Transport Costs and Their Implications for Price Competitiveness in Canadian Goods-Producing Industries

Nicholas Skoulas

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TRANSPORT COSTS AND THEIR IMPLICATIONS FOR PRICE COMPETITIVENESS IN CANADIAN GOODS-PRODUCING INDUSTRIES

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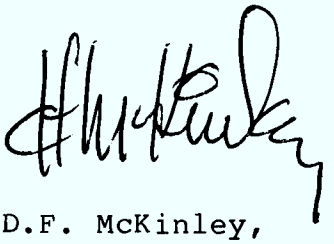
Notwithstanding the contributions and advice of those mentioned above, I remain solely responsible for any shortcomings or errors.

FOREWORD

This study was undertaken in the Research Branch, Bureau of Competition Policy, in connection with an inter-departmental mandate requiring Transport Canada, the Canadian Transport Commission and Consumer and Corporate Affairs Canada to review the interface between regulation and competition and recommend changes to improve efficiency across all modes of commercial inter-city transport.

The initial objective of this study in focussing on the movement of freight was to document the heretofore unknown contribution of transport costs to total costs of goods production in Canada, by industry and by commodity, and the impact of changes in these costs on final selling prices. Once in a while the experimental aspect of economic research, as with research in other areas, carries with it unexpected spin-offs that rival the achievement of its initial purpose. Such is the case in this study. In addition to estimating total transport costs (defined both to include and to exclude inbound transportation charges embodied in inputs), the study uses a new approach to estimate for the first time the magnitude of private trucking in Canada. This estimate is of interest both in enabling total estimates of transport charges from all modes by industry and by commodity to be made and in placing the "for-hire" sector of the Canadian trucking industry against the backdrop of a more realistic perspective.

Thus, the important two-fold contribution of the study is to provide estimates indicating that private trucking accounts for a larger share of domestic freight than rail and "for-hire" trucking combined, and to reveal the relatively greater sensitivity of export-oriented industries (vis-à-vis those whose production is destined for domestic markets) to transport charges.



D.F. McKinley,
Research Branch,
Bureau of Competition
Policy.

SUMMARY

In Canada, transportation matters in general and transport costs in particular give rise to important policy issues. Large geographic size and small population, coupled with heavy dependence on international trade, make Canada a "transport-sensitive" country. Notwithstanding its significance, there is little policy-oriented research either at the theoretical or at the empirical level on the implications of transport costs for either domestic or international trade.

This study is concerned with the identification and assessment of costs incurred in Canada associated with the production and distribution of Canadian goods and the extent to which these costs influence the price competitiveness of Canadian goods-producing industries. Specifically, it examines: the contribution of transport costs to total costs of production and final selling prices by industry/commodity; the significance of transport costs embodied in the value of exports as measured at the Canadian border; the relative magnitude of transport charges in relation to other costs in the production process; and the effect of changes in transport costs on industry/commodity selling prices. In addition, the study explores the sensitivity of transport charges to crude oil price changes and investigates the magnitude of underestimation of transport cost ratios associated with the lack of data on private trucking.

The framework adopted in the study is based on input-output tables and structural economic models of Statistics Canada. This framework and modifications of the structural economic models provide the basic ingredients to examine transport costs and their implications.

The study shows that transport costs contribute significantly to the production and distribution costs in goods production. Transport charges embodied directly and indirectly in the production of domestically produced goods are a significant proportion of aggregate costs of production for certain industries and commodities. The proportion of transport costs to total production costs ranges from about one per cent to over 13 per cent in primary industries and as high as 11 per cent in manufacturing. Even without considering the additional burden of freight costs from the producer onward, average transport costs incurred in the production of goods exceed those related to utilities, advertising and promotion, and retail and wholesale margins.

Estimates show that transportation charges from producer to purchaser as a proportion of delivered price (producers' value plus delivery charges) are relatively low for domestic sales. However, when transportation costs embodied in the production process are considered together with those associated with the distribution of output, total transport costs constitute a significant portion of purchasers' price for both domestic sales and exports.

Empirical results relating to total transport costs show that, for domestic sales, more than 22 per cent of the value of output of goods-producing industries can be characterized by transport cost ratios exceeding 10 per cent of producers' price. Comparable figures are much higher for exports. Over 54 per cent of the value of exported commodities of Canadian goods-producing industries is characterized by having 10 per cent or more of their value at the Canadian border made up of transportation charges.

Evidence presented in this study indicates that exports are more "transport cost sensitive" than domestic sales and that transport costs constitute a substantial proportion of the value of exports at the Canadian border. This is of interest, of course, because of the leading role of exports in the Canadian economy. The strength of many Canadian industries depends on export sales, and high and rising transportation costs dampen the price competitiveness of Canadian goods in foreign markets.

Average transport costs estimated in the study are based on data which do not take into account transport costs incurred in private trucking. This introduces a serious downward bias in the calculated transport cost ratios. An estimate of private trucking transport costs in the study indicates that the bias is significant. Private trucking produced almost two-thirds of total Canadian trucking services in 1974 and accounted for nearly half of total freight transport services produced by all modes of freight transportation in that year. This evidence suggests a substantial understatement of all calculated transport cost ratios and provides an indication of the size of the downward bias.

The study shows that commodity prices (particularly prices of export-oriented commodities) and the overall rate of inflation are sensitive to changes in transportation charges. For instance, a 50 per cent increase in transportation charges raises commodity prices, on average, by 4.7 per cent and the overall rate of inflation by 4.2 per cent. A

5.5 per cent increase in transportation charges or a one per cent increase in labour cost would give rise to identical increases in the overall rate of inflation. Furthermore, transportation charges are not particularly sensitive to crude oil price changes. Commodity prices are more sensitive to changes in transportation charges than to similar percentage increases in crude oil prices.

In general, the analysis shows that transport costs are substantial for both domestic sales and exports. With respect to exports, the results indicate that transport cost is an area that merits special attention from both producers and government(s). This observation takes on added weight when the growing pressures of a worldwide energy crisis are considered.

Estimates presented in this study are not characterized by decimal point accuracy. Nevertheless, they can be viewed as orders of magnitude useful for decision makers in formulating policies which recognize transport cost as a factor in Canada's competitive position, particularly in foreign markets.

Although initially undertaken for a different purpose, it is expected that this study will constitute an integral contribution to the examination of competition and regulation undertaken jointly and begun in 1978 by Consumer and Corporate Affairs Canada, Transport Canada and the Canadian Transport Commission.

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Part I

INTRODUCTION

Transportation is an important area of concern because it relates to a complex set of economic, social, political and technological factors. Following World War II, technological developments, resulting in rapid growth and transformation of the transportation systems, social and political changes, various restrictions and distortions imposed on both domestic and international trade, and an increasing economic interdependence among nations, have spurred massive research and investigation relating to transportation and trade.

Nevertheless, despite a recognition that space has economic significance (transport costs) and affects the flow of goods between nations/regions, most of the literature relating to international and domestic trade abstracts from transport costs for simplicity and convenience and concentrates on the influence and importance of other aspects of trade such as tariffs, quantitative restrictions, domestic subsidies and taxation, etc.

In the last three decades there have been two outstanding policy developments relating to international trade -- the establishment of the European Economic Community and the GATT (General Agreement on Tariff and Trade) agreements -- that will possibly alleviate or dismantle some of the problems of trade restrictions and barriers. These developments, in conjunction with the mounting pressure of a customary prosperity threatened by the worldwide energy crisis, may influence the direction of research in the field of trade. In this international scenario, the issue of the influence of distance -- transport costs -- is expected to gain momentum and attract more research relating to the effect of transport costs on both domestic and international trade.

In Canada, transportation matters in general and transport costs in particular are important issues. Its large size and small population, coupled with a heavy dependence upon international trade,[1] make Canada a

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1. Goods-producing industries exported nearly 26 per cent of their output in 1974. (See Table A.1, Appendix A.)

"transport-sensitive" country.[2] Transportation is an important sector of the Canadian economy, both for its contribution to GDP[3] and for its significance in regional (nowadays particularly in the North) and national economic development. Nevertheless, comparatively little work has been done at either the theoretical or the empirical level on transport costs and their implications for both domestic and international trade.

The purpose of this study is to shed light on the implications of transport costs for the goods-producing sector of the Canadian economy. Specifically, it examines the contribution of transport costs to total costs of production and final selling prices by industry/commodity, the significance of transport costs embodied in the value of exports at the Canadian border, the relative magnitude of transport charges in relation to other major cost elements in the production process, and the effect of changes in the transport costs on industry/commodity selling prices. Furthermore, the study attempts to explore the sensitivity of transportation charges to crude oil price changes and to investigate the magnitude of underestimation of transport cost ratios due to lack of data relating to private trucking. Such analysis, by contributing to a better understanding of the significance of transport costs among goods-producing industries, will, it is hoped, be useful in policy formulation.

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2. In relation to the transport-intensive Canadian economy, J.M. Munro has noted:

> The degree to which the Canadian economy is more transport-intensive -- i.e., the degree to which ton-miles per dollar of GNP is greater in Canada than in the United States -- has varied from 25 per cent in 1950 to 61 per cent in 1964 and has averaged 45 per cent over the years included in Table 4. (Munro, 1969, p. 31)

The years included in Table 4 are from 1940 to 1965.

3. The for-hire transportation sector contributed 5.6 per cent to the Canadian GDP in 1974. In comparison, the contribution of this sector to the GDP of the United States was only 3.9 per cent.

The following section outlines the methodology, models and framework used for analyzing transport costs and briefly discusses the data and their limitations.

Parts III, IV and V present and discuss the empirical findings. Finally, Part VI provides a brief summary and states the conclusions of the study.

Part II

METHODOLOGY, MODELS AND DATA USED

Researching the role of transportation from the perspective of its implications for Canadian industry generally is not an easy task. Ideally, such a study would entail the use of a fairly comprehensive economic model involving regional input-output tables and interrelationships among a large number of variables. Development of such a model would be difficult, time-consuming and might not be successful because of data limitations.

As an alternative to the above-mentioned model, a less elegant but more straightforward approach is adopted in this study. This provides a framework for conducting a study of transportation to shed light on questions relating to the role of transportation costs in production, pricing and distribution in Canadian industry. The methodology for this approach required recourse to the input-output tables and the structural economic models from the Input-Output and Structural Analysis Divisions of Statistics Canada.

The Statistics Canada input-output (I/O) tables for the Canadian economy provide a suitable statistical framework for the analysis of transportation costs as a component of the cost of production of goods and services and of their final purchase price. These tables consist primarily of three matrices. Data relating to the goods and services produced by domestic industries are assembled in a MAKE matrix.[4] The total supply of goods and services in the economy is made up of both domestically produced and imported goods and services. Data relating to goods and services (whether domestically produced or imported) and

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4. MAKE: is a matrix of the values of commodity outputs. In it, each row shows the distribution by commodity of the output of an industry; each column shows the distribution by industry of the output of a commodity. The data related to domestic output only. The gross output of an industry is the aggregate value of goods and services produced and work done by the industry. It is equal to the value of industry's sales plus any increase (less any decrease) in the value of physical change in stocks of finished products and work in progress. (Statistics Canada, 1979)

other components such as taxes, wages and salaries, and surplus that constitute inputs required by each industry to produce their output of commodities, are brought together in a USE matrix.[5] Finally, the purchase of commodities by final buyers, as distinguished from purchases made by industries on current account, are brought together in a Final Demand matrix[6] where consumers, government and business purchases on capital account and exports are distinguished as separate purchasing sectors.

The accounting framework of the tables is the most detailed set of input-output accounts for Canada. In these tables, 595 commodities (groups) and 191 industries (sectors) are distinguished, and the one-to-one correspondence between industries and commodities is abandoned. This allows the format of the tables to be "rectangular"; namely, each industry is allowed to produce more than one commmodity and each commodity may be produced by more than one industry.

The tables are constructed initially in current prices with the entries valued in purchasers' prices. However, to achieve a uniform basis of valuation and so that a dollar's worth of a commodity represents approximately the same quantity of the commodity in every part of the tables, the commodity entries are revalued into producers' prices by deducting estimated costs of for-hire transportation of goods from the factory or farm gate to the purchaser.

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5. USE: is a matrix of the values of intermediate commodity inputs. In it, each row shows the distribution by industry of the input of a commodity; each column shows the distribution by commodity of the input of an industry. (Statistics Canada, 1979)

6. FD: is a matrix of the values of commodity inputs of final-demand categories: personal expenditure on consumer goods and services; fixed capital formation, business and government; value of physical change in inventories, withdrawals and additions; gross government current expenditure on goods and services; exports; imports; and government revenue from the sales of goods and services. (Statistics Canada, 1979)

Similarly, trade and tax margins that make up the difference between producer and purchase prices are reassigned to service or dummy commodities and taxes. These revalued tables are converted to 1971 constant prices by the method of double deflation, each row of the tables (in producers' prices) being deflated by one price index for each commodity group, with value added derived as the residual.

The I/O tables provide estimates of the cost of transportation on purchases. These transportation costs are the services purchased from transportation industries, defined to include all firms and establishments engaged in for-hire transportation. They are the services actually purchased or included in the purchase price of commodities. These are the data from which estimates are made of the proportion that purchased transport costs constitute of an industry's total costs of production. Such estimates make it possible to calculate the average proportion of the purchase price of each commodity that is composed of transport costs. In the tables, this proportion differs for each category of purchaser.

The analysis is extended with the help of the Statistics Canada I/O models which take as parameters relationships derived from the I/O tables. The models assume a constant market share and no change in technology in the particular industry. Further, it is assumed that: each industry purchases its requirements from all of the producing industries of a commodity in proportion to their market share; that the input structure of each commodity is a weighted combination of the input structure of the industries in which it is produced; and that for all industries and final demand sectors, imports bear the same ratio to the purchases of the domestically produced commodity as total imports bear to the total domestic output of that commodity.

The input-output model serves the purpose of analyzing the propagation of demand throughout the economic system. It thus makes possible the examination of how activity in one sector of the economy interrelates with activity in other sectors. In the model, activity is measured in terms of gross production of goods and services and in terms of the associated factor incomes (e.g., wages and salaries, profits) and employment.

The I/O model is used in this study to estimate not only the transport costs directly embodied in the per unit cost of production of an industry or a commodity but also the transport costs indirectly embodied in the cost of production. In other words, the estimates include

transportation costs embedded in the cost of production of every commodity purchased as an input. The method of calculating direct plus indirect transport costs per dollar of industry output is:

$$t' \, [I-D(1 - \hat{\mu}) \, B]^{-1}$$

where t' = a vector of transport margins per dollar of industry output derived from the USE matrix

D = a matrix of market share coefficients derived from the MAKE matrix

B = a matrix of input coefficients (i.e., inputs per dollar of output) derived from the USE matrix

$\hat{\mu}$ = the proportion of imports to total supply by commodity

I = an identity matrix of appropriate dimensions.

In addition, the average direct cost of transportation between producer and purchaser (referred to as delivery cost) is calculated by industry both as a proportion of producers' cost and of producers' plus delivery cost, separately for domestically produced goods and for exports. In a similar manner, estimates are calculated for both: (1) the average costs of transporting each commodity from the producer to the purchaser; and (2) the costs indirectly embodied in the margins -- transport, wholesale and retail service costs -- which make up the difference between the producers' and purchasers' price as well.

The detailed results relating to the average direct and indirect cost of transportation of commodities are obtained as follows: given an NI vector of industries, NC vector of commodities and NM vector of margins (retail, wholesale, transport, etc.) and defining:

t' = a vector of inputs of transport margins per dollar of industry output (1 x NI)

M = a matrix of commodity margin rates per purchasers' dollar (NM x NC) where row 1 is retail margins, row 2 is wholesale margins, etc.

T' = a vector of commodity transport margin rates per purchasers' dollar (1 x NC)

P = a diagonal matrix of the ratio of producers' to purchasers' price for each commodity (NC x NC)

then:

(a) direct and indirect transport costs per purchasers' dollar are given respectively by:

$$t_1' = t' \, DP$$

$$t_2' = [t' \, [I - D \, (I - \hat{\mu}) \, B]^{-1} \, D - t' \, D] \, \hat{p}$$

(b) direct and indirect transport costs between producers and purchasers are obtained respectively by:

$$t_3' = T'$$

$$t_4' = V' \, M + mT'$$

where:

v_i = direct and indirect transport costs per dollar of demand for the i^{th} margin

m = indirect transport cost per dollar of demand for transport margins

(c) the total transport costs per purchasers' dollar is given by:

$$t'_{Total} = t' \, [I - D \, (I - \hat{\mu}) \, B]^{-1} \, D\hat{P} + V'M + (1+m) \, T'$$

The second model which has been simulated to provide the basic ingredients for this study is the price model of Statistics Canada.[7] This model belongs to the family of

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7. For more details relating to both the price model and the input-output model see: Statistics Canada, Structural Analysis Division, November 1974.

cost-push models conventionally associated with input-output models. Making the assumption that every industry passes on, in terms of higher output prices, any cost-price increase it faces and that it maintains its profit margins as a constant proportion of the new output prices, the model serves to analyze the propagation of changes in factor prices or specified commodity prices throughout the economic system.

The price model is expressed mathematically by the following three equations:

$$1.\quad P'_q = P'_{qd}(I - \hat{\mu})B + p'_m \hat{\mu} B + \sum_{i=1}^{NI} p'_{y_i} H_i$$

$$2.\quad P'_{gd} = P'D_g$$

$$3.\quad P'_g = P'_{qd}(I-\hat{\mu}) + P'_m \hat{\mu}$$

where p_g = an NI order vector of industry selling price indexes

P_{qd} = an NC order vector of price indexes of domestically produced commodities

P_m = an NC order of price indexes of imported commodities

P_y = an NY order vector of primary input prices

P_q = an NC order vector of commodity price indexes which is a weighted combination of domestic and imported commodity price indexes

$\hat{\mu}$ = an NC order diagonal vector of proportions of imports to total supply by commodity

B = an NC by NI matrix of intermediate commodity input coefficients.

H = an NY by NI matrix of primary input coefficients.

The first equation states that an industry selling price index is a linear combination of input prices of intermediate commodites, both domestically produced and

imported, and primary inputs -- weighted by the appropriate input coefficients. The second equation transforms industry selling price indexes into price indexes of domestically produced commodities. The final equation calculates commodity price indexes as weighted combinations of domestically produced and imported commodity price indexes.

The price model has a feature that enables the user to exogenize selected endogenous variables (prices/price indexes) and simulate the impact of their changes on all other prices/price indexes. In this study, this feature is used to estimate the impact of transport cost changes (with and without wage interaction) on the other industry/commodity prices and price indexes.

These models use the time series data base assembled in the input-output tables covering the period 1961 to 1974. A brief discussion follows of the transportation cost information contained in this data base. The Input-Output Division of Statistics Canada uses detailed transportation revenue data provided by the Transportation and Communication Division. These data are based on establishment surveys of transportation industries and, for the most of them, such as rail transport, good universe coverage exists. For other transport industries, with a higher proportion of unincorporated business, coverage may be somewhat lower. However, for these industries taxation data are also introduced to obtain gross revenue and expenditure detail and to assure a proper coverage of the universe. As previously mentioned, transportation costs which are not-for-hire but are internal to an establishment remain as commodity inputs to the industry in question (e.g., gasoline and diesel fuel for the industry's own trucks are shown as inputs into bakeries, retail trade, etc.).

The revenue of transport industries is allocated to industries as a transportation cost:

1. directly as an intermediate input (e.g., for moving their own machinery);

2. as an input to an intermediate travel and an entertainment "dummy"[8] industry whose com-

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8. The "dummy" industry is a technique for routing groups of commodities as inputs into industries when the precise commodity content is unknown.

modity output is in turn directed as an input to most industries (e.g., travelling expenses of employees);

3. as a direct input to a final-demand industry (e.g., rail transport to personal expenditures, to government, etc.); and

4. as an input to a transport margin "dummy" industry.

As explained below, there is a simultaneous estimation of transport costs embodied in the purchase cost of commodity inputs by industry and other purchasers. The total output or revenue of the various transport industries assigned to the transport margin "dummy" industry therefore corresponds to the sum of transportation costs of commodities to industries and final-demand sectors.

The direct transport cost allocation into categories 1 to 3 is based on detailed transport revenue information from transport industries in conjunction with industry transport expenditures and on consumer expenditure survey information relating to personal purchase of for-hire transport.

For the purpose of this study, it is the last category which is of most interest because it provides information relating to the cost of transportation of commodities. The transportation margin accounts for the largest portion of the value of transport revenue and is associated with the transport of commodities from producers to purchasers. The allocation of the value of transport revenue is associated with the transport of commodities from producers to purchasers (e.g., origin-destination survey of motor transport) and direct contact with respondents who send supplemental information.

Revenue by commodity detail is built up from the various modes of transport. Survey data usually provide tonnage and mileage information by commodity or commodity group and unit values are applied to these data to obtain transport industry freight revenue by commodity. These unit values come from sources such as the origin-destination truck transport survey, rail waybill analysis, published freight rates and additional information provided by transport companies.

The data vary in the extent of their commodity classification detail; nevertheless, reasonable estimates have been constructed of the transportation revenue related to major high-valued bulk commodities (e.g., iron ore and wheat) and there are reasonably good estimates of groups of products (e.g., fruit and vegetables). For certain commodities (such as lumber) it is necessary to estimate related transport revenue from a more aggregative sub-total (such as forestry products).

A final consistency check concerning the allocation of transportation costs among various commodities is carried out by the input-output system. Transport margin data represent a segment of the difference between producer (e.g., factory gate) valuation and purchaser valuation. Estimates generated for each input-output commodity group along with other margins -- taxes, trade, etc. -- are inspected for their consistency in a commodity balance context.

Part III

THE IMPORTANCE OF TRANSPORTATION CHARGES IN GOODS-PRODUCING INDUSTRIES

This section discusses the empirical findings (relating to average transportation charges) obtained by using the input-output tables and models of Statistics Canada in conjunction with the most recent cross-sectional data base (1974) with which these tables and models are operational.

In the input-output framework, industries are classified according to the 1970 Standard Industrial Classification (SIC). For the most part, the three-digit level of the SIC is used with some more aggregative groupings for primary industries. The data in the input-output system are prepared at three levels of aggregation: a high level of aggregation with 16 industry groups and 49 commodity groups, a medium level with 43 industry groups and 100 commodity groups, and a low level of aggregation that provides information in considerable detail for 191 industries and 595 commodities. The three levels of aggregation are hierarchical. One can derive high from medium, medium from low and low from the worksheet level of detail.

Information relating to transportation charges is generated using alternative modifications of the structural economic models at different levels of aggregation. Transportation cost ratios are obtained at the medium level of industry aggregation (Table A.2, Appendix A) and the high level of commodity aggregation (Table A.4, Appendix A). Information relating to transportation cost is generated at the low level of aggregation for 137 goods-producing industries and 521 commodities.

Since it is unnecessary to present and analyze all the results obtained at the low level of aggregation, an industry and a commodity sample is presented.

Based on the extended list of 137 industries and 521 commodities,[9] 41 industries and 81 commodities were selected which were considered to be of some significance to Canada as a whole and/or some region and provinces (see Tables A.3 and A.5, Appendix A). The selection was based on an investigation of a brief economic profile of each

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9. Industries/commodities relating to construction are not included in these numbers.

industry from published data in terms of value added, employment, export orientation and significance to their appropriate industry group. In the selection process, consideration was given to industries with involvement in raw material processing and sensitive to labour and public policy decisions.

The commodity selection is related to the selected industries with consideration given to weight, volume, value per unit, export orientation and importance of the commodity to the producing industry.

For convenience in subsequent analysis, goods-producing industries were divided into two major groups: primary industries and manufacturing industries. A summary of Table A.1, Appendix A, is presented in Table 1. This table indicates the importance and contribution of the two industry groups in the Canadian goods-producing sector. It is immediately apparent that manufacturing dominates the goods-producing sector in terms of output, exports, value added and employment. Nevertheless, the importance of

Table 1

Principal Statistics in Goods-Producing Industries, 1974

	Primary industries	Manufacturing	Total	Primary industries % share of total
1. Total output ($000)	22,190,752	88,307,958	110,498,710	20.11
2. Exports ($000)	7,789,387	20,801,776	28,591,163	27.24
3. Value added ($000)	13,026,402	30,311,558	43,337,960	30.07
4. Employment (number of persons)	666,687	1,857,798	2,452,485	27.17

Source: Table A.1, Appendix A.

primary industries in making up the principal statistics of the goods-producing sector is significant. They contribute between 20 and 30 per cent of output, exports, value added and employment, as shown in Table 1 (for the importance and contribution of individual industry groups, see Table A.1, Appendix A).

Before undertaking any detailed analysis relating to the importance of transportation charges to the competitiveness of goods-producing industries, it is essential for an accurate interpretation of the findings to define certain terms which are used in the study.

The term "transport costs" refers to the charges of transportation companies for the movement of freight which is the direct cost paid by the user of the transportation services. No attempt has been made to relate this cost to the value of the resources used to provide transport services. Such analysis lies outside the scope of this study.

For the purpose of this study, ratios of transport costs to different valuations of output are calculated. Definition of the terms "purchasers' price," "producers' price" and "delivered price" is essential for interpretation of the results. The Canadian input-output tables distinguish between production valued in purchasers' prices and in producers' prices. Purchasers' prices cover the cost of goods in the market at the point of delivery to the purchaser. Producers' prices cover the producers' costs of production. Output valued in producers' prices can be derived by building up from factor values, or by subtracting from the valuation in purchasers' prices: (a) the cost of transportation between producer and purchaser, (b) retail and wholesale costs, and (c) indirect taxes.

For the purpose of this study, a third concept is created -- that of delivered price, which is producers' costs plus delivery costs (the costs of transporting products from the producer to the purchaser). Between delivered value and purchaser value lie retail and wholesale costs and indirect taxes.

In the following pages, results obtained by using the input-output models are presented and discussed. Detailed results relating to the ratios of transportation charges to different valuations of output at different levels of aggregation are displayed in Tables A.2 and A.5 in Appendix A.

Table A.2, Appendix A, presents these transportation ratios at the medium level of aggregation (26 goods-producing industry groups) and their range at the low level of aggregation, namely, 137 goods-producing industries. These results are summarized and displayed in Table 2, which shows the range of transport cost ratios at medium and low levels of industry aggregation.

Table 2

Range of Average Transportation Charges in Goods-Producing Industries, 1974

	Industry output	Domestic sales	Exports
Industry group	Direct and indirect transportation charges embodied in production cost as a percentage of output valued in	Transportation charges from producers to purchasers (delivery transportation cost) as a percentage of output valued in	Transportation charges from producers to the Canadian border as a percentage of output valued in
	Producers' price	Delivered price	Delivered price
Range of Average Transportation Charges in Industry Groups (Medium Level of Aggregation)			
1. Primary industries	0.79 - 13.17	1.40 - 19.79	4.26 - 14.76
2. Manufacturing	1.91 - 6.81	1.58 - 6.07	1.55 - 8.01
Range of Average Transportation Charges in the Low Level of Industry Aggregation			
1. Primary industries	0.68 - 13.17	0.50 - 46.82	2.33 - 30.39
2. Manufacturing	1.30 - 11.15	0.85 - 19.97	0.76 - 23.19

Source: Table A.2, Appendix A.

The first column of this table indicates the range of transportation charges embodied directly and indirectly in the production cost as a proportion of aggregate cost of production valued in producers' price. Direct and indirect transport charges refer to transport costs embodied in the cost of every input of an industry, going back to primary resources. The range of delivered transportation cost, as a percentage of delivered value, from producers to domestic purchasers and the Canadian border are shown in columns 2 and 3 respectively.

The wide variation of transport cost ratios is immediately apparent. This variation, as expected, increases from the medium aggregation of industry groups to the low level of industry aggregation. The average transport cost embodied in the production cost of primary industries ranges from below one per cent for mineral fuels to over 13 per cent for forestry at both levels of aggregation. The same ratios in manufacturing range from below two per cent for clothing to over seven per cent for wood industries at the medium aggregation of industry groups, and from below two per cent for sugar refineries to over 11 per cent for manufacturers of mixed fertilizers at the low level of industry aggregation.

This information along with that presented in Table 3 indicates the relative magnitude of transport charges relative to other cost elements in the aggregate production cost. It is evident that the value of transportation services embodied in production constitutes a significant cost element in the production process.

A wider variation of delivered transportation charges as a proportion of delivered price is shown in columns 2 and 3, Table 2, for domestic sales and exports. The following discussion concentrates on the results relating to low levels of industry aggregation. Transport charges, from producers to domestic purchasers, embodied in the delivery price of goods produced by primary industries range from below one per cent for base metal and other metal mines to over 46 per cent for gypsum mines. These same ratios in manufacturing range from below one per cent for shipbuilding and repair industries to over 19 per cent for manufacturers of mixed fertilizers.

Similarly, transport charges for exports as a proportion of delivered price at the Canadian border display a wide variation. Freight factors for exports of manufactured

Table 3

Cost Elements Embodied in Production Cost as a Percentage of Output Valued in Producers' Price

Industry group	Transport charges	Electric power & other utilities	Retail & wholesale margins	Advertising & promotion	Profits	Wages, salaries & supplementary income
1. Agriculture	3.44	0.55	3.27	0.00	56.80	5.77
2. Forestry	13.17	0.05	1.08	0.03	9.59	33.75
3. Fishing, hunting & trapping	2.36	0.08	2.95	0.00	43.71	22.62
4. Metal mines	2.78	2.09	1.24	0.06	40.11	23.86
5. Mineral fuels	0.79	1.08	0.26	0.02	47.92	7.00
6. Non-metal mines & quarries	2.96	2.21	2.04	0.22	37.74	24.04
7. Food & beverage	4.86	0.45	2.31	1.77	9.19	14.43
8. Tobacco products	3.64	0.24	0.60	5.01	16.19	14.99
9. Rubber & plastics products	3.19	0.98	2.08	1.10	13.33	27.98
10. Leather	2.92	0.39	3.94	0.91	5.52	32.84
11. Textile	2.64	0.87	2.90	0.81	11.23	25.47
12. Knitting mills	2.26	0.54	0.89	0.92	8.57	28.89
13. Clothing	1.91	0.23	4.24	0.91	7.00	32.32
14. Wood	7.34	0.93	2.97	0.21	9.49	27.50
15. Furniture & fixtures	3.66	0.45	4.90	0.86	9.41	31.97
16. Paper & allied	6.81	2.40	1.76	0.24	22.25	21.48
17. Printing & publishing	3.57	0.40	1.47	0.76	15.12	38.46
18. Primary metal	3.96	1.66	4.65	0.12	9.28	18.66
19. Metal fabricating	3.62	0.55	2.15	0.39	14.53	28.56
20. Machinery	3.09	0.42	3.72	0.66	10.38	30.94
21. Transportation equipment	2.96	0.40	2.43	0.56	8.09	20.53
22. Electrical products	3.07	0.41	2.33	0.96	12.60	29.53
23. Non-metallic mineral prod.	5.90	2.29	2.22	0.34	19.40	28.02
24. Petroleum & coal products	4.82	0.52	0.18	0.62	5.66	4.89
25. Chemical & chemical prod.	5.45	2.29	2.41	3.08	16.37	19.87
26. Misc. manufacturing	2.77	0.44	2.68	2.16	10.34	29.91

Source: Statistics Canada, input-output tables.

goods range from below one per cent for manufacturers of pharmaceuticals and medicines to over 23 per cent for line manufacturers.

Although delivered transport charges are relatively low on the averages disclosed by industry group in Table A.2, Appendix A, it is significant that there is substantial variation among individual industries (see Table A.3, Appendix A) and exports display a much higher ratio of transport charges to delivered price at the Canadian border. From the industry groups presented in Table A.2, Appendix A, only 19 per cent have average delivered transportation charges exceeding five per cent of the delivered price for domestic sales in comparison to 46 per cent of the industry groups relating to exports. Moreover, when the transportation charges embodied in production are considered, together with delivered transport cost, the significance of transportation cost takes on an even more important dimension.

Table 4 presents the frequency distribution of goods-producing industries at the low level of aggregation, according to the total transportation cost (embodied in production plus delivery) as a proportion of the price of output valued at producers' prices.

This table indicates that for domestic sales, 73 per cent of the 137 goods-producing industries have a total transportation cost which exceeds five per cent of the value of output in producers' price. For over 52 per cent of the industries (72 industries), the ratio of total transport charges to the value of output is between 5 and 10 per cent. Over 20 per cent of the industries have total transport costs exceeding 10 per cent of the value of output. In 10 per cent of the industries, the transport charges on domestic sales exceed 15 per cent of the value of output in producers' price.

The last two columns of domestic sales in Table 4 show the frequency distribution of the value of output by total transport costs. These results reinforce the findings relating to the distribution of number of industries. More than 22 per cent of the value of output of goods-producing industries are characterized by having 10 per cent or more of producers' price made up of transportation costs.

Table 4

Distribution of Goods-Producing Industries
by Total Transport Charges, 1974

Total transport costs a) embodied in production b) from producers to purchasers as a percentage of output valued in producers' price	Domestic sales				Exports			
	Number of industries	Percentage share of total	Value of domestic sales ($000,000)	Percentage share of total	Number of industries	Percentage share of total	Value of exports ($000,000)	Percentage share of total
less than 5 percent	37	27.00	15,440.23	18.85	16	11.68	5,377.32	18.81
5 - 10 percent	72	52.56	48,251.48	58.91	72	52.56	7,958.20	27.84
10 - 15 percent	14	10.22	12,945.38	15.81	30	21.90	10,502.68	36.73
over 15 percent	14	10.22	5,270.46	6.43	19	13.86	4,752.96	16.62
Total	137	100.00	81,907.55	100.00	137	100.00	28,591.16	100.00

Source: Statistics Canada, input-output models.

The evidence from Table 4 indicates that exports are more "transport cost intensive" than domestic sales. In 88 per cent of the 137 industries, total transportation cost (up to the Canadian border) relating to exports exceeds 5 per cent of the producers' value of output. The industries belonging to the second class, with total transportation cost from 5 to 10 per cent of producers' value of output, constitute 52 per cent of the total number of goods-producing industries. Transportation charges exceed 10 per cent of the value of output in 35 per cent of goods-producing industries. The last class, with total transportation cost over 15 per cent of the price of output valued in producers' price, represents nearly 14 per cent of the industries of the goods-producing sector.

The last two columns of Table 4 show the frequency distribution of the value of exports by total transport cost. More than 53 per cent of the value of the exports of goods-producing industries are characterized by having 10 per cent or more of their value at the Canadian border made up of transportation costs.

The evidence from the industry space analysis indicates the importance of transportation costs in the goods-producing industries and the wide variation of these costs among individual industries. As disaggregation proceeds from industries to commodities, even greater variation is to be expected.

Tables A.4 and A.5, Appendix A, present the results classified by commodity. In the former, transport cost ratios at the high level of aggregation (27 commodity groups) are displayed. The results relating to 81 selected commodities are presented in the latter. Transport cost ratios have been calculated at different valuations of output (see Table A.4). However, the following analysis focusses on the ratio of total transportation cost as a proportion of output direct valued in purchasers' price.[10] Total transport cost means: (a) transport costs directly embodied in the cost of producing the commodity and transport costs indirectly embodied in the produced goods, namely, transport costs embodied in the cost of every input

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10. These ratios would be greater if they had been calculated as a proportion of delivered price.

of an industry, going back to primary resources; and (b) the direct and indirect costs of transporting the commodity from the producer to the purchaser. The direct delivered transport cost is the cost of purchased transportation used in moving the commodity from the producer to the purchaser. The indirect delivered cost[11] is the cost of purchased transportation used in the internal operations of wholesalers and retailers and the transportation purchased by transport companies (e.g., trucking by railways).

The results of transport cost ratios relating to total transport costs as a proportion of purchasers' price of Table A.5, Appendix A, are summarized and presented in Table 5.

Table 5

Range of Average Transportation Charges in Commodity Groups, 1974

	Domestic sales	Exports
	Total transport costs a) embodied in production b) from producers to purchasers as a percentage of output valued in	Total transport costs a) embodied in production b) from producers to the Canadian border as a percentage of output valued in
	Purchasers' price	Purchasers' price
Commodity groups	Range of average transportation charges in commodity groups (high level of aggregation)	
	2.46 - 28.19	4.48 - 19.57
Commodities	Range of average transportation charges in commodities (low level of aggregation)	
	1.84 - 53.50	2.74 - 63.21

Source: Statistics Canada, input-output models.

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11. For technical reasons, this part of the total transport cost is not included in the calculations of total transport costs relating to industries.

This summary table presents the range of total transport cost ratios at the high (27 commodity groups) and low (548 commodities) level of commodity aggregation. The first column of the table shows the range of these ratios for domestic sales. The range of total transport costs, as a percentage of purchasers' price, for exports is shown in the second column. The wide variation of these ratios among commodity groups is immediately apparent and it can be seen that these results vary more than the findings obtained from the industry aggregation.

The average transport costs (low level of aggregation) for domestic sales range from below two per cent for distilled alcoholic beverages to over 53 per cent for gypsum. Similarly, a wide variation of all transportation charges as a proportion of purchasers' price at the Canadian border is displayed by exports. These ratios range from less than three per cent for knitted wear to over 63 per cent for sand and gravel.

The wide variation of transport cost ratios among individual commodities and the large number of products in the commodity space make it necessary to present the commodity frequency distribution by total transport costs embodied in the purchasers' price. Table 6 shows this frequency distribution for both domestic sales and exports.

Table 6 reveals that, for domestic sales, 74 per cent of commodities have total transport costs exceeding five per cent of their purchasers' price. For 264 commodities, or 51 per cent of all commodity groups, total transport costs constitute five to ten per cent of purchasers' price. In 23 per cent of the commodity groups, total transport costs exceed ten per cent of the final price. The value of domestic sales displays a similar distribution pattern with some decline in the upper two categories. In only 14 per cent of the value of domestically distributed commodities do total transportation costs exceed ten per cent of purchasers' price.

Similarly, the findings for exports indicate that 80 per cent of exported commodities have transport costs exceeding five per cent of their price at the Canadian border. The second category (Table 6), with total transport charges of from five to ten per cent of the commodity's value, accounts for 47 per cent of the number of exported commodity groups. The exported commodities which belong to the third and fourth classes, with total transport costs exceeding ten per cent of the commodity's value, constitute 33 per cent of the number of commodity export categories.

Table 6

Distribution of Commodities
by Total Transport Charges, 1974

Total transport costs a) embodied in production b) from producers to purchasers as a percentage of output valued in producers' price	Domestic sales				Exports			
	Number of industries	Percentage share of total	Value of domestic sales ($000,000)	Percentage share of total	Number of industries	Percentage share of total	Value of exports ($000,000)	Percentage share of total
less than 5 percent	134	25.72	26,386.62	32.22	104	19.96	8,736.47	30.55
5 - 10 percent	264	50.67	44,132.10	53.88	246	47.21	4,306.28	15.06
10 - 15 percent	77	14.78	7,391.67	9.02	106	20.35	12,823.29	44.86
over 15 percent	46	8.83	3,997.16	4.88	65	12.48	2,725.12	9.53
Total	521	100.00	81,907.55	100.00	521	100.00	28,591.16	100.00

Source: Statistics Canada, input-output models.

The frequency distribution of the value of exports is shown in the last two columns of Table 6. Commodities with transport costs exceeding ten per cent of their value at the Canadian border contribute over 54 per cent to the value of exported products of goods-producing industries. Finally, it is interesting to note that commodities with a high ratio of total transportation costs to purchasers' price belong to all stages of production; namely, raw materials, semi-manufactured and manufactured goods.

All of the evidence indicates that exports are more "transport cost intensive" than are domestic sales. That is, the transport cost embodied in the purchasers' price of exports is greater than in domestic sales. This is of interest because of the importance of exports to the Canadian economy generally. In 1974, goods-producing industries exported approximately 26 per cent of their output, and 78 per cent of the income to grain producers came from export markets (see Tables A.2 and A.4, Appendix A).

As far as transportation intensity of exports is concerned, many Canadian industries are geared primarily for exports. The strength of Canada's agriculture, mines and minerals, forest and related industries, transportation equipment industries, machinery industries, etc., is based on export sales (see Tables A.3 and A.4, Appendix A). For many of these export-oriented industries, world markets are extremely competitive and transport costs have a significant bearing on their ability to penetrate foreign markets. Because of the importance of exports to Canadian industries, Canada must respond to market forces often beyond its control. It is for this reason that the costs of production, including total transportation cost, are of critical importance in determining the ability of producers to penetrate export markets.

It is noteworthy that estimated transport cost ratios in this study are likely to be biased for two reasons:

1. The data used in the input-output tables do not include transportation costs relating to private (not-for-hire) trucking. Costs relevant to private trucking are treated in the input-output framework as production inputs of the industry (e.g., gasoline and diesel fuel for owned trucks are shown as inputs into bakeries, retail trade, etc.). This treatment of private trucking costs understates the

total transportation costs and introduces a downward bias in transportation ratios.[12]

2. Transport costs for some commodities or groups of commodities are subsidized by governments. For instance, two specific programs provide for a substantial reduction in freight charges for Prairie grains:

   (a) the Livestock Feed Assistance Act, and
   (b) the Crow's Nest Pass Agreement.

The first program was established by the federal government to assist farmers in developing livestock enterprises in eastern Canada and British Columbia. It subsidizes the transportation costs of feed grains from the Prairie provinces to the eastern provinces and British Columbia.

The second program provides for a substantial reduction in freight charges for the shipment by rail of grains to be exported.[13]

Transport costs thus constitute a substantial proportion of the value of exports at the Canadian border and the transportation cost issue should therefore be a major concern to both producers and government(s) in their efforts to maintain and expand exports.

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12. An attempt to estimate the size of private trucking and to indicate the magnitude of underestimation of transport cost ratios is presented in the next section.

13. Grain shipped for domestic non-livestock use does not receive the Crow's Nest Pass rates.

Part IV

ESTIMATION OF PRIVATE TRUCKING REVENUES

In the preceding section, average transportation charges in goods-producing industries were presented and discussed in an attempt to assess, by industry and commodity group, the contribution of transportation costs to the price competitiveness of Canadian industry. It was pointed out that one source of underestimation of transportation charges was the lack of data relating to private trucking.[14]

Evaluating the role of private trucking in the motor-carrier industry is difficult because statistical data are not collected for this segment of the industry. Thus, direct estimates of the size of Canadian private trucking operations are not available. Nevertheless, such estimates are required to assess the impact of transportation charges on the price competitiveness of goods-producing industries. Towards this end, an attempt to estimate the size of private trucking has been undertaken. The methodology and the resulting estimates are presented and discussed in this section.

The methodology developed for achieving this objective was constrained by three sets of parameters. First, it was decided that the entire estimation would be based upon existing published and unpublished data of Statistics Canada. It would also be based on the latest year for which relevant information was available in the input-output tables. Second, the basic data on each industry and related information were taken directly from, or estimated on the basis of, Statistics Canada sources. Third, an approach was developed which would allow existing relationships in the input-output tables to be used in estimating private and for-hire trucking activity separately by industry.

Based on this methodology, it was possible to produce estimates of private trucking by industry in order to obtain an overall view of the trucking industry in Canada. This was achieved by using data relating to

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14. Private trucking is an operation undertaken by non-transport firms for moving their own goods. In general, these firms are prohibited from hauling non-company freight.

physical quantities of gasoline and diesel fuel consumed by the trucking industry and corresponding operating revenues in 1974 and 1975. Based on this quantitative information and conversion tables,[15] the physical quantities of gasoline and diesel fuel were converted into BTUs (British Thermal Units). This conversion allows the combination of different energy commodities into a common unit (Table 7). Knowing the total amount of BTUs consumed and the total operating revenue, a conversion factor is derived to indicate the BTUs required to produce one thousand dollars in trucking revenue.

The conversion factor for Classes IV and V was estimated in the following way. First, the rates of change of the conversion factors from Class I to Class II and from Class II to Class III were calculated to be 21.90 and 19.45 per cent respectively, with a difference of 2.45 percentage points. Second, it was assumed that the percentage change of conversion factors from Class II to III and from Class II to Classes IV and V has the same percentage difference; namely, that the conversion factor of Class III declined by 17 per cent. On the basis of this assumption, the conversion factor for Classes IV and V was calculated.

Ideally, input-output relationships for the year 1975 would be matched with data for fuel and operating revenues. However, the latest year for which input-output tables are available is 1974. As a result, it was necessary to develop a technique linking these two sets of data in order to produce the conversion factor and related estimate of revenue from private trucking for 1974. A description of this procedure follows.

First, the amount of BTUs necessary for generating the operating revenue for for-hire trucking in 1974 was calculated:

$$\frac{67,120.36215}{3,023} = \frac{X}{2,966}; \quad X = 65,854.774$$

where 67,120.36215 = thousands of million BTUs consumed in for-hire trucking in 1975

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15. The conversion of gasoline and diesel fuel into BTUs is based on tables which indicate that: 1 million imperial gallons of gasoline generate 140.1 thousand million BTUs and 1 million imperial gallons of diesel generate 154.4 thousand million BTUs. See Federal Energy Administration Office of Energy Information and Analysis, June 1977.

Table 7

Fuel Consumption and Operating Revenue,

For-Hire Trucking, 1975

	Class I	Class II	Class III	Class IV, V
Gasoline (gal.s)	33,212,663	24,738,182	40,099,542	n/a
Diesel (gal.s)	141,760,146	65,886,985	46,832,689	n/a
BTUs (thousand millions; gasoline)	4,653.094086	2,575.244746	5,617.945834	
BTUs (thousand millions; diesel)	21,887.776654	10,172.95048	7,230.967181	
Total BTUs (thousand millions)	26,540.86062	12,748.19552	12,848.91302	14,982.39299[a]
Operating revenue ($000,000)	1,532	574	466	451[b]
Conversion factor	57.722	45.026	36.267	30.102[a]

Source: Statistics Canada, Motor-Carriers, Freight and Household Goods Movers, cat. no. 5322, 1975.

[a] Estimate

[b] Source: Statistics Canada, Service Bulletin, cat. no. 53-006, vol. 7, no. 2, 1975.

3,023 = millions of dollars for operating revenue, for-hire trucking, 1975

2,966 = millions of dollars of operating revenue, for-hire trucking, 1974 (Source: Statistics Canada, 1975, cat. no. 5322, Motor-Carriers Freight and Household Goods Movers)

X = thousands of million BTUs required to generate the operating revenue in for-hire trucking in 1974

Second, the total operating revenue generated by for-hire trucking in 1974 is $3,299.6 million, as compiled in the input-output tables of Statistics Canada.[16] Therefore, for consistency reasons, the amount of BTUs necessary for generating this operating revenue is calculated:

$$\frac{65,854.774}{X} = \frac{2,966}{3,299.6}; \quad X = 73,261.773$$

Then, the operating revenue appearing in the input-output tables had to be divided by the amount of BTUs used in 1974 by for-hire trucking for calculating the conversion factor for 1974.[17]

$$\frac{3,299.600}{73,261.773} = 45.038$$

Multiplying BTUs in the thousand millions by this conversion factor produced operating trucking revenue (in thousands of dollars).

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16. The discrepancy in operating revenue between published data and input-output tables is due mostly to the fact that the survey which provides information on trucking does not cover completely the for-hire trucking industry (e.g., the SIC is used, along with other information, to define the limits of the survey universe, and part of the transport activities by truck do not fall within these limits).

17. This conversion factor is the same as that for 1975.

The calculation of this conversion factor is the principal link in obtaining an estimate of operating revenue for private trucking. Unpublished data were made available by Statistics Canada relating to the physical quantity of gasoline and diesel fuel consumed in 1974 by industry. Converting these physical quantities into BTUs and summing them results in the actual total amount of BTUs consumed by industry. Multiplying total BTUs by the conversion factor

Table 8

Estimates of Private Trucking Revenue
by Industry, 1974

Industry	Operating revenue ($000)
1. Forestry	1,000,129
2. Food & beverage	554,845
3. Tobacco products	3,624
4. Rubber & plastics products	12,282
5. Leather	3,777
6. Textile	9,981
7. Knitting mills	2,634
8. Clothing	10,752
9. Wood	334,380
10. Furniture & fixtures	17,288
11. Paper & allied	67,200
12. Printing & publishing	25,199
13. Primary metal	67,541
14. Metal fabricating	81,130
15. Machinery	24,920
16. Transportation equipment	84,557
17. Electrical products	11,629
18. Non-metallic mineral products	251,103
19. Petroleum & coal products	5,748
20. Chemical & chemical products	49,531
21. Miscellaneous manufacturing	20,932
Total	2,639,182

generates total operating revenue for private trucking in 1974, as shown in Table 8.[18]

For the remaining goods-producing industries and retail and wholesale trade, data relating to physical quantities of gasoline and diesel are not available. Estimates of operating revenue value of private trucking produced in these industries are generated from data showing the value of gasoline used by those industries in 1974. A slight variation from the approach described above is required in preparing estimates for these industries and the additional steps required are shown in Table 9.

The value of gasoline used by the industries in Table 9 in 1974 is divided by the average producers' price per gallon. The resulting physical quantity estimate of gasoline is then converted into BTUs and multiplied by the conversion factor to generate the operating revenue produced from private trucking in those industries. In the case of retail and wholesale trade, the conversion factor was calculated from information relating to Class III of for-hire trucking in 1975 on the grounds that this category best approximated the relevant characteristics (from the classes for which information is available) to represent the structure of private trucking of these trade sectors.

In the agriculture industry, the physical quantity of gasoline used by trucks has been used (see Table 9) in estimating the value of private trucking revenue generated in this industry. Direct estimates of private trucking have not been made in the fishing, hunting and trapping industries, principally because of the difficulty in determining the proportion of total gasoline consumed by these industries that is used for purposes other than trucking.

In order to apportion total trucking services by industry, the estimates of Tables 8 and 9 were combined and reallocated to the goods-producing industries. This was done by assigning the estimates of private trucking revenue of Tables 8 and 9 (except wholesale and retail trade) to commodities and then to the industries whose production they constitute. An industry may use its trucks to pick up raw

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18. I wish to acknowledge my considerable debt to F. Bordé, Structural Analysis Division, Statistics Canada, who developed these estimates for the purpose of this study.

Table 9
Estimates of Private Trucking Revenue, 1974

	Agriculture	Metal mines	Mineral fuels	Non-metal mines & quarries	Wholesale trade	Retail trade
1. Value of gasoline at producers' price[a] ($000,000)		1.328	6.975	2.166	80.762	62.117
2. Producers' price per gallon		0.26[b]	0.26	0.26	0.26	0.26
3. Gallons of gasoline consumed in 1974 (1:2), ($000,000)	87.413[c]	5.107	26.826	8.330	310.62	238.91
4. BTUs ($000,000,000)	12,246.46	715.49	3,758.32	1,167.03	43,517.86	33,471.50
5. Conversion factor	45.038	45.038	45.038	45.038	36.26[d]	36.26
6. Operating revenue in 1974 ($000,000)	552	32	169	52	1,578	1,214

Sources: [a] Statistics Canada, input-output tables.
[b] Statistics Canada, Petroleum Refineries, 1975, cat. no. 45-205.
[c] Statistics Canada, Input-Output Division.
[d] This conversion factor is based on operating revenue and total BTUs of Class III in 1975 (Table 7).

materials from suppliers and transport them to its own plant or factory, to transport semi-finished or finished goods within its own manufacturing or assembly operations, or to deliver its own output to purchasers who may be other industries, wholesalers, retailers or final buyers. In the absence of data, it has been assumed that the industries of Table 8 and the primary industries of Table 9 use their trucks for one of the two latter purposes. The estimated value of private trucking has therefore been assigned to commodities in the proportion of the output produced by industry.

The amount of retail and wholesale costs associated with each commodity is estimated in the input-output tables. Private truck transport costs associated with retailing and wholesaling activity have been assigned to commodities by assuming that private trucking constitutes a constant proportion of these costs.

These two sets of estimates provide the total private trucking costs assigned to commodities and ultimately converted to producing industries.

In addition, for-hire trucking costs (described as transport margins) are estimated for commodities in the input-output tables. To these have been added the for-hire truck transport costs used directly by industries which have been assigned to commodities by distributing them over each industry's output in proportion to the commodities produced, in the same manner as for private trucking.

These techniques assign all truck transport costs, whether for-hire or private, to commodities and then to the industries which produce them, thus enabling their comparison. The final detailed results by industry group and by commodity group are presented in Tables B.1 and B.2 respectively in Appendix B. A summary of these findings is presented in Table 10. This table indicates the importance and contribution of private trucking to the motor-carrier industry.

Furthermore, ratios of private trucking costs to output valued at producers' prices at the high level of commodity aggregation (27 groups) are shown in Table 11.

Table 10

Estimates of Trucking Operating Revenues, 1974

	Private ($000)	For-hire ($000)	Total ($000)	Private share of total (%)
1. Primary industries	1,907,186	374,203	2,281,389	84
2. Manufacturing	4,318,421	2,087,296	6,405,717	67
Sub-total	6,225,607	2,461,499	8,687,106	72
Unallocated operating revenue	10,575	838,101	848,676	1
Total	6,236,182	3,299,600	9,535,781	65

Source: Table B.1, Appendix B.

The transport cost ratios of Table 11 indicate the magnitude of estimated average private trucking transportation costs by commodity group. Examination of this table and an overall comparison with Table A.4, Appendix A, indicates that, for many commodity groups, private trucking costs are as important as the transportation charges by all other modes of transport.

Table 12 provides additional evidence of the importance of private trucking in terms of its contribution to total transport services produced in 1974.

Examination of Tables 10 and 12 and of Appendix B reveals some interesting highlights:

- total truck transport costs exceeded $9.5 billion in 1974;
- private trucking accounted for 65 per cent of the total trucking services produced in 1974 and this contribution increased to 72 per cent for the goods-producing industries;

Table 11

Private Trucking Average Transportation Charges

in Commodity Groups, 1974

Commodity group	Total transport costs a) embodied directly in production b) from producers to purchasers as a percentage of output valued in producers' price
1. Grains	6.54
2. Other agricultural products	6.65
3. Foresty products	38.37
4. Fishing & trapping products	0.93
5. Metallic ores & concentrates	0.73
6. Mineral fuels	1.94
7. Non-metallic minerals	4.40
8. Meat, fish & dairy products	5.40
9. Fruit, veg., feed, misc. food products	5.98
10. Beverages	6.00
11. Tobacco & tobacco products	5.29
12. Rubber, leather, plastic fab. products	3.30
13. Textile products	2.36
14. Knitted products & clothing	7.78
15. Lumber, sawmill, other wood products	9.22
16. Furniture & fixtures	5.48
17. Paper & paper products	1.71
18. Printing & publishing	2.10
19. Primary metal products	1.70
20. Metal fabricated products	2.70
21. Machinery & equipment	3.44
22. Autos, trucks, other transportation equipment	2.21
23. Electric & communications products	2.68
24. Non-metallic mineral products	10.37
25. Petroleum & coal products	4.62
26. Chemicals, chemical products	3.41
27. Misc. manufactured products	4.68

Source: Statistics Canada, input-output models.

- private trucking contributed 67 per cent to the total truck transport cost for the manufacturing industries (industries 7 to 26 in Table B.1, Appendix B);

- private trucking accounted for 45 per cent of the total transport services produced by all modes of transport in 1974; and

- any calculation of average transportation charges in the goods-producing industries that omits private trucking significantly understates transport costs.

Table 12

Operating Revenue by Transportation Mode

Transportation mode	Operating revenue ($000,000)	Percentage share of total
1. Railway[a] (freight)	2,141.72	15.62
2. Air carriers[b] (freight)	99.95	0.73
3. Water transportation[c]	1,048.18	7.64
4. Pipelines[d]	884.97	6.46
5. Trucking		
a) for-hire[e]	3,299.60	24.07
b) private[f]	6,236.18	45.48
Total	13,710.60	100.00

Sources: [a] Statistics Canada, Railway Transport, cat. no. 52-207, Table 8, 1977.
[b] Statistics Canada, Air Carrier Financial Statements, cat. no. 51-206, Table 2, 1974.
[c] input-output tables (includes a small portion of revenue from passenger services)
[d,e] input-ouput tables
[f] estimate of this study

These estimates of the magnitude of private trucking activity in Canada have been developed on the basis of certain restrictive assumptions and a methodology conditioned by the limited availability of data. Thus, the estimates may be interpreted as indicating orders of magnitude. In these circumstances, it may be useful to review both the assumptions and the shortcomings relating to the data. As a by-product of this review, certain directions for further research to improve the estimates presented in this study are identified. While it does not appear possible to determine the magnitude of biases in the estimates, the direction of their impact can be indicated. Toward this end, the following data limitations and assumptions are discussed:

1. Direct estimates have not been made for the fishing, hunting and trapping industries (Tables 8 and 9) because of data limitations.

2. Estimates for the retail and wholesale trade, agriculture, metal mines, mineral fuels and non-metal mines and quarries industries have been made solely on the basis of gasoline consumed by these industries. Information on diesel fuel consumption in these sectors is not available.

Both of these influences clearly exert downward pressure on the resulting estimates.

3. In the process of estimation, assumptions have been made which may have resulted in further biases in the overall estimates. The most critical of these assumptions are likely to be the following:

   - Calculation of the conversion factor for the goods-producing industries is based on the assumption of similar structures for both private and for-hire trucking. In the case where a specific class or combination of classes would be selected (from the 1975 data of Table 7) as representing the structure of private trucking, the magnitude of the conversion factor would be affected. The effect on the overall estimates would be positive or negative depending on the selected class (see Table 7).

- In deriving the conversion factor for both retail and wholesale trade, it was assumed that Class III of for-hire trucking is the most appropriate class to represent private trucking. Again the overall estimates may be affected in either direction depending on the class selected for calculating the conversion factor.

- Estimates for manufacturing and forestry (Table 8) have been made on the assumption that the total amount of gasoline and diesel fuel was used for trucking purposes. This obviously introduces an upwards bias in the overall estimates, particularly in forestry.

All in all, this evidence shows that any calculation of average transportation costs in goods-producing industries that does not take private trucking into account significantly underestimates transport costs. Refinements of the methodology and data base can be expected to give rise to improved estimates of private trucking activity. This discussion indicates the direction in which refinements could be made.[19]

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19. The methodology of this study can be duplicated to provide estimates of private trucking activity for subsequent years (1975, 1976, etc.) as soon as the input-output tables for these years are available.

Part V

IMPACT OF CHANGES IN TRANSPORTATION CHARGES ON THE PRICE COMPETITIVENESS OF GOODS-PRODUCING INDUSTRIES

This analysis focusses on whether and how changes in transportation costs affect output prices and consequently the competitiveness of goods-producing industries. The price version of Statistics Canada's input-output model provides a suitable mechanism for investigating and measuring the effects of such changes. A prerequisite to a clear understanding of the empirical results is an appreciation of the model's limitations.

The model belongs to the family of cost-push models and operates on the assumption that each industry passes on, in terms of higher output prices, any cost increase it faces and maintains its profit margins as a constant proportion of the new output prices. Furthermore, the structure of each industry is described by a set of fixed coefficients, so the model does not allow for input substitution. In addition, the response of the industry to a change in cost is assumed to occur immediately. As a result, the model is unable to describe the time sequence in the propagation of price changes.

It seems obvious that many sectors/markets of the economy are unlikely to behave in strict accordance with the assumptions of the model. Industries may, in fact, absorb some cost increases in the form of reduced profits. Various sectors of the economy may differ in the speed with which they respond to cost changes. In many industries, such changes may take place gradually and, in a wide range of goods-producing industries, producers will indeed make substitutions for certain inputs in response to price change.

Nevertheless, the purpose of this investigation is to indicate an order of magnitude and to comprehend the consequences of changes in transport costs on the price of commodities of goods-producing industries. For this purpose, the price model provides an appropriate tool because it is based on information relating to the structure of the whole economy. It is in this context that the price model has been used to measure the impact and consequences of significant changes in transport costs on prices and the price competitiveness of goods-producing industries, though it is realized that, on account of the simplifying assumptions of the model, caution is required in interpreting the results.

Two simulations have been performed. In the first, transport cost was treated as exogenous and its effect on industry selling prices and commodities was calculated. The second simulation, in addition to treating transport cost as an exogenous variable, permitted interaction with wages and salaries. In other words, this simulation allowed for induced changes in the cost of labour. Increased prices of industry output are reflected in the prices of consumer goods. Labour is assumed to respond to these higher prices by demanding higher wages, which in turn will cause further increases in production costs.

In both simulations, an autonomous increase of 50 per cent in transportation charges by all modes of transportation (including pipelines) is assumed and the results indicate the impact of this increase on prices.[20] The results of both simulations are presented in some instances:

(a) for purposes of comparison; and

(b) to indicate the impact of changes in transportation charges with wage-salary interaction as well as the impact of such changes when wage-salary interaction is not possible (e.g., in the case of wage controls).

The analysis concentrates, however, on the second simulation which allows induced changes in labour costs. Results obtained from the simulation involving changes in transport charges provide two major sets of information. The first set indicates the impact of the above-mentioned changes in transport charges on particular aggregate price indexes. More specifically, the results measure the impact of these changes on the Consumer Price Index (CPI), its major components and a variety of gross national expenditure and final-demand price indexes. The second set of information indicates the impact of changes in transport charges on industry selling prices and the prices of individual commodities at a disaggregated level; namely, 191 industries and 595 commodites.

The inflationary impact of increases in transport charges on the whole economy is best illustrated by their effect on the CPI and other selected aggregate price

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20. In both simulations, the prices of imports remain unchanged.

indexes. A summary of the impact of the above-mentioned transport cost changes on the CPI, its major components and selected final-demand price indexes is displayed in Tables 13 and 14.

Table 13

Impact of a 50 Per Cent Increase in Transportation Charges on the Consumer Price Index

Consumer Price Index	Without interaction on wages and salaries (% increase)	With interaction on wages and salaries (% increase)
CPI	2.4	4.2
CPI Components		
Food	2.9	4.8
Non-Food	2.2	3.9
housing	1.7	3.5
clothing	2.1	4.3
transportation	3.8	5.2
health	1.9	4.0
recreation, education, and reading	1.9	3.9
tobacco and alcohol	1.3	2.5

Source: Statistics Canada, price-model simulations.

An examination of the results of Table 13 indicates that the effect of these transport cost increases on the overall rate of inflation is substantial. The CPI rises by 4.2 per cent when interactions with wages and salaries are taken into consideration. (This impact is almost double the increment of 2.4 per cent resulting from the first simulation.) It is interesting to observe that the food element is more transport cost sensitive than the non-food component of the CPI. Of the non-food elements, transportation, which increased by 5.2 per cent, is the most affected. This is to be expected given the nature of this simulation. The increase in the other non-food elements of the CPI ranges from 2.5 per cent (tobacco and alcohol) to 4.3 per cent (clothing).

It is of interest to determine independently from transport cost changes the magnitude of labour cost increases that would generate an equivalent rise in the CPI; namely, 4.2 per cent. Toward this end, the model has been simulated in order to investigate the impact of labour cost changes on all other prices/price indexes (detailed results are not shown). The results indicate that an equivalent effect would be generated by labour cost (wages, salaries and supplementary income) increases of approximately nine per cent. This analysis shows that a 5.5 per cent increase in transport charges or a one per cent increase in labour cost would produce an effect of identical magnitude on the overall rate of inflation.

Table 14

Impact of a 50 Per Cent Increase in Transportation Charges on Final Expenditure Price Indexes

Price indexes	With interaction on wages and salaries (% increase)
1. Consumer expenditures	4.2
2. Machinery and equipment	3.3
3. Construction	5.0
4. Government current expenditure	1.7
5. Export price	6.9
6. Gross domestic product (at market prices)	3.7
7. Total final expenditure	4.3
8. Average price of commodities	4.7

Source: Statistics Canada, price-model simulations.

The impact of increases in transportation charges on selected price indexes is shown in Table 14.

Comparing Tables 13 and 14, it may be observed that, on the whole, final-demand price indexes were affected similarly by the transportation cost changes with the CPI and its major components. A striking exception is the

export price index, which rose by 6.9 per cent, 2.7 percentage points more than the CPI and the Consumer Expenditure Price Index. That is, export prices are more sensitive to changes in transport charges than are domestic consumer prices.

In view of the importance of foreign trade to the Canadian economy, the impact of transport cost changes on export prices is of particular interest. The impact of these changes on selected industries and commodities is presented in Tables 15 and 16. All the listed industries and

Table 15

Impact of a 50 Per Cent Increase in Transportation Charges on Export-Oriented Goods-Producing Industries

Industries	Without interaction on wages and salaries (% increase in industry selling price)	With interaction on wages and salaries (% increase in industry selling price)
1. Iron mines	2.8	5.5
2. Coal mines	2.6	5.2
3. Fish products	2.5	4.9
4. Sawmills	4.3	7.1
5. Miscellaneous wood	4.1	6.8
6. Pulp & paper	4.7	7.4
7. Aluminum smelting & refining	2.8	4.7
8. Aircraft & parts manufacturers	1.2	4.2
9. Motor vehicle parts & accessories manufacturers	2.1	4.6
10. Manufacturers of mixed fertilizers	6.7	8.8

Source: Statistics Canada, price-model simulations.

commodities are export-oriented in the sense that they export over 50 per cent of their output.

Table 15 shows that changes in industry selling prices of export-oriented industries range from 4.2 per cent to 8.8 per cent. The same patterns of price increases of Table 15 appear in export-oriented commodities of Table 16 in response to the same transport cost increases. Most of the price increases in these two tables are higher than the average price increase of commodities (see Table 14).

Careful examination of all results displayed in Tables 15, and those not shown, reveals an interesting response of price increases relating to labour-intensive industries/commodities. A differential price response associated with the two simulations is marked. The price

Table 16

Impact of a 50 Per Cent Increase in Transportation Charges on Export-Oriented Commodities

Commodities	With interaction on wages and salaries (% increase in commodity price)
1. Iron ores & concentrates	5.5
2. Fish products	4.8
3. Lumber & timber	7.1
4. Pulp	7.4
5. Newsprint paper	7.4
6. Nickel in primary form	5.1
7. Aluminum & aluminum alloys, cast	5.5
8. Specialized aircraft & equipment	4.2
9. Motor vehicle accessories, parts and assemblies	4.4
10. Fertilizers	5.6

Source: Statistics Canada, price-model simulations.

increases of output in response to the second simulation (which includes wage-salary interaction) are significantly higher than the price increases caused by the first simulation (which excludes wage-salary interaction). For example, Table 15 shows that aircraft and parts manufacturers' prices rose by only 1.2 per cent when the wage interaction is excluded. By comparison, they jumped to 4.2 per cent in the second simulation when wage-salary interaction is taken into account. Thus, it may be concluded that even industries/commodities which are not substantial direct users of transportation are affected by transport cost changes when interactions with labour cost are taken into account.

The preceding analysis dealt with whether and the extent to which changes in transportation charges affect prices. Another important question relates to the extent to which these price changes affect both domestic and international trade flows. When the price changes are substantial and constitute a significant portion of a commodity's value, the effect on trade flows seems obvious. For commodities for which price changes are small, the effect on trade flows cannot be determined in a general study. The impact of small price changes on trade flows of these commodities will be the combined effect of consumers' reactions to these price changes, competition and, in the case of foreign trade, other international forces. However, it is clear from other evidence (e.g., labour disputes, etc.) that industries/firms are sensitive to even slight changes in their costs of production because they fear that slightly higher commodity prices may affect their market position.

Given the degree to which the transportation industry relies on crude oil products, the analysis is taken a step further to include a look at the impact of oil price increases on transportation charges. In addition, a comparison is made between the impacts of changes in transportation charges and changes in crude oil prices on the overall rate of inflation.

For this purpose, a simulation has been performed with the price mode. A 50 per cent increase in the price of crude oil (domestic and imported) is assumed. The simulation results are displayed in Tables 17 and 18. These results indicate the sensitivity of transportation charges to crude oil price changes. A 50 per cent increase in crude oil prices results in an increase in transportation charges ranging from about five per cent in truck transport to about seven per cent in air transport. Although these estimates

Table 17

Impact of a 50 Per Cent Increase in Crude Oil Prices on Transportation Charges

	With interaction on wages and salaries (% increase in industry selling price)
1. Air transport	7.1
2. Water transport	7.0
3. Railway transport	5.9
4. Truck transport	5.3

Source: Statistics Canada, price-model simulations.

are unlikely to constitute precise reflections of reality because of the previously mentioned limitations of the model, they do provide orders of magnitude that may be useful to policy makers and regulators of the transport industry considering changes in transportation charges in response to oil price increases.

The inflationary impact of the aforementioned crude oil price increase on the economy as a whole is best demonstrated by its effect on the selected price indexes of Table 18.

An examination of Table 18 and an overall comparison with Tables 13 and 14 indicate that prices are more sensitive to increased transportation charges than to oil price increases. The inflationary impact on the whole economy of a 50 per cent increase in transportation charges was larger than the impact of an equivalent oil price increase.

This higher sensitivity of prices to changes in transportation charges than to oil price increases is not surprising. Transportation cost makes up a higher percentage of total industry costs than the cost of crude oil products, as Table 19 indicates.

Table 18

Impact of a 50 Per Cent Increase in Crude Oil Prices on Selected Price Indexes

Price indexes	With interaction on wages and salaries (% increase)
1. CPI	2.9
CPI Components	
Food	2.8
Non-Food	3.0
housing	3.0
clothing	2.3
transportation	4.6
health	2.4
recreation, education and reading	2.2
tobacco and alcohol	1.5
2. Consumer expenditure	3.2
3. Total final expenditure	3.4

In addition, it may be noted that Table 19 shows only the transportation cost embodied directly and indirectly in the production cost, whereas the major contribution of transportation charges to the final commodity prices appears as delivery transportation cost from the producer to the purchaser (see Table A.2, Appendix A). Therefore, identical percentage increases in transport charges and crude oil prices will not have equivalent effects on industry costs and the overall rate of inflation.

However, the effect of oil price increases in the preceding analysis may be underestimated. A major reason for this is that a significant real price increase for crude oil has occurred between 1974 and 1979. Therefore, it should be expected that crude oil products would constitute a higher percentage of total industry costs in 1979 than in

Table 19

Transport Charges and Crude Oil Products
Embodied in Production Cost

Industry group	Direct and indirect transportation charges embodied in production cost as a percentage of output valued in producers' price	Value of crude oil products[a] embodied in production cost as a percentage of output valued in producers' price
1. Agriculture	3.44	3.67
2. Forestry	13.17	4.07
3. Fishing, hunting & trapping	2.36	5.51
4. Metal mines	2.78	1.99
5. Mineral fuels	0.79	0.42
6. Non-metal mines & quarries	2.96	2.68
7. Food & beverage	4.86	2.17
8. Tobacco products	3.64	2.08
9. Rubber & plastics products	3.19	1.43
10. Leather	2.92	0.95
11. Textile	2.64	1.41
12. Knitting mills	2.26	1.14
13. Clothing	1.91	0.72
14. Wood	7.34	2.20
15. Furniture & fixtures	3.66	1.01
16. Paper & allied	6.81	3.44
17. Printing & publishing	3.57	1.23
18. Primary metal	3.96	1.52
19. Metal fabricating	3.62	0.95
20. Machinery	3.09	0.71
21. Transportation equipment	2.96	0.73
22. Electrical products	3.07	0.77
23. Non-metallic mineral products	5.90	3.58
24. Petroleum & coal products	4.82	0.70
25. Chemical & chemical products	5.45	3.94
26. Misc. manufacturing	2.77	0.95

Source: Statistics Canada, input-ouput models.

[a] Crude oil products include: motor gasoline, aviation gasoline, fuel oil, benzene, toluene and xylene, butane, propane and other liquid petroleum gases and naptha.

1974.[21] This suggests a trend in which the relative price structure in Canada is becoming increasingly sensitive to crude oil price increases. In addition, the model operates on the assumption that each industry maintains its profit margins as a constant proportion of its output price by passing on, in terms of higher output prices, any increase in cost. However, recent experience relating to the profits of the oil industry indicates that this industry has not behaved in accordance with this assumption. Its profit increases were in excess of the level required for maintaining constant profit margins. If the model had taken into account the apparent inclination of integrated oil companies to use higher cost as an opportunity to introduce proportionally higher prices, there is no doubt that the price impact of crude oil price increases would be higher than embodied in estimates presented here.

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21. In the short run, demand for crude oil products can be assumed to be inelastic.

Part VI

SUMMARY AND CONCLUSIONS

This study is concerned with indentifying and assessing the magnitude of transport costs in the production and distribution of Canadian goods and the extent to which these costs influence the price competitiveness of Canadian goods-producing industries.

Based on input-output tables and structural economic models of Statistics Canada, a framework is developed. Along with the 1974 input-output tables and alternative modifications of the structural economic models it provides the basic ingredients to examine general aspects of transportation costs and their implications for the goods-producing sector in Canada.

The study deals with: (a) the contribution of transport costs to aggregate costs of production and final selling prices by industry/commodity; (b) the significance of transport costs embodied in the value of exports at the Canadian border; and (c) the relative magnitude of transport charges relative to other major cost elements in the production process. In addition, it estimates private trucking revenues in order to indicate the underestimation of average transport costs due to the lack of data relating to this segment of the motor-carrier industry. Finally, the effects of changes in transportation charges on industry/commodity selling prices are examined.

Empirical findings show that transport costs contribute significantly to the production and distribution costs of goods-producing industries. Transport charges embodied directly and indirectly in the production of domestically produced goods appear to be a significant proportion of aggregate costs of production for some industries and commodities. Nevertheless, a wide range of variation in their relative importance is observed. The proportion of transport costs to total production costs ranges from below one per cent to over 13 per cent for primary industries and from less than two per cent to more than 11 per cent for manufacturing. The evidence indicates that the transport costs embodied in production constitute a substantial cost element in the aggregate production costs. As shown in this study, even without considering the additional freight cost burden from the producer onward, average transport costs in goods production exceed those related to utilities, advertising and promotion, retail and wholesale margins, etc.

Findings of the study indicate that delivery transport costs (transportation charges from the producer to the purchaser) as a proportion of delivered price (producers' value plus delivery charges) are relatively low, on the averages disclosed by industry/commodity group for domestic sales. However, there is substantial variation among individual industries/commodities. Exports display a much higher ratio of delivery cost to delivered price at the Canadian border relative to domestic sales. In addition, the results show that when transportation costs embodied in the production process are considered together with the transportation charges associated with the distribution of output, total transport costs constitute a significant portion of purchasers' price for both domestic sales and exports.

The empirical results relating to total transport costs show that 28 of 137 three-digit SIC industries have total transport costs exceeding 10 per cent of the producers' value of their output for domestic sales, and 123 of 521 domestically distributed commodities have total transport costs exceeding 10 per cent of their purchasers' price. Comparable figures are much higher for exports. In 35 per cent of the 137 goods-producing industries, namely 49 industries, total transport costs relating to exports exceed 10 per cent of the producers' value of output. For 171 commodities, or 32 per cent of all commodity groups, total transport costs exceed 10 per cent of their value at the Canadian border. Finally, nearly 55 per cent of the value of exports of Canadian goods-producing industries is characterized by having 10 per cent or more of their value at the Canadian border made up of transportation charges.

All the evidence in this study indicates that exports are more transport cost sensitive than domestic sales and that transport costs constitute a substantial proportion of the value of exports at the Canadian border. This is of interest because of the leading role of exports in the Canadian economy. The strength of many Canadian industries depends on export sales, and high transportation costs and relatively rapid increases in transportation charges dampen their price competitiveness in foreign markets.

The average transport costs used in the study are based on data which do not take into account transport costs incurred in private trucking. This introduces a downward bias in the calculated transport cost ratios. An estimate

of private trucking transport costs of the study indicates that this bias is significant. Private trucking produced nearly two-thirds of total Canadian trucking services in 1974 and accounted for nearly half of total freight transport services produced by all modes of transportation in that year. This evidence indicates a substantial underestimation of calculated transport cost ratios and provides an indication of the size of the downward bias.

The findings relating to whether and how changes in transportation charges affect output prices and, consequently, the competitiveness of goods-producing industries reveal that commodity prices (particularly prices of export-oriented commodities) and the overall rate of inflation are sensitive to such changes. For instance, a 50 per cent increase in transportation charges raises commodity prices, on average, by 4.7 per cent and the overall rate of inflation by 4.2 per cent. The evidence also indicates that a 5.5 per cent increase in transportation charges or a one per cent increase in labour cost would generate the same effect on the overall rate of inflation. Furthermore, analysis shows that transportation charges are not very sensitive to crude oil price changes and that commodity prices are more sensitive to changes in transportation charges than to similar percentage increases in crude oil prices.

In general, the current study provides evidence that average transport costs are significant for both domestic sales and exports. With respect to exports, the results indicate that transport cost is an area that merits special attention from both producers and government(s). This observation is given added weight when the growing pressures of a worldwide energy crisis are taken into account.

There is no doubt that the transport costs associated with moving products from distant domestic sources to the Canadian border even before reaching foreign markets strain the ability of exporters to compete effectively.

All the estimates presented in this study are not to be interpreted as precise reflections of reality. Nevertheless, they can be viewed as orders of magnitude useful for decision makers in formulating transportation/economic policies which recognize transport costs as a factor in Canada's competitive position, particularly in foreign markets.

APPENDIX A

Table A.1

Principal Statistics in Goods-Producing Industries, 1974

Industry group	Total output		Exports		Employment		Value added at market prices	
	$000	% share of total	$000	% share of total	Number of employees	% share of total	$000	% share of total
A. Primary Industries								
1. Agriculture	9099726	8.23	2737750	9.58	466531	19.02	5350987	12.35
2. Forestry	2497769	2.25	52629	0.18	63554	2.59	1137603	2.63
3. Fishing, hunting & trapping	326203	0.30	108123	0.38	26482	1.08	220236	0.51
4. Metal mines	3927367	3.60	1626108	5.69	64093	2.61	2581979	5.96
5. Mineral fuels	5294865	4.78	2691823	9.41	24483	0.99	3070273	7.08
6. Non-metal mines & quarries	1044822	0.95	572954	2.00	21544	0.88	665324	1.54
B. Manufacturing Industries								
7. Food & beverage	15167598	13.72	1254036	4.39	221754	9.04	3676123	8.47
8. Tobacco products	722639	0.65	73806	0.26	9525	0.39	229483	0.53
9. Rubber & elastics products	1955900	1.77	284279	0.99	54182	2.21	824639	1.90
10. Leather	587228	0.53	29353	0.10	26500	1.08	229709	0.53
11. Textile	2538939	2.30	202211	0.71	75740	3.08	955981	2.21
12. Knitting mills	609456	0.55	9802	0.04	25553	1.04	231839	0.54
13. Clothing	2121289	1.91	110208	0.39	102222	4.19	841201	1.94
14. Wood	4085778	3.70	1511709	5.29	107177	4.37	1546227	3.57
15. Furniture & fixtures	1368646	1.24	86935	0.30	52365	2.14	578831	1.34
16. Paper & allied	7836837	7.10	3929074	13.73	130508	5.32	3511231	8.10
17. Printing & publishing	2611621	2.35	74134	0.26	93365	3.81	1419050	3.27
18. Primary metal	8735288	7.91	3250433	11.37	120815	4.93	2508047	5.79
19. Metal fabricating	6127578	5.55	668254	2.34	154060	6.28	2680088	6.18
20. Machinery	3452995	3.12	1094228	3.83	89046	3.63	1459707	3.37
21. Transportation equipment	10975481	9.93	5930578	20.74	171764	7.00	3191446	7.36
22. Electrical products	4789614	4.33	640171	2.24	133093	5.43	2047618	4.72
23. Non-metallic mineral prod.	2371871	2.15	176742	0.62	57607	2.35	1159923	2.68
24. Petroleum & coal products	5353424	4.48	406850	1.42	15990	0.65	565400[a]	1.30
25. Chemical & chemical prod.	4934385	4.47	728892	2.55	79469	3.24	1841481	4.25
26. Misc. manufacturing	1961391	1.77	340081	1.19	65063	2.65	813534	1.88
TOTAL	110498710	100.00	28591163	100.00	2452485	100.00	43337960	100.00

Source: Statistics Canada, input-output tables.

[a] Value added at factor cost

Table A.2

Average Transportation Charges in Goods-Producing Industries, 1974

Industry group	Industry output		Domestic sales				Exports			
	Direct and indirect transportation charges embodied in production cost as a percentage of output valued in		Transportation charges from producers to purchasers (delivery transportation cost) as a percentage of output valued in				Transportation charges from producers to the Canadian border as a percentage of output valued in			
	Producers' price		Producers' price		Delivered price		Producers' price		Delivered price	
	Average	Range	Average	Range	Average	Range	Average	Range	Average	Range
A. Primary Industries										
1. Agriculture	3.44	-	3.70	-	3.57	-	7.23	-	6.74	-
2. Forestry	13.17	-	4.06	-	3.90	-	6.14	-	5.79	-
3. Fishing, hunting & trapping	2.36	-	3.10	-	3.00	-	4.45	-	4.26	-
4. Metal mines	2.78	1.38-5.46	1.42	0.50-6.43	1.40	0.50-6.04	12.44	2.39-21.49	10.81	2.33-17.69
5. Mineral fuels	0.79	0.68-2.79	8.03	6.97-8.12	7.44	6.52-7.51	17.33	16.93-21.43	14.76	14.48-17.65
6. Non-metal mines & quarries	2.96	1.73-5.26	24.68	1.21-88.07	19.79	1.20-46.82	12.72	11.95-43.65	11.19	10.67-30.39
B. Manufacturing Industries										
7. Food & beverage	4.86	1.30-7.12	2.65	1.33-6.13	2.58	1.31-5.77	3.41	1.07-18.45	3.24	1.06-15.58
8. Tobacco products	3.64	2.98-5.31	1.63	1.49-2.11	1.60	1.47-2.06	5.85	4.73-5.93	5.53	4.51-5.60
9. Rubber & elastics products	3.19	2.31-3.87	2.81	1.21-3.89	2.73	1.20-3.75	3.81	3.48-5.95	3.67	3.37-5.61
10. Leather	2.92	2.01-5.17	1.94	1.76-2.81	1.90	1.73-2.73	3.15	0.97-5.00	3.03	0.96-4.76
11. Textile	2.64	1.79-3.04	1.74	1.08-3.76	1.71	1.07-3.63	4.18	1.15-11.00	3.99	1.14-9.91
12. Knitting mills	2.26	2.21-2.26	2.80	2.45-5.05	2.72	2.39-4.80	5.71	3.37-15.22	5.23	3.26-13.21
13. Clothing	1.91	-	3.62	-	3.49	-	4.73	-	4.52	-
14. Wood	7.34	4.55-8.05	5.80	1.64-7.57	5.48	1.61-7.30	10.26	3.00-17.32	9.27	2.91-14.76
15. Furniture & fixtures	3.66	3.22-3.84	3.10	2.52-3.44	3.00	2.46-3.32	1.94	1.16-2.71	1.90	1.15-2.64
16. Paper & allied	6.81	5.72-8.26	4.46	2.54-7.48	4.27	2.48-6.96	4.63	4.09-4.64	4.42	3.90-4.43
17. Printing & publishing	3.57	1.44-3.69	1.87	1.07-1.92	1.83	1.06-1.88	8.72	3.00-8.89	8.01	2.91-8.16
18. Primary metal	3.96	3.02-6.23	3.35	1.33-5.70	3.24	1.32-5.40	3.94	1.17-6.34	3.77	1.16-5.96
19. Metal fabricating	3.62	2.15-4.90	3.14	1.40-4.01	3.05	1.38-3.85	5.68	2.96-7.90	5.36	2.88-7.32
20. Machinery	3.09	2.02-3.52	3.12	2.03-3.39	3.02	1.99-3.28	4.69	2.06-7.02	4.44	2.02-6.56
21. Transportation equipment	2.96	2.26-4.63	1.61	0.86-2.70	1.58	0.85-2.63	1.58	0.89-2.37	1.55	0.88-2.32
22. Electrical products	3.07	2.17-5.45	1.97	1.25-4.04	1.93	1.23-3.88	2.94	1.87-6.57	2.84	1.84-6.17
23. Non-metallic mineral prod.	5.90	3.65-10.12	6.46	3.61-17.69	6.07	3.49-15.03	8.80	3.37-30.20	7.74	3.26-23.19
24. Petroleum & coal products	4.82	4.74-11.07	5.68	5.56-14.47	5.37	5.27-12.64	3.36	3.25-12.38	3.24	3.15-11.01
25. Chemical & chemical prod.	5.45	3.13-11.15	4.60	1.89-24.96	4.40	1.85-19.97	6.70	0.77-12.05	6.21	0.76-10.76
26. Misc. manufacturing	2.77	2.06-3.53	2.49	1.63-4.30	2.42	1.61-4.12	2.74	1.54-6.69	2.65	1.52-6.27

Source: Statistics Canada, input-output models.

Table A.3

Average Transportation Charges in Selected Goods-Producing Industries, 1974

Industries	SIC 1970	Industry output	Domestic sales	Exports	Exports as % share of industry output
		Direct and indirect transportation charges embodied in production cost as a percentage of output valued in	Transportation charges from producers to purchasers as a percentage of output valued in	Transportation charges from producers to the Canadian border as a percentage of output valued in	
		Producers' price	Delivered price	Delivered price	
1. Iron mines	058	5.46	6.04	17.69	58.22
2. Base metal & other metal mines	059	2.12	0.50	8.75	36.33
3. Coal mines	061	2.79	6.04	17.65	87.66
4. Asbestos mines	071	2.71	1.20	10.67	96.15
5. Other non-metal mines	072, 0791, 0792 0794, 0799	1.73	16.62	10.99	60.60
6. Slaughtering & meat processors	1011	4.14	1.89	2.03	5.97
7. Dairy factories	104	6.50	1.60	4.94	3.73
8. Fish products	102	4.19	3.71	1.59	54.84
9. Feed mfgrs.	106	8.35	2.41	4.81	3.85
10. Flour & breakfast cereals	105	7.12	5.77	1.48	14.15
11. Miscellaneous food	1085	4.82	3.26	3.26	6.28
12. Tire & tube mfgrs.	1623	3.87	3.75	3.37	10.15
13. Plastic fabricators, NES	165	2.99	2.33	3.63	18.17
14. Synthetic textile mills	183	2.99	1.68	3.03	9.97
15. Carpet, mat & rug	186	2.72	1.45	9.91	1.67
16. Sawmills	251	8.05	7.30	9.93	51.74
17. Veneer & plywood mills	252	7.31	7.24	2.91	23.62
18. Sash & door & planing mills	254	5.61	1.61	9.71	5.31
19. Miscellaneous wood	259	6.96	5.25	7.52	42.44
20. Household furniture	261	3.84	3.32	1.84	4.85
21. Pulp & paper	271	7.05	5.14	4.43	65.94
22. Printing & publishing	286, 288, 289	3.69	1.88	8.16	2.91
23. Iron & steel	291	4.54	3.38	5.96	12.92
24. Aluminum smelting & refining	295	4.81	5.40	2.53	62.18
25. Other smelting & refining	295	3.08	1.32	3.50	70.51
26. Fabricated struct. metal	302	2.54	1.57	7.32	9.88
27. Metal stamp. press. & coat.	304	4.90	3.40	4.08	5.60
28. Wire & wire products mfgrs.	305	3.62	3.18	6.08	13.32
29. Agricultural implement	311	3.52	2.76	2.79	62.73
30. Misc. machinery & equip. mfgrs.	315	3.17	3.28	6.56	21.69
31. Aircraft & parts mfgrs.	321	2.26	1.49	1.09	62.43
32. Motor vehicle mfgrs.	323	2.65	1.67	1.36	61.71
33. Motor veh. pts & access. mfgrs.	324	3.40	1.54	2.32	59.25
34. Communications equipment mfgrs.	335	2.31	1.42	1.84	23.93
35. Cement mfgrs.	352	4.80	9.44	16.07	7.38
36. Ready-mix concrete mfgrs.	355	8.79	3.49	3.65	1.00
37. Glass & glass products mfgrs.	356	3.65	4.32	5.15	5.60
38. Petroleum refineries	365	4.75	5.27	3.15	7.60
39. Mfgrs. of mixed fertilizers	372	11.15	19.97	10.76	66.22
40. Mfgrs. of industrial chemicals	378	6.30	5.99	6.87	25.59
41. Misc. manufacturing	3992, 3994-3999	2.59	4.12	2.86	22.91

Source: Statistics Canada, input-output models.

Table A.4

Average Transportation Charges in Commodity Groups, 1974

Commodity group	Industry output		Domestic sales					
	Direct & indirect transportation charges embodied in production cost as a percentage of output valued in		Transportation charges from producers to purchasers (delivery transportation cost) as a percentage of output valued in				Total transport costs (a) embodied in production (b) from producers to purchasers as a percentage of output valued in	
	Producers' price		Producers' Price		Delivered Price		Purchasers' price	
	Average	Range	Average	Range	Average	Range	Average	Range
1. Grains	3.44	3.44	10.90	9.18-11.89	9.83	8.40-10.63	10.30	9.04-11.29
2. Other agricultural products	3.47	3.44-4.02	2.66	0.99-10.46	2.59	0.98-9.47	5.80	3.44-13.20
3. Forestry products	12.81	4.51-13.02	4.21	3.16-20.35	4.04	3.06-16.91	16.70	7.47-27.13
4. Fishing & trapping products	2.36	2.36	3.13	3.00-4.00	3.03	2.91-3.85	5.40	5.38-6.59
5. Metallic ores & concentrates	2.73	1.92-5.42	1.92	0.50-9.13	1.89	0.49-8.36	4.13	2.67-14.35
6. Mineral fuels	0.82	0.68-2.79	7.43	3.56-55.53	6.91	3.40-35.70	15.34	9.03-27.01
7. Non-metallic minerals	3.28	0.93-5.63	26.38	12.68-88.30	20.87	11.25-46.89	28.19	2.71-53.50
8. Meat, fish & dairy products	4.69	3.76-6.50	1.83	0.65-6.85	1.80	0.64-6.41	5.96	4.71-8.58
9. Fruit, veg., feed, misc. food prod.	5.18	1.30-8.35	3.62	1.40-14.03	3.49	1.38-12.31	7.76	3.09-18.56
10. Beverage	3.52	3.23-3.98	2.34	1.87-3.70	2.29	1.83-3.57	3.25	1.84-7.66
11. Tobacco & tobacco products	3.65	2.98-5.31	1.63	0.01-2.13	1.60	0.01-2.08	2.46	2.10-5.31
12. Rubber, leather, plastic fab. prod.	3.27	2.01-5.01	2.64	1.00-7.20	2.58	0.99-6.72	5.11	3.04-9.82
13. Textile products	2.66	1.79-3.59	1.71	0.33-14.75	1.68	0.33-12.85	4.05	2.42-16.18
14. Knitted products & clothing	2.00	1.91-2.62	3.66	1.68-5.33	3.53	1.65-5.06	4.27	2.17-5.29
15. Lumber, sawmill, other wood prod.	7.31	4.66-8.25	5.88	1.06-15.74	5.55	1.05-13.60	10.85	5.74-20.51
16. Funiture & fixtures	3.71	3.25-3.85	3.34	2.04-3.90	3.23	2.00-3.75	5.54	4.27-6.15
17. Paper & paper products	6.69	3.53-7.54	4.81	0.62-44.12	4.59	0.61-30.61	9.84	5.69-33.67
18. Printing & publishing	3.60	1.91-4.49	1.77	0.59-3.23	1.73	0.59-3.12	4.97	2.54-6.10
19. Primary metal products	3.90	2.98-5.89	3.15	0.37-23.71	3.05	0.36-19.16	7.11	3.17-14.87
20. Metal fabricated products	3.71	2.72-4.88	3.28	0.44-7.43	3.17	0.44-6.92	6.30	2.95-10.42
21. Machinery & equipment	3.28	2.04-3.75	3.41	1.29-5.55	3.30	1.27-5.26	5.99	3.36-8.71
22. Autos, trucks, other transp. eqp.	3.00	2.26-4.65	1.61	0.72-4.74	1.59	0.70-4.53	4.23	2.06-7.16
23. Elec. & communications prod.	3.00	1.93-5.15	1.96	1.06-6.83	1.93	1.04-6.40	4.25	2.89-7.25
24. Non-metallic mineral products	5.82	3.64-10.00	6.51	2.36-28.24	6.11	2.30-22.02	11.17	5.23-27.16
25. Petroleum & coal products	4.63	1.76-6.38	6.72	0.75-34.80	6.29	0.74-25.81	6.74	5.54-21.97
26. Chemicals, chemical prod.	5.13	3.50-6.30	5.15	0.41-30.00	4.90	0.41-23.07	8.60	4.73-45.97
27. Misc. manufactured products	2.97	2.30-4.21	2.46	0.83-6.29	2.40	0.82-5.92	4.29	2.59-8.37

Source: Statistics Canada, input-output models.

Exports						Exports as % share of output
Transportation charges from producers to the Canadian border as a percentage of output valued in				Total transport costs (a) embodied in production (b) from producers to the Canadian border as a percentage of output valued in		
Producers' price		Delivered price		Purchasers' price		
Average	Range	Average	Range	Average	Range	
7.42	7.15-9.16	6.90	6.67-8.39	7.43	7.22-8.73	78.72
6.37	1.16-30.40	5.95	1.15-23.31	8.54	4.69-30.64	8.70
7.04	2.76-56.12	5.87	2.69-35.95	18.48	13.21-42.73	1.84
4.56	2.81-5.25	4.35	2.73-4.99	6.84	5.21-7.53	32.97
12.06	2.02-21.53	10.49	1.98-17.72	14.78	4.10-24.32	43.15
17.39	7.72-79.48	12.50	7.16-44.28	12.16	5.05-51.79	50.66
18.63	3.63-117.86	14.77	3.50-54.10	19.57	5.86-63.21	53.20
2.52	0.68-21.32	2.40	0.68-17.57	6.80	4.83-32.29	9.08
3.91	0.82-14.01	3.68	0.81-12.29	9.22	5.06-20.73	5.96
5.87	5.32-13.65	5.46	5.05-12.01	9.36	8.82-16.31	12.26
5.93	5.92-6.56	5.69	5.60-6.16	11.17	9.70-11.29	10.18
5.08	0.99-15.80	4.75	0.98-13.65	8.17	3.51-14.04	6.80
4.77	1.35-18.60	4.46	1.33-15.68	7.73	3.73-15.04	6.04
4.97	0.62-17.84	4.65	0.61-15.14	7.10	2.74-18.84	4.53
10.31	2.59-42.79	9.28	2.52-29.97	17.35	9.73-38.07	38.18
2.12	0.90-2.72	2.07	0.89-2.65	5.81	4.22-6.58	5.00
4.57	0.45-20.09	4.35	0.45-16.73	11.47	6.57-23.23	49.86
9.46	0.86-11.56	8.58	0.85-10.37	13.01	2.83-14.92	2.63
3.96	0.32-13.51	3.75	0.32-11.90	7.57	4.05-13.33	38.82
5.92	1.13-23.04	5.54	1.12-18.73	9.33	4.52-22.35	7.76
5.48	0.78-12.23	5.06	0.77-10.89	8.06	4.09-12.77	33.01
1.56	0.53-5.47	1.54	0.53-5.19	4.48	3.14-9.38	58.37
2.98	0.67-17.46	2.85	0.66-14.87	5.71	3.35-18.28	14.25
9.49	1.55-49.88	8.09	1.53-33.28	13.75	4.81-42.77	7.20
3.61	1.75-156.04	3.38	1.72-60.94	7.18	5.60-34.48	10.85
7.94	0.21-62.33	7.11	0.21-38.40	12.47	4.03-46.55	17.92
2.36	0.16-11.33	2.28	0.16-10.18	5.34	3.02-12.00	17.87

Table A.5

Average Transportation Charges, 1974
Selected Commodities

Commodities	Industry output	Domestic sales		Exports		Exports ($000,000)
	Direct and indirect transportation charges embodied in production cost as a percentage of output valued in	Transportation charges from producers to purchasers (delivery transportation cost) as a percentage of output valued in	Total transport costs (a) embodied in production (b) from producers to purchasers as a percentage of output valued in	Transportation charges from producers to the Canadian border as a percentage of output valued in	Total transport costs (a) embodied in production (b) from producers to the Canadian border as a percentage of output valued in	
	Producers' price	Delivered price	Purchasers' price	Delivered price	Purchasers' price	
1. Cattle and calves	3.44	1.32	4.84	4.52	8.32	52.83
2. Other live animals	3.44	2.46	5.99	10.98	15.37	10.72
3. Wheat, unmilled	3.44	8.41	9.04	6.67	7.22	1892.62[a]
4. Barley, oats, rye, corn, grain, NES	3.44	10.63	11.29	8.39	8.73	293.02[a]
5. Vegetables, fresh	3.45	3.64	6.23	4.10	7.57	26.87
6. Oil seeds, nuts and kernels	3.44	3.89	5.69	6.67	8.59	346.42[a]
7. Lugs and bolts	12.87	4.03	16.77	4.33	17.14	24.51
8. Pulpwood	13.02	5.84	18.73	5.78	17.87	11.67
9. Fish landings	2.36	2.92	5.83	4.99	7.53	74.61
10. Iron ores & concentrates	5.42	8.36	14.35	17.72	24.32	472.66[a]
11. Metal ores & concentrates, NES	2.12	0.50	2.67	8.75	11.75	1026.13
12. Coal	2.79	6.40	9.03	17.67	21.95	236.36[a]
13. Sulphur, crude & refined	0.93	28.94	33.12	31.15	35.55	79.58[a]
14. Asbestos, unmfd., crude & fibrous	2.71	-	2.71	10.68	14.39	322.29[a]
15. Beef, veal, mutt & pork, fresh & frozen	3.79	1.59	5.08	1.85	5.72	103.79
16. Animal oils & fats & lard	4.18	4.56	8.54	0.68	4.83	37.88
17. Chesse, cheddar & processed	6.44	2.03	7.25	3.90	10.57	6.97
18. Other dairy products	6.48	1.47	6.93	5.43	12.19	59.65
19. Fish products	4.17	3.74	7.06	1.57	5.71	334.37[a]
20. Fruits & preparations canned	5.16	3.25	6.90	0.82	5.98	4.73
21. Feed for commercial livestock	8.34	1.91	9.72	5.10	13.61	17.30
22. Feeds, grain origin, NES	6.86	12.31	18.56	3.43	10.41	18.72
23. Wheat flour	7.19	4.98	11.17	1.10	8.27	58.22
24. Sugar	1.31	1.73	3.09	6.96	9.02	22.19
25. Misc. food, NES	5.05	3.16	7.44	8.24	13.01	27.46
26. Ale, beer, stout & porter	3.23	2.16	3.09	12.01	16.31	10.57
27. Tires & tubes, passenger cars	3.87	4.10	6.42	1.86	5.53	17.14
28. Plastic pipe fittings & sheet	3.52	2.09	5.50	5.10	8.88	31.53
29. Leather	5.01	1.18	6.13	3.81	9.08	12.32
30. Fabrics, broad woven of cotton	2.56	1.13	3.61	6.56	9.48	18.35
31. Carpeting, fabric rugs, mats	2.72	1.46	3.53	10.73	14.45	5.45
32. Clothing	1.93	3.98	4.47	6.69	9.20	64.29
33. Pulpwood chips	8.01	9.05	17.38	3.77	11.92	13.87
34. Lumber & timber	7.99	7.09	12.58	10.17	18.34	1309.21[a]
35. Veneer and plywood	7.30	7.38	11.99	2.52	9.73	108.90
36. Misc. wood	7.20	6.44	11.92	4.32	11.41	79.91[a]
37. Household furn. incl. camp & lawn	3.85	3.75	5.92	2.45	6.50	22.69
38. Pulp	7.05	3.16	10.37	3.55	10.74	1824.48[a]
39. Newsprint paper	7.04	6.15	13.25	5.46	12.53	1628.09[a]
40. Office and stationery supplies	4.38	8.18	9.64	8.53	13.41	9.82
41. Paper cartons, bags, cans & bottles	5.96	2.04	7.66	11.10	17.74	7.04
42. Newspapers, magazines & periodicals	3.68	3.12	6.10	10.37	14.92	25.28
43. Other printed matter	3.75	2.36	5.54	8.82	13.30	17.80
44. Steel bars and rods	4.27	2.68	6.92	2.70	7.12	63.83
45. Steel plates, nut fabricated	4.53	1.60	6.15	11.90	17.15	27.40
46. Tinplate	4.54	9.51	14.87	8.38	12.64	70.21
47. Galvanized steel sheet & strip	4.54	2.41	7.06	6.97	11.73	18.21

Table A.5
(Cont'd)

Average Transportation Charges, 1974
Selected Commodities

48. Steel pipes & tubes, NES	3.43	5.46	8.85	7.54	11.49	22.49
49. Nickel in primary forms	3.08	0.48	4.10	3.74	7.13	812.58[a]
50. Copper & copper alloys, prime forms	3.08	-	3.07	2.60	5.88	560.65[a]
51. Zinc & zinc alloys, primary forms	3.08	0.14	3.17	2.91	6.25	215.78[a]
52. Prefab. bldgs & struct., mainly met.	2.72	0.44	2.95	8.86	12.40	54.00
53. Metal products, NES	3.59	2.93	6.04	3.87	7.79	6.53
54. Bolts, nuts, screws, washers, etc.	3.61	2.82	5.66	6.98	10.88	88.25
55. Tractors, farm & garden type	3.53	2.97	6.40	1.42	4.97	62.29[a]
56. Other agricultural machinery	3.54	2.53	5.24	2.78	6.44	322.29[a]
57. Mach. ind. specified & special purp.	3.45	4.03	6.33	10.37	12.20	318.16
58. Passenger automobiles & chassis	2.65	2.17	4.05	1.49	4.28	2688.66[a]
59. Trucks, chassis, tractors, com.	2.65	1.19	3.43	0.92	3.65	872.03[a]
60. Motor vehicle engines and parts	3.31	1.51	4.70	1.85	5.07	405.78[a]
61. Motor veh. access., parts & assemb.	3.29	1.38	4.44	2.48	5.64	1279.08[a]
62. Gas ranges & elec. stoves domestic	3.07	2.05	4.32	14.87	18.28	6.07
63. Tel. & teleg. line apparatus & equip.	1.93	1.05	2.89	2.20	4.34	131.23
64. Electronic equipment components	2.31	1.33	3.76	1.85	4.18	124.00
65. Domestic equipment, NES	1.41	2.15	4.21	5.99	9.44	30.26
66. Cement	4.82	9.50	14.06	16.35	22.01	22.02
67. Concrete basic products	6.01	5.26	10.45	3.94	10.16	10.98
68. Non-metallic min. basic prod., NES	6.13	21.87	27.16	12.57	18.37	0.49
69. Aviation gasoline	4.75	10.10	10.73	11.50	16.10	0.30
70. Motor gasoline	4.75	5.92	5.54	5.69	10.14	15.69
71. Asphalt and coal oils, NES	6.38	12.03	16.24	17.99	24.89	7.13
72. Coke	4.02	15.81	21.97	7.02	13.12	9.77
73. Fertilizers	4.39	23.07	25.97	10.89	15.43	275.25[a]
74. Plastic resins & mat., not shaped	5.88	1.36	7.15	2.51	7.68	52.80
75. Pharmaceuticals	3.50	1.81	4.00	0.54	4.03	39.41
76. Soaps, detergents, cleaning products	5.07	4.29	7.48	15.59	20.83	1.20
77. Alcohols and their derivatives	5.81	5.38	11.27	14.68	21.18	0.62
78. Fertilizer chemicals	6.09	7.98	13.03	12.00	17.22	108.11[a]
79. Synthetic Rubber	5.79	1.33	7.13	3.10	8.84	67.63[a]
80. Agricultural chemicals	4.94	2.39	6.92	1.59	6.32	6.07
81. Medical & related instruments, etc.	2.62	2.65	4.69	1.98	4.62	21.87

Source: Statistics Canada, input-output models.

[a] Exports constitute over 40 per cent of commodity output

APPENDIX B

Table B.1

Estimates of Trucking Operating Revenue

by Industry, 1974

Industry	Private ($000)	For-hire ($000)	Total ($000)	Private % share of total
1. Agriculture	666,514	94,852	761,366	87.54
2. Forestry	966,397	184,902	1,151,299	83.93
3. Fishing, hunting & trapping	4,379	3,057	7,436	58.88
4. Metal mines	32,636	35,444	68,080	47.93
5. Mineral fuels	179,520	8,620	188,140	95.41
6. Non-metal mines & quarries	57,740	47,328	105,068	54.95
7. Food & beverage	963,392	315,434	1,278,826	75.33
8. Tobacco products	39,883	14,696	54,579	73.07
9. Rubber & plastics products	81,162	66,373	147,535	55.01
10. Leather	46,484	21,128	67,612	68.75
11. Textile	94,124	59,465	153,589	61.28
12. Knitting mills	42,922	2,517	45,439	94.46
13. Clothing	198,051	37,941	235,992	83.92
14. Wood	422,181	73,827	496,008	85.11
15. Furniture & fixtures	83,172	44,294	127,466	65.25
16. Paper & allied	143,512	141,601	285,113	50.33
17. Printing & publishing	65,958	28,082	94,040	70.13
18. Primary metal	173,753	178,587	352,340	49.31
19. Metal fabricating	234,392	174,321	408,713	57.34
20. Machinery industries	221,267	107,258	328,525	63.35
21. Transportation equipment	410,186	184,797	594,983	68.94
22. Electrical products	184,783	109,043	293,826	62.88
23. Non-metallic mineral products	279,099	170,614	449,713	62.06
24. Petroleum & coal products	262,699	108,664	371,363	70.73
25. Chemical & chemical products	209,881	199,433	409,314	51.27
26. Misc. manufacturing	161,520	49,221	210,741	74.64
Sub-total	6,225,607	2,461,499	8,687,106	71.66
27. Unallocated operating revenue a) non-competitive imports b) service c) final demand	10,575	838,101	848,676	1.24
Total	6,236,182	3,299,600	9,535,782	65.39

Source: Statistics Canada, input-output models.

Table B.2

Estimates of Trucking Operating Revenue

by Commodity Group, 1974

Commodity group	Private ($000)	For-hire ($000)	Total ($000)	Private % share of total
1. Grains	193,024	8,372	201,396	95.84
2. Other agricultural products	456,474	73,618	530,092	86.11
3. Forestry products	997,154	200,670	1,197,824	83.24
4. Fishing & trapping products	3,985	2,974	6,959	57.26
5. Metallic ores & concentrates	32,643	34,676	67,319	48.49
6. Mineral fuels	158,534	4,597	163,131	97.18
7. Non-metallic minerals	45,824	49,122	94,946	48.26
8. Meat, fish & dairy products	416,675	88,293	504,968	82.51
9. Fruit, vegetables, feed, miscellaneous food products	423,917	184,481	608,398	69.67
10. Beverages	120,147	44,072	164,219	73.16
11. Tobacco & tobacco products	39,253	14,521	53,774	72.99
12. Rubber, leather, plastic fabric products	107,218	76,429	183,647	58.38
13. Textile products	91,213	54,120	145,333	62.76
14. Knitted products & clothing	242,054	45,286	287,340	84.23
15. Lumber, sawmill, other wood products	408,280	68,221	476,501	85.68
16. Furniture and fixtures	86,656	46,513	133,169	65.07
17. Paper & paper products	141,499	141,287	282,786	50.03
18. Printing & publishing	62,325	26,524	88,849	70.14
19. Primary metal products	174,854	172,820	347,674	50.29
20. Metal fabricated products	193,563	160,062	353,625	54.73
21. Machinery & equipment	266,190	122,615	388,805	68.46
22. Autos, trucks, other transportation equipment	410,080	183,512	593,592	69.08
23. Electric & communications products	197,045	117,707	314,752	62.60
24. Non-metallic mineral products	283,369	171,303	454,672	62.32
25. Petroleum & coal products	283,431	118,046	401,477	70.59
26. Chemicals, chemical products	230,520	202,820	433,340	53.19
27. Misc. manufactured products	160,351	47,598	207,949	77.11
Sub-total	6,226,278	2,460,259	8,686,537	71.67
28. Unallocated operating revenue	9,904	839,341	849,245	1.16
a) non-competitive imports				
b) service industries				
c) final demand				
Total	6,236,182	3,299,600	9,535,782	65.39

Source: Statistics Canada, input-output models.

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