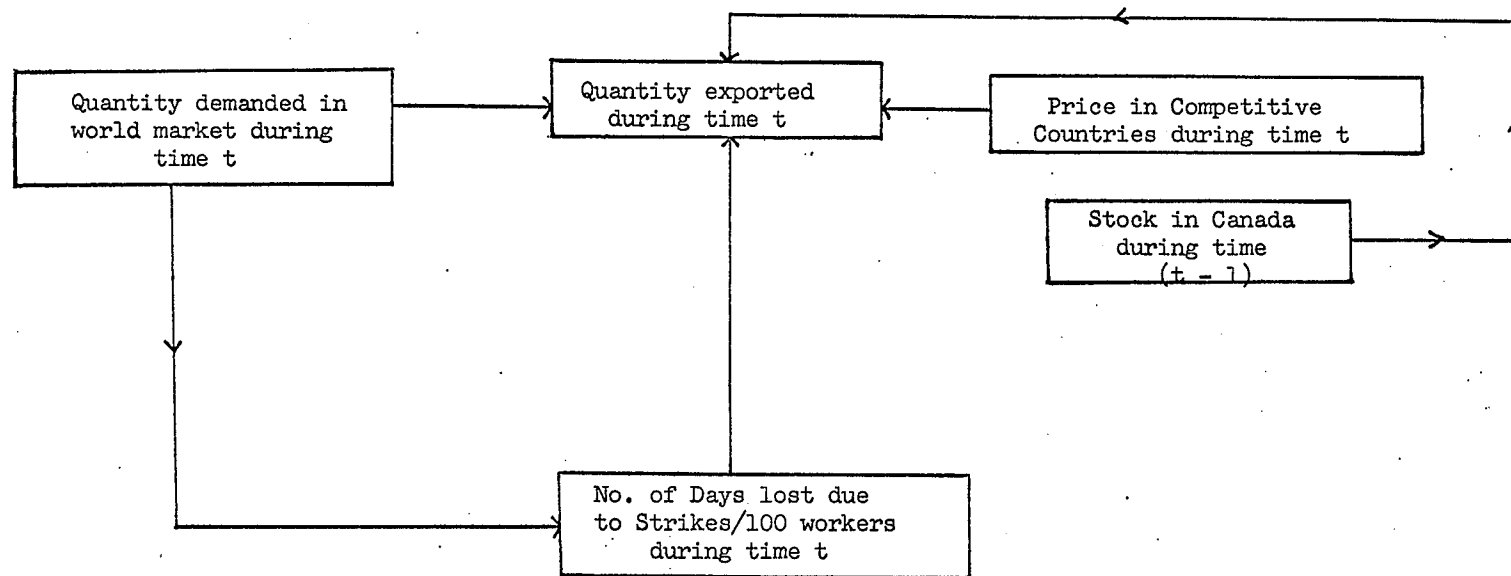


Figure 12

Conceptual Flow Diagram of Wheat
Exports and Dock Strikes

in Canada, and other exporting countries, demand for wheat in the world market, stock of wheat in Canada lagged by one year, and the number of days lost per hundred workers due to dock strikes during a year.

There are certain conceptual issues related to this model which need clarification. Some of the important ones among these are the following:

1. The degree of interaction or inter-dependence among the price variables: It can be argued that the export prices of wheat of major exporting countries are inter-related (especially, the Canadian and the U.S. prices are likely to be highly correlated). Further, it may be argued that price also depends on demand and supply of the commodity. This model assumes that supply (in our case, export) depends on the world demand for wheat, but the world demand for wheat does not depend on Canadian export price. Although during the last couple of years, 1973 to 1975, the export prices of wheat in all the major exporting countries have been sky rocketing, they can be explained more by increased cost of production and the general high level of inflation than by increased demand for wheat. A close look at the total world demand for wheat during the same period reveals that demand has not increased to such a degree that it can explain the entire rise in the export price (Table D1-Appendix D). Therefore, the demand for wheat in the world market may be considered to be only an exogenous variable.

2. The concept of demand for wheat in the world market during a year is related to the total export of wheat by major exporting countries or to the total import of wheat by major importing countries. This concept of world demand for wheat is not sound, since total export or import of wheat during a year might be well below the actual demand. However, this variable is used as a proxy variable for demand.

3. The number of days lost per hundred workers due to dock strikes as a variable is related to the concept of measuring how efficiently the dock is functioning. Since strikes have, at times, completely blocked the movement of grains abroad, this variable (number of days lost per hundred workers during a year) measures the severity of a strike. It takes into account both the duration of a strike and the number of workers involved.

The Statistical Model

The working statistical model is the single equation model which is specified as follows:

$$Y_t = f(Dem(t), P_{(Can)t}, P_{(US)t}, P_{(Aus)t}, ST_{(t-1)}, \\ DL(t), T_R, U_t \dots\dots\dots 5(i))$$

where:

Y_t = The quantity of wheat exported in bushels during the t^{th} year,

$P_{(Can)t}$ = export price of Canadian wheat per metric ton in U.S. dollars during t^{th} year,

$P_{(US)t}$ = export price of U.S. wheat per metric ton in U.S. dollars during t^{th} year,

$P_{(Aus)t}$ = export price of Australian wheat per metric ton in U.S. dollars during t^{th} year,

$Dem(t)$ = demand of wheat in the world market during t^{th} year,

$ST(t-1)$ = stock of wheat in Canada during $(t-1)^{th}$ year,

$DL(t)$ = number of days lost per hundred workers during t^{th} year,

T_R = trend variable,

U_t = random error.

Hypothesized Factors Influencing Wheat Exports

The export price of Canadian wheat is expected to have a negative relationship with her wheat exports. The export price of U.S. and Australian wheat is hypothesized to have positive relationship with Canadian wheat exports, because the relative higher prices of wheat in the competitive exporting countries will increase the exports of Canadian wheat. The relationship between demand for wheat in the world market and Canadian exports of wheat is hypothesized to be positive, since increase in world demand for wheat is likely to increase the exports of Canadian wheat. The previous years stock of wheat in Canada is hypothesized to be positively related to her exports of wheat. The relationship between the number of days lost per hundred workers due to dock strikes and the

Canadian wheat exports is hypothesized to be negative. The longer the period for which a shipping port is idle, the greater is the expected loss in exports. The trend variable in the model is introduced to test for secular influence, if any, in exports of wheat which are not explicitly taken into account by other variables. The trend variable is included also to take into account factors such as secular shifts in preferences on the part of wheat importers, and institutional/structural and other changes such as improvement in communication or transportation or expansion and development of more integrated trade policies. Furthermore, the addition of trend variable improves the specification of the model in so far as it picks up the effect of omitted variables which are highly correlated with time. Accordingly, it reduces the problem of autocorrelation and the bias that enters the model due to incomplete specification of the model.

Regression Results: Under the alternative hypotheses, the relationship specified above in equation 5(i) was tested in log and non-log form with alternative combinations of independent variables (Table D1-Appendix D). The model was tested with three alternative measures of strike variables, namely, i) the number of days lost per hundred workers during a year, and is estimated as:

$$\frac{\text{total \# of days lost due to dock strikes during a year}}{\text{Total \# of workers involved}} \times 100,$$

ii) the number of days lost per hundred workers per strike during a year and is estimated as:

$$\frac{\text{total \# of days lost due to dock strikes during a year}}{\text{Total \# of workers involved} \times \text{\# of strikes}} \times 100,$$

iii) the number of man-days lost per strike during a year and is estimated as:

$$\frac{\text{total \# of days lost} \times \text{total \# of workers involved}}{\text{\# of dock strikes}}$$

during a year. Of these three measures of strike variables, measure i), i.e. the number of days lost per hundred workers during a year, was noted to be significant in the regression model 5(i). In this section, however, the results of only one regression equation of linear form (which had a high multiple R^2 of value = 0.86 and low standard errors of regression coefficients) are discussed. The results are summarized in Table 19.

The analysis supports the hypothesis that Canadian wheat exports have increased with the increase in the demand of wheat in the world market. The regression coefficient 9.85 is significant with positive sign at 1 percent. The elasticity of wheat exports with respect to the demand for wheat in the world market is 1.07 (indicating that 1 percent increase in the total demand for wheat in the world market is associated with 1.07 percent increase in Canadian exports of wheat). The regression coefficient -14,447.12 between Canadian wheat export price and total

TABLE 19

MULTIPLE REGRESSION EQUATION FOR DOCK STRIKES AND WHEAT EXPORTS

Dependent Variable	Statistic	Independent Variables				Multiple R ²	F-Ratio	Durbin-Watson Statistic
Export of wheat		Demand of wheat in world market	Export Price of Wheat in Canada/met. ton in US \$	Export Price of Wheat in USA/met. ton in US \$	# of days lost/100 workers due to dock strikes			
	Regression coeffs.	9.85**	-14447.12**	7739.54**	-1765.79**	0.86	28.82	1.92
	S.e of regression coeffs. ^a	(1.06)	(3075.86)	(1971.67)	(738.02)			
	Elasticity	1.07	-2.85	1.51	-0.05			

* Significant at 5 percent level.

** Significant at 1 percent level.

^a Standard errors are in parentheses.

Canadian wheat exports is significant at 1 percent with a negative sign as hypothesized. In this study the price elasticity of demand for Canadian wheat in the international market is estimated at -2.85, which indicates that 1 percent increase in export price (per metric ton) of Canadian wheat is associated with a 2.85 percent decrease in Canadian exports of wheat. This suggest that the export price of Canadian wheat is an important determinant in explaining the variation in wheat exports. Two other variables, namely, the export price of U.S. wheat and the strike i.e. the number of days lost per hundred workers had regression coefficient values of 7,739.54 and -1,765.79 and were found significant at 1 percent and 5 percent level respectively, with the hypothesized signs. Their respective elasticities were estimated as 1.51 and -0.05. The high level of significance of the U.S. export price of wheat in explaining the variation in the Canadian wheat exports, once again suggests the importance of pricing policies in wheat exports. The elasticity value of 1.51 indicates that a 1 percent increase in export price (per metric ton) of the U.S. wheat is associated with a 1.51 percent increase in the Canadian exports of wheat. The variable number of days lost per hundred workers due to dock strikes during a year statistically establishes the relationship between dock strikes and losses in wheat exports. Their elasticity -0.05 indicates that 1 percent increase in the number of days lost per hundred workers

is associated with 0.05 percent decrease in Canadian exports of wheat.

Variables such as the stock of wheat in Canada lagged by one year, the export price of Australian wheat and the time trend were removed from the model for the reasons that they were either insignificant or that they posed the problem of multicollinearity or both (Table D2-Appendix D). The problem of multicollinearity, its effects on regression coefficients and how it was handled is discussed in the latter part of this chapter.

Critical Duration of Dock Strikes

In the previous section, it has been established statistically that dock strikes have caused adverse shifts in wheat exports. The question might well be asked as to which durations of dock strikes are critical enough to cause serious shifts in Canada's wheat exports? In order to determine that "critical" duration of dock strikes, the number of days lost per hundred workers during a year were divided into five sub-groups:

i) Number of days lost per hundred workers during a year due to all dock strikes for less than or equal to six days,

ii) Number of days lost per hundred workers during a year due to all dock strikes continuing for less than or equal to fourteen days,

iii) Number of days lost per hundred workers during a year due to all dock strikes continuing for less than or equal to twenty-nine days,

iv) Number of days lost per hundred workers during a year due to all dock strikes continuing for less than or equal to fifty-nine days,

v) Number of days lost per hundred workers during a year due to all dock strikes continuing for less than or equal to ninety days.

Each of these five measures of the severity of dock strikes (a measure of cumulative effect of dock strikes of different durations-cumulative in the sense that, for example, measure #ii takes into account measure #i and similarly, measure #iii takes into account measures #i and #ii, and so on--) were run independently as independent variables in equation 5(i) in order to determine a strike duration that could cause statistically significant shifts in wheat exports. The results of strikes with that "critical duration" which showed significant effects on exports of wheat are discussed in Table 20.

Regression Results: The results of the regression analysis (the independent variables being the number of days lost per hundred workers for dock strikes of various durations) revealed that dock strikes of duration fourteen days or less have no statistically significant effect on variation in exports of wheat; dock strikes of a duration of more than fourteen days but equal to or less than

TABLE 20

MULTIPLE REGRESSION EQUATION FOR DOCK STRIKES AND WHEAT EXPORT

Dependent Variable	Statistic	Independent Variables				Multiple R ²	F-Ratio	Durbin-Watson Statistic
Export of wheat		Demand of wheat in the world market	Export price of wheat in Can./met. ton in U.S. \$	Export price of wheat in U.S.A./met. ton in U.S. \$	# of days lost/100 workers due to dock strikes continuing for less than or = to 29 days			
	Regression coeffs.	10.00**	-14019.51**	7664.50**	-1515.82*	0.86	25.39	1.89
	S.e of regression coeffs. ^a	(1.11)	(3241.97)	(2083.22)	(836.20)			
	Elasticity	1.08	-2.76	1.49	-0.02			

* Significant at 5 percent level.

** Significant at 1 percent level.

^a Standard error are in parentheses.

twenty-nine days have significant effect on wheat exports in the sense that they decrease the exports. In other words, dock strikes involving 100 workers and of less than or equal to fourteen days duration have no significant effect, but as their duration increases beyond two weeks they start having a significant effect on exports of wheat in terms of loss in sale in the international market. The regression coefficient -1,515.8 can be statistically interpreted that, on average, an increase of one day in the strike duration after twenty-nine days of the strike might be associated with a loss in wheat exports of 1,515.8 bushels.

Multicollinearity: A concern about the presence of multicollinearity in the model was expressed earlier while discussing the conceptual economic model. The correlation matrix was, therefore, computed. The matrix revealed that the price variables were interrelated, and the other variables such as demand, stock and time trend were also related with each other (Table D2-Appendix D). The presence of multicollinearity in the model leads to biased regression coefficients with high standard errors, and can lead one to drop variables incorrectly from the model. To handle this problem, the usual method was applied, i.e. to drop out one of two variables which had a high correlation coefficient and a less significant regression coefficient, or to develop some alternative measures for those variables which were interrelated. As for example,

a new variable, Ratio of Canadian price to U.S. price was developed to get rid of a correlation of 0.84 between Canadian and U.S. export prices. But the use of this variable in the model reduced the value of R^2 and also decreased the level of significance of other variables. Consequently, the price variables for Canada and the U.S. were left in the model.

Auto-Correlation: The presence of auto-correlation was tested by using Durbin-Watson Statistics and it was concluded that auto-correlation was not a problem in the model.

Some Implications

As was stated at the outset in Chapter 1, the basic purpose of this study was to establish a statistical relationship between dock strikes and losses, if any, in wheat exports, and to determine the critical duration of a dock strike which could likely cause serious shifts in Canadian wheat exports. The regression analysis of the export data for the twenty-three year period, 1951-1952 to 1973-1974 crop year has revealed that if 100 dock workers were on strike then statistically significant losses in wheat exports start once the strike enters into a third (to fourth) week. Specifically, an increase in the duration of a dock strike by one day beyond the first twenty-nine days is associated with an average loss of 1,516 bushels in wheat exports. However, this estimate of

loss in bushels of wheat exports should be interpreted with care. The result is tentative in the sense that it is based on the analysis of historical data, and does not consider some of the variables which are not controllable; for example, changes in government policies which cannot be predicted in so far as those are caused by unpredictable developments in international politics. Furthermore, the figure on estimated losses does not take into account the effect of a strike called at certain critical times of the year. For example, a strike called by the dock workers at times when grain is awaiting to be loaded and shipped for arrival at a final destination within a given period of time may have some serious repercussion on the economy. As mentioned in Chapter 1, there have been instances when untimely delivery or uncertain deliveries of wheat from exporting countries have turned the customers abroad to other sources of supply. The Prairies economy is much dependent on the sale of agricultural commodities of which wheat is the most traded one. Loss in exports of wheat can affect the Canadian economy in general and the Prairies economy in particular.

The implication of the above for government and labor is that government should normally try to intervene and settle the strike (for example, involving 100 workers) as it enters into the third week, since strikes continuing for more than three to four weeks can have serious adverse effects on the exports of Canadian wheat. The export

prices of wheat in Canada and the U.S.A. were noted to be highly significant variables in explaining variations in Canadian wheat exports; the implication for the government of this would be to review the Canadian Wheat Board policies.

The strike variable identified in this chapter, and its impact on wheat exports should be interpreted with care, since an individual strike is subject to its own set of peculiarities and to the changing situation under which the strike is called. In view of these considerations and other interpretive problems of dock strikes of various lengths, the findings of this study which, to the author's knowledge is the first of its kind, should be treated as indicative rather than definitive.

CHAPTER 6

SUMMARY AND CONCLUSION

Findings

This chapter attempts to integrate the materials presented in the previous chapters, interpret the major findings of the study and to outline their implications for public policy. The major question in this thesis was whether dock strikes have an impact on Canadian wheat trade? In attempting to answer this question, the author decided first to analyze the trends and patterns in Canadian wheat exports during the two decades 1955-1975. The analysis of trends and patterns in Canadian wheat exports in Chapter 2 revealed that Canada's position as a major exporter of wheat in the international market has deteriorated during the period examined. Formerly, during the nineteen forties and early fifties, Canada had the leading position in wheat exports. The analysis of wheat exports data for the decades 1955-1975 revealed that Canada has lost her leading position as wheat exporter to U.S.A.

The analysis in Chapter 2 further revealed a major shift in the Canadian wheat market from western Europe (especially United Kingdom) towards Asian countries such as Japan and China. Starting with the 1963-1964 crop failure due to bad weather in the U.S.S.R.: the U.S.S.R.

has also been a sporadic importer of wheat from Canada. A close examination of Canadian performance in the Japanese and Chinese wheat markets in Chapter 2 revealed that Canada's share in the Japanese wheat market has declined from 40 percent during 1964-1965 to 23 percent during 1974-1975, whereas, the U.S. share has increased from 47 percent to about 60 percent during the same period. As to Canada's performance in the Chinese wheat market, the analysis in Chapter 2 revealed that during the period 1965-1972, the Chinese wheat market was dominated by Canada, but during 1972-1973 the U.S.A. entered the Chinese market and increased her share from 11.2 percent in 1972-1973 to 27.2 percent in 1974-1975. It appears from the analysis in Chapter 2 that the U.S. has been as successful in selling her wheat to a non-Communist country such as Japan, as to the Communist countries such as the U.S.S.R. and China.

Therefore the analysis in Chapter 2 raises the question: why has Canada not been able to maintain her leading position in the international wheat market? Perhaps part of the answer to this question can be obtained by examining the changes in the Canadian Wheat Board policies; and the Canadian and government international trade policies, such as, export subsidies and long term credit sales. Consequently, further research in this direction and a comparative analysis of the U.S. and Canadian agricultural trade policies will be helpful. In this study, however, due to time constraint and other

limitations, the author was committed to examining only one of the factors affecting wheat exports, namely, "dock-strikes" in the grain-transportation system. While a strike at any stage of movement of grains has the potential to slow down the exports, a strike at the dock could completely block Canada's exports.

Recognizing the potential impact of dock strikes on exports of wheat, a historical analysis of dock strikes for the crop years 1947-1948 to 1974-1975 was undertaken in Chapter 3. The analysis revealed that with the increased degree of organization in the labor sector, while the frequency of dock strikes has been relatively stable, the severity or impact of dock strikes has increased rapidly. This rapid increase in the severity (in terms of the days lost per hundred workers involved in a strike) of dock strikes due to high work force involvement and increased duration has raised concern among various groups related to the grain industry. The increase in the severity of dock strikes is revealed by the fact that average man-days lost per year due to dock strikes during the last ten years period examined, 1965-1975, have tripled as compared to those during the previous years (increasing from an annual average of 24,220 man-days in the 1947-1965 period to an average of 82,199 man-days per year during 1965-1975). The analysis in Chapter 3 further revealed that the early and mid-nineteen sixties were unfavorable periods in terms of dock strikes. About 37

percent of the total dock strikes over the 1947-1975 period occurred during 1960-1966. In fact, this coincided with the contract that Canada had signed to deliver wheat to the U.S.S.R.

An analysis of geographic patterns in dock strikes in Chapter 3 showed that in recent years, the West Coast and St. Lawrence River have experienced strikes involving a high work force and longer durations. The data also revealed that port of Churchill (Manitoba) did not experience a single strike during the entire period 1947-1975 examined. The analysis relating to issues and unions involved revealed that economic issues often prolonged the strike durations and took more time to settle than noneconomic issues, and that the longshoremen were more prone to strike than seafarers.

The analysis in Chapter 3 also suggested that dock strikes follow a seasonal pattern. For example, 93 percent of the total dock strikes in the 1947-1948 to 1974-1975 period were called during the months of March to November. No dock strike was reported during the month of January in the last twenty-eight year period examined. To test the presence of seasonality in dock strikes, the data were tested for i) Monthly variation (January, February,December) and ii) Seasonal variation (Fall, Winter, Spring and Summer). The analysis of variance technique was used which confirmed that the frequency of dock strikes is influenced by months and seasons. Such findings

and other important features of dock strikes revealed by the analysis in Chapter 3 prompted further investigations in this area which were undertaken in Chapters 4 and 5.

An analytical model was developed in Chapter 4 to explain how changes in certain economic and institutional/structural factors, such as employment, wage rates, Consumer Price Index, union-membership and a sudden increase in the level of wheat exports may induce a high level of strike activity. In the analysis, the author used two measures of dock strikes activity: the frequency measure and the frequency of strike per thousand workers involved.

The analysis in Chapter 4 was severely hampered by data problems. The only significant relationships uncovered were between the yearly percentage change in wage rate and CPI, and dock strikes, and between the percentage changes in unionized workers and dock strikes. The positive significant regression coefficient of 0.2709 between the yearly percentage change in wage rate and dock strikes confirmed the concept of "orbit of coercive comparison" developed by Professor Ross. According to this concept, workers satisfaction with wages is not based on the nominal or real wage rate in their particular industry or sectors, but rather on a comparison made with the wages of workers in other industry or sector. The significant regression coefficient of 1.088 between the yearly percentage change in CPI and the frequency of dock strikes is interpreted to mean that an increase in the rate of Consumer Price Index

has fostered the dock strike activity.

The significant regression coefficient -1.7706 between percentage change in union-membership and the level of dock strikes activity supported the hypothesis that unionization among dock workers has decreased the frequency of dock strikes. Also, it confirmed the (same) conclusion reached in Chapter 3, which was based on the historical analysis of dock strikes data. Despite certain data problems, and the problems of measurement of some of the variables, the results of the regression analysis between changes in economic and noneconomic variables and dock strikes activity were consistent and satisfactory with $R^2 = 0.62$.

Having explained the frequency of dock strikes, the author attempted to determine the relationship between average duration of dock strikes and economic and noneconomic variables in the second part of Chapter 4. The analytical model used to explain the variation in the frequency of dock strikes was slightly modified and variables such as the number of workers per strike, the proportion of strikes called for noneconomic reasons, were introduced in the model to make it suitable for the purpose. In order to determine the length of strike the author calculated the average strike durations, as is normally done. The analysis revealed that the variables Consumer Price Index and the proportions of dock strikes called for noneconomic reasons were significant with

negative signs at 5 percent level. Their respective regression coefficients were estimated at -0.3939 and -39.2827. Therefore, the analysis in the second part of Chapter 4 showed that the increase in CPI has forced the workers to settle the strike quickly since the workers living within the narrow margin of the difference between the wage rate and CPI cannot afford a strike for a longer duration. The significance of noneconomic variables supports the hypothesis that noneconomic issues are settled quickly. Wage rate and the number of workers involved were not very instrumental in explaining the variation in the duration of dock strikes. However, the empirical results in terms of signs of coefficients were as hypothesized, although the R^2 value (0.49) was not significant at 5 percent level.

A review of Canadian performance in wheat and wheat flour trade in the international market in Chapter 2, the historical analysis of dock strikes in Chapter 3, and an attempt to see if a significant relationship existed between several economic and noneconomic variables and dock strikes activity in Chapter 4, suggest that a relationship possibly exists between variations in wheat exports and dock strikes (i.e. the number of days lost per hundred workers due to dock strikes). In order to test this proposition, an analytical model was developed in Chapter 5 which statistically established that dock strikes have caused shifts in Canadian wheat exports. The regression

coefficient of -1,515.8 between the variable the number of days lost per hundred workers involved in a strike and the level of wheat exports was significant at 5 percent level. This relationship suggests that an increase in one day in the strike duration after twenty-nine days of the strike is associated with an average loss of nearly 1,600 bushels of exports of Canadian wheat. However, this estimate of losses in bushels of wheat exports should be interpreted with some care. This result is tentative in the sense that it is based on the analysis of historical data, and does not consider some of the variables which are not controllable; for example, changes in government policies that cannot be predicted in so far as those are caused by unpredictable development in international trade policies. Furthermore, the figure on estimated losses does not take into account the additional losses in grain export that would arise if a strike were called by the dock workers at times when grain is awaiting to be loaded and shipped for arrival at a final destination within a given period of time.

The other variables in the model developed in Chapter 5 noted to be significant in explaining the variations in Canadian wheat exports were the Canadian export price and the U.S. export price of wheat. Their respective regression coefficients were estimated as -14,447.12 and 7,739.54. These regression coefficients showed that export price is an important determinant in explaining the

variation in Canadian wheat exports. The relationship between world demand for wheat and the Canadian exports was significant with the regression coefficient 9.85 which showed that Canadian wheat exports have increased with increase in the demand for wheat in the world market. The analysis in Chapter 5 provided significant regression coefficients with signs as hypothesized, and R^2 of value 0.86 significant at 1 percent level.

Implications and Conclusions

With regard to public policy, there seem to be three primary implications suggested by this study.

First, Canada's competitive position in the world trade in wheat and wheat flour has deteriorated. This study shows that other than dock strikes, the export price of Canadian wheat has been an important determinant in explaining the variations in wheat exports. One of the important implications for the Canadian government would be to review the pricing system and to try to bring Canadian wheat export price to the U.S. competitive level. In the past, there has been considerable disagreement on the Canadian Wheat Board pricing policies.¹⁵ The higher export price of Canadian wheat seems to be related to the high quality of wheat that Canada exports. However, it

¹⁵S. Sinclair, "Canada and Wheat in International Trade," International Journal, 1958, pp. 288-99.

appears that top quality of Canadian wheat is no longer an advantage for Canada. Schmitz and McCalla have also drawn similar conclusions in their study.¹⁶ In light of the new milling techniques and the demand in new, expanding, and changing markets, the U.S. has made adjustment for a wheat diversification program, i.e. transition into the production of lower quality high yield utility wheat. The implication in this respect for the Canadian government and the producers is to relate the production of the top quality of wheat to the demand in the world market.

Secondly, the research suggests a better market potential for Canadian wheat in European countries excluding the U.K., and Asian countries such as China and Japan. The research shows that during 1965-1975, 40 to 50 percent of Canadian total exports of wheat have been directed towards Asia, especially to China and Japan. This trend seems likely to continue in the years to come; therefore, government should develop greater trade ties with these countries.

Thirdly, the research has revealed that dock strikes have caused serious shifts in Canadian wheat exports; the implication for the government would be to

¹⁶Andrew Schmitz and Alex McCalla, Comparison of Canadian and U.S. Grain Marketing System (Berkley: Report prepared for National Grain and Feed Association), March 1976, pp. 47-48.

ensure an efficient movement of grain and to keep the consistent flow of wheat exports for the timely delivery to the consumer abroad. Dock strikes involving 100 workers and prolonging for more than three to four weeks duration should be intervened in by the government and settled without further delay.

Limitations of the Study

There were several data limitations which would circumscribe the results of this study. Some of these problems were caused by the nature of the data required. For example, some of the data needed were qualitative and could not, therefore, be quantified to test empirically. The other problem was caused by the lack of data that could have been quantified but were not available for this study.

One major limitation of the analysis in Chapter 4 was the lack of data and/or measurement scale for institutional and structural variables. Data for the increase in membership of the dock workers union over the time period covered by this study was not available. The use of a proxy variable in such a case may not provide a good measure of the relationship to be investigated. Furthermore, the paucity of data on demographic, institutional/structural and other important factors associated with the dock strike activity and/or average duration of a strike makes the statistical model specified in Chapter 4 incomplete. The specification error, i.e. the omission

of important explanatory variables from the model can yield biased regression coefficients; the inferences based on these coefficients, therefore, are not as accurate as one would like them to be, since the estimate of the residual variance is biased upward.

Therefore, the qualitative measure of noneconomic variables, the absence of information on demographic and socio-economic status of the dock workers, and the inherent measurement errors in some economic data imply cautious interpretation of the conclusions reached in Chapter 4.

The results obtained in Chapter 5 are also subject to certain limitations due to the presence of multicollinearity. Some of the explanatory variables in regression equation 5(i) were interrelated. The price variables, i.e. the export price of wheat of major exporting countries, and especially that of the U.S. and Canadian wheat were estimated to have a correlation coefficient of 0.84. The other variable such as demand, stock and time trend were also found to be related to each other. The presence of multicollinearity in the model yields biased regression coefficients with high standard errors which could mislead one to drop certain variables from the model.

The variable D_t , demand for wheat in the world market during a year used in model 5(i) is related to the total export of wheat by major exporting countries. The concept of demand for wheat could cause a measurement

error if the total export or import of wheat during a particular year is below the actual world demand. The use of this measure as a proxy variable for the world demand for wheat may not provide a fully satisfactory measure of the relationship investigated.

The estimate of losses in wheat exports due to dock strikes made in Chapter 5 should be interpreted with care. The result is tentative in the sense that it is based on the analysis of historical data and does not consider some of the variables which are not controllable. For example, changes in government policies cannot always be predicted in so far as those are caused by unpredictable international developments. Furthermore, an individual strike is subject to its own set of peculiarities and to the changing situation under which the strike is called. For example, a strike called by the dock workers at times when grain is awaiting to be loaded and shipped for arrival at a final destination with a given period of time may have more serious repercussion on the economy than under a less severe deadline.

In view of these considerations and other interpretive problems of dock strikes of various lengths, the findings of this study which to the author's knowledge is the first of its kind should be treated more as being indicative than definitive.

Suggestions for Further Research

This study was limited to the analysis of the strikes in one of the modes of grain transportation, i.e. the "water transportation" and to measure its impact on Canadian wheat exports. Strikes in other sectors of the grain industry, such as grain-handlers, public service alliance, and by railway workers must also affect the exports of wheat. Therefore, a logical extension of this work would be to examine the combined effect of all strikes which could stop the movement of wheat at any stage.

Additional research is required to answer the question raised in Chapter 2 of this study, namely, why has Canada's share as a percentage of total world demand of wheat declined? The decline can be attributed to any one, or to a combination of any such factors as quality of wheat, pricing policy, transportation of wheat, Canadian Wheat Board policies, or government export policies. Each of these factors needs an in-depth analysis from the standpoint of policy and the implications of the policy. A comparative analysis of Canadian and U.S. wheat exports policies would also be very useful in this context.

Still another area that can be pursued fully is the possible use of a simulation model in predicting losses in wheat exports due to the threat of dock strikes. Further investigation of this area might well turn up ways and means of collecting inputs, formulating values and probability models and framing decision rules to weigh

and evaluate the various inputs fed into the model.

In closing, it might even be appropriate to state that any one of the chapters in this thesis could have been separated out and studied in great detail as part of either dock strikes and its impact on Canadian wheat exports or as part of a more generalized topic such as grain transportation and international trade. This more generalized approach could well turn into an intensive study of the grain transportation system in the context of a simulation model.

APPENDICES

APPENDIX A

TABLE A1
CANADIAN AGRICULTURAL EXPORTS AS A PERCENTAGE OF TOTAL EXPORT OF CANADA
(in 1000'S \$)
1955-1974

Year	Total Export \$	Total Agricultural Export \$	% of Total Export	Wheat and \$	Wheat Flour % of Total Export	% of Total Agricultural Export
1955	4,281,784	801,365	18.72	412,658	9.64	51.49
1956	4,789,538	1,012,545	21.14	584,630	12.21	57.74
1957	4,839,094	909,112	18.79	441,590	9.13	48.57
1958	4,830,410	1,034,063	21.41	515,476	10.67	49.85
1959	5,021,672	969,829	19.31	496,591	9.89	51.20
1960	5,255,575	908,997	17.30	462,734	8.80	50.91
1961	5,754,985	1,192,979	20.73	712,244	12.38	59.70
1962	6,178,523	1,157,382	18.73	652,050	10.55	56.34
1963	6,798,538	1,356,144	19.95	840,663	12.37	61.99
1964	8,094,360	1,702,017	21.03	1,119,162	13.83	65.76
1965	8,525,078	1,592,651	18.68	903,768	10.60	56.75
1966	10,070,766	1,861,794	18.49	1,142,141	11.34	61.35
1967	11,111,804	1,483,289	13.35	801,080	7.21	54.01
1968	13,220,265	1,395,470	10.56	741,121	5.61	53.11
1969	14,441,556	1,211,188	8.39	524,694	3.63	43.32
1970	16,458,183	1,684,892	10.24	744,175	4.52	44.17
1971	17,424,151	1,983,603	11.38	884,681	5.08	44.60
1972	19,500,134	2,135,386	10.95	961,574	4.93	45.03
1973	24,719,157	3,002,884	12.15	1,266,129	5.12	42.16
1974	31,292,506	3,813,129	12.19	2,093,028	6.69	54.89

SOURCE:

Derived from Canada Department of Agriculture, Canada's Trade in Agricultural Products (Economics Branch), annual.

TABLE A2

CANADIAN EXPORT AS A PERCENTAGE OF GROSS NATIONAL PRODUCT 1955-1974

Year	Gross National Product ¹ (in millions \$)	Export as a % of G.N.P. ²		
		Total %	Agriculture %	Wheat & Flour %
1955	27,895	15.35	2.87	1.48
1956	31,374	15.27	3.23	1.86
1957	32,907	14.71	2.76	1.34
1958	34,094	14.17	3.03	1.51
1959	36,266	13.85	2.67	1.37
1960	37,775	13.91	2.41	1.22
1961	39,080	14.73	3.05	1.82
1962	42,353	14.59	2.73	1.54
1963	45,465	14.95	2.98	1.85
1964	49,783	16.26	3.42	2.25
1965	55,364	15.40	2.88	1.63
1966	61,828	16.29	3.01	1.85
1967	66,409	16.73	2.23	1.21
1968	72,586	18.21	1.92	1.02
1969	79,749	19.90	1.67	0.72
1970	85,448	19.26	1.97	0.87
1971	93,094	18.72	2.13	0.95
1972	102,935	18.94	2.07	0.93
1973	120,438	20.52	2.49	1.05
1974	140,880	22.21	2.71	1.49

SOURCE:

¹ Government of Canada, Economic Review (Finance Branch), April 1976.² Derived from Canada Department of Agriculture, Canada's Trade in Agricultural Products (Economics Branch), annual.

TABLE A3

EXPORTS OF WHEAT AND WHEAT FLOUR BY PRINCIPAL EXPORTERS
(IN MILLIONS OF BUSHELS)
1955-1956 to 1974-1975

Crop Year	Canada		U.S.A.		Australia		Argentina		Others		World Total
	Total	%	Total	%	Total	%	Total	%	Total	%	
1955-1956	304	27.4	346	31.2	102	9.2	112	10.1	246	22.1	1,110
1956-1957	270	20.6	549	41.9	126	9.6	99	7.6	267	20.3	1,311
1957-1958	317	26.6	402	33.8	62	5.2	78	6.5	332	27.9	1,191
1958-1959	300	22.8	442	33.6	75	5.7	103	7.8	396	30.1	1,316
1959-1960	280	20.6	509	37.5	122	9.0	78	5.7	370	27.2	1,359
1960-1961	342	21.7	661	41.9	183	11.6	71	4.5	320	20.3	1,577
1961-1962	265	20.8	718	40.9	232	13.2	86	4.9	356	20.2	1,657
1962-1963	330	20.5	638	39.7	182	11.3	66	4.1	392	24.4	1,608
1963-1964	552	26.7	849	41.0	287	13.9	102	4.9	280	13.5	2,070
1964-1965	438	23.3	720	38.2	238	12.7	163	8.7	322	17.1	1,881
1965-1966	547	23.8	860	37.4	209	9.1	292	12.7	390	17.0	2,298
1966-1967	545	26.3	742	35.9	257	12.4	112	5.4	414	20.0	2,070
1967-1968	336	17.4	753	39.0	258	13.4	50	2.5	536	27.7	1,933
1968-1969	306	18.5	552	33.5	197	11.9	102	6.2	494	29.9	1,651
1969-1970	346	18.5	617	32.9	266	14.2	78	4.1	567	30.3	1,874
1970-1971	435	21.9	740	37.2	349	17.5	64	3.2	401	20.2	1,989
1971-1972	504	26.2	621	32.3	321	16.7	49	2.5	432	22.4	1,927
1972-1973	577	23.3	1,166	47.2	204	8.3	129	5.2	395	16.0	2,471
1973-1974	419	18.2	1,142	49.6	202	8.8	44	1.9	494	21.5	2,301
1974-1975	394	17.0	1,041	45.0	296	12.8	80	3.4	504	21.8	2,315

SOURCE:

The Canadian Wheat Board, Annual Report, 1973-1974.

TABLE A-4

EXPORT OF CANADIAN WHEAT AND WHEAT FLOUR BY SELECTED AREAS (IN 000's BUSHEL)
1955-1956 to 1974-1975

Crop Year	United Kingdom		Europe (exc. U.K.)		U.S.A.		North & Central America (exc. U.S.A.)		South America		Africa		Asia Middle East & Oceania		Total
	Total	%	Total	%	Total	%	Total	%	Total	%	Total	%	Total	%	
1955-1956	109,446	35.4	127,210	41.1	8,256	2.7	9,294	3.0	6,751	2.2	8,200	2.7	40,025	12.9	309,182
1956-1957	90,435	34.5	101,242	38.7	7,548	2.9	7,028	2.7	6,610	2.5	2,615	1.0	46,319	17.7	261,797
1957-1958	104,061	32.9	101,141	32.0	8,920	2.8	8,787	2.8	8,223	2.6	2,165	0.7	82,776	26.2	316,073
1958-1959	100,887	34.9	87,511	30.3	5,012	1.7	8,291	2.9	7,234	2.5	10,845	3.8	69,134	23.9	288,914
1959-1960	93,578	34.4	75,602	27.8	3,627	1.3	8,045	3.0	8,880	3.3	12,644	4.7	69,311	25.5	271,687
1960-1961	91,773	26.5	124,910	36.0	3,858	1.1	8,288	2.4	6,122	1.8	4,956	1.4	106,727	30.8	346,634
1961-1962	85,959	24.2	104,162	29.4	2,864	0.8	9,128	2.6	6,308	1.8	8,427	2.4	137,857	38.8	354,705
1962-1963	89,623	27.4	90,155	27.5	2,475	0.8	8,606	2.6	8,556	2.6	12,545	3.8	115,401	35.3	327,361
1963-1964	90,832	15.4	351,711	59.3	1,975	0.3	23,403	4.0	9,905	1.7	5,823	1.0	107,987	18.3	591,636
1964-1965	80,148	20.1	140,279	35.2	1,048	0.3	23,705	6.0	12,011	3.0	4,668	1.2	136,423	34.2	398,282
1965-1966	78,505	13.4	297,625	51.0	1,618	0.3	31,120	5.3	7,793	1.3	3,382	0.6	164,070	28.1	584,113
1966-1967	73,134	14.2	186,208	36.2	748	0.1	25,838	5.0	5,570	1.1	15,002	2.9	208,089	40.5	514,589
1967-1968	64,953	19.4	115,246	34.3	588	0.2	22,088	6.6	3,686	1.1	6,051	1.8	122,748	36.6	335,360
1968-1969	58,223	19.1	64,428	21.1	479	0.2	18,757	6.1	3,686	1.2	8,377	2.7	151,213	49.6	305,163
1969-1970	54,695	15.8	107,173	31.2	1,546	0.4	24,251	7.0	8,473	2.5	12,069	3.5	136,459	39.6	344,666
1970-1971	66,479	15.3	85,977	19.8	350	0.1	22,056	5.1	25,716	5.9	40,429	9.3	193,407	44.5	434,414
1971-1972	48,900	9.7	60,885	32.0	147	-	27,517	5.5	20,059	4.0	24,778	4.9	220,498	43.9	502,784
1972-1973	44,587	7.8	209,550	36.3	93	-	26,453	4.6	22,660	3.9	18,956	3.3	253,876	44.1	576,175
1973-1974	46,044	11.0	94,915	22.7	2,933	0.7	30,236	7.2	37,004	8.8	21,954	5.2	186,318	44.4	419,404
1974-1975	57,731	14.6	59,514	15.1	364	0.1	28,743	7.3	36,894	9.4	32,392	8.2	178,786	45.3	394,434

SOURCE:

The Canadian Wheat Board, Annual Report, 1974-1975.

APPENDIX B

APPENDIX B

DOCK STRIKES

The Data Source

The major source of dock strikes data in Canada is the report entitled Strikes and Lockouts in Canada, published by Labor Canada, Ottawa, which contains a yearly record of strikes and lockouts in different industries by union involved. During 1947-1956, this report "Strikes and Lockouts in Canada" listed all strikes involving 10 or more workers. In 1957 the coverage was changed and it started publishing only those strikes which involve over 50 workers or for which the loss of man-days exceeded 250. This continued until 1968, and once again, during 1969 the coverage was changed to list all strikes involving 100 or more workers and this is continued to date.

Some Definitions--For the Purpose of this Study:

Dock Strikes: A dock strike is defined as stoppage of work by a group of employees working at the docks (or related to water transport) to press for the settlement of their demands.

Union: The workers organization directly involved or concerned with the dispute that led to work stoppages. The main union at docks are i) Longshoremen's

International Association (I.L.A.), ii) Seafarers' International Union (S.I.U.), iii) The Marine Officers Union and The Canadian Merchant Service Guild.

Management: Individual or group of individuals employing the workers and responsible for decision making. The main employers are i) Maritime Employers Association at Vancouver, B.C., Montreal, P.Q., Toronto, Ontario, Halifax, Nova Scotia and St. John, N.B., ii) Canadian Lake Carriers Association, and iii) Shipping Federation of Canada.

Workers involved: The total number of workers shown in any one of the tables in this study includes workers more than once if they were involved in strikes more than once. Workers indirectly affected, such as those laid off as a result of a work stoppage, are not included in the data on workers involved.

Duration: The duration of a strike is calculated in terms of the days the strike lasted, counting the starting date and the subsequent days up to the termination date.

Duration in Man-days: Duration in days multiplied by the number of workers involved.

Problem of the Unit of Measurement

One of the difficult phases of strike statistics is that of determining the basic unit to be counted and classified. Obviously, a trend of the number of strikes

is meaningless unless the unit counted possess certain uniform characteristics. An individual strike has two components, i) number of workers involved, and ii) number of days strike lasted. From this point of view, man-days lost may be a good unit to measure the impact, but simply a trend of strikes also speaks of the union-management relationship and as well as of the general economic and political conditions prevailing in the country at that time.

In tabulating dock strikes data, however, the problems encountered were such as, shall a strike called by an international union extending into several ports be called one strike, or as many as it extended over the various ports. Shall a strike called by a local union of one international union located a thousand miles apart be considered one strike or as many as the number of ports affected. A strike starting in one crop year and continuing to the next should be counted as one strike or more. A strike involving more than one issue should be counted as one strike or as many as issues involved. For the purpose of this study, a strike was counted more than once if it extended over various ports, involved more than one issue, and extended over two crop years. For this reason the number of strikes reported by ports, by years and by issues in the tables in Chapter 3 do not tally with each other.

APPENDIX B1

SUMMARY OF DOCK STRIKES BY CROP YEAR 1947-1948 to 1974-1975

Name of Union	Location	Starting Date	Terminating Date	No. of Workers Involved	Major Issues	Results
<u>1947-1948</u>						
Seamen	Fort William, Ont.	Sept. 8	Sept. 8	10	Against employment of non-union workers when union seamen not immediately available & alleged discrimination in dismissal of a seaman.	Compromise
Seamen	Halifax, N.S.	Sept. 8	Sept. 9	30	For improved living conditions aboard ship.	Workers
Seamen	Halifax, N.S.	Sept. 22	Sept. 23	60	Refusal of shipyard, at which freighters were tied up, to permit union agents to cross yard to board vessels.	Compromise, agents taken aboard in mid-stream.
Seamen	Montreal, P.Q.	Sept. 23	Sept. 24	26	For replacement of chief officer.	Employer.
Seamen	Fort William, Ont.	Oct. 16	Oct. 16	20	For replacement of fire doors of boilers as safety measures following mishap.	Workers.

(Continued)

APPENDIX B1 - continued

Name of Union	Location	Starting Date	Terminating Date	No. of Workers Involved	Major Issues	Results
Seamen	Halifax, N.S.	Nov. 27	Nov. 28	63	Alleged refusal to sail pending settlement of negotiations for wage increases.	Employer
Ships Officers & seamen	Halifax, N.S. & British Columbia ports.	Dec. 22	-	75	For new agreements providing increased wages & other changes, & disputes over carrying arms to China.	-
Ships Officers & seamen	Halifax, N.S. & B.C. ports.	Dec. 22/47	Jan. 5/48	40	For new agreements providing for increased wages & other changes & disputes over carrying arms to China.	Indefinite
Ships Officers & seamen	Halifax, N.S., St. John, N.B., & B. C. Ports.	Mar. 1	Apr. 15	300	For a new agreement providing for increased wages, changes in working conditions, unions, security, etc.	Compromise agreement signed by all but 4 companies.
Seamen	Great Lakes & St. Lawrence River	June 6	-	225	For a union agreement.	Indefinite
Stevedors	Three Rivers, P.Q., Cardinal, Ont.	Jul. 19	Jul. 19	97	For increased wages.	Workers
<u>1948-1949</u>						
Seamen	Cardinal, Ont.	Aug. 29	Sept. 2	15	Against dismissal of cook for unsatisfactory service.	Employer

(Continued)

APPENDIX B1 - continued

Name of Union	Location	Starting Date	Terminating Date	No. of Workers Involved	Major Issues	Results
Seamen	Halifax, N.S. & Montreal, P.Q.	Nov. 5	Nov. 23	200	Protesting sale of Canadian registry ships to foreign interests & alleged hiring of foreign seamen to replace Canadian seamen.	Employer
Seamen	Nova Scotia, New Brunswick, Quebec B.C. & Foreign ports.	Mar. 22	Oct. 20	1,500	For a union agreement providing for increased wages, reduced hours, changes in working conditions, professional hiring arrangements, etc. following reference to conciliation boards.	Indefinite
				<u>1949-1950</u>		
Seamen	Nova Scotia, New Brunswick, Quebec, B.C. & Foreign ports.	Mar. 22	Oct. 20	1,500	For a union agreement providing for increased wages, reduced hours, changes in working conditions, professional hiring arrangements, etc. following reference to conciliation boards.	Indefinite
Seamen	Botwood, Nfld.	May 28/50	May 31	6	Protest against disciplining a seaman for refusal to obey orders.	Employer

(Continued)

APPENDIX B1 - continued

Name of Union	Location	Starting Date	Terminating Date	No. of Workers Involved	Major Issues	Results
<u>1950-1951</u>						
Seamen	B. C. ports.	Aug. 25	Sept. 2	50	For new agreement providing for increased wages & in over-time rates, unionship, repayment for statutory holidays, improved working conditions, etc. following reference to conciliation board (600 of these 800 seamen employed by 2 of the 3 steam ship lines were involved in railway strikes from Aug. 22-Aug. 30).	Compromise
<u>1951-1952</u>						
River Pilots	Montreal, Three Rivers & Quebec, P.Q.	Oct. 25	Oct. 26	77	For licensing of 5 additional pilots.	Workers
Stevedors	Sorel, P.Q.	June 21	June 25	265	For time & one half after 10 hrs. & for Saturday afternoon & double time on Sunday.	Workers
Stevedors	Three Rivers, P.Q.	Jul. 21	Jul. 22	64	For increased wages, piece rates.	Compromise
<u>1952-1953</u>						
Seamen	Vancouver, B.C.	Oct. 16	Oct. 17	22	Dispute over replacement of sick crew member.	Workers
Seamen	Erieau, Ont.	Jul. 6	Jul. 7	22	For a union agreement providing for increased	Compromise

(Continued)

APPENDIX B1 - continued

Name of Union	Location	Starting Date	Terminating Date	No. of Workers Involved	Major Issues	Results
Stevedors	Toronto, Ont.	Jul. 8	Jul. 9	40	Protesting removal of a worker from job on winch for alleged dangerous operation.	Employer
<u>1953-1954</u>						
Seamen	Canadian ports.	Sept. 28	Oct. 26	412	For new agreement providing for increased wages, reduced hrs. from 56 to 40 per week with same take home pay & other charges, following reference to conciliation board.	compromise.
Stevedors	Toronto, Ont.	June 11	June 14	105	Protesting dismissal of 2 workers fighting on the job.	Employer
<u>1954-1955</u>						
Stevedors	Hamilton, Ont.	Nov. 2	Nov. 4	55	Inter-union disputes as to bargaining agency.	Indefinite
Barge Seamen	Quebec, P.Q.	Apr. 18	May 9	40	For a union agreement providing for increased wages, retroactive to June 24, 1956 following reference to conciliation board.	Compromise
Seamen	Vancouver, B.C.	Jul. 3	Sept. 14	16,000	For a new agreement providing for increased wages & overtime rates, following reference to conciliation board.	Indefinite

(Continued)

APPENDIX B1 - continued

Name of Union	Location	Starting Date	Terminating Date	No. of Workers Involved	Major Issues	Results
<u>1955-1956</u>						
Seamen	Vancouver, B.C.	Jul. 3	Sept. 14	16,000	For a new agreement providing for increases in wages & overtime following reference to conciliation board.	Compromise
Seamen	Saint John, N.B.	Oct. 1	Dec. 16	2,800	For a new agreement providing for increases in wages & overtime following reference to conciliation board.	Indefinite
Unlicensed & Licensed ships personnel.	Great Lakes & St. Lawrence River	May 10	May 19	2,100	For a new agreement providing for hourly instead of monthly rates of pay, increase in wages & in pay for overtime & limitation of hours of work following reference to conciliation board.	
<u>1956-1957</u>						
Unlicensed ships personnel.	Donnacona, P.Q.	Aug. 8	Aug. 25	30	For a union agreement providing for increased wages, pay of overtime & fringe benefits following reference to arbitration board.	
Stevedors	Botwood, Nfld.	Aug. 13	Sept. 4	451	Dispute over specified time for loading ships.	

(Continued)

APPENDIX B1 - continued

Name of Union	Location	Starting Date	Terminating Date	No. of Workers Involved	Major Issues	Results
Stevedors & Office Port Alfred, Quebec clerks.		Sept. 27	Nov. 1	866	For a great increase in wages then recommended by arbitration board in new agreement under negotiations.	
<u>1957-1958</u>						
Dept. of Transport. Corporation of St. Lawrence-Ottawa, Kingston pilots.	Montreal, Kingston, Waterway	Nov. 4	Nov. 19	52	Workload & job security.	Return of Pilots.
Masters, Mates & Pilots Lac 47C (AFL/CIO)	Kingston, Ont.	Apr. 21	Dec. 15	47	Use of pilots on foreign vessels on the Great Lakes.	Dispute unsolved at close of 1958 shipping season.
Seafarers (AFL-CIO/CLC)	B.C. Coast	May 16	May 26	350	Wages.	Work resumed under a special act of parliament. Negotiations to continue.
Marine Engineers (CLC), Merchant Service Guild (CLC)	B.C. Coast	June 24	Jul. 26	171	Wages.	Work resumed under a special act of parliament. Negotiations to continue.
<u>1958-1959</u>						
Masters, Mates & Pilots Lac 47C (AFL/CIO)	Kingston, Ont.	Apr. 21	Dec. 15	47	Use of pilots on foreign vessels on Great Lakes.	Dispute unsolved under special act of parliament. Negotiations to continue. (Continued)

APPENDIX B1 - continued

Name of Union	Location	Starting Date	Terminating Date	No. of Workers Involved	Major Issues	Results
Longshoremen & warehousemen & various Locals (CLC)	Laval Transport Ville Jacques Cartier, P.Q.	Aug. 21	Sept. 24	1,300	Wages, hrs. & improved pension plan.	Workers
Longshoremen & warehousemen Loc. 505 (CLC)	Prince Rupert, B.C.	Sept. 3	Sept. 24	32	Handling deep sea shipping.	Settlement terms not reported.
Seafarers (AFL-CIO/CLC)	Gibson, B.C.	Dec. 18	Dec. 24	181	Wages.	Return of workers. Further negotiations.
Longshoremen & warehousemen Loc 503(CLC)	Port Alberni, B.C.	May 21	May 22	173	Payment of waiting time.	Injunction obtained, return of workers.
Marine Eng.(CLC)	Vancouver, B.C.	June 26	Jul. 17	27	Wages, Union Jurisdiction.	Workers
			<u>1959-1960</u>			
			nil			
			<u>1960-1961</u>			
I.L.A. Locs. 375, 1552, 1657, 1845 (CLC).	Montreal, P.Q.	Sept. 23	Sept. 27	2,900	Conduct of a foreman.	Foreman relieved. Return of workers.
Seafarers (AFL-CIO)	St. Lawrence & Great Lakes	Sept. 29	Oct. 4	646	Wages, hours.	Wage increase of 5%. Weekly hrs. reduced from 48 to 44.
						(Continued)

APPENDIX B1 - continued

Name of Union	Location	Starting Date	Terminating Date	No. of Workers Involved	Major Issues	Results
St. John's Long-shoremen (Ino.)	St. Johns, Nfld.	Oct. 10	Oct. 12	140	Hiring of gangs to unload one ship.	Return of workers.
Seafarers (AFL-CIO)	Fort William, Ont.	Nov. 7	Nov. 10	109	Jurisdictional disputes.	Return of workers.
Brewery workers Loc. 333 (AFL-CIO/CLC)	Vancouver, B.C.	Nov. 8	Nov. 28	325	Wages and fringe benefits.	17½¢/hr. increase in wage during first year of agreement, 8¢/hr. in 2nd year. Improved fringe benefits.
Seafarers (AFL-CIO)	Fort William, Port Arthur, Ont.	Apr. 10	May 10	14	Signing of an agreement.	Return of workers, negotiation to continue after certification proceedings.
I.L.A. Loc. 1829 (AFL-CIO/CLC)	Hamilton, Ont.	May 12	May 19	150	Gang system of operation.	Return of workers.
I.L.A. 1842 (AFL-CIO/CLC)	Toronto, Ont.	May 25	May 26	60	Refusal to unload boat using single pallet.	Return of workers, pending meeting with company officials.
I.L.A. 1842 (AFL-CIO/CLC)	Toronto, Ontario	Jul. 10	Aug. 19	585	Wages.	Wage increase by 21¢ per hr. over 2 yrs.
I.L.A. Loc. 714 (AFL-CIO/CLC)	Hamilton, Ont.	Jul. 12	Aug. 18	196	Wages.	Wage increase of 29¢ per hr. over 2 yrs.

(Continued)

APPENDIX B1 - continued

Name of Union	Location	Starting Date	Terminating Date	No. of Workers Involved	Major Issues	Results
<u>1961-1962</u>						
I.L.A. 1842 (AFL-CIO/CLC)	Toronto, Ont.	Jul. 10	Aug. 19	585	Wages.	Wage increased by 21¢ per hr. over 2 yrs.
I.L.A. Loc. 714 (AFL-CIO/CLC)	Hamilton, Ont.	Jul. 12	Aug. 18	196	Wages.	Wage increase by 29¢ per hr. over 2 yrs.
I.L.A. Loc. 1846 (AFL-CIO/CLC)	Trois-Rivieres, P.Q.	May 7	May 26	76	In sympathy with seafarers.	Return of workers.
<u>1962-1963</u>						
I.L.A. Loc. 1842 (AFL-CIO/CLC)	Toronto, Ont.	Oct. 15	Oct. 16	6,000	Wages, piggy back operations, 3 yr. agreements.	Improved fringe benefits.
CNTU-Chartered local.	Sorel, P.Q.	Apr. 1	May 29	530	Interpretation of recall clause in agreement.	Employees to be recalled as operation research.
Longshoremen & warehouse men Various Locals (CLC)	Vancouver, New Westminster & Port Moody, B.C.	Jul. 19	Jul. 20	1,700	Wages, other benefits.	Return of workers. Negotiations to continue.
I.L.A. Loc. 1842 (AFL-CIO/CLC)	Toronto, Ontario	Jul. 23	Jul. 26	500	Inter union dispute over election of business agent.	Elections settled. Return of workers.
<u>1963-1964</u>						
I.L.A. Loc. 375 (AFL-CIO/CLC)	Montreal & Trois Rivieres, P.Q.	Sept. 9	Sept. 11	2,500	Delayed negotiations in a new contract.	Return of workers. Referral to conciliation. (Continued)

APPENDIX B1 - continued

Name of Union	Location	Starting Date	Terminating Date	No. of Workers Involved	Major Issues	Results
I.L.A. Various locals(AFL-CIO/CLC)	Montreal, Quebec & Trois Rivières, P.Q.	Oct. 4	Oct. 14	3,800	Wages in a new agreement.	10¢/hr. retroactive to Jan/63 & each successive 'yr. of contract, other improved benefits.
Seafarers (AFL-CIO)	Canadian ports.	Oct. 18	Oct. 25	3,421	Imposition of govt. trusteeship on Maritime unions.	Return of workers.
Longshoremen & warehousemen(CLC)	Various ports, B.C.	Nov. 4	Nov. 5	2,500	Delay in signing new agreement.	Return of workers. Pending settlement.
Longshoremen Protective Unions (Ind.)	St. John's, Nfld.	Apr. 24	June 13	30	Alleged abuse of closing hrs.	Return of workers. Pending report of Federal enquiry commission.
Longshoremen Protective Unions (Ind.)	St. John's, Nfld.	Apr. 24	June 13	393	Mechanization, # of workers in gangs, sling loads, moving workers from one job to another.	Return of workers. Pending reports of Federal Enquiry Commission.
I.L.A. Loc. 375 (AFL-CIO/CLC)	Montreal, PQ.	June 15	June 18	1,800	Alleged arbitrary changes in welfare benefits & Pension Plan.	Return of workers. Further negotiations.
<u>1964-1965</u>						
I.L.A. Loc. 1654 (AFL-CIO/CLC)	Hamilton, Ont.	Aug. 10	Aug. 13	100	Disciplinary suspension of 1 worker.	Return of workers & duration of suspension reduced. (Continued).

APPENDIX B1 - continued

Name of Union	Location	Starting Date	Terminating Date	No of Workers Involved	Major Issues	Results
I.L.A.(AFL-CIO/CLC)	Toronto, Ont.	Oct. 22	Oct. 24	600	Alleged violation of working rules by some members.	Return of workers. Matter to be discussed.
Unorganized.	Summerside, P.E.I.	Oct. 24	Oct. 26	50	Wages, fringe benefits.	Wage increase varying according to cargo to be handled, plus lunch money for work after certain hrs.
Longshoremen's Protective Union (Ind.)	St. John's, Nfld.	Oct. 26	-	550	Union refusal to accept terms of industrial enquiry commission.	4¢/hr. increase. Improved overtime rates in a 3 yr. agreement.
I.L.A. Loc.1739 (AFL-CIO/CLC)	St. Lawrence River ports.	Nov. 9	Nov. 10	3,500	Refusal of Federation to accept recommendations of Judge Rene Lippe regarding pensions.	Return of workers. Report to be considered.
Brewery workers Loc.333(AFL-CIO/CLC)	Vancouver, B.C.	Sept. 11	Sept. 19	600	Union security & membership coverage.	Return of workers.
I.L.A. Loc.273 (AFL-CIO/CLC)	Saint John, N.B.	Apr. 26	Apr. 30	104	Wages, Term of contract, control over operation of equipment, loading & unloading of vehicles.	20¢/hr. increase retroactive to Jan. 1, 1965. 20¢/hr. increases on Jan. 1/66, 1967 & 1968. Job Security for union members in hiring out equipments, other improvements.

(Continued)

APPENDIX B1 - continued

Name of Union	Location	Starting Date	Terminating Date	No. of Workers Involved	Major Issues	Results
I.L.A. Loc. 1654 (AFL-CIO/CLC)	Hamilton, Ont.	June 26	June 29	70	Disciplinary action against one employee.	Return of workers.
				1965-1966		
Longshoremen & warehousemen Loc.1654(AFL-CIO/CLC)	Hamilton, Ont.	Aug. 26	Aug. 27	150	Alleged Harbour Commissioner's criticism of union members.	Return of workers.
I.L.A. Loc.1654 (AFL-CIO/CLC)	Hamilton, Ont.	Nov. 18	Nov. 19	60	Dismissal of one employee for cause.	Return of workers.
I.L.A. Loc.1654 (AFL-CIO/CLC)	Hamilton, Ont.	Nov. 21	Nov. 22	70	Disciplinary action against one employee.	Return of workers.
I.L.A. Loc.1654 (AFL-CIO/CLC)	Hamilton, Ont.	Nov. 21	Nov. 28	70	Disciplinary action against few employees.	Return of workers.
Longshoremen's Protective Union (Ind.)	St. John's, Nfld.	Feb. 28	Mar. 8	44	No agreement for grain cargo.	Return of workers.
I.L.A. Loc.375 (AFL-CIO/CLC)	Montreal, P.Q.	Apr. 19	Apr. 22	3,500	Alleged grievances over parking facilities.	Return of workers.
I.L.A. Loc.1869 (AFL-CIO/CLC)	Toronto, Ont.	Apr. 22	Apr. 23	293	Alleged irregularities on water front.	Return of workers.

(Continued)

APPENDIX B1 - continued

Name of Union	Location	Starting Date	Terminating Date	No. of Workers Involved	Major Issues	Results
I.L.A. Various Locals(AFL-CIO/CLC)	Various St. Lawrence River ports.	May 9	June 16	4,150	Wages, working conditions.	40¢/hr. increase retroactive to Jan.1/66, 20¢-Jan.1/67, 20¢-June 1/67; other benefits.
I.L.A. Loc.1654 (AFL-CIO/CLC)	Hamilton, Ont.	June 9	June 10	192	Alleged injustice to one former longshoreman.	Return of workers.
I.L.A. Loc.1869 (AFL-CIO/CLC)	Toronto, Ont.	June 24	June 29	587	Suppression of 2 workers.	Return of workers.
I.L.A. Loc.1654 (AFL-CIO/CLC)	Hamilton, Ont.	Jul. 11	Jul. 25	174	Wages.	Return of workers.
<u>1966-1967</u>						
Longshoremen & Warehousemen Various locals (CLC)	Various ports, B.C.	Nov. 17	Dec. 8	4,180	Union Recognition.	Return of workers.
Unorganized	Summerside, P.E.I.	Nov. 25	Nov. 26	100	Wages.	Return of workers.
I.L.A. Loc. 375 (AFL-CIO/CLC)	Montreal, P.Q.	Nov. 24	Nov. 28	3,000	Interpretation of application of Picard findings.	Court injunction issued. Return of workers.
<u>1967-1968</u>						
Seafarers (AFL-CIO/CLC)	Sorel, P.Q.	May 8	May 31	28	Wages.	26¢/hr. increase immediately; 22¢-May 17/69; \$1.40 retroactive. (Continued)

APPENDIX B1 - continued

Name of Union	Location	Starting Date	Terminating Date	No. of Workers Involved	Major Issues	Results
				<u>1968-1969</u>		
I.L.A. Loc.1843	Halifax, N.S.	May 25	June 12	150	In protest over promotion of one worker.	Return of workers, pending negotiations.
				<u>1969-1970</u>		
I.L.A. Loc.1846 (AFL-CIO/CLC)	Madeleine, P.Q.	Aug. 25	Sept. 2	331	Mechanization, reduction in # of workers in gang, sling loads.	Return of workers when court injunction issued.
Longshoremen & warehousemen Various locals (CLC)	Various ports, B.C.	Sept. 25	Nov. 8	3,230	Wages, hours.	Resume work under old contract for 90 days.
Longshoremen & warehousemen Various locals (CLC)	Various ports, B.C.	Feb. 5	Feb. 13	3,230	Wages, hours.	\$1.50/hr. increase over 30 months; \$13,000 retirement settlement, other improvements.
Longshoremen & Warehousemen Loc. 500(CLC)	Vancouver, B.C.	Mar. 30	Apr. 1	1,000	Alleged dispute over dispatch of work gangs.	Return of workers.
Merchant Service Guild (CLC)	Various ports, B.C.	May 3	June 13	1,200	Safety standard accomodation manning.	10% wage increase effective Oct. 1/69, 10%-June 13/71, 6%- Dec. 1/71, other improvements.
I.L.A. Loc 1958, 1605 & 1739 (AFL-CIO/CLC)	Quebec City, P.Q.	Jul. 2	Aug. 1	135	Management rights, job security.	Return of workers.

(Continued)

APPENDIX B1 - continued

Name of Union	Location	Starting Date	Terminating date	No. of Workers Involved	Major Issues	Results
<u>1970-1971</u>						
I.L.A. Loc. 1958 1605, 1739 (AFL-CIO/CLC)	Quebec City, P.Q.	Jul. 2	Aug. 1	135	Management rights, job security.	Return of workers.
Seafarers(CLC)	5 St. Lawrence River ports, Quebec	Sept. 23	Oct. 24	113	Guaranteed 10 work months.	Wage increases, security of employment, time & one-half after 40 hrs., improved vacations & fringe benefits.
<u>1971-1972</u>						
I.L.A. Loc. 1843 (AFL-CIO/CLC)	Halifax, N.S.	Sept. 16	Sept. 18	400	Alleged mistreatment at the hands of NHB Police.	Return of workers. Pending on investigation.
Longshoremen & warehousemen, various locals (CLC)	Vancouver, B.C.	Oct. 27	Oct. 30	200	Disagreements over truck loading procedures.	Return of workers.
I.L.A. Locs. 375 1846 & 1739	Montreal, Trois Rivières & Quebec P.Q.	May 12	Jul. 10	3,275	Size of gangs.	Return of workers, when parliament legislated back to work order.

(Continued)

APPENDIX B1 - continued

Name of Union	Location	Starting Date	Terminating Date	No. of Workers Involved	Major Issues	Results
<u>1972-1973</u>						
Longshoremen & warehousemen Loc. 500 (CLC)	6 B.C. ports.	Aug. 7	Sept. 1	3,300	Wages, hiring hall practices, fringe benefits.	Return of workers when parliament legislated back to work orders.
Longshoremen & warehousemen Loc. 514 (CLC)	Victoria, B.C.	Feb. 15	Feb. 17	290	Retroactive pay.	Return of workers.
Three unions.	Vancouver, B.C.	June 29	Jul. 2	103	Breakdown in negotiations.	Return of workers.
<u>1973-1974</u>						
I.L.A. Loc. 1842 (AFL-CIO/CLC)	Toronto, Ont.	Sept. 27	Sept. 27	100	Not reported.	Not reported.
I.L.A. Loc. 269 (AFL-CIO/CLC)	Halifax, N.S.	Nov. 8	Dec. 2	650	Wages, working conditions.	Return of workers.
I.L.A. Loc. 273 (AFL-CIO/CLC)	Saint John, N.B.	Feb. 1	Feb. 20	750	Wages, term of contract.	2½ yr. contract reached by mutual agreement.
I.L.A. Loc. 1764 (AFL-CIO/CLC)	Saint John, N.B.	Mar. 9	Mar. 18	135	All issues.	Wages increase.
Seafarers (AFL-CIO/CLC)	Great Lakes, St. Lawrence Rivers	Mar. 16	Apr. 5	200	Wages, hours of work.	Wage increases, reduction in hours.

(Continued)

APPENDIX B1 - continued

Name of Union	Location	Starting Date	Terminating Date	No. of Workers Involved	Major Issues	Results
I.L.A. (AFL-CIO/CLC)	St. Lawrence River ports.	Apr. 9	Apr. 21	138	Wages.	Not reported.
<u>1974-1975</u>						
Canadian Marine Officers Union (AFL-CIO/CLC)	Great Lakes & St. Lawrence River	Aug. 8	Oct. 2	400	Wages, cost of living, escalator clause.	Wage increases.
Canadian Merchant Service Guild (CLC)	Great Lakes & St. Lawrence River	Aug. 8	Sept. 28	427	Wages, cost of living, escalator clause.	Not reported.
I.L.A. Locs. 1657, 1605 Checkers (AFL-CIO/CLC)	Montreal, Quebec, P.Q.	Apr. 17		320	Rejection of conciliation report.	
I.L.A. Loc. 375 (AFL-CIO/CLCO)	Montreal, P.Q.	May 30	June 4	900	Dispute over legislated settlement.	Return of workers.

SOURCE:

"Strikes and Lockouts in Canada", Labor Canada, Ottawa.

APPENDIX C

TABLE C1
ECONOMIC AND NONECONOMIC VARIABLES
AND DOCK STRIKES

Calendar Year	Frequency of Strikes	Frequency of strikes /1000 workers	No. of Days Lost/100 Workers	Unemploy- ment rate	Change in Unemploy- ment rate	Consumer price index
1955	3	1.21	4.66	4.0	0.2	67.54
1956	4	2.97	3.32	3.2	0.8	68.52
1957	2	5.84	15.90	4.4	1.2	70.69
1958	6	4.14	12.97	6.7	2.3	72.56
1959	2	37.04	43.44	5.6	1.1	73.39
1960	5	1.84	1.32	6.6	1.0	74.29
1961	5	3.50	8.29	6.7	0.1	74.96
1962	4	6.87	8.45	5.4	1.3	75.86
1963	7	0.33	0.55	5.0	1.4	77.21
1964	9	1.23	2.51	4.2	0.8	78.56
1965	8	1.19	0.55	3.4	0.8	80.51
1966	10	0.67	0.49	3.1	0.3	83.51
1967	1	0.66	0.64	3.6	0.5	86.15
1968	2	0.77	8.00	4.2	0.6	90.03
1969	3	0.56	0.83	4.0	0.2	94.08
1970	5	8.06	20.97	5.9	1.9	97.23
1971	2	0.77	0.96	6.4	0.5	100.00
1972	2	0.29	0.29	6.3	0.1	104.8
1973	4	0.54	2.78	5.6	0.7	112.7
1974	6	0.87	0.75	5.4	0.2	125.0
1975	5	0.65	6.00	7.1	1.7	137.9

(Continued)

TABLE C1-continued

Calendar Year	% change in consumer price index	Wage rate	% change in Wage rate	Real Wage rate	% change in wage rate % change in consumer price index	Consumer price index lagged by 1 year
1955	0.22	61.09	8.78	0.90	8.56	67.39
1956	1.44	68.39	6.85	0.97	5.41	67.54
1957	3.17	70.94	-0.18	1.00	-3.35	68.52
1958	2.65	70.81	7.48	0.98	4.83	70.69
1959	1.14	76.11	4.47	1.04	3.33	72.56
1960	1.23	79.51	6.82	1.07	5.59	73.39
1961	0.91	84.93	0.59	1.13	-0.32	74.29
1962	1.20	85.43	4.07	1.12	2.78	74.96
1963	1.78	88.91	7.15	1.15	5.37	75.86
1964	1.75	95.27	6.61	1.21	4.86	77.21
1965	2.48	101.57	7.50	1.26	5.02	78.56
1966	3.72	109.19	7.17	1.31	3.45	80.51
1967	3.59	117.02	8.03	1.36	4.44	83.51
1968	4.07	126.42	1.93	1.40	-2.14	86.15
1969	4.50	128.86	14.57	1.37	10.07	90.03
1970	3.35	147.63	14.69	1.52	11.34	94.08
1971	2.85	169.32	6.05	1.69	3.20	97.23
1972	4.80	179.56	9.35	1.71	4.55	100.00
1973	7.54	196.34	15.16	1.74	7.62	104.8
1974	10.91	226.11	13.11	1.81	2.20	112.7
1975	10.32	255.76	16.25	1.85	5.93	125.0

(Continued)

TABLE C1-continued

Calendar Year	Union Member As % of Labor Force	No. of Workers Per strike	No. of Days Lost/Strike	No. of Man-Days Lost Per Strike	Proportions of Strikes called for noneconomic Reasons	Trend Value
1955	23.6	140.33	57.00	6,466.67	0	1
1956	24.3	760.25	17.00	8,362.50	0.25	2
1957	24.0	118.00	58.00	6,000.50	0.50	3
1958	25.3	380.19	67.67	10,610.00	0.33	4
1959	24.9	100.00	12.00	330.00	0.50	5
1960	24.5	824.00	7.80	3,582.00	0.60	6
1961	23.9	201.00	23.60	4,838.00	0.60	7
1962	22.9	161.50	7.50	487.50	1.00	8
1963	22.7	4,811.00	29.67	16,903.33	0.71	9
1964	22.6	795.78	22.44	5,500.00	0.89	10
1965	23.2	324.38	20.75	7,343.75	0.88	11
1966	24.3	1,331.00	10.20	18,046.00	0.70	12
1967	26.0	3,000.00	4.00	10,720.00	1.00	13
1968	26.7	585.00	42.00	24,200.00	0	14
1969	26.7	1,237.00	24.33	34,990.00	0.67	15
1970	27.6	1,135.60	23.60	12,748.00	0.80	16
1971	27.4	300.00	3.5	375.00	1.00	17
1972	28.5	3,287.50	41.50	85,675.00	1.00	18
1973	28.9	285.75	8.25	2,762.50	0.50	19
1974	30.6	341.67	28.33	7,571.67	0	20
1975	31.2	1,453.00	30.20	43,393.60	0	21

SOURCE:

1. Labor Canada, Strikes and Lockouts in Canada (Ottawa), annual.
2. Statistics Canada, Price and Price Index (Published in Economic Review-1976).
3. Canada Year Book - 1974.
4. Statistics Canada, Unemployment and Payrolls (Labor and Price Division), Pub. 72-002.

TABLE C2
CORRELATION MATRIX

	Frequency of Strikes	Frequency of Strikes/1000 Workers	No. of Days Lost/100 Workers	Unemploy- ment rate	Change in Unemployment rate	C.P.I.
Frequency of strikes	1.00	-0.31	-0.24	0.07	0.12	0.23
Frequency of strikes/1000 workers		1.00	0.79	-0.08	0.20	-0.19
No. of days lost /100 workers			1.00	0.23	0.42	0.53
Unemployment rate				1.00	0.33	0.23
Change in Unemploy- ment rate					1.00	0.18
CPI						1.00

(Continued)

TABLE C2-continued

	% Change in CPI	Wage Rate	% Change in Wage rate	Real Wage rate	% Change in Wage rate-- % Change in CPI	CPI lagged by 1 year
Frequency of strikes	-0.04	0.11	0.18	0.15	0.25	0.12
Frequency of strikes /1000 workers	-0.26	-0.38	-0.29	-0.43	-0.13	-0.36
No. of days lost/100 workers	0.50	-0.21	-0.23	-0.22	-0.05	0.93
Unemployment rate	0.10	0.51	0.23	0.52	0.19	0.53
Change in unemploy- ment rate	0.08	-0.06	0.12	-0.11	0.08	-0.05
CPI	0.50	0.60	0.51	0.53	0.18	0.61
% Change in CPI	1.00	0.68	0.60	0.56	-0.15	0.63
Wage Rate		1.00	0.69	0.97	0.25	0.99
% change in wage rate			1.00	0.63	0.70	0.70
Real wage rate				1.00	0.27	0.97
% change in wage rate-- % change in C.P.I.					1.00	0.30
CPI .. lagged by 1 year						1.00

(Continued)

TABLE C2-continued

	Union Members as % of Labor Force	No. of workers /strike	No. of Days lost/strike	Proportion of strikes for noneconomic reasons	Trend Variable
Frequency of strikes	-0.04	0.14	0.08	-0.05	0.23
Frequency of strikes /1000 workers	-0.26	-0.33	-0.28	0.12	-0.45
No. of days lost/100 workers	-0.01	-0.30	0.09	-0.08	-0.22
Unemployment rate	0.59	0.11	0.26	-0.12	0.50
Change in unemploy- ment rate	-0.02	0.02	0.21	0.04	-0.09
C.P.I.	0.54	-0.16	-0.13	-0.39	0.53
% Change in C.P.I.	0.52	0.05	0.02	-0.18	0.50
Wage Rate	0.92	0.24	0.04	0.22	0.92
% change in wage rate	0.63	0.24	-0.01	-0.14	0.62
Real wage rate	0.89	0.30	0.03	-0.10	0.98
% change in wage rate--					
% change in C.P.I.	0.32	0.25	-0.04	-0.01	0.31
CPI lagged by 1 year	0.93	0.25	0.04	-0.23	-0.05
Union members as % of labor force	1.00	0.16	0.17	-0.37	0.84
No. of workers/strike		1.00	0.08	-0.22	0.36
No. of days lost/strike			1.00	-0.50	0.04
Proportion of strikes for noneconomic reasons				1.00	-0.06
Trend Variable					1.00

TABLE C3

MULTIPLE REGRESSION EQUATIONS AND THEIR COEFFICIENTS
FOR DOCK STRIKES AND ECONOMIC/NONECONOMIC VARIABLES
(LINEAR FORM)

Dependent Variable	Statistic	Independent Variables					Multiple R ²	F-Ratio	Durbin-Watson Statistics
		Unemployment Rate	Consumer Price Index	Wage Rate	Trend Variable	Union Members as % of Labor Force			
Frequency of Strikes	Regression coeffs. (b)	0.02618	0.02438	0.05992	-0.05430 *	-1.47266 *	0.38482	1.75153	2.57171
	^a S.E (b)	0.47233	0.02640	0.05264	0.29963	0.58642			
Frequency of Strikes	Regression coeffs. (b)	Unemployment Rate	% Change in CPI	% Change in Wage Rate	Trend Variable	Union Members as % of Labor Force	0.59227	4.06722	2.75251
	^a S.E (b)	0.58528	0.99491 **	0.24801 *	0.12854	-1.93614 **			
Frequency of Strikes	Regression coeffs. (b)	0.42068	0.37101	0.12970	0.12517	0.45022	0.27948	1.45460	2.02341
	^a S.E (b)	0.48984	11.71348	0.47714	0.50836				
Frequency of Strikes	Regression coeffs. (b)	Unemployment Rate	Real Wage Rate	Trend Variable	Union Members as % of Labor Force		0.30291	1.62952	1.94686
	^a S.E (b)	-0.01932	0.15074	0.26422	-0.92926 *				
Frequency of Strikes	Regression coeffs. (b)	0.47697	11.71348	0.47714	0.50836		0.30291	1.62952	1.94686
	^a S.E (b)	0.00064	0.10946	0.26085 *	-0.93284 *				
Frequency of Strikes	Regression coeffs. (b)	0.47697	0.15415	0.14896	0.40221		0.62712	4.70904	2.89596
	^a S.E (b)	0.49205	0.97154 **	-1.65458 **	0.00001	0.22487 *			
Frequency of Strikes	Regression coeffs. (b)	0.40696	0.35012	0.42527	0.00001	0.12563	0.62712	4.70904	2.89596
	^a S.E (b)	0.40696	0.35012	0.42527	0.00001	0.12563			

(Continued)

TABLE C3--continued

Dependent Variable	Statistic	Independent Variables						Multiple R ²	F-Ratio	Durbin-Watson Statistics
		Unemployment Rate	% Change in CPI	% Change in Wage Rate	Trend Variable	Union Members as % of Labor Force	Wheat Export in Bushels			
Frequency of Strikes	Regression coeffs. (b)	0.48726	0.97634**	0.22503	-0.01390	-1.63258*	0.00001	0.62729	3.64660	2.89809
	a.S.E (b)	0.42671	0.36849	0.13036	0.17898	0.52438	0.00001			
Frequency of Dock Strikes	Regression coeffs. (b)	Unemployment Rate	% Change in CPI	% Change in Wage Rate	Trend Variable	Union Members as % of Labor Force	Dummy Variable	0.62603	3.62710	2.87588
	a.S.E (b)	0.60138	1.04802**	0.26925*	0.04169	-1.81666**	1.25737			
								0.36753	1.62711	1.99153
No. of Days lost Per Strike	Regression coeffs. (b)	No. of Workers Per Strike	Proportions of Strikes for non-economic Reasons	Trend Variable	% Change in Wage Rate - % Change in CPI	Unemployment Rate		0.36753	1.62711	1.99153
	a.S.E (b)	0.00357	29.31558*	0.84529	-0.45326	2.60028				
								0.36051	1.57850	2.03863
No. of Days lost Per Strike	Regression coeffs. (b)	No. of Workers Per Strike	Proportions of Strikes for non-economic Reasons	Trend Variable	Real Wage Rate	Unemployment Rate		0.36051	1.57850	2.03863
	a.S.E (b)	0.00339	29.85257*	0.80482	-1.52740	2.68145				
								0.47838	2.56792	1.99609
No. of Days lost Per Strike	Regression coeffs. (b)	No. of Workers Per Strike	Proportions of Strikes for non-economic Reasons	Trend Variable	Consumer Price Index	Wage Rate		0.47838	2.56792	1.99609
	a.S.E (b)	0.00017	36.82834	0.45049	-0.42004*	-0.05039				
								0.49113	2.09112	1.87947
No. of Days lost Per Strike	Regression coeffs. (b)	No. of Workers Per Strike	Proportions of Strikes for non-economic Reasons	Trend Variable	Consumer Price Index	Wage Rate	Unemployment Rate	0.49113	2.09112	1.87947
	a.S.E (b)	0.00043	39.20200*	0.89558	-0.40485*	-0.1170	1.94521			
								0.49113	2.09112	1.87947

(Continued)

TABLE C3--continued

Dependent Variable	Statistic	Independent Variables						Multiple R ²	F-Ratio	Durbin-Watson Statistics
		Union Members as % of Labor Force	No. of Workers Per Strike	Proportions of Strikes for non-economic Reasons	Trend Variable	Consumer Price Index	Wage Rate			
No. of Days lost Per Strike	Regression coeffs.(b)	-0.30985	0.00042	-39.74864*	0.89623	-0.40761*	-0.10334	0.49130	1.65567	1.87233
							Unemployment Rate			
							2.01677			
							Wage Rate			
	^a S.E (b)	4.82602	0.00383	18.54466	2.85945	0.23464	0.39681			
							Unemployment Rate			
							3.71840			
No. of Days Lost Per Strike	Regression coeffs.(b)	-0.98193	0.00056	-38.76921**	0.29637	0.40430	1.88932	0.48843	2.06865	1.86943
	^a S.E (b)	3.92909	0.00365	17.49610	1.63241	0.22574	3.55144			

* Significant at 1 percent level.

** Significant at 5 percent level.

^a Standard errors are in parentheses.

TABLE C4

MULTIPLE REGRESSION EQUATIONS AND THEIR COEFFICIENTS
FOR DOCK STRIKES AND ECONOMIC/NONECONOMIC VARIABLES
(LOG-LINEAR FORM)

Dependent Variable	Statistic	Independent Variables						Multiple R ²	F-Ratio	Durbin-Watson Statistics
		Unemployment Rate	Consumer Price Index	Wage Rate	Trend Variable	Union Members as % of Labor Force				
Frequency of Strikes	Regression coeffs. (b)	0.35548	0.29885	2.03611	-0.67028	-7.76437*		0.28644	1.12397	2.59936
	aS.E (b)	0.58582	0.28879	1.93525	1.14296	4.12083				
Frequency of Strikes	Regression coeffs. (b)	Unemployment Rate	% Change in CPI	% Change in Wage Rate	Trend Variable	Union Members as % of Labor Force		0.37027	1.64637	2.2455
	aS.E (b)	0.67672	0.37820	0.31474*	0.01058	-6.89135**				
Frequency of Strikes	Regression coeffs. (b)	0.59800	0.29315	0.17071	0.47755	2.56893		0.18519	0.85230	2.11030
	aS.E (b)	0.59523	3.40200	1.23208	3.51337					
Frequency of Strikes	Regression coeffs. (b)	Unemployment Rate	Real Wage Rate	Trend Variable	Union Members as % of Labor Force			0.27455	1.41920	2.12482
	aS.E (b)	0.18421	0.47143	0.32403	-4.50748					
Frequency of Strikes	Regression coeffs. (b)	0.55768	0.05462	0.39058	2.14753			0.39601	1.83582	2.24048
	aS.E (b)	0.12451	0.07466	0.39125	-3.90858*					
Frequency of Strikes	Regression coeffs. (b)	Unemployment Rate	Change in CPI	Union Members as % of Labor Force	% Change in Wage Rate	Wheat Export in Bushels		0.41530	0.5389	2.27073
	aS.E (b)	0.57067	0.29226	0.26741	-6.16229	0.42652				
Frequency of Strikes	Regression coeffs. (b)	0.58965	0.25397	0.17248	2.58389	0.55166		0.41530	0.5389	2.27073
	aS.E (b)	0.67208	0.41669	0.27041	-0.21990	-6.08901	0.68368			
Frequency of Strikes	Regression coeffs. (b)	0.62166	0.32137	0.17617	0.33519	2.74238	0.68619	0.41530	0.5389	2.27073
	aS.E (b)	0.62166	0.32137	0.17617	0.33519	2.74238	0.68619			

(Continued)

TABLE C4--continued

Dependent Variable	Statistic	Independent Variables						Multiple R ²	F-Ratio	Durbin-Watson Statistics
		No. of Workers Per Strike	Proportion of Strikes For non-economic Reasons	Trend Variable	% Change in Wage Rate- % Change in CPI	Unemployment Rate				
No. of Days lost per Strike	Regression coeffs.(b)	0.17551	0.08652	-0.74983	-0.12364	0.44105		0.23763	0.87277	2.18818
	^a S.E (b)	0.21520	0.60123	0.57843	0.08501	0.83412				
No. of Days lost per Strike	Regression coeffs.(b)	No. of Workers Per Strike	Proportion of Strikes for non-economic Reasons	Trend Variable	Real Wage Rate	Unemployment Rate		0.15233	0.50318	2.04323
	^a S.E (b)	0.00112	7.55494	-3.33648	43.04646	1.31003				
No. of Days lost per Strike	Regression coeffs.(b)	0.00395	22.17228	3.92912	81.36823	4.07446		0.21025	0.74541	2.27143
	^a S.E (b)	No. of Workers Per Strike	Proportion of Strikes for non-economic Reasons	Trend Variable	Consumer Price Index	Wage Rate				
No. of Days lost per Strike	Regression coeffs.(b)	0.02745	0.05489	-1.43968	-0.43369	1.03749		0.21034	0.57714	2.27828
	^a S.E (b)	0.23407	0.62376	1.52750	0.46704	1.63764				
No. of Days lost per Strike	Regression coeffs.(b)	No. of Workers Per Strike	Proportion of Strikes for non-economic Reasons	Trend Variable	Consumer Price Index	Wage Rate	Unemployment Rate	0.21934	0.48165	2.26325
	^a S.E (b)	0.02371	0.04991	-1.43036	-0.44027	1.03783	-0.03662			
No. of Days lost per Strike	Regression coeffs.(b)	0.26070	0.65952	1.60281	0.51261	1.69940	0.92829	0.21934	0.48165	2.26325
	^a S.E (b)	Union Members as % of Labor Force	No. of Workers Per Strike	Proportion of Strikes for non-economic Reasons	Trend Variable	Consumer Price Index	Wage Rate			
No. of Days lost per Strike	Regression coeffs.(b)	2.64478	0.00991	0.14426	-0.95893	-0.45516*	-0.01948	0.21934	0.48165	2.26325
	^a S.E (b)	7.11323	0.27234	0.72818	2.08783	0.53201	Unemployment Rate -0.14286 Wage Rate 3.34357 Unemployment Rate 1.00227			

(Continued)

TABLE C4--continued

Dependent Variable	Statistic	Independent Variables						Multiple R^2	F-Ratio	Durbin-Watson Statistics
		Union Members as % of Labor Force	No. of Workers Per Strike	Proportion of Strikes for non-economic Reasons	Trend Variable	Consumer Price Index	Unemployment Rate			
No. of Days lost per Strike	Regression coeffs. (b)	2.60961	0.01039	0.14339	-0.96986	-0.45456*	-0.14146	0.21933	0.60873	2.26376
	^a S.E (b)	3.59495	0.24923	0.68437	0.88130	0.50180	0.93472			

* Significant at 1 percent level.

** Significant at 5 percent level.

^a Standard errors are in parentheses.

APPENDIX D

TABLE D1
EXPORTS AND STRIKES VARIABLES

Year	Export of Canadian Wheat (000's bu)	World Export of wheat (000 metric tons)	Stock of Wheat in Canada as of July 31 lagged by one year (000's bu)	Price of Wheat /metric ton in Australia	Price of Wheat /metric ton in Canada
1951-1952	304,722	20,963	99,811	71.00	64.96
1952-1953	329,026	24,482	166,943	74.00	69.48
1953-1954	208,835	21,378	197,916	73.14	73.15
1954-1955	211,288	20,138	289,469	63.68	68.04
1955-1956	272,260	23,452	386,815	58.87	66.33
1956-1957	230,856	24,573	398,893	53.38	63.36
1957-1958	279,912	31,135	375,369	56.07	62.75
1958-1959	257,421	26,699	410,386	60.55	62.18
1959-1960	240,321	29,964	407,554	56.31	64.28
1960-1961	317,567	30,889	419,001	55.64	63.84
1961-1962	326,069	40,498	455,888	55.10	65.36
1962-1963	304,102	37,530	437,391	57.71	69.91
1963-1964	539,637	49,316	331,888	58.74	67.97
1964-1965	368,052	45,231	422,547	58.72	69.69
1965-1966	546,781	56,891	388,800	58.25	65.62
1966-1967	483,456	50,319	403,924	57.35	67.54
1967-1968	311,320	47,130	320,122	62.19	72.11
1968-1969	281,216	39,560	371,750	59.08	68.72
1969-1970	319,535	44,380	429,510	59.16	70.70
1970-1971	410,410	46,290	479,628	54.90	61.30
1971-1972	479,043	47,130	465,990	56.24	64.45
1972-1973	553,241	48,290	339,334	57.28	67.24
1973-1974	400,587	54,388	272,257	66.14	98.22

(Continued)

TABLE D1-continued

Year	Price of Wheat /metric ton in U.S.A.	Trend Variable	No. of Days Lost/100 Workers	No. of Days Lost/100 Workers due to Strikes Continuing for less than or equal to--		
				7 days	14 days	29 days
1951-1952	77.17	1	1.16	1.16	1.16	1.16
1952-1953	83.71	2	3.48	3.48	3.48	3.48
1953-1954	78.94	3	5.69	3.59	5.69	5.69
1954-1955	66.98	4	17.89	3.63	17.89	17.89
1955-1956	64.11	5	4.67	0	.38	.38
1956-1957	62.39	6	6.98	3.41	3.41	3.41
1957-1958	64.93	7	35.32	0	26.92	16.14
1958-1959	63.59	8	17.49	1.69	1.69	3.61
1959-1960	63.21	9	55.55	0	0	55.55
1960-1961	62.15	10	1.31	.44	.62	1.31
1961-1962	65.16	11	8.40	0	15.07	8.40
1962-1963	66.58	12	8.41	.87	.87	.87
1963-1964	65.69	13	0.55	.10	.12	.12
1964-1965	66.17	14	2.51	.28	.28	.28
1965-1966	60.09	15	0.48	.19	.33	.48
1966-1967	62.10	16	0.49	1.00	.49	.49
1967-1968	64.11	17	0.66	.13	.13	.66
1968-1969	61.59	18	8.00	0	8.00	8.00
1969-1970	60.06	19	0.82	.28	.28	.28
1970-1971	58.02	20	20.96	0	0	16.29
1971-1972	62.13	21	1.08	.50	.50	.50
1972-1973	64.37	22	1.29	1.78	1.78	.89
1973-1974	107.98	23	4.53	2.46	5.67	4.53

(Continued)

TABLE D1-continued

Year	No. of Days Lost/100 Workers due to Strikes Continuing for less than or equal to--		No. of Days Lost /100 Workers/Strike	No. of Man-Days Lost/Strike
	59 days	90 days		
1951-1952	1.16	1.16	0.59	387.50
1952-1953	3.48	3.49	2.33	70.00
1953-1954	5.69	5.69	0.89	2,208.50
1954-1955	17.89	17.89	13.68	355.00
1955-1956	4.67	4.67	0.86	4,133.33
1956-1957	3.41	6.98	0.84	9,181.50
1957-1958	15.00	19.41	7.08	7,956.20
1958-1959	5.31	5.31	1.07	80,603.75
1959-1960	55.55	55.55	55.56	410.00
1960-1961	1.31	1.31	0.17	2,386.25
1961-1962	8.40	8.40	2.80	8,040.00
1962-1963	.87	.87	2.15	342.50
1963-1964	.55	.55	0.04	7,683.33
1964-1965	.28	.28	0.31	11,023.75
1965-1966	.48	.48	0.04	11,481.82
1966-1967	.49	.49	0.17	18,150.00
1967-1968	.66	.66	0.31	5,580.00
1968-1969	8.00	8.00	4.57	1,800.00
1969-1970	.82	.82	0.17	32,110.00
1970-1971	20.96	20.96	10.48	3,180.00
1971-1972	1.08	1.08	0.30	42,866.67
1972-1973	1.29	1.29	0.63	21,895.00
1973-1974	4.53	4.53	0.07	3,542.86

SOURCE:

1. The Canadian Wheat Board, Annual Report, 1974-1975.
2. Commodity Trade Statistics, Trade Year Book (Rome: F.A.O.), annual.
3. Labor Canada, Strikes and Lockouts in Canada (Ottawa), annual.

TABLE D2
CORRELATION MATRIX

	Export of Wheat in 000 bu.	Export of Wheat in 000 metric tons	Visible Stock of wheat lagged/yr. 000 bus.	Price of Wheat in Australia /metric ton
Export of wheat in 000 bu.	1.00	0.82	0.18	-0.29
Export of Wheat in 000 metric tons		1.00	0.41	-0.43
Visible Stock of wheat lagged per year 000 bus.			1.00	-0.92
Price of Wheat in Australia per metric ton				1.00

(Continued)

TABLE D2-continued

	Price of Wheat in Canada /metric ton	Price of Wheat in U.S.A. /metric ton	Trend Variable	No. of Days Lost/100 Workers
Export of wheat in 000 bu.	0.07	-0.07	0.64	-0.42
Export of Wheat in 000 metric tons	0.32	-0.05	0.89	-0.31
Visible stock of wheat lagged /yr. 000 bus.	-0.33	-0.64	0.50	0.19
Price of wheat in Australia per metric ton	0.40	0.69	-0.48	-0.24
Price of wheat in Canada per metric ton	1.00	0.84	0.33	-0.25
Price of wheat in U.S.A. per metric ton		1.00	-0.08	-0.14
Trend Variable			1.00	-0.22
No. of Days lost/100 workers				1.00

(Continued)

TABLE D2-continued

	No. of Days Lost/1000 Workers by Duration				
	Up to 6 days	Up to 14 days	Up to 29 days	Up to 59 days	Up to 90 days
Export of wheat in 000 bu.	-0.31	-0.35	-0.36	-0.35	-0.37
Export of wheat in 000 metric tons	-0.46	-0.28	-0.25	-0.25	-0.27
Visible stock of wheat lagged/yr. 000 bus.	-0.57	-0.09	0.11	0.14	0.15
Price of wheat in Australia per metric ton	0.67	0.00	-0.16	-0.19	-0.20
Price of wheat in Canada per metric ton	0.30	-0.01	-0.16	-0.18	-0.20
Price of wheat in U.S.A. per metric ton	0.52	0.10	-0.09	-0.11	-0.12
Trend Variable	-0.40	-0.28	-0.16	-0.15	-0.17
No. of Days lost/100 workers	-0.13	0.37	0.93	0.93	0.95
<u>No. of Days lost/1000 workers by duration</u>					
Up to 6 days	1.00	0.15	-0.09	-0.11	-0.10
Up to 14 days		1.00	0.23	0.19	0.24
Up to 29 days			1.00	0.99	0.99
Up to 59 days				1.00	0.99
Up to 90 days					1.00

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