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# *Truck Activity in Canada*

## *A Profile*



Canada 

# ***Truck Activity in Canada***

**— A Profile —**



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***Prepared for: Motor Carrier Policy Branch, Transport Canada***

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## ***PREFACE***

This profile is an update to a 1998 publication, *Trucking in Canada: A Profile*, funded by Industry Canada and the Canadian Trucking Research Institute. The intent was, and still is, to give the layperson a better sense of how trucks are used, how their use is regulated, who operates them, and how they factor into the overall economy in Canada.

Funding for this edition was provided by Transport Canada. Rene Kehoe from the Motor Carrier Policy Branch at Transport Canada was responsible for the project and gave the author some appreciated assistance in the final weeks of work on such things as up-to-the-minute numbers and formatting. Stephen Petit, editor of *Today's Trucking* magazine, kindly volunteered to edit the final manuscript. Joanne Ritchie from Industry Canada proofread the final copy and this assistance was also appreciated.

The views expressed and factual accuracy are solely the responsibility of the author. Notes on sources, calculations used to develop graphs, and qualifications about the quality of information are at the end of the document.



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## ***Did You Know . . .***

- In 2002, 26 trucks a minute crossed the Canada-United States border.
- For-hire trucking, private trucking and couriers represent a \$48-billion industry.
- There are 671,000 trucks in Canada, but only 163,000 of these are tractor-trailers hauling freight on the highways—most are straight trucks, used in urban areas or local hauling.
- Close to one-third of a million people work in the trucking industry or drive trucks.
- In the 2001 Census compiled by Statistics Canada, “truck driver” is the largest occupation listed for male Canadians.
- 97.1 per cent of all truck drivers are male.
- The largest Internet-based load-matching service lists about 40,000 available loads a day.
- From 1994 to 1998, trucks were only four per cent of vehicles involved in collisions. They did, however, make up 11 per cent of vehicles involved in fatal collisions.
- Between 1994 and 1998, the collision rate for trucks involved in fatal collisions declined by 16.5 per cent and the collision rate for trucks involved in injury collisions declined by 12.1 per cent.
- For-hire trucking adds 2.4 times more to Canada’s gross domestic product than rail (passenger & freight).
- The value of exports and the value of imports carried by truck have grown at annual rates of 11 per cent and nine per cent respectively since 1992.
- Trucks registered in Canada account for 70 per cent of cross-border trucking activity.
- Trucks’ demand for energy has been growing by 4.6 per cent a year since 1990, versus a total growth in energy demand of only 1.6 per cent a year.
- Ontario, with 38 per cent of the Canadian population, accounts for 40 per cent of truck travel, 41 per cent of for-hire trucking revenues, 54 per cent of the total for-hire international truck tonnage, and 63 per cent of all truck trips that cross the Canada-United States border.
- The average truck on the highway weighs 24.2 tonnes and carries a payload of 14.1 tonnes—but there is a lot of variation above and below these averages.
- By 2007, truck engines will be emitting only about two per cent of the particulates (small, sooty bits) and oxides of nitrogen that they did in 1987.
- There are about 26,000 trucks in Canada with satellite-based tracking and messaging services.





# 1. Trucking Activity

Trucking is vital to the Canadian economy because almost anything you can imagine is transported by truck at some stage of its production—"If you got it, a truck brought it," is a common phrase. But trucking activity in Canada is hard to quantify because so many different types of organizations use trucks, and they're used in so many different ways.

Some companies—"for-hire" motor carriers—are in business expressly to haul things for other people. Other companies have trucks to distribute goods they produce themselves. Then again, not everyone uses trucks to haul freight for commercial purposes. A construction company, for example, uses trucks and trailers to lug heavy machinery from job site to job site. Some of the largest fleets on the road are run by municipal governments, which use trucks as platforms for specialized equipment like a garbage packer, tree-trimmer, crane, or snowplough. And then there are owner-operators—"freelance" truckers who drive and own their vehicle and work on contract.

***"Trucking affects everyone. The clothes we wear, the food we eat, in fact, most of the things we use in our daily lives are brought to us by truck, at least part of the way. Trucking is a major segment of the . . . economy . . . and is also critical for the competitiveness of Canadian business . . . Because it is more flexible than other modes . . . constrained only by the extent of the road network, trucking can provide the quality of service required to satisfy today's increasingly demanding shippers."***

Statistics Canada, 1995

***"Of all freight traffic, something approaching half makes its entire journey by truck, and most of the remainder that is hauled by train, ship or aircraft relies on truck transport at one or both ends of its trip."***

Canada Transportation Act Review Panel, 2001

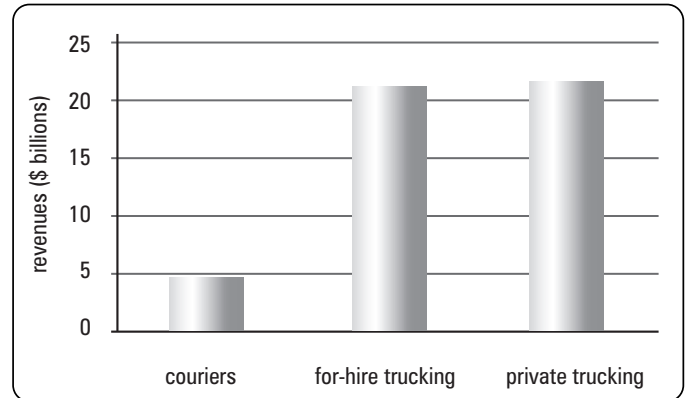
No matter who you are, there's a truck for every job. You'll see truck-tractors that connect with trailers (sometimes more than one), and trucks that have their own box for holding cargo. Most trucks on the road are used for long hauls over the highway or pickup and delivery in the city. And some you'll never see: they operate away from the highway in logging, farming, mining or oilfield applications.

So when, and under what circumstances, is a "truck" part of the "trucking industry"? The easy answer is that any truck should count, but even that view is open to qualification. Take, for example, Transport Canada's suggestion that trucking in this country is a \$47.8-billion industry (Graph 1). This total lumps together three broadly defined types of truck user: for-hire trucking companies, courier operations, and private companies that manage their own fleet. However, most private

fleets don't generate much revenue, so the estimate of \$21.8 billion for private trucking is better viewed as the operating cost of trucks for these companies. And the package vans couriers use really aren't trucks at all—their registered gross vehicle weight is less than 4,500 kilograms (roughly 10,000 lbs.), the cut-off point for what is defined as a "truck" for the purposes of safety regulations.

Graph 1 does emphasize an important point: for-hire trucking is only one facet of trucking activity in Canada. Table 1 makes the statement a different way. Of the nearly 671,000 trucks registered in Canada, for-hire trucking accounts for only 78,000 vehicles. Add an estimated 41,000 owner-operator trucks in for-hire service and the total is 119,000 trucks, or just 18 per cent of the fleet. While it's true that for-hire trucks proportionately turn the most miles and handle the largest volume of freight, it's important to remember there are more than a half-million other trucks on the road, making deliveries in cities, hauling grain from farms to elevators, and ploughing roads.

Graph 1: Components of Trucking Activity, 2000



Source: Transport Canada

Table 1: The Truck Fleet, 2001

Private & gov't trucks	238,032	35.4%
Farm trucks	225,000	33.5%
For-hire trucks	78,000	11.6%
Non-cargo/off-road trucks	72,468	10.8%
Owner-operators	55,500	8.3%
Couriers	2,000	0.3%
<b>Total Fleet</b>	<b>671,000</b>	<b>100.0%</b>

Source: estimated (see endnotes)

A third way to characterize trucking activity is by the number of people it employs—Table 2. If trucking is defined as an industry, as Statistics Canada does for the purpose of computing the system of national accounts, 166,900 people work full-time in trucking. This swells to 194,425 when you add self-employed drivers (owner-operators)\* contracted to for-hire trucking companies. And when you include all employees at for-hire trucking firms, owner-operators, delivery drivers, and drivers working for private fleets, the trucking industry

\* Owner-operators are difficult to define properly. More on this in Section 9.

employs some 320,000 full-time workers, more than 263,000 of whom are truck drivers. Trucking activity accounts for roughly 2.6 per cent of total employment in Canada, not including those who build, sell, fix, or inspect trucks for a living.

Table 2: Trucking Employment

Trucking "industry" as defined under national accounts	166,900
For-hire trucking, including owner-operators	194,425
Truck drivers, 2001 census	263,510
<b>Total employment in trucking</b>	<b>320,000</b>

Source: Statistics Canada, Transport Canada

### Couriers

*Couriers and parcel-delivery firms are part of trucking activity because they operate trucks—although most vans, automobiles and even bicycles used do not qualify as a truck as that term is used here—and because they provide services that compete with services provided by for-hire carriers. Many of these companies now do what the first trucking companies did—either distribute small shipments from a few large shippers to many consignees spread out over a delivery territory or collect small shipments and deliver them to one consignee. Couriers, or the “couriers and local messengers industry” as they are called in the national accounts, probably operate only 2,000 trucks as trucks are defined here.*

### Private Trucking

*There is nothing particularly private about a truck on a public road where the owner of the freight is the same as the owner of the truck (or possibly a leased operator working for the owner). Never-the-less, “private trucking” is used to mean most trucks that are not accounted for by the for-hire trucking industry.*

*Because these trucks are operated by someone working for an industry other than for-hire trucking, the value of the service provided is captured under some other, non-trucking part of the national accounts—for example, farming or manufacturing. There are a number of varying estimates for this value of private trucking; the \$21.8 billion shown on Graph 1 is speculative. The important point, whatever the “value,” is that private (or “non-for-hire”) trucks are a very large component of total trucking activity.*

## 2. Trucking and the Economy

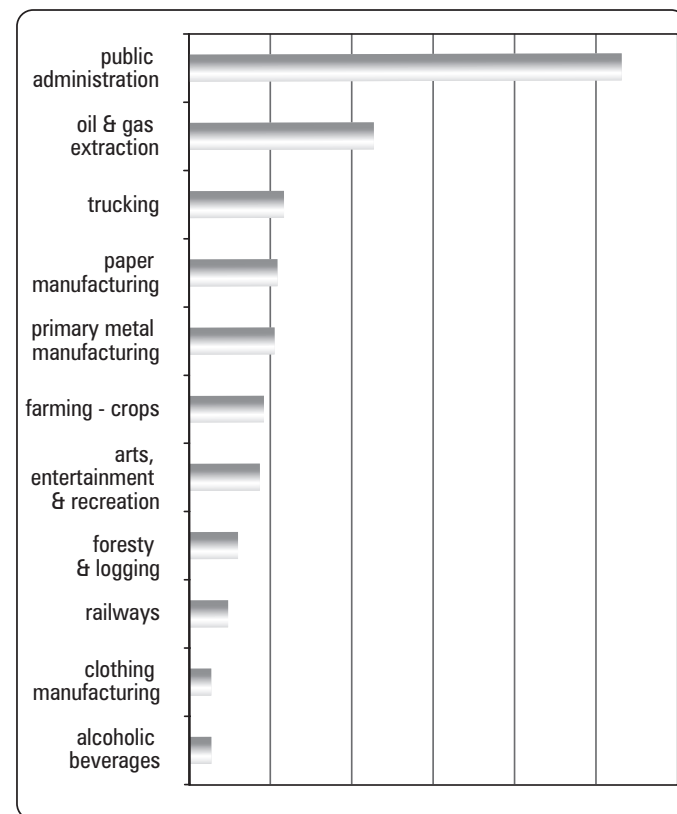
The absence of a common definition of trucking activity makes its importance to the economy difficult to measure. Moreover, even when certain definitions are used—for example, “for-hire trucking”—the sense of importance changes with the measure used (tonnes of freight, tonne-kilometres of freight, revenues, employment).

This section provides a number of measures.

### GROSS DOMESTIC PRODUCT

Canada’s economy, as measured by its gross domestic product (GDP), was \$940 billion in 2001 (1997 dollars). For-hire trucking accounted for 1.2 per cent—and this considers only the commercial activities of for-hire trucks (18 per cent of the total fleet). This 1.2 per cent of GDP may seem small, but Graph 2 shows that it’s about the same size as the pulp and paper industry, and the primary metal manufacturing industry (all steel mills and other sources of primary metals). For-hire trucking is one-third larger than arts, entertainment and recreation, and almost twice the size of forestry (raw logs). The rail industry—both passenger and freight—is only 42 per cent as large as the for-hire trucking industry.

Graph 2: Relative Contribution to GDP, 2001



Source: Statistics Canada

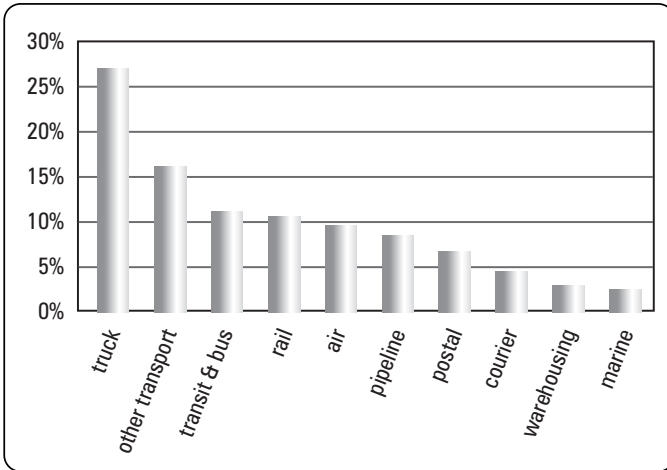
Lest anyone be carried away by these numbers, the oil and gas industry is almost twice as large as trucking. And Canada’s truly giant industries—like public administration—make trucking look positively miniscule.

### TRUCKING WITHIN THE TRANSPORT SECTOR

Another way to put trucking in perspective is to measure it against other segments of the transportation and warehousing sector of the economy. Again, truck activity is defined here as commercial, for-hire trucks.

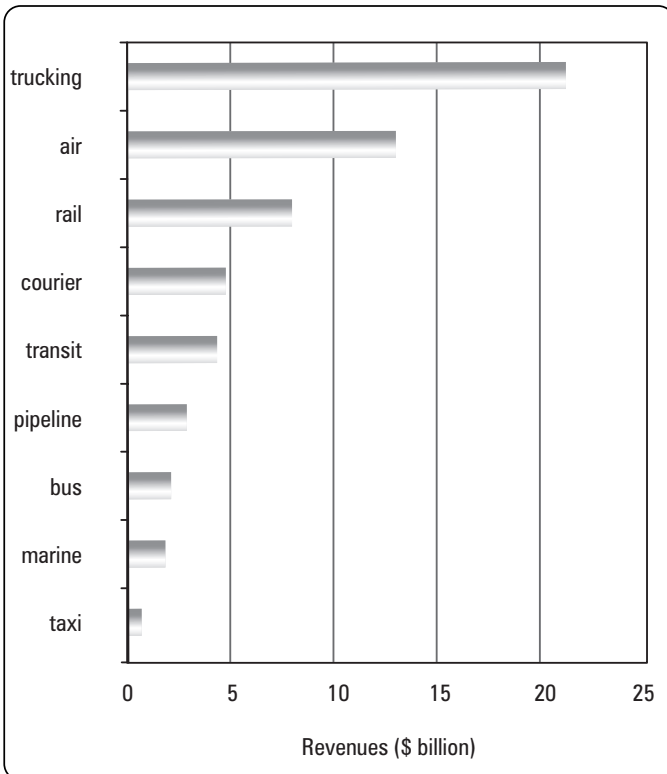
As shown in Graph 3, trucking, at 27 per cent, is by far the largest component of this sector. In this comparison, trucking is 2.4 times as large as the rail industry (rail includes passenger transportation and trucking excludes freight carried by the private trucks, couriers, farm trucks, and other service trucks).

Graph 3: Transport and Warehousing GDP, 2001



Source: Statistics Canada. "Other" consists of a variety of "scenic and sightseeing transportation and support activities for transportation"—including things like baggage handling, pilotage and harbour operations.

Graph 4: Transport Revenues, 2000



Source: Statistics Canada & Transport Canada. Figures shown for transit include significant government subsidies; information is for slightly different years; and numbers shown for pipelines (gas and oil) include some guesswork.

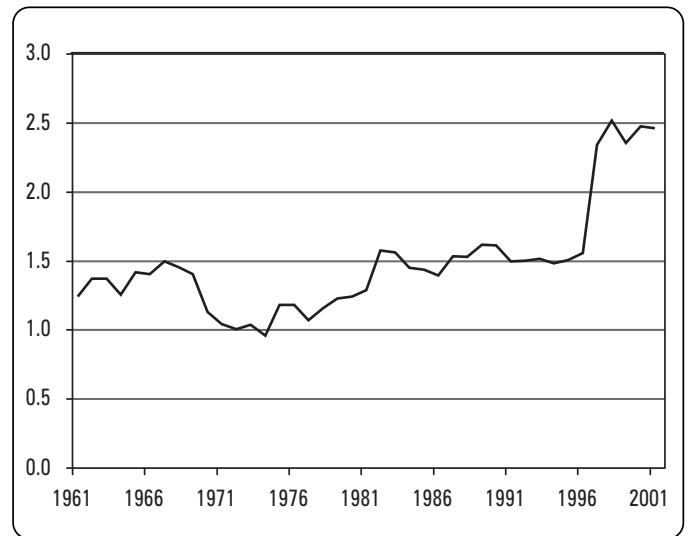
A comparison similar to that in Graph 3 can be made by looking at commercial transport revenues only (Graph 4). In this case, the numbers are from a variety of sources and are not as clean as those on gross domestic product. Again, trucking accounts for more than one-third of all commercial transport activity, even though some activities shown in Graph 3 (other, postal) are omitted.

### TRUCK-RAIL COMPETITION

For the first half of the 20th century, railways were the key, if not the only, means of land-based transportation in Canada. Transportation policy was synonymous with rail policy. Quite often the issue was "what do we do with those damn trucks that are interfering with the policy?"

Sparked by a rail strike in the 1950s and deregulation in the late 1980s, trucking companies expanded in scope and gradually became the dominant form of land-based freight transportation in Canada. This is shown quite remarkably in Graph 5, covering the contribution to total GDP for both truck and rail. By 2001, trucking—just the for-hire component—accounted for \$11.7 billion of GDP versus \$4.8 billion for rail. (The sharp jump in the ratio of truck to rail GDP in 1997 may be partly a measurement problem.)

Graph 5: Truck vs Rail GDP

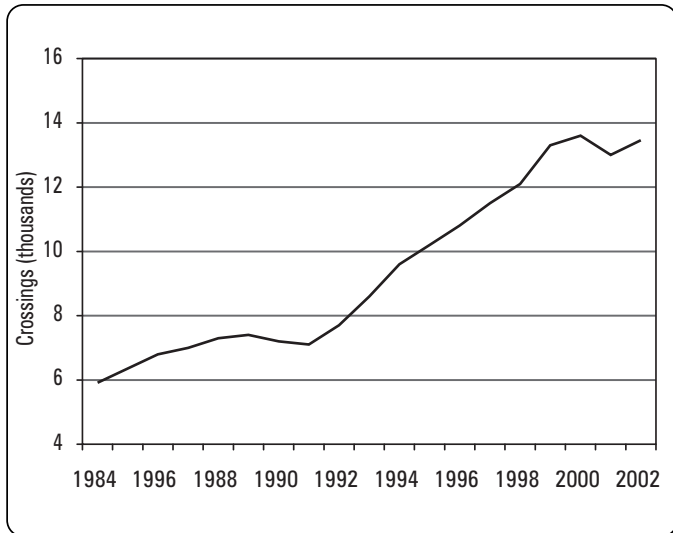


Source: Statistics Canada; truck GDP/rail GDP

### TRADE

One final point about the role trucking plays within the economy: it is vital in making Canada one of the world's great trading nations. The Canada-United States Free Trade Agreement signed in January 1988 and the North American Free Trade Agreement (NAFTA) signed by Canada, the United States, and Mexico in 1992 re-oriented Canada's trade flows to the north and south (more about this in Section 4). As a result, cross-border truck trips have increased nearly five per cent a year for the last 18 years—and 5.4 per cent from 1990 to 2002 (Graph 6).

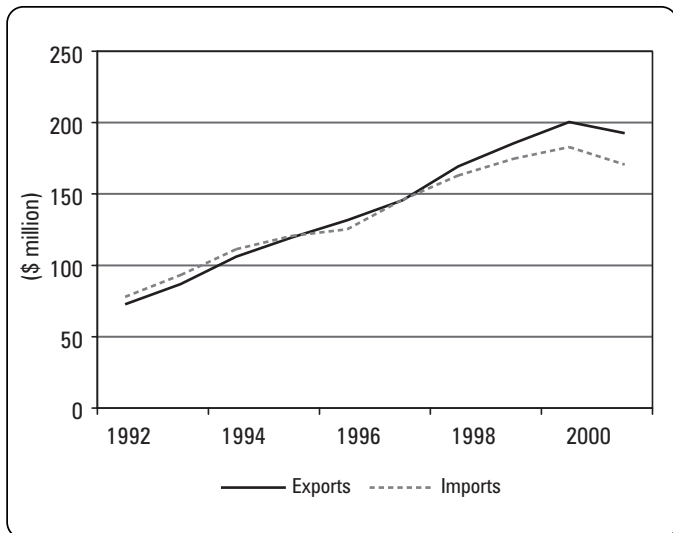
**Graph 6: Up-Tick in Cross Border Trucking**



Source: Transport Canada & Statistics Canada

Graph 7 shows the value of trade carried by truck between Canada and the United States. Exports have grown more than 11 per cent a year since 1992, while imports are up nearly nine per cent during the same period. These rates are two to three times the growth of Canada's economy, and this average annual rate of increase includes the downward blip in 2001.

**Graph 7: Trade Volumes Keep Growing**



Source: Transport Canada (from Statistics Canada)

### 3. The Fleet

Provincial and territorial motor vehicle records show there are 3.6 million trucks registered in Canada. Most of these are pickup trucks and vans not involved in moving goods. For this profile, a truck is a vehicle designed to carry freight, machinery or equipment, or a vehicle (truck-tractor) designed to pull trailers that carry freight, machinery or equipment. These vehicles have a registered weight\* of at least 4,500 kilograms (about 10,000 lbs.). This is about the weight where two-axle trucks

\* Registered weight is referred to as "GVW" (gross vehicle weight) in the text.

need four tires on the rear axle. So a truck generally means a vehicle (other than a bus) with six or more tires, which excludes most pickups and vans.

#### TRUCK COUNT

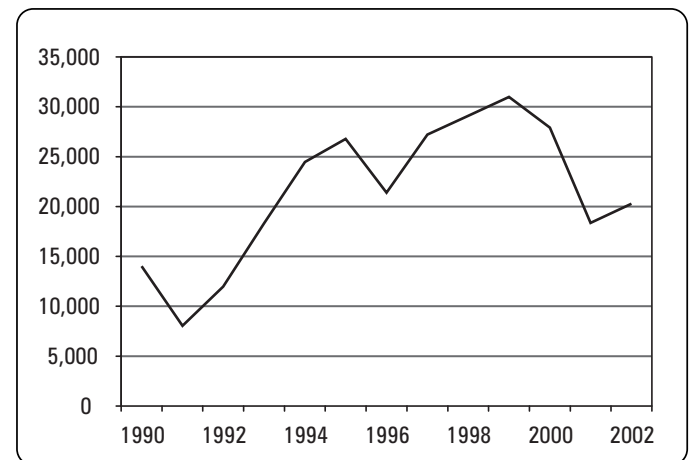
Using this cut-off of 4,500 kg, it is estimated that, in 2001, there were 671,000 trucks in Canada (Table 1). Of these, almost 600,000 are trucks on public roads carrying freight. The rest work off the highway or are specialty trucks (snow-ploughs, cranes, trucks with machinery mounted) that don't haul freight.

There are also 3.9 million trailers in Canada, according to registration data, but again most have nothing to do with truck activity. The best guess is that about 368,000 trailers are used to haul freight, half for for-hire carriers and half for private fleets.

Truck manufacturers use a class system to designate trucks of various gross vehicle weight ratings (measured in pounds). Classes 1 and 2 vehicles are less than 10,000 lbs. GVW; classes 3, 4, and 5 are 10,001 to 19,500 lbs. GVW; class 6 is 19,501 to 26,000 lbs. GVW; class 7 is 26,001 to 33,000 lbs.; and class 8 vehicles are 33,001 lbs. (roughly 15,000 kg) or more.

Class 8 accounts for nearly 41 per cent of all trucks above 4,500 kg GVW, and 43 per cent of the 583,558 on-road, freight-carrying trucks. Almost all truck-tractors are class 8 vehicles. Class 8 truck sales are volatile from year to year (Graph 8), and are a good indicator of the overall demand for trucking services.

**Graph 8: Class 8 Truck Sales Fluctuate**



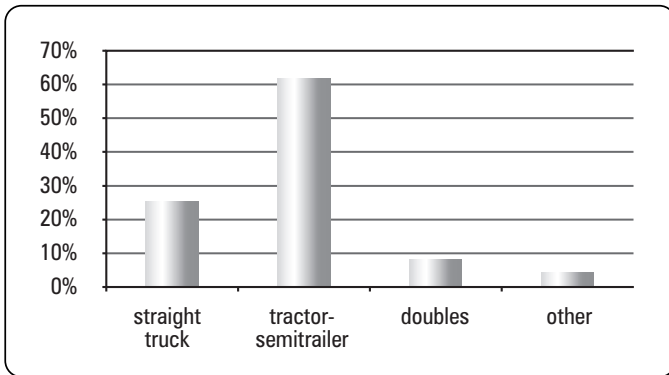
Source: Transport Canada & *Today's Trucking*

#### TRUCK TYPES

Of the almost 600,000 freight-carrying trucks, 28 per cent are truck-tractors—that is, powered vehicles that pull trailers. The remaining 72 per cent are "straight trucks," or powered vehicles with freight-carrying bodies attached. This includes pickups and vans with 4,500 kg GVW or above; this heavy pickup and van component accounts for just over one-quarter of the straight-truck population. Straight trucks dominate city streets and local roads but make up a relatively small share of total truck traffic on the main highways (Graph 9). Roughly 62 per

cent of highway truck traffic is tractors with one trailer (tractor-semitrailer or tractor-trailer), eight per cent are tractors with two trailers (doubles) and a small percentage consists of other configurations.

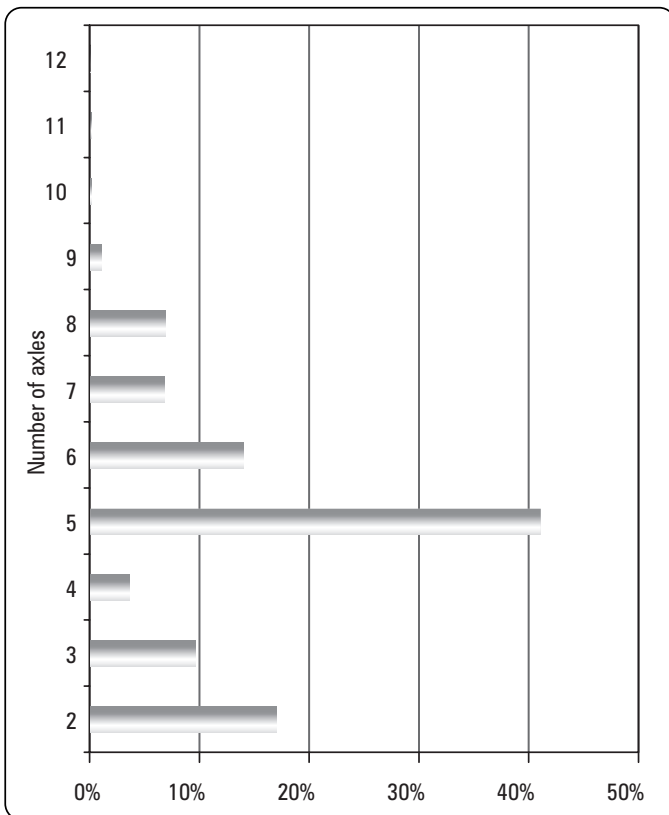
Graph 9: Configurations on Main Highways



Source: NRS99 (excludes non-cargo trucks). "Other," on the graph, consists of a few triple-trailers in four provinces, some "bobtail" tractors (a tractor not pulling a trailer), a few straight trucks hauling trailers, and a few "unknowns."

Another way of characterizing trucks is by the number of axles they have (Graph 10). More than 40 per cent of trucks on main highways have five axles: one steering axle and two rear axles on the power unit, and two axles on the trailer. Regulations restrict the amount of weight each axle can bear. Indeed, the main reason five-axle vehicles are so common is that U.S. federal regulations limit trucks and tractor-trailer combinations to 80,000 lbs. GVW, and five axles carry that weight legally on the

Graph 10: Number of Axles on a Truck



Source: NRS99 (excludes non-cargo trucks)

Interstate Highway System. These U.S. regulations have a strong influence on trucks travelling on Canadian highways, as a large number will cross the border at some point on their trip.

More axles let you to carry more weight. In Canada, the heaviest truck allowed (62,500 kg, or nearly 138,000 lbs.) under an interprovincial agreement requires eight axles. Some U.S. border states also allow heavier gross weights with additional axles.

Table 3 provides a closer look at the number of axles on a truck. Here, only the three most common configurations are shown and the distributions are within configuration categories. In other words, 68.1 per cent of all doubles have eight axles, 85.6 per cent (64.2 + 21.4) of tractor-semitrailers have five or six axles and 92.1 per cent (66.3 + 25.8) of straight trucks have two or three axles.

Table 3: Common Configurations by No. of Axles

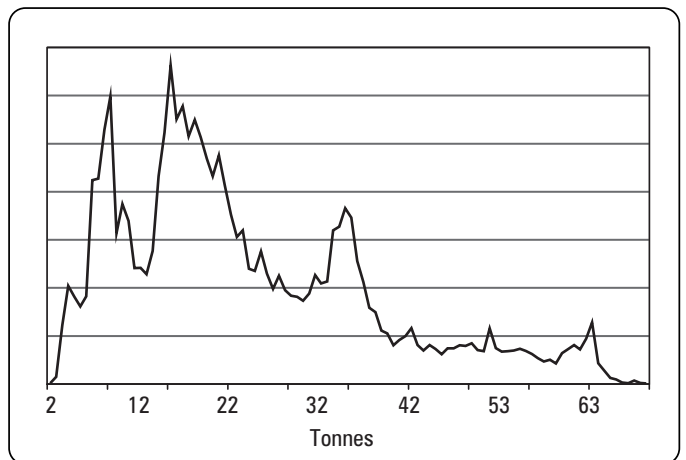
Configuration	# Axles	Distribution
Straight Trucks	2	66.3%
	3	25.8%
Tractor-semitrailers	5	64.2%
	6	21.4%
Doubles	8	68.1%

Source: NRS99 (excludes non-cargo trucks and only shows the most common number of axles on three configurations on main highways)

### TRUCKS ARE HEAVY

The average cargo-carrying truck on the highway weighs 24.2 tonnes (24,200 kg) but, as shown in Graph 11, there is considerable variation around this average. For one thing, almost one-third of the trucks on the highway are empty. This accounts for the second peak shown, at around 16 tonnes. An empty tractor-semitrailer weighs 14 to 16 tonnes. The first peak, at around nine tonnes, is primarily loaded straight trucks. The peak shown at about 36 tonnes is the 80,000-lbs. U.S. federal maximum. The smaller peak at around 63 tonnes is the maximum weight allowed in Canada for trucks with eight axles (four jurisdictions allow 63,500 kg, the rest allow 62,500 kg). Weights exceeding these limits are possible, but only by permit.

Graph 11: Truck Weights Vary

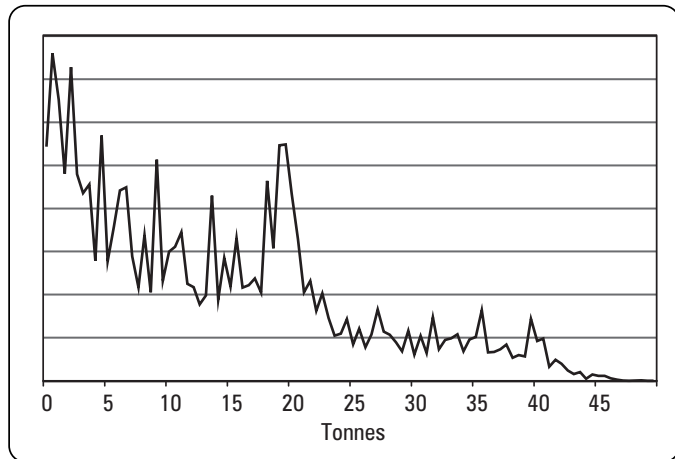


Source: NRS99 (excludes non-cargo trucks)



Just as there is great variation in total truck weights, so there is with cargo weight. The mean cargo weight of all loaded trucks observed on main highways is only 14.1 tonnes. But within this, average weights vary from one kg to more than 50,000 kg. In Graph 12, the peak between 18 to 20 tonnes is on account of the fully-loaded tractor-semitrailers operating at the U.S. federal weight limit of 80,000 lbs.

Graph 12: So Do Cargo Weights

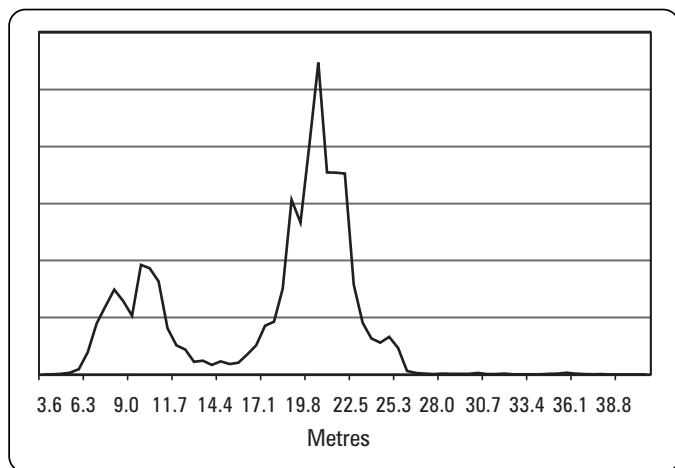


Source: NRS99 (excludes non-cargo trucks and empty trucks)

#### TRUCKS ARE LONG

Most trucks are between 5 to 25 metres long; some, operating under permit, exceed 25 metres. On main highways where more than 60 per cent of the trucks are tractor-trailers, the most common lengths are in the range of 18 to 25 metres (Graph 13). Approximately two-thirds of the observations shown on the graph fall within this range.

Graph 13: How Long is that Truck?



Source: NRS99 (excludes non-cargo trucks)

#### TRUCK, AND TRUCKING COSTS

Transport Canada has, since 1972, published a guide to trucking costs. This is too voluminous to summarize here but a few illustrations give a general idea as to what a truck costs and how much it costs to provide a trucking service.

First, the price of a new truck varies greatly depending on how you choose to equip it—your choice of engine, transmission,

axles, body and cab style, even the seats and switches on the dash. A two-axle straight truck with a simple cargo box might cost \$77,000 to \$85,000. A truck-tractor can cost anywhere from \$110,000 to \$135,000 or more. Typical trailers for general freight range from \$27,000 to \$33,000, while trailers used for bulk products or other special commodities cost considerably more. For instance, a set of double trailers used in a “B-train” hauling liquid cargo can cost more than \$200,000.

These equipment costs, when combined with operating costs such as the driver’s wages, fuel, and an allowance for administrative overheads, mean that most tractor-semitrailers on the highway cost \$1.20 to \$1.50 per kilometre to operate. This is higher for trucks pulling double trailers: typically the range is \$1.50 to perhaps as high as \$2 per kilometre.

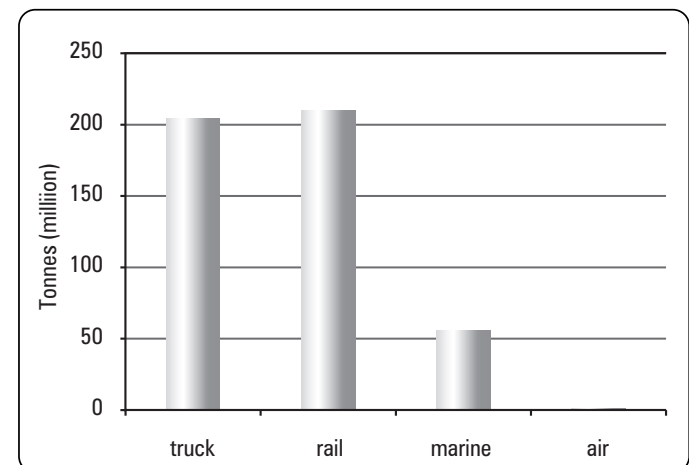
## 4. Freight Hauled by Truck

About 90 per cent of trucks in Canada are used to haul freight or equipment on public roads. The rest work either off-road or in some non-freight application. This section explores freight carried by the freight-carrying trucks.

#### TOTAL TONNAGE

Nobody really knows how much freight trucks haul. Statistics Canada is the most common source of information on the volume of freight handled by for-hire trucks—278 million tonnes in 2000—204 million domestic and 74 million cross-border. But this survey of 1,711 motor carriers, out of a population of at least 9,317, includes only firms domiciled in Canada that earn \$1 million or more in revenues, mostly from long-distance hauls (80 kilometres or more). This survey is the source of the information on domestic tonnages for trucks shown in Graph 14.

Graph 14: Domestic Freight Volumes, 2000



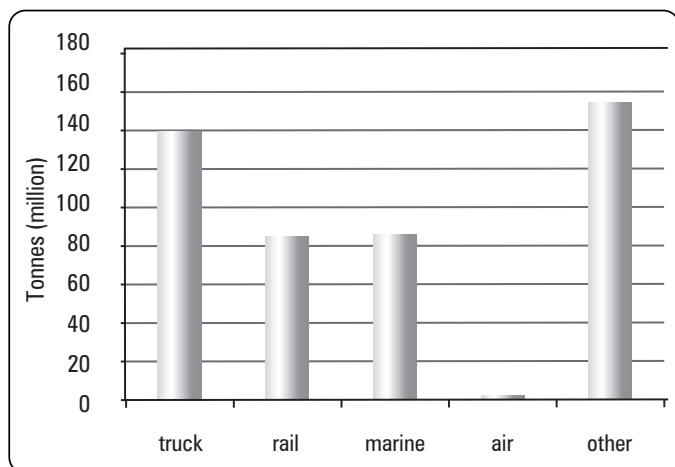
Source: Transport Canada (from Statistics Canada)

Other sources suggest truck volumes are much larger. For example, if a 1999 roadside survey of trucks on main highways—a one-week sample with more than 65,000 observations—is extrapolated to annual volumes, the total could be as high as 474 million tonnes. And this still does not account for freight moving in urban areas or on secondary roads. Further,

because of the sampling method, this 474 million is known to underestimate volumes where the trip distance is less than 200 kilometres.

A more comprehensive source of information is available for cross-border flows. Trade statistics, in dollar terms, have been converted to tonnages. In this case, “other”—mainly pipelines—is added as a transport service (Graph 15). Trucks carried 140 million tonnes across the Canada-U.S. border in 2001. While this is only 30 per cent of the freight volumes (tonnes), it represents 64 per cent of the value of trade between the two countries.

Graph 15: Canada-U.S. Freight Volumes, 2001



Source: Transport Canada (from Statistics Canada). “Other” is mainly freight carried by pipeline.

To illustrate the differences between the two sources of information, Statistics Canada’s survey of larger for-hire carriers shows 73.7 million tonnes of cross-border truck freight in 2000. The trade data shows 140 million tonnes. A small portion of this difference is attributable to private trucks, and another portion—possibly less than one-third—is accounted for by trucks operated by U.S.-based carriers.

This point about the different numbers from different sources is important. For example, one study of grain movements in the Prairie provinces for the 1995-96 crop year estimated a total of 51.6 million tonnes moved by truck. Most of this (84 per cent) was classified as local movements, usually by farm trucks, from a farm to an elevator or other local destination. Because grain volumes are well tracked, these estimates are accurate. So the question arises: what do other sources say about grain movements?

Statistics Canada’s survey, which does not include farm trucks in its target population, shows 2.8 million tonnes of unmilled grain moved by truck in 1996 in all of Canada. Even if milled grain is added, the Canada-wide total is only 3.5 million tonnes. The 1999 roadside survey, which attempts to estimate movements of 200 kilometres or more on main highways, suggests 4.3 million tonnes of cereal grains moved by truck in all of Canada.

The difference in these numbers is enormous—51.6 million tonnes in three provinces versus anywhere from 2.8 to 4.3 million tonnes Canada-wide. This doesn’t mean that any source is inaccurate—they target only a portion of truck activity. But it does show how sources must be understood in terms of what they are trying to estimate. It also reinforces the earlier point that nobody really knows how much freight is handled by trucks.

## TRUCK AND RAIL MARKETS

While trucks and railways compete for freight, much of their business is distinct. Railways haul primarily bulk commodities—coal, grains, potash and other fertilizers, ores, lumber and other forest products—over long distances. Trucks certainly move a lot of bulk products locally (gravel in dump trucks or the almost 52 million tonnes of grain in the three Prairie provinces), but, on longer hauls, they’re best used to serve the manufacturing, wholesaling and retail sectors.

The Canada Transportation Act Review Panel, a federal commission looking at federal transportation policy, examined rail traffic volumes and noted that rail freight, measured either in tonnes or tonne-kilometres, had grown by only 0.8 per cent a year between 1988 and 1999. “The explanation [for this sluggish growth] lies in the rail industry’s continued dependence on the bulk commodity sector,” it said. “Because of its inherent service flexibility, trucking has benefited more than rail from growth in the new economy, despite significant efforts by railways to attract a greater share of high-growth, high-value traffic. As well, trucking has been the main beneficiary of growing north-south flows.”

**“More than 70 per cent of rail and marine activity was related to transportation of primary goods in 2000. Not surprisingly, around 70 per cent of for-hire trucking business was related to the transportation of manufactured and fabricated products and materials.”**

Transport Canada, 2001

One area where trucks and railways both compete and work together is the market for intermodal freight—freight moving in containers, or sometimes truck trailers—that moves both on a rail car and over the road. To give a sense of the close relationship between the two industries, consider that, for Canadian Pacific Railways and Canadian National Railways, in the first nine months of 2002, intermodal revenues—containers or truck trailers—amounted to 20 per cent of total freight revenues. Virtually all of this freight moves over the road at one end (or both) of the rail haul.

## FOR-HIRE FREIGHT CHARACTERISTICS

Statistics Canada’s survey of the larger for-hire trucking companies provides information on the freight hauled by these carriers. As shown in the first two rows of Table 4, most freight handled by these carriers, as measured by the number of shipments or tonnes, is domestic. But, in terms of trucking revenues, cross-border moves now account for 47 per cent of activity.



The next two rows, showing domestic traffic only, tell something important about trucking services. The dividing line of 10 tonnes is used as a rough proxy for distinguishing between truckload (TL) services and less-than-truckload (LTL) services. The two are very different. TL service is direct: the truck picks up freight at the shipper's dock and delivers to the consignee's dock—there is only one customer's goods on board. LTL freight is picked up, taken to a terminal where it is consolidated with other freight bound for the same destination, then carried by a linehaul truck to a terminal near the destination city, and then finally delivered by another truck. There are several variations on this pattern, but the point is that the delivery of the service requires a freight-sorting terminal.

Table 4: For-Hire Trucking Freight

Domestic vs Cross-border			
	Revenue (million)	Tonnes (million)	Shipments (million)
Domestic	7,336	204.6	27.7
Cross-border	6,436	73.8	7.9
Domestic Traffic			
	Revenue	Tonnes	Shipments
<10 tonnes	42%	9%	75%
≥10 tonnes	58%	92%	24%
Shipment Characteristics			
Average Shipping Distance (km)	Domestic	798	
	Cross-border	1,177	
Average Shipment Weight (kg)	Domestic	7,830	
	Cross-border	9,360	
Average Revenue/Tonne-Km (\$)	Domestic	3.07	
	Cross-border	1.36	

Source: Statistics Canada. Percentages for shipments over/under 10 tonnes don't add because of rounding.

This distinction in the two services can be seen by the fact that LTL services account for only nine per cent of tonnage, but fully 42 per cent of the revenues earned. TL freight, on the other hand, accounts for 92 per cent of the tonnes, but only 58 per cent of revenues.

The final three rows compare characteristics of domestic and cross-border shipments. Cross-border shipments tend to be larger and move longer distances. But, because the proportion of TL shipments in this mix of cross-border traffic is considerably larger than it is in domestic service, the average revenue per tonne-kilometre is considerably lower.

## TRUCKING SERVICES

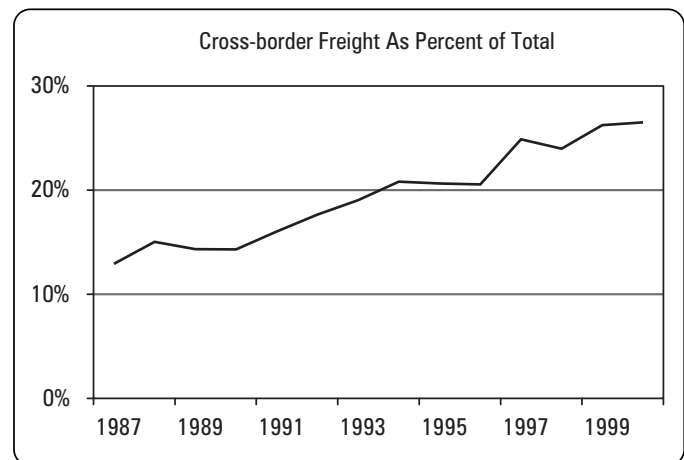
Trucks do more than just move freight. Many companies with trucks or with trucking services contracted to them provide what is known as logistics services, where they manage all or a portion of a customer's distribution system. For example, Ford Motor Co. has a plant near Toronto that produces 1,500 minivans a day. To keep it running, a logistics company, TPG, organizes 800 truck deliveries a day from 300 different parts makers. Loads arrive at 12 different points along the assembly lines without ever being more than 10 minutes late. Parts are loaded into the trucks in an exact sequence so that when they are unloaded they move directly onto the assembly line. Trucking has become an integral part of the warehousing-assembly-line production process.

## NORTH-SOUTH REALIGNMENT

Another characteristic of truck freight is that trade agreements have shifted more truck freight into a north-south alignment. This can be shown in two ways. First, as illustrated in Section 3 of this profile, the volume of trucks crossing the border (growing at 5.5 per cent a year since 1990) and the value of the commodities they carried (growing at 11 and nine per cent per year respectively for exports and imports) expanded much faster than the overall economy (2.8 per cent a year) in the 1990s.

Second, considering only the larger for-hire motor carriers, the figures in Graph 16 tell the tale. Cross-border freight jumped from about 13 per cent of total volumes in 1987 to almost 27 per cent in 2000. Revenues from this cross-border freight now account for 47 per cent of total for-hire revenues.

Graph 16: For-Hire Trucking Cross-border Activity



Source: Transport Canada & Statistics Canada

One final note about the growth in cross-border freight. Canadian truckers have increased their share of the total over the past decade or so. In 1984, Canadian trucks accounted for 59 per cent of the trucks crossing the border; in 2000, they accounted for 70 per cent. In this case, "Canadian trucker" means a trucking company domiciled in Canada using trucks registered in Canada and Canadian drivers. The company itself may well be owned by American interests, as there are a large number of trucking companies with operations on both sides of the border.

## URBAN GOODS MOVEMENTS

There are also large volumes of freight moving within towns and cities that don't show up in intercity transportation statistics (Statistics Canada's survey of 1,711 large for-hire carriers; the 1999 roadside survey, or the trade data that has been converted to traffic flows for Canada-U. S. movements). One study estimates the annual movement within urban areas is in the range of 45 to 73 tonnes per capita. This suggests a total volume of perhaps two billion tonnes annually in Canada. Presumably, this includes much of the 278 million tonnes estimated in Statistics Canada's survey and all of the 474 million tonnes estimated from the 1999 roadside survey (all the main highways pass through cities).

But this estimate of two billion tonnes has to be understood in context. Adding up urban goods movements can count freight two or even three or more times. To start, much of the intercity volumes show up twice in the sense that they have an origin in one urban area and a destination in another. If this same freight moves from a warehouse to a retail outlet, it counts as another tonne. In some cases, this same tonne also moves by truck from a retail outlet to a residence. Some of it also shows up as garbage when it moves by truck to a transfer station and from there, by another truck (and another tonne of urban goods movement) to a landfill site.

The point is that Statistics Canada's estimate of 278 million tonnes of intercity freight (larger for-hire carriers) or the roadside survey estimate of 474 million tonnes of intercity freight (trucks on the main highways) can only be compared to the (possible) two billion tonnes of urban freight if the differences in the two measures are considered.

## 5. Roads, Traffic and Safety

Trucks, with minor exceptions, travel on public roads and this raises several issues. Three are examined here: How important are trucks in considering traffic? What role do trucks play in the sensitive debate over road-user taxes? And, what are the facts about truck safety?

### ROADS

There are 1.4 million kilometres of roads in Canada, as measured on a two-lane equivalent basis (one kilometre of a four-lane freeway counts as two kilometres). But 85 per cent of this network is local, everything from urban streets to country roads (almost all gravel) to bush roads. There are 171,000 kilometres of highways where most trucking activity occurs. And of these highways, 25,196 kilometres ("route kilometres" in this case) are main intercity highways. These highways constitute about two per cent of the network, yet handle most of the truck activity.

### TRAFFIC

Truck traffic levels change enormously from one road to another. On main highways, about 15 per cent of the traffic consists of trucks. But this varies from a high of 21 per cent in New Brunswick to a low of 10 per cent (Prince Edward Island) or even five per cent (Yukon). It varies even more from one par-

ticular road to another. Translating these percentages into actual traffic counts, the average kilometre of main highway in Canada has about 1,100 trucks a day in both directions. In Ontario, the average is 2,300 trucks a day, although the main freeway (Highway 401) has volumes exceeding 10,000 trucks a day in Southern Ontario and 40,000 a day near Toronto.

In total, it is estimated that trucks account for 25 to 27 billion vehicle-kilometres of travel annually. Rough estimates suggest perhaps 10 billion of these occur on main highways. So, about 40 per cent of all truck activity occurs on two per cent of the road network, the main highways.

### ROAD SPENDING, ROAD TAXES

Figuring out what Canadians spend on roads versus what they pay in taxes related to using them is an art, not a science.

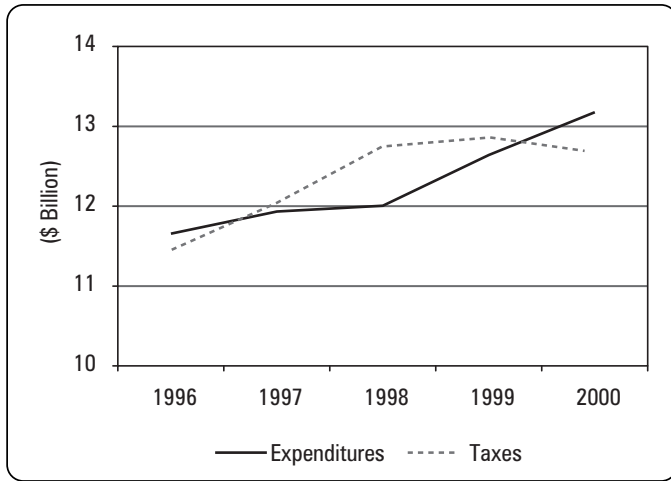
The expenditure side of the issue is straightforward, although there is always some estimating involved with municipal governments (48 per cent of total road spending in 2000) because their road departments often have budgets that include more than just roads. That aside, Transport Canada's latest estimate for the year 2000 (fiscal year ending in March 2001 for the provincial and federal governments) of \$13.2 billion spent on roads is accurate enough.

The other controversy surrounding expenditures on roads is that, strictly, annual expenditures are not the same as what an economist means when the phrase "road cost" is used. This term, in addition to annual road maintenance costs, includes such things as the cost of land on which roads run, the imputed capital costs of the funds used in road construction, and sometimes, costs that road users impose on others, such as air pollution or delays.

The revenue side of the question, taxes, is where the controversy heats up. There are few instances of dedicated road taxes in Canada. Rather, taxes related to road use, such as fuel taxes plus various licences and fees on vehicles and drivers, are collected and simply consolidated with other taxes in a general fund. Governments are free to spend the dollars wherever they want.

Graph 17 shows the view of Transport Canada. On the tax side of the equation, this perspective deducts a "sales-tax-equivalent" from provincial fuel taxes. It could be argued equally well that since fuel taxes were introduced long before sales taxes, and since they were introduced as a road tax, this deduction should not be made. Either argument is arbitrary, but just to show its impact, the latter, in 2000, would add \$866 million to taxes with the consequence that the two lines on the graph would show motorists paying \$347 million more than governments spend on roads.

Graph 17: Are Road Users Paying Enough?



Source: Transport Canada

The most recent federal commission looking at transportation policies painted an even more dramatic picture. According to its calculations for 1998 (fiscal year ending in March 1999), road users paid about \$14.3 billion in road taxes. This included \$400 million in road tolls in addition to the fuel taxes and licence fees used in Graph 17. Road expenditures, including the amount toll road operators spend, were about \$12 billion, leaving the motorists in a position of paying more than \$2 billion more than was spent.

The controversy about figuring out total expenditures (or road costs) and tax revenues is nothing compared to the debate about how much various groups of motorists pay or should pay. This is where trucks usually get a bad rap because many commentators, not knowing the answers to these tricky questions, borrow various ratios from U.S. road-cost allocation studies. Invariably, these U.S. ratios show that the costs trucks impose on roads exceed the amount trucks pay in taxes. Whether or not these U.S. ratios have anything to do with the way Canadian roads are built, or what they cost, is rarely debated. Truckers, of course, feel maligned by these arguments and point to the fact that they already pay relatively high taxes. An operator of a heavy truck in Ontario, for example, currently pays more than 10 cents a kilometre in fuel taxes. In Newfoundland and Labrador, that same operator pays close to 12 cents a kilometre.

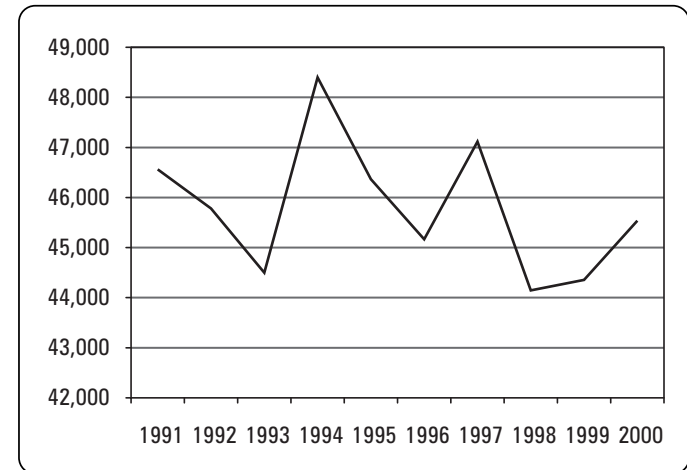
### ROAD SAFETY

There were 2,560 people killed and 155,968 injured in collisions on Canadian roads in 2000. There is obviously a road-safety problem in this country, and trucks play a part.

Graph 18 shows total trucks involved in collisions over the past decade. Although it is difficult to be certain about trends, it's encouraging that, in a decade when trucking activity perhaps doubled, the number of trucks involved in collisions actually fell. Information to determine the real increase in truck activity during the 1990s is not available, but it is known that the number of tonne-kilometres of freight handled by the larger for-hire carriers doubled between 1990 and 2000 and that the total number of trucks crossing the Canada-U.S. border increased by 89 per cent in this same period.

In December 2001, Transport Canada published a report that provides a detailed look at all the truck collisions between 1994 and 1998. Over this five-year period, trucks averaged four per cent of all vehicles involved in collisions. They also averaged 11 per cent of all vehicles involved in fatal collisions (oddly, only three per cent of those involved in injury collisions). On average, over this period, there were 554 trucks a year involved in fatal collisions and in 80.1 per cent of these cases it was the occupant of another vehicle that was killed; in 8.2 per cent of the cases, it was a pedestrian; and in 11.8 per cent of the cases, it was the occupant of the truck. While trucks are involved in only a small proportion of total collisions, they tend to be severe ones and, in most cases, it is the occupant of another vehicle who suffers.

Graph 18: Trucks Involved in Collisions



Source: Transport Canada

Other information in this profile, while not directly pointing to the cause of collisions, offers clues about why truck collisions happen. First, most occur during daylight hours on dry roads and in clear weather. This does not mean that night-time driving, slippery roads and inclement weather don't play a part in truck safety. They do. But these factors are not the main reasons why trucks are involved in collisions.

***"[In the five-year period 1994 to 1998] drivers of automobiles, light trucks and vans were recorded as having a driver condition "other than apparently normal" 4.25 times more frequently than the drivers of heavy trucks in fatal collisions. [And] In fatal crashes, drivers of automobiles, light trucks and vans were recorded as having a driver action "other than driving properly" 2.74 times more frequently than the drivers of heavy trucks."***

Transport Canada, 2001

Second, the report lists all truck collisions in terms of the type of collision. In the case of fatal collisions, more than one-third involved two vehicles moving in opposite directions, either a head-on collision or a sideswipe. In the case of injury collisions involving a truck, close to one-third involved rear-end collisions.

sions. The numbers are not broken down in enough detail to know whether it is smaller vehicles running into trucks or trucks running into smaller vehicles.

Third, the authors look at all fatal collisions involving a truck and another vehicle (automobile, van or light truck) over the five-year period. The findings (see text box) are interesting. Considering all truck collisions that involved a fatality and another vehicle (car, light truck or van) where one of the drivers was found to be “other than apparently normal” on the police report—in other words, intoxicated or something else—in 81 per cent of the cases, it was the driver of the smaller vehicle who was “other than apparently normal.” Looking at all fatal collisions involving a truck and another vehicle where improper driver action was noted on the police report, in 73.3 per cent of the cases it was the driver of the smaller vehicle where the police indicated, “other than driving properly.”

Although these findings are not conclusive evidence of fault, they point a finger at drivers of smaller vehicles. This is corroborated by similar information from the United States where a recent government report said 78 per cent of critical traffic incidents involving a truck and a car were initiated by the car driver.

One final finding from the Transport Canada report: the collision rate, as measured by the number of trucks involved in collisions divided by the population of registered trucks, is falling. The fatal collision rate fell by 16.5 per cent between 1994 and 1998 and the injury-collision rate fell by 12.1 per cent.

#### **WHAT CAUSES TRUCK CRASHES?**

No one has a good explanation as to why trucks are involved in collisions or why some are more severe than others. Among the many factors to consider: the road; the weather; the time of day; the alertness and skills of the drivers involved; the design and mechanical conditions of the truck; the type of cargo; and the safety-management practices of the motor carrier.

To understand the issue better, the U.S. Congress has mandated a study on truck crashes, with results due in 2004 or 2005. The importance of noting this new study here is simply to reinforce the point that safety experts really don't know enough about what causes a truck to crash. A major effort is being made to reduce the number of trucks involved in collisions. The government's role in this—safety regulations—is explained in the next section.

## **6. Trucks and Government**

Truck activity has to be understood in terms of the relationship between truckers—the vehicle, the driver, the person or company responsible for the operation and other aspects of the activity—and governments. This is because, more so than most activities, operating a truck crosses the path of government regulations and policies in a wide assortment of areas. For one thing, trucks use public roads. For another, they haul freight for virtually every other industry, so to some extent fall under

the regulatory purview of these other industries (for example, consider livestock hauling and regulations on the handling of animals, or the transport of nuclear wastes and all the regulations that entails).

Finally, trucks have a habit of crossing jurisdictional boundaries, meaning their operators will come into contact with different rules and tax regimes as they vary from government to government.

#### **LEGISLATIVE FRAMEWORK**

There is not a large federal role in trucking as there is in air, rail, and marine transport. This makes Canada somewhat unique among western countries where generally the most senior level of government has much to do with things like the provisioning of roads, taxing of road users, or the regulation of truck operations.

Under Canada's constitution, the federal government has regulatory responsibility for extra-provincial trucking. Any carrier, even if it has hundreds of trucks operating purely within the boundaries of a province or territory and just one truck that occasionally operates beyond this base, falls under federal regulatory control. However, since 1954, this responsibility has been delegated to the provinces and territories. The legislation that does this, the *Motor Vehicle Transport Act*, was recently amended, but this delegation continues.

The remaining federal role is in such areas as standards for new vehicles, the transportation of dangerous goods, and the responsibility for international crossings. In addition, legislation that addresses air quality gives the federal government control over engine emissions and fuel standards. Other legislation addresses labour issues (the particular issue of how long a truck driver can drive, however, falls under the *Motor Vehicle Transport Act*, not the more general labour legislation).

Provinces and territories that, for the most part, own and operate the major roads, have the most regulatory responsibility for trucking. This can be fairly broad—for example, traffic acts that control vehicles on the road; environmental acts that control the condition of vehicles in use (federal regulations only apply to new vehicles); or labour laws that control aspects of the working conditions. In the past, the most notable provincial or territorial regulatory control over trucking came about because governments believed that for-hire trucking—the provisioning of a transportation service by truck for compensation—had to be regulated. Here, “regulated” means economic regulation—controls on who may enter the industry, controls on the service that may be provided and, in some provinces, rate controls.

#### **DEREGULATION AND THE NATIONAL SAFETY CODE**

From the 1970s on, federal, provincial, and territorial governments have gradually lost their enthusiasm for economic regulation of transportation—air, rail, truck—and even the ownership and operation of transportation infrastructure—ports or airports—or transportation enterprises—the federal government used to own the major airline and the major railway;

provincial governments used to own several more local transportation enterprises (local rail line, some trucking operations and bus lines).

While governments still have a lot of ownership and regulatory control over urban transit, they have abandoned any remaining regulatory control over trucking. Again, “regulatory control” in this context, means the classic form of economic regulation, not other areas of regulations such as traffic, safety or environmental.

**“Almost everyone agrees that the days of economic regulation are over, not just in trucking but in a wide range of other sectors. Historically, economic regulation was justified in areas where it was alleged that the market did not work to allocate resources and ensure [efficiency]. Terms such as ‘natural monopoly’ (in regard to railways) or ‘destructive competition’ (in the case of trucking) were used to label these instances of market failure . . .”**

Canada Transportation Act Review Panel, 2001

But as this “deregulation,” as it came to be called, occurred, another worry arose. If market forces were the only controls on who could offer a trucking service and what combination of price and service could be offered, there might be adverse impacts on highway safety. Market forces could drive some operators to cut corners. As a result of these concerns, the federal, provincial, and territorial governments agreed to a large new effort on truck safety regulations. The standards in the National Safety Code (NSC) were agreed to in 1987 (see text box). They have been struggling with implementing the NSC uniformly across the country ever since.

## OTHER AREAS OF REGULATION

Economic regulation (in the past) and safety regulation (NSC) are not the only areas where governments control truck activity.

**Traffic regulations:** Trucks are subject to a large number of traffic regulations because they drive on publicly provided roads and because they share these roads with other vehicles. To a small extent, there are even special traffic regulations that apply to trucks (truck speed limits, trucks not allowed in certain lanes, regulations on the use of certain types of brakes in certain areas, etc).

**Truck weights and dimensions:** How heavy or long a truck can be encompasses literally hundreds of pages of provincial and territorial regulatory text, a special inter-jurisdictional task force and several inter-jurisdictional agreements, a raft of “special permits” (for trucks that exceed the normal weight and dimension limits), and a large infrastructure for enforcement (highway weigh scales and mobile inspectors). These regulations control how much weight a truck can have on a tire, an axle, and the vehicle or vehicle combination. They also control many of the dimensional aspects of a truck. In addition, any trucking company operating into the United States falls under both federal U.S. law (main highways) and state law (state highways and various exceptions to federal law on main highways). The three NAFTA countries have established a special body to consider the integration of North American rules, although little has been accomplished to date.

**Vehicle Standards:** New vehicles are manufactured in accordance with standards set in the federal *Motor Vehicle Safety Act*. Many of these standards are specifically set for trucks. So, for example, there are specific standards for bumpers that have been designed for trucks to help mitigate the severity of a collision if an automobile hits the rear of a truck. Or, as another

### National Safety Code

1. **Single Driver Licence – procedures to ensure drivers hold only one licence**
2. **Knowledge & Performance Tests – driver testing standards**
3. **Driver Examiner Training – training course standards for examiners**
4. **Classified Driver Licences – different classes for different vehicles**
5. **Self-Certification – criteria for companies that train/test drivers**
6. **Medical – requirement for each class of driver’s licence and requirement for re-examination**
7. **Profiles – information on drivers and carriers maintained by jurisdictions**
8. **Suspensions – criteria to suspend a driver’s licence**
9. **Hours of Service – limits on hours of work for truck drivers (new standards being drafted)**
10. **Load Security – criteria for ensuring loads are properly secured**
11. **Maintenance & Inspection – maintenance and inspection frequency standards**
12. **On-Road Inspections – standards shared by all Canadian and U.S. jurisdictions through the Commercial Vehicle Safety Alliance (CVSA) for inspecting drivers and vehicles on the road and for putting drivers and vehicles out-of-service.**
13. **Trip Reports – requires drivers to inspect trucks prior to each trip**
14. **Safety Ratings – a rating mechanism for motor carriers based on on-road performance (collisions, inspections, traffic violations, etc)**
15. **Audits – record-keeping requirements for carriers so that auditors can review a carrier’s practices**

example, the brake standards for trucks (unlike smaller vehicles) mandate the use of antilock brakes (brakes controlled by sensors and electronics that prevent wheels from locking up during hard braking).

**Emissions:** The control of truck emissions used to be handled by Transport Canada under the *Motor Vehicle Safety Act*. However, as of April 1, 2000, Environment Canada took over responsibility. The logic here is that, as has been the case in the United States, one agency should set standards for both vehicle emissions and fuel. More detail on the standards is provided in Section 7.

**Taxation:** There are large areas of truck taxation that are subject to special regulations—regulations on how fuel tax is prorated among jurisdictions in which a truck operates, similar regulations for vehicle registration taxes, taxes (particularly in the United States) that have particular application to trucking companies, special treatment of some taxes (for example, the provincial sales tax) in the case of a purchase of a truck that is to be used extra-provincially, etc.

**Dangerous Goods:** The transportation of certain goods is regulated under the federal *Transportation of Dangerous Goods Act*. All provinces and territories have adopted these regulations.

**Drug & Alcohol Testing:** While Canadian law does not require trucking companies to test employees for drug and alcohol use, U.S. law does. And, since most large Canadian trucking companies operate into the United States, they must comply with U.S. drug and alcohol testing regulations. Interestingly, Canadian companies that do conduct random tests on their drivers find fewer than one per cent of drivers are using banned substances (suggesting that drug and alcohol use by truck drivers is not a large factor in truck collisions—although it apparently is a large factor in the automobiles that run into trucks).

**Border:** Because of the importance of trade between Canada and the United States and, in particular, trade carried by truck, there are a large number of regulations that might be labelled (somewhat inaccurately) as “border regulations.” These include such things as how a “foreign” truck can be used in the neighbouring country (cabotage) or what the driver of that truck can or cannot do without a work permit. They also include various rules and procedures used to move a truck, driver, and cargo across the border. And they cover such things as the reciprocal recognition of certain markings on a truck (those indicating dangerous goods).

This sketch of safety regulations (the NSC) and other regulations hardly scratches the surface of a large subject. There are literally thousands of pages of regulations and even more pages of government policy documents, consultants’ reports, and trade association arguments that come into play here. Nevertheless, it demonstrates an important aspect of truck activity: no part of this activity is immune from government regulation, even though the convention is to call trucking a “deregulated” industry.

## 7. Energy

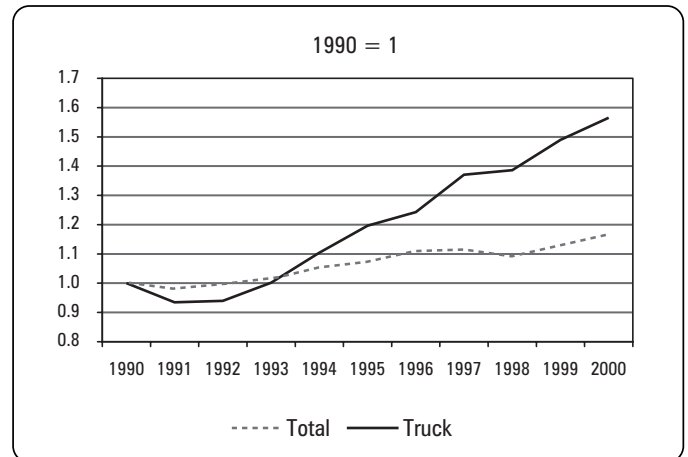
The use of energy is of particular importance in describing truck activity because energy costs are a large component of operating costs. In 2000, 26.3 per cent of owner-operators’ costs were accounted for by fuel (and this percentage will be higher in the winter of 2002-2003 given the recent up-tick in fuel prices). Secondly, energy used by trucks is increasing at a faster rate than other sectors of the economy. Thirdly, there is a growing concern with emissions resulting from the use of petroleum-based fuels. This section explores these subjects.

### ENERGY DEMAND

The demand for energy in Canada in 2000 was 8,164.4 petajoules. This is equivalent to about 43 barrels of crude oil per person, and trucks account for 6.7 per cent of this. In this case, “truck” means all trucks with a registered weight of 3,855 kg or more, whether they are freight-carrying or something else. So, “truck” in much of this section includes a larger population of vehicles—possibly eight to 10 per cent larger—than in most other sections.

Since 1990, the demand for energy by trucks has been growing at an annual rate of 4.6 per cent a year (Graph 19). Total energy demand has been growing at only a rate of 1.6 per cent. What’s more, available forecasts suggest the use of diesel fuel, most of which is accounted for by trucks, will continue to grow quickly over the next several decades. One 1999 forecast suggests the use of diesel will increase by 74 per cent between 1990 and 2020.

Graph 19: Insatiable Demand for Energy



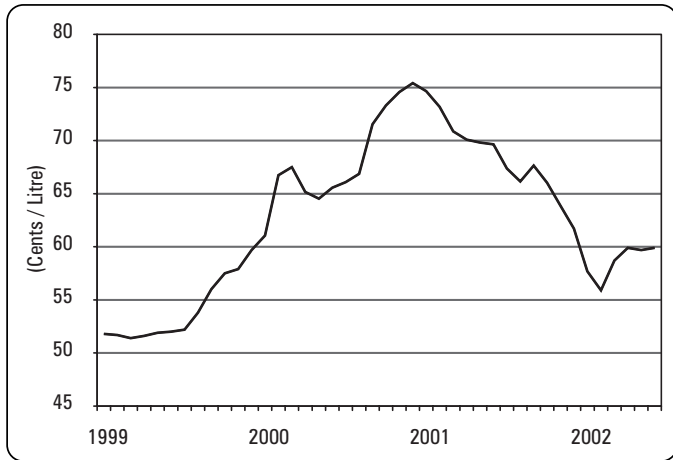
Source: Natural Resources Canada. “Truck” means  $\geq 3,855$  kg

### ENERGY PRICES

Diesel fuel prices were relatively stable throughout the 1990s, hovering around 50 cents per litre in southern Ontario and somewhat above or below this in other places depending on local taxes and other factors. This price, and the one shown in Graph 20, are retail prices for diesel at a self-serve outlet. Larger trucking companies pay less than this, perhaps in the range of five to 10 cents a litre less depending on their arrangements with particular sellers.



Graph 20: Diesel Price Spike to 75¢ a Litre



Source: Transport Canada, Statistics Canada

This stability of prices changed when prices shot up by as much as 50 per cent by the end of the year 2000. Price fluctuations of this magnitude cause turmoil within the industry. Although the impact of a fuel price increase varied from one situation to another, as a rough rule of thumb, a 50 per cent increase in the price of fuel increases over-the-road costs by close to 10 per cent.

### EMISSIONS

A truck's use of petroleum fuels, particularly diesel, has a number of consequences. In terms of air quality, burning diesel results in the emission of carbon monoxide and other substances contributing to smog and acid rain. Also, burning diesel, or any other carbon-based fuel, results in the emission of carbon dioxide and other gases responsible for global warming. (This is the "consensus view"—there are doubters.)

### AIR QUALITY

Public health is adversely affected by vehicle emissions of particulate matter (PM), nitrogen oxides (NO<sub>x</sub>), sulphur oxides (SO<sub>x</sub>) and a number of volatile organic compounds (hydrocarbons, or HC). In addition, carbon monoxide (CO) is toxic. To control this, the United States and Canada regulate emissions and have been doing so since the 1970s. While there have been differences, regulations set by the U.S. Environmental Protection Agency (EPA) are the de facto standards in Canada. This is because, in the past, truck engines were (and still are) manufactured by U.S. companies that meet the EPA standard and that have agreed to import only such engines into Canada. More recently, when Environment Canada took over the regulation of engine emissions, it announced a policy of matching U.S. standards.

**Air pollution is a serious health problem. Across Canada, studies show that there are more than 5,000 premature deaths a year that can be attributed to air pollution.**

Federal Agenda on Cleaner Vehicles, Engines and Fuels, February 17, 2001

Table 5 shows the latest figures available (1995) for the contribution of heavy-duty vehicles to total emissions. As shown, with the possible exception of nitrogen oxides, heavy-duty vehicles are relatively small players. But these numbers probably understate the seriousness of particulate matter from diesel exhaust as, first, diesel emissions are relatively more responsible (two per cent of the total) for the very fine particulate matter (less than 2.5 micrometers in size) and, second, substances attached to these bits of dust are probably carcinogenic.

Table 5: Heavy Trucks and Emissions

Per Cent of Total Emissions				
PM	SO <sub>x</sub>	NO <sub>x</sub>	VOC	CO
0.2%	1.3%	16.0%	1.7%	2.3%

Source: Environment Canada. Heavy-duty vehicle = trucks and buses ≥ 3,855 kg

Truck operators are now focused on more restrictions in the near future. By June 2006, diesel fuel must contain no more than 15 parts-per-million of sulphur (current fuel contains as much as 500 ppm). Sulphur levels in fuel has to be reduced so that diesel engines will be able to meet further restrictions in 2007.

In terms of actual emissions levels—regulated in terms of grams per brake-horsepower-hour (g/bhp-hr)—the standards are:

**CO (carbon monoxide):** 15.5 g/bhp-hr. This standard was introduced in 1987; prior to then, it was 25 grams. Truck engines are well below either level when operated under typical duty cycles.

**HC (hydrocarbons or VOC):** The standard has been 1.3 g/bhp-hr since 1987, however starting with engines made in October 2002, the new 2004 standard for this emission (or, more correctly, NMHC—non-methane hydrocarbons) is combined with the emission levels for oxides of nitrogen. In 2007, the limit for NMHC will be 0.14 g/bhp-hr.

**NO<sub>x</sub> (oxides of nitrogen):** Emission levels have been progressively reduced from 10.7 g/bhp-hr in 1987 to four grams in 1998. The new 2004 standard (which applies to engines manufactured after October 2002) is a combined NMHC-NO<sub>x</sub> limit of 2.4 g/bhp-hr or 2.5 if the NMHC emissions are held to 0.5 g/bhp-hr. In 2007, the limit for NO<sub>x</sub> will be lowered to 0.2 grams—less than two per cent of the 1987 level.

**PM (particulates):** Emission limits have been reduced from 0.6 g/bhp-hr in 1987 to the current 0.1 limit of 1998. In 2007, this will be further reduced to 0.01 g/bhp-hr—that is, a 98 per cent reduction over the 1987 limits.

The 2004 standards for nitrogen oxides and hydrocarbons were advanced to October 2002 in a settlement reached by the U.S. Justice Department, government agencies, and diesel engine manufacturers over a claim by the EPA that manufacturers had programmed their engine computers to turn off emission controls during highway driving in order to improve fuel efficiency.

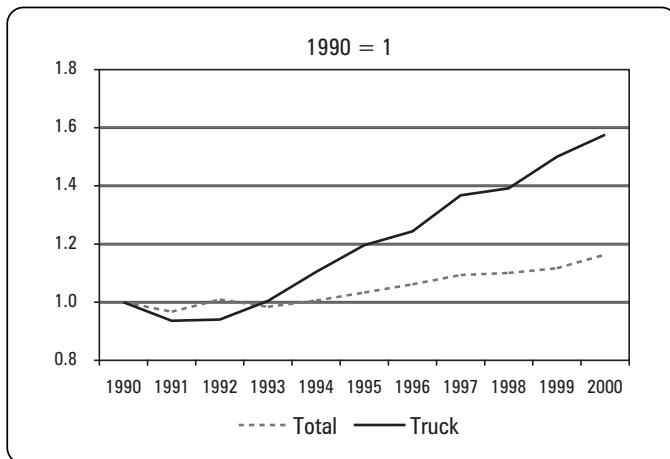
## GREENHOUSE GASES

Transportation accounts for more than one-third of greenhouse gas emissions and trucks account for 8.3 per cent (trucks heavier than 3,855 kg GVW). Canada has signed the Kyoto accord, thereby binding it to reduce greenhouse gas emissions to levels six per cent below those of 1990. Although the precise impact on trucking is not known—the government’s plan is fairly vague—trucks are too important to be ignored in any government action. This is particularly true because of the forecasts for the rapid growth in diesel fuel use. In fact, looking at the past decade—1990 to 2000 (Graph 21)—while total greenhouse gas emissions have been growing in Canada at a rate of 1.5 per cent per year, emissions from trucks have been growing at a rate of 4.7 per cent.

**“Reducing GHG emissions from transportation represents a considerable challenge. However, given the size of and growth in emissions, it will be hard to ignore transportation if Canada is to meet its Kyoto commitments.”**

Transportation Climate Change Table, 1999

Graph 21: Greenhouse Gases



Source: Natural Resources Canada. “Truck” = > 3,855 kg

A recent study suggests there are a number of “promising” ways for trucks to reduce greenhouse gas emissions. Some, such as training drivers to drive in a more fuel-efficient manner or limiting trucks to lower speeds, are relatively low-cost measures with fairly significant impacts. The problem is that, even if all of the promising and even “most-promising” measures were adopted, the trucking industry would have difficulty achieving the “six per cent below 1990” target by 2010. This is because the rate of forecast growth in trucking and a truck’s use of energy is high enough to mean that, by 2010, the “six per cent below” target means a 40 per cent reduction over the forecast emissions. That would be difficult to achieve although, as the final comments in this section will make clear, not impossible.

The study also looks specifically at the possibilities of shifting freight from trucks to rail to achieve Kyoto targets. The findings? “Opportunities to shift freight from truck to rail or

marine in the five corridors studied generated small GHG reductions at considerable cost.” This is interesting, as the federal government’s current plans for meeting the Kyoto targets (as vague as they are) include “encouraging intermodal freight.”

## ENERGY EFFICIENCY

The subject of how much fuel a truck uses to travel a certain distance occupies a great amount of time in Canada. Articles are written, consultants are hired, workshops are held, and policy makers ponder. An individual truck operator or the manager of a fleet can do a great deal to influence the amount of fuel used. Various devices can be purchased—auxiliary heaters for the cab, aerodynamic devices, more energy efficient tires, synthetic lubricants, central tire-inflation devices, engines suited for the particular hauling conditions, lighter tractors and trailers, etc—that all improve fuel efficiency.

Of most importance, drivers can drive in such a way to minimize fuel consumption. The better fleets offer drivers bonuses for achieving fuel consumption benchmarks. The difference between a good driver and a bad one can easily mean a difference of 25 per cent or more in fuel consumption.

In all the chatter, two important points stand out. First, actual improvements made over the last several decades are impressive. This is a result of many factors, chief among them better engines and other truck components, larger trucks to haul more payload for less fuel per tonne than smaller trucks and more efficient trucking operations (for example, fewer kilometres driven empty). No one has precise figures, but it is likely that some trucking operations today are hauling a given amount of freight for one-third the amount of fuel they were using in the 1970s.

Second, the evidence suggests that further improvements in fuel efficiency can be made if the industry were to use existing available technologies and adopt the best operating practices (spec’ing engines, driving fuel efficiently, etc). A recent article from the Argonne National Laboratory in the United States points out there is plenty of room to achieve greater fuel efficiency with trucks by just using the available, off-the-shelf technologies. The authors suggest that, in the United States, class 8 trucks can average 4.25 kilometres per litre (km/L). (This is 10 miles per gallon in U.S. measures and 12 mpg in Imperial measures.)

While fuel consumption in Canada is higher than in the United States (the climate, rougher operating conditions and bigger trucks account for this), to put this figure of 4.25 km/L in perspective, in the early 1990s, the for-hire industry as a whole—all the linehaul operations, the city pickup and delivery and even the yard fuel—had an average fuel consumption rate in the order of 2.0 km/L. A recent Natural Resources Canada study suggests that fleets in the late 1990s had an average of 2.5 km/L (excluding B-train fleets) and 1.7 km/L (B-train fleets). The best operator in this benchmarking study had a fleet average of 3.0 km/L. Statistics Canada’s estimates for 2001 suggest an average of 2.8 km/L for all trucks and 2.5 km/L for all tractor-trailers (7.9 and 7.0 mpg in Imperial terms).



**“Most of the improvement in energy efficiency [in freight] occurred in the truck and rail segments. Heavy trucks, with a 45.9 peta joule improvement, contributed the most to the increase in energy efficiency [1990 to 1999] . . . The trucking industry has achieved efficiency improvements by consolidating loads (maximizing the use of the available capacity), increasing backhaul movements (reducing the number of kilometres travelled without freight loads), and improving its practices (vehicle maintenance, vehicle specification and drivers’ skills).”**

Natural Resources Canada, 2001

**“Most of the improvements [1990 to 2000] in energy efficiency [in the freight sector] were related to heavy trucks.”**

Natural Resources Canada, 2002

It may be that the Argonne National Laboratory figure of 4.25 km/L is not achievable as an industry average in Canada, but anything in the mid 3- to 4-km/L range would be a considerable improvement. If the total fleet average could be raised by 40 per cent—say 3.5 km/L for tractor-trailers and 2.4 km/L for B-trains, the entire Kyoto target could be met.

So why doesn't industry buy all the off-the-shelf technologies—the best engines, tires, aerodynamic devices, central-tire inflation, lighter trucks, etc.? And why doesn't the entire industry adopt the operational practices now used by the best fleets?

The Argonne National Laboratory paper says it is because the price of fuel is not high enough. Truck operators make trade-offs every day about how much they are willing to spend on fuel and how much they are willing to spend on fuel-saving technologies and fuel-saving operational practices. As fuel prices rise, the tradeoff points more in the direction of fuel saving. (The recent Canadian study listing “promising” and “most promising” measures did not include on its list the possibility of using taxes to raise fuel prices.)

Kyoto might just have a chance after all.

## 8. For-hire Motor Carriers and Couriers

Although for-hire motor carriers and couriers account for only 119,000 trucks, as a truck is defined here, and although this is only 18 per cent of the fleet, they are arguably the most important part of total truck activity. These companies operate the largest trucks and travel (by far) the greatest distances. They account for most of the long-haul freight movements in the country.

That said, it is difficult to put precise numbers to this assumed level of importance.

Transport Canada suggests there are almost 25,000 motor carriers in the country (1998) although this number appears to include both for-hire motor carriers and the larger, incorporated owner-operators. Whatever the case, Statistics Canada collects financial information (2000) on 9,317 carriers, each earning \$30,000 or more a year. In addition, there are 17,657 couriers—“courier and local messengers” as they are officially called by Statistics Canada—although probably many do not operate trucks. Only about 10 per cent of the vehicles operated by couriers qualify as trucks.

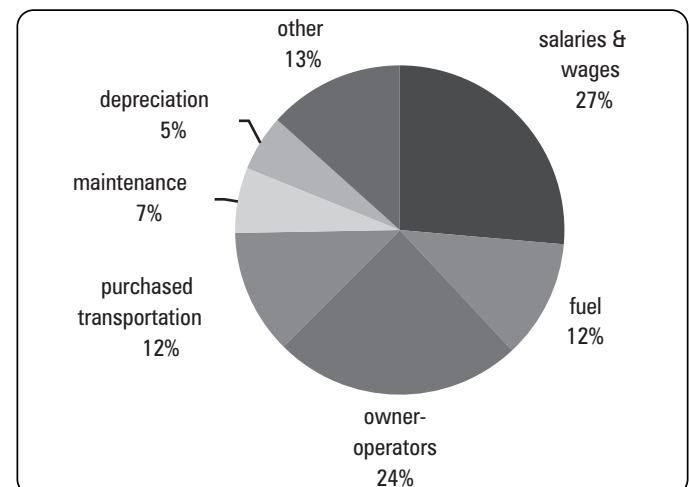
In 2000, for-hire motor carriers transported 278.4 million tonnes of freight according to Statistics Canada's survey. However, this volume is accounted for by only 1,711 motor carriers out of at least 9,317. Those included in the survey are the larger carriers with annual revenues of \$1 million or more and they are only those carriers that earn the majority of revenues on long-distance shipments (80 kilometres or more). It is known from older surveys that the short-haul and smaller carriers excluded from Statistics Canada's survey account for a high tonnage (think of local gravel trucks). In addition, the larger courier companies (revenues of \$1 million or more) handle an estimated 521 million parcels a year. An even rougher estimate suggests the entire courier industry handles 763 million letters, packages and parcels a year.

For-hire motor carriers, plus the owner-operators working for them, account for roughly 194,000 full-time jobs. In addition, there are a large number of part time jobs—no numbers are available but the total is known to be well above 20,000. Employment in the courier industry is unknown.

### OPERATING EXPENSES

The figures in Graph 22 show an industry composite account of operating expenses in 2000—this is for all 9,317 for-hire motor carriers with annual revenues of \$30,000 or more.

Graph 22: Operating Expenses, 2000



Source: Statistics Canada. “Purchased transportation” includes driver services, vehicle lease or rents, load broker services and other purchased transportation services.

More detail is provided in Table 6 where the financial statements of carriers of various sizes are shown. The numbers in the row

showing revenues are not additive as most revenues for owner-operators are actually expenses for the for-hire motor carriers.

As shown in Table 6, large carriers spend proportionately more on owner-operators than do smaller carriers. This, in turn, accounts for the lower proportions spent on fuel, maintenance and depreciation by large carriers. The owner-operators they engage are bearing these expenses. Conversely, the higher proportion of revenues accounted for by fuel, maintenance and depreciation by small carriers and owner-operators is accounted for by the fact that they are not using as many owner-operators.

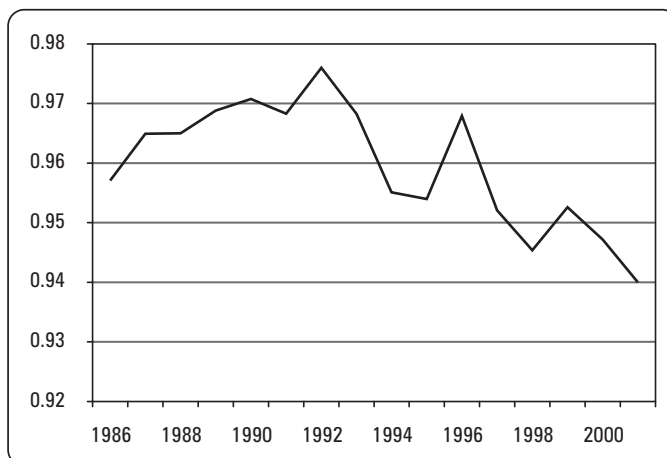
The other thing to note about Table 6 is the ratios in the last two lines. The largest carriers generate far more revenues per employee or per truck than do the smaller carriers.

### PROFITABILITY

The traditional method of measuring profitability in the trucking industry is the operating ratio—the proportion of operating revenues accounted for by operating expenses. Everything left over is available to pay interest, taxes and the return to owner's equity. For the industry as a whole, the 1990s was a good decade (see Graph 23). The operating ratio was generally

improving (falling)—particularly from the very high levels during the 1991 recession—and now stands comfortably at 0.95. For the latest year available (2000), other measures of profitability show that the industry had an average return on equity of 17.8 per cent, a return on total capital employed of 14.8 per cent and an interest coverage of 4.9 (interest coverage is the amount of net income available, before taxes, to pay interest).

Graph 23: Motor Carriers' Operating Ratio



Source: Statistics Canada. Carriers with revenues ≥ \$1 million

Table 6: Financial Statements, 2000

	For-hire Motor Carriers			Owner-Operators	Couriers
	Large	Medium	Small		
# carriers	82	3,195	6,040	35,979	17,657
Revenues (\$ million)	6,562	14,174	1,366	6,329	4,981
<b>Operating Expenses as % of Revenues</b>					
Wages	24.6	24.2	25.4	18.8	33.2
Fuel	7.5	11.6	18.2	26.3	6.4
Owner-Operators	28.0	21.8	2.7	—	—
Purchased transportation	14.1	9.7	12.8	10.6	37.2
Maintenance	4.6	6.2	10.5	8.2	4.7
Depreciation	3.5	5.1	11.6	12.1	2.7
Other	11.0	13.0	12.5	14.1	7.7
<b>Revenues per:</b>					
Employee	203,391	174,215	77,609	107,288	na
Truck	423,710	265,163	96,021	119,336	na

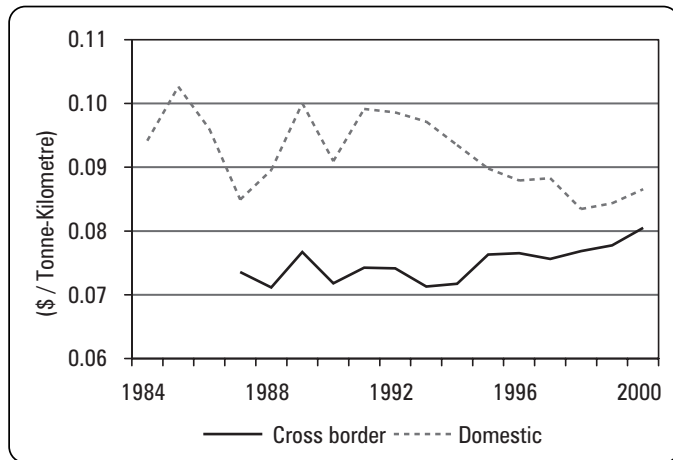
Source: Statistics Canada

- Large ≥ \$25 million; medium = \$1-to-\$25 million; small \$30,000-to-\$1 million
- Proportion of revenues spent on wages for some small carrier, owner-operators and couriers (generally unincorporated) does not include the net income that is considered earning by these operators.
- For couriers, owner-operation expense are included with purchased transportation.

This industry average disguises the performance of various sectors within the industry in parts of the country. For example, in 2000, Ontario-based carriers were not as profitable as carriers in the rest of the country, whether measured in terms of the operating ratio (0.96), return on equity (15.4 per cent), return on total capital (13.8 per cent) or interest coverage (3.7). The year before, it was carriers from Western Canada that did not perform as well as carriers elsewhere. In 2000, the operating ratio for different types of trucking operations—general freight, household goods, tankers, dry bulk, forest products and other specialized freight—was remarkably uniform (0.95 or 0.94), although the return on capital tended to be higher for general freight and household goods carriers than for others.

These industry averages also disguise the fact that some companies fail every year. During the 1990s, there was a constant 300 to 600 firms declaring bankruptcy each year. Most were small carriers and owner-operators, although some failures were more spectacular.

Graph 24: Rates Have Been Flat



Source: Statistics Canada

One factor in understanding the financial performance of the for-hire trucking industry is that freight rates have not increased since the industry was deregulated (effective deregulation occurred in the late 1980s for most trucking). To show this, the graph above plots freight revenues per tonne-kilometre. There are qualifications to this calculation—to be meaningful, the basket of services provided by the industry has to remain constant from one year to the next—but even with these qualifications, the graph provides a good indication as to what has happened to rates. Domestic rates have hovered around nine cents per tonne-kilometre for well over a decade. Cross-border rates have hovered around seven to eight cents.

The case of those who predicted doom and gloom for the industry when it was deregulated (“the industry won’t survive”) seems to be weak. The consumer price index increased by 57 per cent between 1984 and 2000 and the industrial products price index increased by 44 per cent during the same period. Despite this, domestic trucking rates have held more or less steady since 1984, and international rates have not increased by much. Yet the industry as a whole still manages a reasonable operating ratio. The implication seems to be that there has

been a significant increase in productivity. Indeed, a recent federal report suggests that between 1980 and 2000, trucking productivity increased by 37 per cent, unit costs decreased by 30 per cent and freight rates fell by 25 per cent.

## 9. Drivers

It is not possible to describe trucking without taking a look at truck drivers. Like any other industry, trucking companies employ workers. But trucking activity puts the relationship of employer-employee (or, in some cases, contractor) through some peculiar strains.

In trucking, the worker is asked to take a valuable tool (the truck, which typically costs more than \$100,000 when new) many kilometres from its home base (and away from direct supervision) and haul a cargo of often very valuable goods (a trailer load of tobacco products has a retail value of more than \$1 million). Further, this worker is asked to perform on a public road where some other drivers either don’t like trucks or don’t have driving skills commensurate with the collision risks at hand.

Many trucking issues—public policy issues (road safety) or industry issues (shortages of workers)—are related to this peculiar position of truck drivers.

### DATA SOURCES

Before taking this look at truck drivers, one caution. There is no single, comprehensive source of information available on truck drivers. In what follows, several sources—labour surveys, on-road truck surveys, financial and operating data collected by Statistics Canada—are used, but none covers quite the same population as the others. This results in a certain imprecision. More details are available in an endnote.

### DRIVER POPULATION

The 1996 census suggested 222,795 men in Canada described themselves as “truck drivers,” the largest single male occupation in Canada. A 1998 estimate indicates that 231,000 men and women describe their occupation as the driver of a commercial truck. This was 1.6 per cent of the entire labour force. The latest census (2001) indicates there are now 263,510 truck drivers in Canada, 1.7 per cent of the work force.

But, in addition to these people who describe their profession as a truck driver, there are many others who drive trucks on occasion—everyone from farmers to people in the construction industry and other industries where occasionally the job requires handling a truck. There are, after all, 671,000 trucks in the country and it would be very difficult for 263,510 people to drive all of them.

Of those who describe their occupation as the driver of a commercial truck, 55 per cent work for for-hire motor carriers. The rest work for private motor carriers.

Another way of classifying truck drivers is to distinguish between those who are self-employed contractors and who

own their own trucks (owner-operators) and those who are employees. There are 36,000 to 50,000 owner-operators in Canada. But the term “owner-operator” itself has various meanings and this is probably one reason why it is difficult to count numbers. In Atlantic Canada, the term “broker” is often used interchangeably with the term “owner-operator” and in Western Canada, the term “lease-operator” is widely used.

In its simplest form, owner-operator means a person owning a truck and hauling under contract for a motor carrier. There are many variations in these contracts, and in some provinces, in regulations, that attempt to define owner-operators. The result is that there are grey areas, particularly as to what constitutes self-employment. At one extreme, some owner-operators haul freight on their own account. These are often called independent truckers. They may get their freight on a trip-by-trip basis from load brokers or from any one of a number of Internet sites that post loads. Alternatively, they may have longer-term relationships with one or more shippers. These independent truckers have their own operating authority, direct relationships with shippers and receivers (or freight brokers), their own insurance, tax filing status, carrier registration numbers, and so on. At the other extreme, some owner-operators “sign on” to haul for a motor carrier and the contract is such that, for all practical purposes, the driver is not really much different than a company employee other than the rather obvious requirement of owning or leasing the truck. And then there are the dump truck operators. Often operating with a single truck or perhaps a small fleet of five or so, these drivers are often referred to as owner-operators, but they, too, are in fact registered with the various provincial ministries of transportation as carriers.

### GROWING USE OF OWNER-OPERATORS

Over the last several decades, the proportion of truck drivers that are owner-operators or, in some cases, independents, has been growing. For example, Statistics Canada’s annual collection of financial information from for-hire motor carriers shows that in 1975 owner-operator expenses accounted for 11.2 per cent of total industry operating expenses. By 1999, this had grown to 24.2 per cent.

There are probably two reasons for this growing use of owner-operators. First, several decades ago, prior to deregulation, large trucking companies were unionized and the use of owner-operators was one way to diminish the union’s power. Self-employed people (owner-operators) did not join unions. Second, after deregulation, competitive pressures in the industry were fierce and the use of owner-operators allowed carriers to expand or contract capacity with the market. Rather than having to buy trucks and hire (and train) drivers, companies could simply “sign on” as many owner-operators as they needed. The drivers could just as easily be dismissed or not dispatched as often.

While the available information on the population of truck drivers suggests that only fewer than two per cent are owner-operators (37,000 to 50,000 out of a population of 263,500), this doesn’t give the complete picture. If just long-haul drivers

are considered, about one-fifth are owner-operators or independent truckers.

### DRIVER CHARACTERISTICS

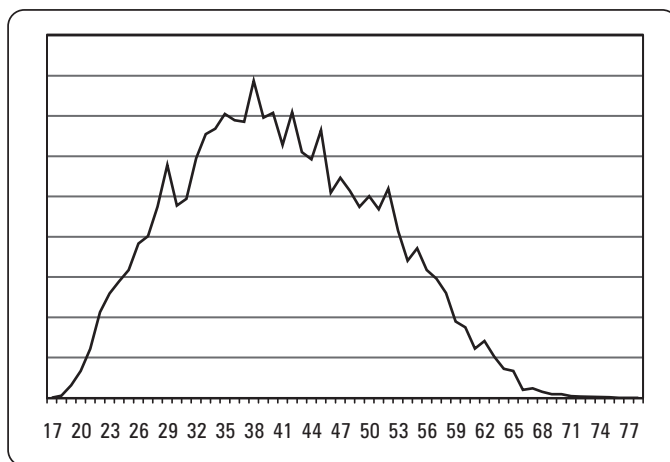
From five survey-based sources, plus anecdotal accounts, it is possible to paint a picture of truck driver characteristics.

The anecdotal accounts suggest there is a high turnover rate for truck drivers. This is mainly a concern in the long-haul truck-load sector of trucking. People get the appropriate driver’s licence, get a job, then either leave the industry or move to another company. American sources suggest the turnover rate for individual trucking companies is as high as 100 per cent in a year. A Canadian private sector survey suggests an industry-wide turnover rate of 35.8 per cent. “Industry,” in this case, refers to larger for-hire motor carriers.

Truck driving is one of the most male-dominated occupations in the country. A 1998 labour force survey showed that 97.2 per cent of truck drivers are male versus only 54.5 per cent of the labour force. The latest census (2001) indicates that 97.1 per cent of truck drivers are male.

Truck drivers also appear to be older than people in other occupations. A 1998 labour force survey shows that, whereas 14.7 per cent of the labour force is between the ages of 15 to 24, only seven per cent of truck drivers are this young. That could be partly explained by restrictions in some jurisdictions as to how old a person has to be to obtain a truck-driver’s licence. But the fact that this same survey shows that 35.8 per cent of truck drivers are 45 or older (versus 31.5 per cent for the whole labour force) is more difficult to explain.

Graph 25: Truck Drivers’ Age Profile



Source: NRS99

And within the truck driver population, owner-operators tend to be even older than the company drivers. Information from a 1999 roadside survey shows that the average age of a truck driver (long-haul on main highways) is 40.7 years. The average age, from this same survey, of drivers who own their own trucks is 42.5 years.

A more worrisome characteristic of truck drivers, from a small survey conducted by two nurses from Cambridge, Ont., is that

they don't appear to be very healthy. According to the survey, 81 per cent of the drivers were overweight, 33 per cent had blood pressure that was too high, 60 per cent did not get enough physical exercise, 87 per cent did not have a diet that met the standards of the Canada Food Guide, and 34 per cent smoked.

Truck drivers have less education than people in other occupations. The 1998 labour force survey indicates that 73.1 per cent of truck drivers do not have a high school diploma—versus 47.7 per cent for the whole labour force. Only 1.9 per cent of truck drivers have a university degree, versus 19 per cent of the labour force. Another source indicates that, among truck drivers, owner-operators are less educated than company drivers.

“Education” in the above paragraph means schools most people attend as children. These numbers don't recognize the on-road education that truck drivers receive. But beyond the ordinary on-road education, a controversial issue is how much training a driver should receive before being allowed to drive a truck. This is a complex issue—should driver training schools be certified? If so, by whom? Should motor carriers provide more training? Should governments be more involved in truck driver training (funding, standards, supplying schools, etc)? Are current training standards for truck drivers high enough? There are strong views on all sides of these questions.

***“After 18 years of being an owner-operator, I just sold my tractor. Enough is enough. So many costs have gone up—not just fuel, but parts, labor and repairs, tires, and insurance. Also, in Ontario we have the new annual emissions testing, as well as the yearly vehicle inspection. Even the periodic medical test for drivers has become an increased expense. All of these requirements call for time off and add to expenses that many consumers know nothing about. And above all this, the [Ontario] Ministry of Transportation has increased enforcement. Though a great idea to weed out the bad apples, it's more time we lose at the scales and at the roadside. And after all these factors, many large companies still want to cut rates . . . .”***

Bob Turcotte, Oakville, October 2000

From the 1999 roadside survey, some aspects of driver training and experience are known. The average driver has 16.2 years of truck driving experience although this is a bit deceptive because it disguises the great diversity around the average: 38.8 per cent have less than 10 years and 32 per cent have 20 years or more. Just over half the drivers had received National Safety Code training and 45.8 per cent had received some form of driving training over the past three years. Finally, 14.8 per cent had received some form of business skills training (dealing with customers, tracking, analysing costs, understanding contracts, etc) in the past three years.

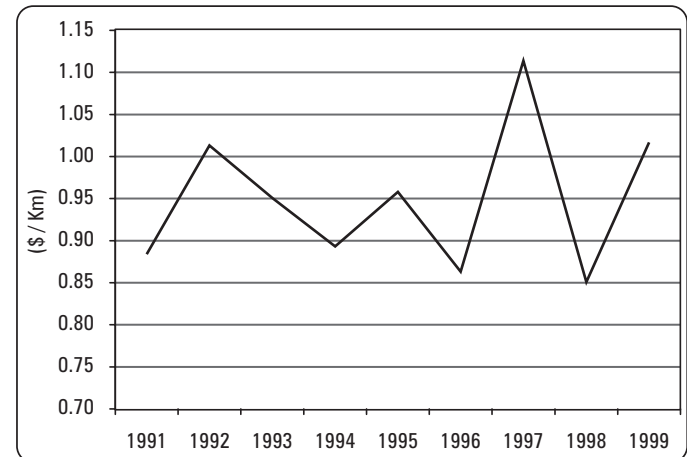
As these figures demonstrate, there clearly is a continuing-education aspect to the truck driving profession. Whether there is

enough or whether the quality is high enough are both contentious topics.

## PAY AND WORKING CONDITIONS

The strong views people hold on the question of driver skills or training are nothing compared to the views they hold on driver pay. As shown in Graph 26, owner-operators have not received a raise in more than a decade. The data shown—about one dollar per kilometre—is transportation revenues divided by total kilometres driven. Since both numbers are estimates, there is some year-to-year fluctuation that may not indicate real changes in pay rates. Also, since there are year-to-year changes in the mixture of owner-operators included in the surveys—say, the proportion driving smaller trucks in urban areas versus those driving big trucks on long, intercity operations versus those driving the big, double-bottom tankers—there might be other year-to-year changes that do not indicate real change. But even with these caveats, the main point is clear. Owner-operators are paid about one dollar a kilometre and this rate has not changed for quite a while.

Graph 26: Owner-Operator Earnings are Flat



Source: Statistics Canada. 1999 is latest year available.

Long-haul owner-operators driving tractors on general freight operations will be surprised at the numbers shown in Graph 26. Typically, their earnings—that is “earnings,” not the advertised “per-mile” payments—are in the range of 60 to 85 cents per kilometre; a 2001 industry survey puts the average compensation rate for intercity owner-operators at 64 cents per kilometre, which is not much more than the “buck a mile” most long-haul owner-operators will say they’re making. However, in Graph 26, a number of owner-operators driving smaller trucks in urban areas are included. Earnings for these drivers tend to be higher, when measured on the basis of distance driven, as the number of kilometres is considerably lower than the long-haul operators. There are also specialized owner-operators included in the figures shown in the graph—for example, in 1999, owner-operators working for household goods movers earned an average of \$1.97 per kilometre (a lot of their earnings are related to loading and unloading at individual residences). The general freight carriers included in the average shown in Graph 26 only earned 79 cents per kilometre.



The 2001 industry survey also puts the average company driver pay rate at 23 cents per kilometre—although details are not known, it is likely this is the average for the larger for-hire carriers. It is also likely that this rate varies considerably from one type of trucking operation to another (unionized or non-unionized, long-haul freight versus urban cartage, freight vans versus specialized commodities).

Whatever the precise rates for owner-operators or company drivers, or the range about these averages, the condition of truck drivers is best described in Statistics Canada's 1997 labour force statistics. In that year, about 62 per cent of owner-operators reported total earnings of less than \$20,000. And the average (pre-tax) earnings for owner-operators in that year were only \$18,300. Company drivers did better with average incomes of \$33,000 for for-hire carriers and \$32,600 for private carriers.

From this same source, Table 7 shows the average after-tax earnings of these three groups. Data from this source for 1998 indicates that company drivers (for-hire) had improved their position slightly—average earnings were \$35,000. Information for 1998 for the other two driver groups is not provided from this source, although the financial and operating statistics that Statistics Canada collects from owner-operators shows an average net income of \$22,110 in 1999.

Table 7: Driver Incomes

1997 Average After-Tax Incomes	
Owner-operators	\$16,000
Company drivers (for-hire)	\$26,800
Company drivers (private)	\$26,230

Source: Statistics Canada

And from all accounts, drivers work long hours to earn this money. According to a 1998 labour force survey, company drivers, working for for-hire carriers, average more than 50 hours a week and owner-operators average slightly more than 52 hours a week. From this same source, 20 per cent of "paid truck drivers were usually on duty 60 hours or more a week." And these figures disguise the real working hours of many long-haul drivers because they no doubt reflect the "official" hours recorded in driver's logbooks. A National Safety Code standard requires all drivers, except those operating locally, to maintain logbooks. This way, enforcement officers can tell if a driver is working longer than allowed under the hours-of-service regulations. Not surprisingly, drivers have learned to disguise their real working hours by showing that almost every time they stop the truck they have booked "off duty." The reality is that a great number of "off duty" hours are spent in holdups at border crossings, doing paperwork, inspecting trucks, securing loads, loading and unloading, and the myriad of other things that constitute the long-haul truck driver's daily schedule. Why do they show much of their non-driving time as "off duty"? Because of the way they are paid. Most long-haul drivers are paid by the dis-

tance driven. To maximize earnings, which are low to begin with, they have to preserve all the "on duty" time they can for actually driving the truck. That way, they don't "run out of hours" half way between Toronto and Vancouver.

Although no figures are available for Canadian drivers on this off-duty-but-actually-working time, a 1999 U.S. study sheds light on one part of the problem. According to the study, the average dry van driver spent 33.5 hours a week waiting to be loaded or unloaded.

One final point about drivers' hours of work. Not only are the hours long, but also for most drivers they are irregular. According to a 1995 survey, only 40 per cent of drivers have a regularly scheduled workweek.

It is no wonder that a 1997 Statistics Canada labour force survey indicates that truck drivers find their jobs stressful.

***"There is so much pressure on drivers to perform these days, they often do so in direct conflict with safety and operational prudence. In many ways, they are forced into dangerous situations by shippers who impose steep financial penalties against carriers for service failures and missed delivery appointments. In the wake of our performance-based regulatory philosophy, additional pressure has been placed on drivers to comply and to perform according to ever-tightening schedules and enforcement demands."***

Jim Park, editor of a trucking magazine and former driver, Spring 2002

## 10. Regional Perspectives on Trucking

This section puts some perspective on truck activity by looking at it on a regional basis. To make comparisons, the graphs use a base line—population. It might be assumed that the activity of 671,000 trucks in Canada more or less follows the same pattern as population settlement. As the graphs show, however, this is not quite the case.

In the graphs, Yukon has been included with British Columbia and the other two territories with the Prairies. But this convention is not always possible with the available sources. Endnotes provide details.

The first panel on Graph 27 compares the population in five regions with the number of trucks. What stands out is the relatively high level of activity on the Prairies. Only 17 per cent of the Canadian population lives on the Prairies (and Nunavut and Northwest Territories) but 40 per cent of the trucks are registered here. This has a lot to do with the number of farm trucks. The other notable point is the relatively low level of truck activity, as measured by the number of trucks, in Québec.

The second panel on Graph 27 compares populations with estimates of truck travel. The first bar—vkt(1)—is an estimate

based on the Canadian Vehicle Survey by Statistics Canada. This estimate is made for only 87 per cent of the truck population shown in Table 1 and used in the first panel. Excluded trucks include some off-road vehicles, some non-freight vehicles and an adjustment made in Table 1 for a possible underestimate of the Québec fleet. Nevertheless, part of the pattern in the second panel reinforces the observations made about the first panel: truck activity is relatively high on the Prairies and relatively low in Québec.

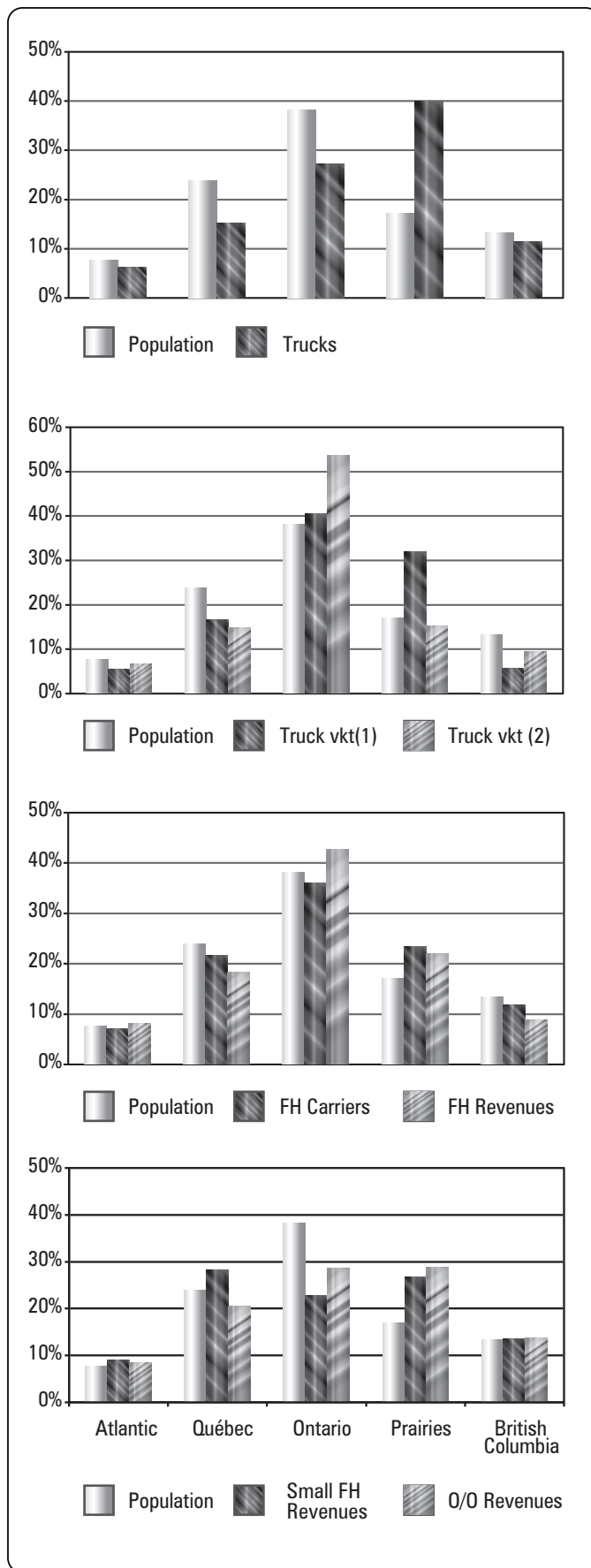
The second estimate of truck travel—vkt(2)—is based on a 1999 roadside survey that captures activity on the main highways. Here, though, trucks are only freight-carrying and some shorter trips (under 200 kilometres) are under-represented. So what this second estimate of truck travel really captures is long-haul intercity freight truck activity. As shown, this tends to reinforce part of the earlier observation (low level of activity in Québec) but now the importance of Ontario as a hub of truck activity begins to be seen.

The third panel compares population with two numbers from Statistics Canada’s survey of larger for-hire carriers: number of carriers domiciled in each region (“FH Carriers”) and total revenues for the year 2000 (“FH Revenues”). As shown, activity in Québec and British Columbia is somewhat less than the number of people living in those provinces would suggest. Conversely, Ontario has fewer firms than its proportion of the population but these firms are the larger ones. Ontario for-hire firms account for 43 per cent of total industry revenues. The Prairie provinces, because of Winnipeg and Calgary, also have a relatively high share of for-hire trucking activity—at least as measured by the larger firms (annual revenues of \$1 million or more). The importance of the Prairies is reinforced by looking at the distribution of for-hire trucking employment (not shown on the graphs): the Prairies accounts for 25.3 per cent of employment versus 17.1 per cent of the population.

To check this notion that for-hire trucking activity tends to be concentrated in Ontario and the Prairies, the last panel in Graph 27 shows the distribution of revenues for small for-hire carriers (“Small FH Carriers”) and owner-operators (“O/O Revenues”). In this case, activity in Ontario is relatively low and the main reason is the concentration of these components of truck activity on the Prairies. Breaking the Prairies down into individual provinces, this concentration is mainly on account of Alberta. To put this in sharper focus, Alberta has only three-quarters the population of British Columbia, yet the revenues for small for-hire carriers and owner-operators in Alberta exceed those in British Columbia by 30 per cent (this is 1999 information, the latest available).

To complete this regional comparison of truck activity, two more panels are shown in Graph 28. The first shows two measures of cross-border trucking activity. “FH X-border tonnes” is Statistics Canada’s 2000 estimate of north and southbound flows of freight carried by larger for-hire carriers. “X-border trucks” is the count of all trucks (Canadian and American, for-hire and private) crossing the border in 2001. Ontario dominates international truck activity in Canada. Almost 63 per cent of all trucks crossing the border do so in Ontario.

Graph 27: Regional Perspective (1)



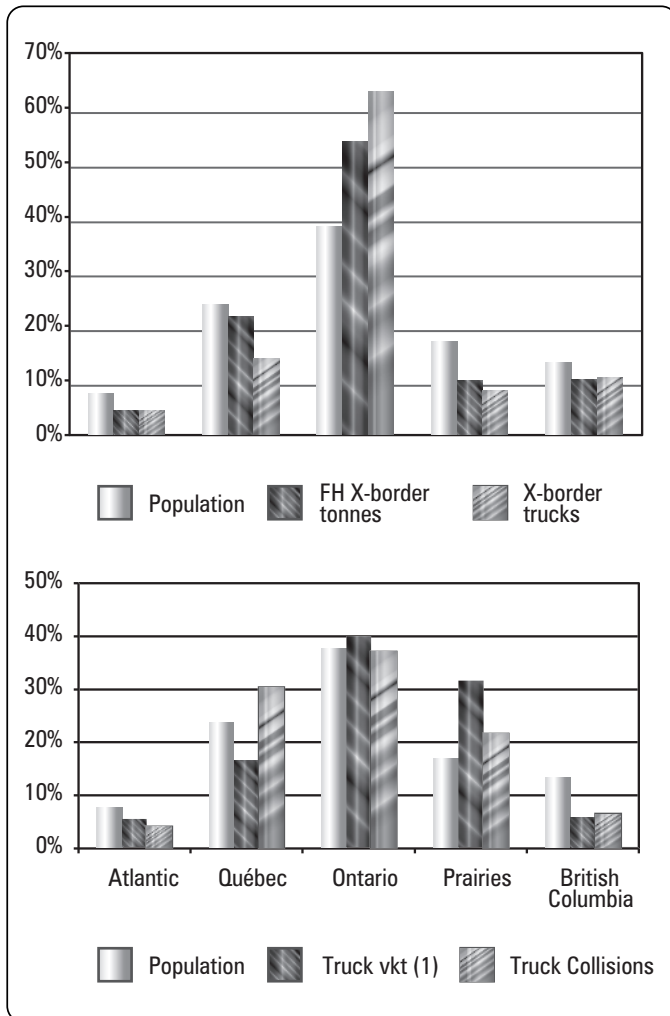
Source: See endnotes

The final panel has to be viewed with caution. Truck travel shown, vkt(1) is the same as that used in Graph 27 and is Statistic Canada's estimate for 2001. As explained previously, sampling problems may account for the relatively low level of activity shown in Québec.

But the number of trucks involved in collisions is from a census survey and is known to be accurate. Putting these two sources together and comparing them with populations seems to indicate a road safety problem in Québec—a relatively high number of trucks involved in collisions in spite of the relatively low level of exposure to the risk of a collision (kilometres driven). And just the opposite conclusion appears to be the case for the Prairies—high level of activity as measured by kilometres driven but a number of trucks involved in collisions more in line with the relative share of population.

The caution in these apparent findings from Graph 28 is that the two surveys, in addition to possibly some sampling problems in the estimate of kilometres driven, cover slightly different populations of trucks. It is not known if this affects the observations just made in a significant way, but the possibility that it might has to be noted.

Graph 28: Regional Perspective (2)



Source: see endnotes

## 11. Trucking Issues

What does the future hold for trucking? There is no indication that trucks are going to disappear anytime soon. If anything, and if past trends hold, the relative importance of trucking may even grow.

It is likely that a number of past and current issues, as identified in the preceding pages will remain. Five stand out in importance.

### THE BORDER

The rapid increase in traffic across the Canada-United States border over the past decade or so, and the structural shifts in manufacturing that have occurred because of trade agreements, have increased the importance of how trucks cross the border. The 26 trucks crossing the border every minute speak to the significance of the issue.

Over the past few decades, aspects of how trucks are regulated or taxed have been brought into alignment between the two countries—more accurately, aspects of Canadian policies and practices have slowly been brought into alignment with those south of the border. Institutions to prorata fuel taxes or truck registration taxes, procedures for inspecting trucks on the roadside, cargo-securement standards, signs used to indicate the presence of dangerous goods, aspects of safety regulations (the concept of auditing or safety-rating, for example) are now identical or, at least, similar in both countries.

There remain, however, a number of areas where differences exist—drug and alcohol testing, hours of work, truck weights and dimensions—and these will continue to be irritants to international trucking. “Irritants,” simply means that a motor carrier providing cross-border services will have to operate that service in a more complex manner than if the regulations and taxes were identical. “Irritant” also means that every so often, the differences in the regulations will cause problems—for example, a driver on a cross-border trip trying to ensure that he or she complies with both sets of hours-of-work rules at the appropriate time and getting it wrong; or a truck designed for the weight and dimension regulations of one jurisdiction not quite getting the weight distribution correct in another.

In addition to the regulatory-taxation issues already mentioned, several more serious issues will mean that the whole subject of international trucking will continue to occupy a lot of time for truck operators, trucking associations, government policy people, highway agencies and enforcement agencies. The more serious issues have, in the past, included immigration—what a driver from one country could or could not do in the other country—cabotage—rules governing the routes a foreign truck can travel—and border-crossing road capacity—particularly at several key crossings in Ontario and perhaps Québec and British Columbia. More recently, these issues have been joined by the question of security. New procedures by immigration and customs agencies on both sides of the border are now being implemented. It is too early to know what the consequences will be. But it is likely that these security issues when coupled with the other issues—road capacity, regulatory and taxation differences, and unresolved reg-



ulatory matters—will mean that the border will stay on the radar screens of truck operators for some time to come.

## **TAXATION**

Since trucks first started to compete with railways, the issue of whether or not trucks pay an appropriate share of highway taxes has simmered—usually on the back burner. But every decade or so, taxation is brought to the boil enough that some government agency looks at the issue or commissions a study. With more than half a century of inaction, the only reasonable guess about the future is that the issue will not go away but, nevertheless, no government policies—tax rates—will change. A more likely possibility is that fuel taxes will be discussed as a part of the effort to meet Kyoto targets.

## **REGULATION AND COMPETITION**

Governments have deregulated transportation markets in the sense that economic regulation is no longer practiced. There continue to be suggestions that governments should step back in because of what some call “market failure.” Current calls for the “re-nationalization” of the British rail industry or the current debate about the future of the North American airline industry are good examples of where these suggestions will be made. In the past, economic regulation was justified where someone claimed the market failed, although there was always much debate as to whether markets failed or more simply whether competition was a rather fierce determinant of supply and demand.

In the case of trucking, some argued that competition was so severe that market conditions should more properly be labelled as “destructive competition.” In the trucking industry today, competition is fierce and as a result, some components of trucking rates are held to very low levels. This shows up most graphically in what the market pays for the act of moving a trailer from one to point to another along the highway network. General freight haulage has become a commodity market in the sense that there are many suppliers with little, if any, way to differentiate their services, and a large group of buyers who can readily switch from one supplier to another. This creates concerns about driver pay and a company’s ability to invest in safe management practices. One of the consequences is that there will always be some pressure on governments to “do something.” Some governments may find the arguments for re-regulation seductive.

## **SAFETY REGULATION AND ENFORCEMENT**

Another area where politicians will find pressures to “do something” will continue to be highway safety.

To the average motorist, big trucks can be intimidating, and seen as a safety threat. Over the last decade or so, particularly as a result of deregulation, governments have greatly expanded truck safety regulations and enforcement efforts. It might be legitimate to question the wisdom of the scale of this effort or, at least, the relative level of this effort compared to regulations controlling young, male drivers of red sport cars. But this is not politically saleable. In any case, even if trucks are not as large a part of the problem as the general public thinks, it still

could be argued that no truck should be involved in collisions (just as in the area of air safety, the standard is that no airplane should crash).

So truck safety regulations will continue to be an issue and, if anything, will grow in importance for two reasons. First, new federal legislation will require the provinces and territories to implement a nationally uniform regime of safety ratings for operators of commercial vehicles. Safety ratings—NSC Standard #14—are something like the demerit point system used for automobile drivers, only a lot more complex. If the past six years is any guide—the provinces and territories have been struggling with implementation since 1997—there will be difficulties achieving this nationally uniform regime. The second reason why the importance of truck safety regulations may grow in the future, is that it is likely the pressures to make the regulations of the three NAFTA countries more uniform will grow.

## **THE DRIVER**

The final issue that will occupy a great deal of time for those connected with trucking is the driver. The issue encompasses a complex mix of training and skills levels, compensation, perceived shortages and the institutions that allow some drivers to be classified as self-employed owner-operators. As shown in Section 9 of this profile, drivers are poorly paid and certain aspects of their working conditions seem harsh—for example, the large proportion that do not have a regularly scheduled workweek. These pay and working condition issues may or may not be something that public policy should confront. But the fact that these compensation issues, and the more general issue of driver skills, have a lot to do with highway safety, presumably do elevate the issues to something that governments will have to deal with. There is strong evidence from the United States that driver pay and working conditions are significant factors in considering truck collisions.

That these five issues will be the most important trucking issues over the next few years is, of course, just a guess on the part of the author. But this is certain: trucking will remain vital to the workings of the Canadian economy. And for all the reasons outlined in Section 6, regulations and policy are intimately bound up in how trucking activity occurs. In considering these regulations and policies, there is a mutual interest here, among truck operators, shippers, governments, and the public to ensure that trucking is as efficient, safe, and environmentally friendly as possible as long as these goals are consistent with a working environment that provides drivers (and others) an opportunity to make a decent living.

## SOURCES AND NOTES

### GLOSSARY (SELECTED TERMS FOR ACRONYMS USED IN NOTES)

CVS	Canadian Vehicle Survey (StatsCan #53-223)
LTL	Less-than-truckload
MCF	Motor Carriers of Freight, a designation used in StatsCan surveys of for-hire carriers
NRCan	Natural Resources Canada
NRS99	National Roadside Study, 1999. In the notes, data from this source can be obtained from Canadian Council of Motor Transport Administrators, 2001, 1999 <i>National Roadside Study Project Report</i> (referred to as “CCMTA 2001”) or from numbers generated from the database.
O/O	Owner-operator
SAAQ	Société de l'assurance automobile du Québec
StatsCan	Statistics Canada—all references to specific publications noted by the catalogue number
T-Facts	Transport Canada web site with data. ( <a href="http://www.tc.gc.ca/pol/en/T-Facts3/NoFrames.asp">www.tc.gc.ca/pol/en/T-Facts3/NoFrames.asp</a> )
TIC	Transport Canada, 2001, <i>Transportation in Canada 2001</i>
TL	Truck-load
TOD	StatsCan's Commodity Origin Destination Survey

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Text Box: (1) trucks crossing border—StatsCan, unpublished data from International Travel Section, which provides Canada Customs and Revenue Agency counts of inbound trucks at each crossing. The total has been multiplied by two, divided by 365, and by 24 and by 60 to estimate 25.6 trucks per minute. (2) \$48 billion—Graph 1; (3) number of trucks—Table 1; (4) people employed in trucking—Table 2; (5) & (6) 2001 census & truck driver's sex—StatsCan 2001 census. (7) Load-matching services: Link Logistics lists around 40,000 available loads each day according to *Today's Trucking*, March 2002, p. 31; (8) and (9) trucks involved in collisions—Transport Canada, 2001, *Heavy Truck Collisions 1994-1998*, TP 2436 E; (10) truck versus rail GDP—Graph 2 or 3; (11) trade volumes by truck—Graph 7; (12) proportion (69.5 per cent) of cross-border trucks with Canadian registrations—StatsCan, unpublished data from International Travel Section; (13) truck energy demand—Graph 19; (14) Ontario—percentages as developed in Section 10; for-hire revenues are both large carriers (2000) and small carriers (1999); (15) average truck weight—Section 3 (NRS99 data); (16) PM and NOx emissions—Section 7; (17) satellite tracking and messaging—Cancom Tracking web site, Dec/02.

### 1. Trucking Activity

- Text Box: (1) StatsCan, #53-222, 1995 p. 7; (2) Canada Transport Act Review Panel, 2001, *Vision and Balance*, p. 175.
- Graph 1: TIC, Figure 10-2. Data on couriers are from “Canadian Courier Market Size, Structure and Fleet Analysis Study,” Infobase Marketing Inc., Jan/01. Estimate of courier revenues is the same as that (for 1999) given for the “couriers and local messengers industry” in StatsCan #50-002, v17, #2, Sept/01. Data on for-hire trucking are from StatsCan's quarterly MCF survey (carriers earning  $\geq$ \$1 million annually) and a survey of tax records for smaller carriers (\$30,000 to <\$1 million). These numbers were calculated from a special tabulation as the published source data (StatsCan #53-222 and #50-002) only sum to \$20.8 billion. The estimated figure for private carriers is by Transport Canada.
- Table 1: The Fleet: (1) The CVS (2001) shows 654,474 trucks on registration files and StatsCan's web site (2002) shows 644,301 (CANSIM, Table 405-0004). For this profile, this has been increased to 671,000. The CVS shows only 84,776 trucks in Québec versus the SAAQ, which estimates a fleet of 100,718 (“Orientation du Ministère des Transports du Québec Concernant les Charges et Les Dimensions des Véhicules Lourds,” Rencontre de Presse, 12 décembre 1996, p. 3.), and 1995 R.L. Polk data that suggest 125,408 trucks. (2) The “non-cargo/off-road” trucks or, at least, the percentage, was developed from the CVS by comparing total trucks on registration lists with total “in-scope” trucks, (3) for-hire fleet, for both large and small carriers, for 1999, is shown in StatsCan #50-002, v18, #1. This has been rounded up from 77,762, to 78,000. (4) O/O trucks are shown in StatsCan #50-002, v18, #2, as 54,433 for 1999. This has been rounded up to 55,500. (5) Farm trucks are a guess, based in part on the approximately 150,000 shown for the three Prairie provinces in F.P. Nix, 1998, *Commercial Vehicle Program Threshold*, Road Safety and Motor Vehicle Regulations, Transport Canada. (6) Information on couriers, for 1999, is from StatsCan #50-002, v17, #2, Table 9, which shows 1,944 trucks. (7) Other numbers shown are a residual.
- Table 2: (1) StatsCan #72-002, Nov/02 “preliminary”; (2) previous figure plus 74% of (1999) O/Os reported in StatsCan #50-002, v18, #2, Table 4. (3) 2001 census figures are from StatsCan #96F0030XIE2001009, p. 26. (4) The final line is as reported in TIC, Table 6-1.

Total trucking activity: Total (2000) employment, at 12,208,000 is from StatsCan, #11-210, 2000/2001, Table 8.  
(320,000/12,208,000 = 2.62%).

## 2. *Trucking and the Economy*

- Graph 2: StatsCan #15-001, June/02. Industries, with correct names, and IMAD codes are as follows (same order as in graph): 91 Public Administration (\$52,846); 211 Oil and Gas Extraction (\$22,661); 484 Truck Transportation (\$11,739); 322 Paper Manufacturing (\$10,939); 331 Primary Metal Manufacturing (\$10,603); 111 Crop Production (\$9,255); 71 Arts, Entertainment and Recreation (\$8,773); 113 Forestry and Logging (\$6,123); 482 Rail Transportation (\$4,875); 315 Clothing Manufacturing (\$3,082); 31212 Breweries + 31213 Wineries + 31214 Distilleries (\$2,840). Numbers in parentheses are the net outputs (or value added) of each industry for 2001 expressed in millions of 1997 dollars.
- Graph 3: StatsCan #15-001, June/02. StatsCan #53-222, 2000, p. 11, indicates that trucking accounts for 41% of transport GDP. TIC, Table 2-2 shows trucking accounts for 31%. The difference in these numbers—41%, 31% or the 27% suggested in the text—is the industries included in the denominator. For here, all industries in NAICS codes 48 and 49 are included.
- Graph 4: Revenues: (1) trucking from TIC (see Graph 1); (2) air and rail from TIC, Table 13-6; (3) courier from TIC (see Graph 1); (4) bus (intercity, school bus, charter, etc) and transit from StatsCan #53-215, 1999-2000 (subsidy for transit from TIC, Table 10-7); (5) oil pipeline revenues from StatsCan #55-201, 2000; gas pipeline “revenues” are an estimate based on “transmission” expenses (no capital costs are included) as shown in StatsCan #57-205, 2000; (6) marine revenues, excluding government-owned companies and revenues for companies hauling on their own account, are from StatsCan #54-205, 1999; (7) taxi revenues are a guesstimate based on the 2000 figures (1997 dollars) shown in TIC, Appendix 2-1.
- Graph 5: Data from (1)1961-1991—old copies of StatsCan #15-001; (2) 1991-1996—StatsCan #15-001, June/96; (3) 1997—StatsCan #15-001, Aug/97, and (4) 1997-2001—StatsCan #15-001 June/02. The latest figures are from the new series where GDP is measured in constant 1997 dollars. Other than noting that the 1997-2001 figures are from the new series, no other reason for the sharp jump in the ratio can be provided.
- Graph 6: 1984 numbers from Blanchard, G. and L. Clavel, 1988, *Transborder Trucking Between Canada and the United States*, TP 9200, Transport Canada; the 1986-2001 numbers from TIC, Fig 9-1; and the 1985 number is an extrapolation between 1984 and 1986.
- Graph 7: 1992-1996 numbers from 1999 version of TIC, Table 8-5; the 1997-2001 numbers from TIC, Table 7-7.

## 3. *The Fleet*

- Fleet: Registration data from StatsCan #53-219, 1998. Series discontinued with the 1998 edition.
- Estimate of trailers used to haul freight commercially: *The Canadian Truck Market*, Toronto: *Today's Trucking*, 1998. T-Facts shows a figure of 166,106 semitrailers (preliminary) operated by for-hire carriers in 1998 where the numbers for small carriers are based on 1997 figures.
- Graph 8: TIC, Figure 10-5 for 1990-2000 numbers; *Today's Trucking* for 2001-2002 numbers. The 2002 numbers are November year-to-date multiplied by 12/11.
- Estimated number of trucks and estimated number of on-road, freight-carrying trucks in class 8: CVS, 2001, p. 21 and p. 26. 93.3% of the estimated 163,393 on-road, freight-carrying tractors are in class 8.
- Estimated number of tractors and straight trucks in truck fleet: CVS, 2001, p. 28. Of the total 583,558 “in-scope” trucks, 28.0% are tractors and 19.1% are heavy pickups and vans.
- Graph 9: NRS99, based on an estimated 1,082,423 trips on all roads.
- Graph 10: NRS99, based on an estimated 1,082,429 trips on all roads.
- Table 3: NRS99, *Project Report*, Table 14.
- Graph 11: NRS99, based on an estimated 1,016,926 trips on all roads.
- Graph 12: NRS99, based on an estimated 661,787 trips with filter FO1CARGOB set = yes.
- Graph 13: NRS99, based on an estimated 866,454 trips.
- Truck and trucking costs: Trimac Logistics Ltd., 2001, *Operating Costs of Trucks in Canada, 2001*, prepared for Transport Canada.

## 4. *Freight Hauled by Truck*

- Number of cargo- or equipment-carrying trucks: Table 1.
- Graph 14: TIC, Table 7-5 adapted from StatsCan sources.
- Roadside survey tonnage: NRS99. Total tonnes measured on all roads, expanded to annual volumes by multiplying by 52.143, is 488.2 million tonnes. The same figure for just the SHS roads is 473.7 million. See *Project Report*, Table 2.

Graph 15: TIC, Table 7-7 adapted from StatsCan sources.

U.S. trucks account for less than one-third of cross-border freight: In 2002, 30.4% of the trucks entering Canada had U.S. registration plates; StatsCan, unpublished data from International Travel Section.

Grain volumes: 1995-96 crop-year estimate: Trimac Consulting Services Ltd., 1997, *Review of Grain Transportation By Truck in Western Canada*, prepared for Transport Canada

Canada Transportation Act Review Panel quote: *Vision and Balance*, 2001, p. 39.

Text Box (Transport Canada quote): TIC, p. 50.

Rail intermodal freight: financial data from RBC Capital Markets, "Research Comment" Oct 22/02 and Oct 23/02. Total reported freight revenues are \$7.15 billion and intermodal revenues are shown as \$1.41 billion.

For-Hire Freight Characteristics (including Table 4): Information from StatsCan #53-222. There is some question as to whether the information shown in Table 4 on shipment characteristics is meaningful in that it mixes TL and LTL shipments in computing averages.

Trucking services (logistics): Details of Ford's Windstar plant from *The Economist*, Dec 7/02, p. 66.

Rate of growth of economy: StatsCan #11-210 (Canadian Economic Observer, Historical Statistical Supplement 2000/01), Table 1. Real GDP growth from 1990 to 2000 was 2.77% a year. At market prices, the economy grew at a rate of 4.8%.

Graph 16: 1987-1998 data from Transport Canada T-Facts; 1999-2000 from StatsCan #53-222 (special tabulation PPA03).

Canadian share of cross-border traffic is inferred from registration plates on trucks crossing the border; from StatsCan, unpublished data from International Travel Section.

Urban goods movements: 45-73 tonne per capita: R.K. House & Associates and Clayton Sparkes & Associates, 1979, *The Economics of Urban Goods Movements*, TP 2186, Transport Canada. At the upper limit, 73 \* approx. 30 million suggests there could be as much as 2 billion tonnes of very local movements not captured in inter-city freight surveys.

## 5. Roads, Traffic and Safety

Road lengths: TIC, p. 72.

"Main highways" means the 24,134 route-kilometres of the NHS plus the 1,061 additional kilometres included in the NRS99.

In other words, "main highways" corresponds to the "SHS" in the NRS99.

Traffic volumes: Leore, Robert, 1997, "The State of the Canadian Intercity Highway System, 1986-1993," *Proceedings*, CTRF annual meeting, pp. 540-554. Strictly, the AADTT figures Leore gives include a small proportion of buses. The statement that Highway 401 in Ontario has volumes in excess of 40,000 is based on the known AADT in excess of 350,000 and a guess that the proportion of trucks exceeds 10%. Many stretches of freeways in Southern Ontario have AADTTs above 10,000. (Ray Barton Assoc, 2000, *Ontario Freight Transportation System Study*, prepared for Transport Canada, Exhibit 8.6). Actual 1995 volumes were: Trafalgar (just west of Toronto): 13,303; Putnam (London): 9,977 (Little, G. R.; Tardiff, L.; Rhone, W. Hanns; and M. Babin, 1997, *1995 Commercial Vehicle Survey*, Ontario Ministry of Transportation). These same two sites, during the NRS99, had truck volumes of 21,736 and 15,688, respectively (CCMTA 2001, Table 1 of Appendix F).

Truck travel: CVS estimate 25.1 (2001) and 26.6 (2000) vkt for trucks. But, these exclude some trucks (e.g., non-freight) and there is a possibility of an under-representation of trucks from Québec. Strictly, these vkt are for trucks domiciled in Canada travelling anywhere (i.e., including the U.S.) so the estimate is not the same as an estimate of truck travel in Canada. This point is overlooked here. Leore (op cit) estimates 9.7 billion truck vkt on the NHS in 1993 (which is almost the same as "main highways" here). The NRS99 survey, extrapolated to annual values, suggests 9.4 billion truck vkt on main highways ("SHS") but it is known that this underestimates truck trips < 200 km. So, it is likely that there are 10 billion vkt or more of truck travel on main highways which, depending on the choice of denominators (25, 26 or possibly something higher) is the source of the estimate in the text that 40% of truck travel occurs on main highways.

Graph 17: TIC "Addendum" Table 3-4

The contention that fuel taxes and licence fees were first introduced as road taxes: Bryan, N. 1972. *More Taxes and More Traffic*. Canadian Tax Papers, No. 55, Canadian Tax Foundation, Toronto.

Road taxes versus expenditures in 2000 (fiscal year ending March 31/01): Transport Canada (TIC, Addendum, Table 3-4) deducts \$903 million from fuel taxes as a provincial fuel tax equivalent. It also shows that 95.9% of the fuel tax is paid by motorists. If 95.9% of \$903 million is added back to the tax line shown in Graph 17, total taxes = \$13.5 billion versus total expenditures of \$13.2 billion (difference of \$354 million).

Recent federal commission calculations: *Vision and Balance*, p. 178.

Road taxes paid by an operator of heavy trucks in Ontario: an NRCan report, *Fuel Efficiency Benchmarking in Canada's Trucking Industry, Results of an Industry Survey*, March 2000, shows that operators of B-train fleets have an average fuel consumption rate of 57.6 L/100 km. Federal and provincial diesel taxes in Ontario are 18.3¢/L which results in a tax of 10.5¢/km. In Newfoundland and Labrador, the tax is 20.5¢/L.

Road collision fatalities and injuries: Transport Canada, 2001, *Canadian Motor Vehicle Traffic Collision Statistics*, TP 3322.

Graph 18: Transport Canada's TRAIID. The statement that truck activity may have increased by a factor of two is based on (a) StatsCan's International Travel data (unpublished) shows that the number of trucks entering Canada increased by 89% between 1990 and 2000; (b) StatsCan #53-222 shows total tonne-kilometres (tn-km) of truck freight in 1990 at 77.8 billion and, in 2000, at 164.9 billion (2.1 X); and (c) (see previous note) truck volumes were increasing at an annual rate of 10.5% at Trafalgar which, in a decade, more than doubles the total.

Transport Canada report: *Heavy Truck Collisions 1994-1998*, TP 2436E, Dec/01. The section (the "third" point in the text) dealing with driver condition or driver action excludes data from Québec.

U.S. study on truck-car critical incidents: as reported by Martin R. Walker (FMCSA) in describing the "Truck-Car Interaction Study," FMCSA workshop, Jan 12/03, Washington, DC.

FMCSA's Large Truck Crash Causation Study. TRB web site ([http://gulliver.trb.org/publications/reports/tccs\\_dec\\_](http://gulliver.trb.org/publications/reports/tccs_dec_)). As of Jan/03, data on 664 truck crashes, out of the planned 1,000, had been coded. While the FMCSA (Ralph Craft) warns that it is too early to reach any conclusions, the overwhelming impression from these first 664 collisions is the extent to which human factors (drivers) seem to be the most critical.

## 6. Trucks and Government

Text Box quoting Canada Transportation Act Review Panel: *Vision and Balance*, p. 255.

## 7. Energy

Proportion of O/O costs accounted for by fuel: StatsCan, #50-002, preliminary data provided by Transport Canada. This proportion jumps around from year to year and 26.3% is abnormally high. However, from other sources, it is in line with over-the-road operating costs of trucks. Large carriers, in the fourth quarter of 2000, spent only 12% of operating expenses on fuel (StatsCan, #53-222, 2000, Table 4.1). However, it is not possible to know if this includes all fuel purchased by O/Os working for the large carriers. Trimac's 2001 *Operating Costs of Trucks in Canada* shows fuel costs in the range of 21-22% for domestic trucking operations. An article in the May/03 issue of *highwaySTAR* on operating cost increases for owner-operators suggests the percentage could be as high as 40%.

Addition of trucks with GVW > 3,855 kg: The suggestion that this adds 8-to-10% to the fleet is based on 1990 R.L.Polk data shown in G.W.R. Taylor et al, 1993, *A Study of Canadian Heavy Duty Diesel Vehicle Characteristics*, prepared for Environment Canada.

Energy demand and Graph 19: From NRCAN, *EndUse Energy Data Handbook*, 1990 to 2000, pp. 2-5.

Conversion:  $8,164.4 \text{ PJ} = 1,318,387,312 \text{ barrels of crude oil equivalent} \div 30,769,669 \text{ people (StatsCan, \#57-601, Table 1.18)} = 42.8 \text{ barrels per capita}$ .

Forecast 74% increase in on-road diesel fuel: Transportation Climate Change Table, 1999, *Transportation and Climate Change: Options for Action*, p. 9.

Graph 20: Monthly figures from Jan/99 to Dec/01 from TIC, Figure 5.11 (source is M.J. Ervin Associates). From Jan/02 to June/02, the source is the Toronto retail self-serve prices contained in StatsCan, *Energy Statistics Handbook*, Quarter II, 2002, cat #57-601, Table 10.6.

Air quality: The Clean Diesel Independent Review Panel, established by the U.S. Environmental Protection Agency (EPA), wrote in the fall of 2002: "Reviews by EPA and other public health agencies have found that ground-level ozone, particulate matter, nitrogen oxides, sulfur oxides and a number of volatile organic compounds adversely affect public health. These reviews have concluded that each of these pollutants contributes, or is likely to contribute, to one or more of the following health effects: premature mortality, cancer, aggravation of cardiovascular disease and adverse respiratory effects including exacerbation of asthma, changes to lung tissues and structures, altered respiratory defense mechanisms, decreases in lung function and chronic bronchitis." Clean Diesel Independent Review Subcommittee, Clean Air Act Advisory Committee, 2002, *Meeting Technological Challenges for the 2007 Heavy-Duty Highway Diesel Rule*, Washington, D.C.

Emission limits: (1) EPA, "Emission Standards Reference Guide for Heavy-Duty Engines and Nonroad Engines," EPA420-F-97-014; (2) Taylor, Gordon W. R., 2001, *Trucks and Air Emissions*, Environment Canada, EPS 2/TS14, Ottawa. The actual 2007 limits are more complex than as described in the text: there is a phase-in period and there is a new limit for formaldehyde.

Greenhouse gas emissions: Estimates of total and truck's share are from NRCAN (op cit, *Data Handbook*).  
Text Box quoting Transportation Climate Change Table: Transportation Climate Change Table, 1999, op cit, p. 18.

Graph 21: Environment Canada, "1995 Criteria Contaminant Emissions for Canada (tonnes)."  
[www.ec.gc.ca/pdb/ape/ape\\_tables/canada95\\_e.cfm](http://www.ec.gc.ca/pdb/ape/ape_tables/canada95_e.cfm)

Government's current plans: Environment Canada, 2002, *Climate Change Plan for Canada*. For trucking, the plan sets some nebulous goals for increasing the use of biodiesel, "encouraging" intermodal freight, and encouraging efficiency.

Recent Study: Transportation Climate Change Table.  
The statement, "It would be difficult for trucks to achieve the '6% below target' by 2010." Strictly, the target date is

2008-2012. Total medium and heavy truck emissions in 1990 were 25.0 Mt. This is almost the same as the emissions from “on-road diesel” so, for the sake of this illustration, “on-road diesel” is assumed to be almost synonymous with trucks. The forecast level of emissions from on-road diesel in 2010 is 39.4 Mt (Transportation Climate Change Table, op cit, Table 2.4). A reduction to 6% below 1990 (24.2 Mt) implies a 38.5% reduction from the “business as usual” forecast for on-road diesel. All the “most promising” and “promising” measures (8.65 Mt, Transportation Climate Change Table, op cit, Appendix A) do not come anywhere close to achieving this target.

- Truck-to-Rail freight shifts (small savings in ghg emissions at a high cost): Transportation Climate Change Table, op cit, p. ix.
- Fuel efficiency (difference between a good driver and a bad one): As one example, see the article by Jim Park in *Today's Trucking*, Oct/99, p. 61 where the difference in fuel consumption between two trips is 27.5%
- Statement that fuel efficiency may have increased by a factor of three since the 1970s: In the previous edition of this profile (F Nix, 1998, *Trucking in Canada: A Profile*, Canadian Trucking Research Institute and Industry Canada, p. 36) data are given for a 34-tonne truck in 1975 with a fuel efficiency of 0.0361 L/tn-km. This is compared to a 44-tonne truck in 1995 that achieves 0.0133 L/tn-km (37% as much fuel as the 1975 truck). In Jim Park's test run (op cit) in 1999, the best trip managed 0.0135 L/tn-km (very close to the figure calculated in the 1998 edition) and fully loaded B-trains can easily exceed this.
- Text box on energy efficiency: NRCan, Office of Energy Efficiency, 2001, *Energy Efficiency Trends in Canada 1990-1999: An Update*, p. 36. NRCan, Office of Energy Efficiency, 2002, *Energy Efficiency Trends in Canada 1990-2000: An Update*, p. 30.
- Fuel efficiency figures (1) early 1990s—StatsCan #53-222; (2) NRCan Office of Energy Efficiency, FleetSmart Program, *Fuel Efficiency Benchmarking in Canada's Trucking Industry: Results of an Industry Survey*, March 2000, and (3) StatsCan's estimate for 2001—CVS 2001.
- Argonne National Laboratory article: Saricks, C., A.D. Vyas, F. Stodolsky, and J.D. Maples, 2003, “Potential Effect of Future Energy Efficiency and Emissions Improving Technologies on Fuel Consumption of Heavy Trucks,” TRB paper 03-3648.

## 8. For-Hire Motor Carriers and Couriers

- Number of carriers: T-Facts shows 24,908 motor carriers in 1998.
- Number of trucks operated by couriers: StatsCan #50-002, v17, #2, Table 9: 1,944 trucks versus 19,824 vehicles (excluding bicycles, warehouse equipment and trailers).
- Freight: Total tonnes: StatsCan #53-222, 2000, Table 3.1; number of carriers in TOD population: Table 5.3. Courier packages for those earning  $\geq$ \$1 million: StatsCan #50-002, v17, #2. The estimate for all couriers is based on Infobase Marketing (op cit).
- Employees: Table 2 for full-time employees. Data on part-time employees are not available. However, O/Os employed 22,307 part-time employees in 1999 (StatsCan #50-002, v18, #2, Table 4) of which it is estimated that 74% worked for for-hire carriers. In addition, small for-hire carriers employed 5,776 part-time employees in 1999 (StatsCan #50-002, v18, #1, Table 6).
- Graph 22: StatsCan #50-002, preliminary data from Transport Canada
- Table 6: For-hire motor carriers from StatsCan #50-002, v18, #1, Table 1; O/Os from StatsCan #50002, v18, #2, Table A; couriers from StatsCan #50-002, v17, #2, Table 5.
- Graph 23: Data calculated from StatsCan #53-222, various years. (2001 OR based on information in a Feb/03 press release)
- Profitability: Figures for 2000 from StatsCan #53-222, Tables 2.6 and 2.7.
- Graph 24: Data from StatsCan, #53-222, various years. StatsCan itself does not agree with this calculation (dividing estimated total shipment revenues by the estimated total tonne-kilometres). Rather, it calculates an average dollars/tn-km on a per-shipment basis. For example, for the latest year (2000), it shows an average of \$3.55/tn-km. This is not meaningful for an industry consisting of a group of carriers hauling LTL freight and another group hauling TL freight. Admittedly, the number used here also suffers from conceptual problems, the chief one being that to be meaningful over time the basket of services provided has to stay relatively constant (same mixture of commodities, same mixture of LTL and TL freight, same shipping distances). Another problem, with either calculation, is that the target population for the TOD survey has changed several times during the period shown—the most recent being in 1997 when NAICS definitions were adopted. From 1997 on, carriers included in the survey were Canadian-based for-hire trucking companies whose annual operating revenues were  $\geq$ \$1 million, the major part of which was derived from long-distance (80-plus km) deliveries.
- Inflation: CPI—StatsCan #11-210, Table 11; Industrial Products Price Index, Table 12. To put a longer-term perspective on this point, the first TOD survey (1973) shows an average trucking “rate” (if we accept this calculation as a proxy for rates) of a little more than 4¢/tn-km. The current approximate 9¢ represents a 125% increase in trucking prices over 27 years. The CPI, in this same period, increased by 304%.
- Productivity changes between 1980 & 2000: Transport Canada, 2003, *StraightAhead: A Vision for Transportation in Canada*, p. 27.

## 9. Drivers

Value of a trailer load of tobacco products: Carroll McCormick, "Stop Thief," *Motor Truck*, March-April 2002, p. 29, reports that "a load of smokes can be worth as much as \$1.2 million."

Data sources — five: (1) Irwin Bess, 1999a, "Socio-Economic Profile of Independent Truck Drivers," StatsCan #53222. The interest is the use of 1997 Survey of Labour and Income Dynamics data to compare O/Os with company drivers. Bess' use of the term "Independent Truck Drivers" does not correspond to the use in the text. (2) Irwin Bess, 1999b, "Work Patterns of Truck Drivers," *Perspectives*, StatsCan #75-001, winter 1999. Data of interest were developed from labour force and other surveys in the period 1995-1998. Most information from these first two sources is from Canadian residents who described themselves as truck drivers on the survey. This excludes, for example, a farmer driving a truck-load of produce to market. (3) NRS99 with 65,052 respondents provides information on (mainly) long-haul truck drivers on main highways. Here, a farmer driving a truck is included as a truck driver and, unlike the first two sources, 6.1% of known respondents were American-based drivers. (4) StatsCan's MCF Survey (Survey of Small For-Hire Carriers and Owner-Operators) results in data that appear in the #53-222 usually as part of a special study as well as in #50-002. This provides a continuous source of financial and operating data from 1991 to 1999 on people who describe themselves as truck drivers on tax filings. The most recent data (1999) appear in #50-002, v18, #2. These estimates are based on a sample of tax filings supplemented with a follow-up telephone survey. In 1999, there were an estimated 43,746 carriers (small for-hire carriers or O/Os) and of this population, 37,196 were judged to be O/Os. These estimates are based on a sample of 23,109 tax records and follow-up interviews with 3,479 respondents. While the quality of this source is believed to be good, there can be questions about some information (e.g., large jumps from year-to-year in some numbers). As a check, it may be noted that StatsCan's survey estimates (1999) 7,041 O/Os in Québec whereas SAAQ records show (2002) only 5,237 O/Os. This may be an accuracy problem in the StatsCan estimate or it may be a difference between what StatsCan and SAAQ define as O/Os.

Driver population: 1996 census from StatsCan #53-222, 1997, p. 16. 1998 numbers from Bess 1999b, p. 15; 2001 census—Table 2. Estimate of #O/Os is based on StatsCan's MCF survey for 2000 (37,979) and Bess 1999b who reports that in 1998 there were about 50,000.

Defining the term "owner-operator:" Jim Park, editor of *highwaySTAR*, assisted with some of the text.

Proportion of drivers that are O/Os: The figure of 1/5 based on NRS99 (CCMTA, 2001, Table 17.) StatsCan's MCF has shown the number of owner-operators varying from a low of 34,712 in 1991 to a high of 41,061 in 1998, but it is difficult to see any trend. Looking at O/O expenses as a percentage of total for-hire motor carrier expenses, StatsCan's #53-222 (1975) shows that 11.2% of expenses of both the Class I, II and III freight carriers plus the household good carriers were accounted for by O/Os. By 1999 (latest numbers available if small carriers are to be included) this had grown to 24.2% (StatsCan #50-002, v18, #1, Table 1).

Turnover rates: Canadian source is Cerno Research, "2001 Trucking Operations and Compensation and Benefits Report Drivers," as quoted by R. Lockwood, 2001, "In Search of Fair Pay," *Today's Trucking*, July/Aug/01.

Truck driver sex: Bess 1999b, p. 15.

Text Box: Bob Turcotte, letter to the editor, *Today's Trucking*, Oct/00

Driver age: 1998 labour force survey data from Bess 1999b, p. 15. Bess 1999a shows that O/Os are older than company drivers. The actual numbers used, including Graph 25, from NRS99 (outliers and zero values excluded).

Driver health: Survey of 73 drivers (2001 and 2002?) by Sharri Crowley and Theresa Milani from Cambridge Memorial Hospital as reported in *highwaySTAR*, June/02, p. 8.

Driver education: Most data from Bess 1999b. Difference between O/Os and company drivers is from Bess 1999a.

Driver experience: NRS99 (outliers and zero values excluded); the mean of 16.2 for years of driving experience has a very high c.v. (68.2%).

Graph 26: Numbers based on StatsCan's estimate of O/Os transportation revenues (not total operating revenues) divided by an estimate of total distance driven. Sources: StatsCan, #53-222 1991, Table 6.11; 1999, Table 6.10; 1993, Table 4.9; 1994, Table 3.9; #50-002, v13, #5; V5, #1; v16, #1; v17, #1; and v18, #2.

Pay rates: Industry average of 64¢/km for O/Os and 23¢/km for company drivers based on the 2001 survey by Cerno Research as reported by R. Lockwood (op cit).

Average incomes (including Table 7): Bess 1999a. The average after-tax income for O/O shown in Table 7 has a c.v. of 22%. The 1998 figure for company drivers (for-hire) is from Bess 1999b (\$673 \* 52). The 1999 figure (net income) for O/Os calculated from StatsCan #50-002, v18, #2, Table B.

Driver hours worked: Bess 1999b (averages were read from a graph and, therefore, are not precise). It is assumed that "paid drivers" includes both company drivers and O/Os although the source does not specify this. The argument that many long-haul drivers disguise non-driving working time as "off duty" in their logbooks is based on two papers/articles: (1) A. James Park, "Not Enough Hours in a Day," proceedings of the 38<sup>th</sup> annual CTRF conference, May 2003 (Park is the editor of *highwaySTAR* magazine and a former long-haul driver); and (2) Mike Smith, "Running Legally", *Truck News* May 2003 (Smith is a truck driver and a director of the Owner-Operator's Business Association of Canada).

Regularly scheduled workweek: Bess 1999b, from the 1995 Survey of Work Arrangements.

Waiting time: U.S. study, by the Truckload Carriers Association, reported by Nick Carraway in *Today's Trucking*, Sept/99, p. 56.

Job stress: According to Bess, 1999a, "almost seven out of every 10 drivers (69%) reported that they felt that their work and personal lives were very to somewhat stressful. However, owner-operators were far more likely than any other type of driver to report feeling stressed given their age, health, education, status as the house-hold income earner and location of residence. The results showed that 80% of owner-operators felt very to somewhat stressed compared to 66% of company drivers." This is based on 1997 SLID data.

Text Box: Jim Park, "Changing the Face of Trucking," CTRF, *Proceedings*, 2002, p. 150.

## **10. Regional Perspectives on Trucking**

Graph 27: Population figures as at July 1/01 (StatsCan web site). Panel #1: truck population as in Table 1 (which adds 16,526 trucks to StatsCan's CVS estimate of the Québec fleet). Panel #2: vkt (1) CVS 2001; vkt (2) NRS99. Panel #3: StatsCan #53-222 (in both series the territories are included with BC). Panel #4: StatsCan #50-002, v18, #1 and v18, #2 (in both cases the territories are included with BC).

Employment: numbers given for the Prairies based on StatsCan #72-002, Nov/02 "preliminary."

Graph 28: Panel #1: For-hire cross-border tonnages for 2000: StatsCan #53-222; trucks crossing the border for 2001: StatsCan unpublished data. Panel #2: vkt (1) as in Graph 27; truck collisions: Transport Canada TRAIID.

## **11. Trucking Issues**

Relationship between driver pay and on-road safety: Michael Belzer (University of Michigan and Wayne State University) has written several books and research papers on the subject. The latest, with Daniel Rodriguez and Stanley A. Sedo, for the FMCSA, is *Paying for Safety: An Economic Analysis of the Effect of Compensation on Truck Driver Safety*. Sept/02



