

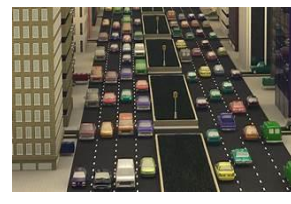
**CANADIAN
TRANSPORTATION
RESEARCH FORUM**

**GROUPE DE RECHERCHES
SUR
LES TRANSPORTS AU CANADA**



**RESEARCH PAPER
No 2**

**RECHERCHES PAPIER
N° 2**



FOREWORD

CTRF is a broadly based network of transportation professionals with an interest in research and commentary on public policy issues. Membership is open to anyone in any aspect of transportation.

CTRF's objectives are: to encourage transportation research in those disciplines which address themselves to the economic, managerial, technical, political and social aspects of transportation; to provide a common meeting ground to exchange ideas and research results; to provide a forum for presenting and discussing transportation issues to bring together persons involved with Canada's transportation system.

In 2024, the Canadian Transportation Research Forum decided to launch its Research Papers to further encourage and stimulate interest in transportation.

The Research papers provide the views of the author or authors and are not necessarily those of the Canadian Transportation Research.

From time to time, CTRF may choose to showcase a research paper, prepared by its members, on its website. Such papers are presented for discussion purposes and do not necessarily represent the position of the organization or its members. Criteria for showcasing is broad, however, papers will be generally considered that provide evidence and insight on the Canadian transportation system, regulation and policy, or provide some historical record and inventory that could be a resource for the Canadian transportation industry.

Le GRTC est un groupe de professionnels (les) en transport intéressés (ées) à la recherche et aux questions de politiques publiques. Être membre du GRTC convient à quiconque s'intéresse aux transports.

Les objectifs de GRTC sont d'encourager la recherche dans les domaines suivants liés aux transports: économie, gestion, technologie, politique et aspect social; de fournir un lieu de rencontre pour échanger idées et résultats de recherche; de créer un forum pour présenter et discuter de questions de transport; de réunir les personnes intéressées au système canadien de transport.

En 2024, le groupe de recherches sur les transports au Canada a décidé de lancer ses documents de recherche pour encourager et stimuler davantage l'intérêt pour les transports.

Les documents de recherche expriment les points de vue de l'auteur ou des auteurs et ne sont pas nécessairement ceux du le groupe de recherches sur les transports au Canada.

De temps à autre, le CTRF peut décider de présenter sur son site Web un document de recherche préparé par ses membres. Ces documents sont présentés à des fins de discussion et ne représentent pas nécessairement la position de l'organisation ou de ses membres. Les critères de présentation sont larges, mais seront généralement pris en considération les documents qui fournissent des preuves et des informations sur le système de transport canadien, la réglementation et la politique, ou qui fournissent des données historiques et un inventaire qui pourraient constituer une ressource pour l'industrie canadienne des transports.

CTRF President

GRTC Président

NETWORKS IN CANADIAN TRANSPORT, BARRIERS TO ENTRY AND COMPETITION

Joseph Monteiro, Barry E. Prentice and Anna Robak

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INTRODUCTION

Networks have always been important in transportation and telecommunication. They define the key to success in today's dynamic marketplace. They have become ubiquitous today in all other sectors of the economy, banking, pipelines, grocery shopping, etc. especially because of the Internet - "network of networks". The Internet has connected virtually everything today. It has connected everybody, everything, everywhere into a network. Of course, the Internet has also changed how existing transportation networks behave. Recently, the COVID-19 pandemic disrupted supply chains, resulting in increased cost of goods, and affected services in air, ocean and other transportation sectors. As a result, in Canada the Competition Bureau launched a market study of competition on passenger air travel service and joined a joint new working group in Australia, New Zealand, the United Kingdom and the US, to identify and prevent potentially anticompetitive conduct in the global supply and distribution of goods. And in the US, the Justice Department's Antitrust Division and the Department of Transportation jointly announced a broad public inquiry into the state of competition in air travel.ⁱ

Initial interest in networks began with one of our papers published in the Canadian Transport Research Forum Proceedings that won a runner-up prize to the best conference paper in 2007. It was later followed up with another paper on the use of mathematics in network and economic theories in network. These papers were sent to Anna Robak to see if she wanted to develop it further. But she wrote back asking what exactly should be done? In the meantime, the competition authority in Canada raised concern about the lack of competition in the airlines in Canada, a network industry. This provided the motivation for this paper. It began to expand over time with occasional doubts whether it would be completed so the initial sections of this paper which were completed were presented at the 60th Canadian Transport Research Forum Conference in Ottawa, Ontario by Professor Barry Prentice and Anna Robak in 2025.

The structure of this paper evolved over time. In Part I we begin reviewing the definition of networks and whether networks are important and widespread in Canadian transportation. If networks are important and widespread, any knowledge gaps warrant investigation. Part II reviews the use of mathematics to describe networks from routing to networks and the economic theory of networks in transportation from the theory of network formation and growth to strategic interaction models and network externalities. We also briefly touch on graph neural networks and Bayesian networks whose use is becoming increasingly popular in transportation. It also briefly reviews pricing in networks. These three parts provide an introduction to whether networks in transportation create barriers to entry and competition, the key motivation for this paper.

In Part III, whether networks in transportation create barriers to entry are examined at length. It begins by examining the definition of barriers to entry; then explores how barriers to entry are treated under Competition laws in Canada, USA, EU, Australia and New Zealand; and finishes with an assessment of the extent to which networks create barriers to entry. To determine if barriers exist in Canadian transportation, we reviewed studies in each mode of transportation.

Part IV examines how transportation network industries are treated under the Competition law in Canada and other Canadian transportation laws in each mode of transportation - rail, air, road, water and pipelines.

It then reviews how networks in transportation are treated in other Jurisdictions – US, EEC, Australia, and New Zealand in each of the modes of transportation under their respective competition laws and their transportation laws.

Based on a review of transportation networks we determined that transportation industries that operate as networks are special forms of organization that deserve special attention in competition laws. Could the lack of entry and competition we observe in some modes of transportation be a result of *networks* in these industries? If so, it is not surprising, that the Competition Bureau plans to examine barriers to entry and expansion as part of the scope of its study on airlines.

Part V therefore suggests a framework for treating competition policy in transportation network industries. The four key elements include: market definition; market power analysis; competitive analysis; and options to promote competition and consumer welfare.

The conclusion summarizes the paper and emphasizes the importance of networks not only in transportation but in many sectors of the economy and suggests that there may be a case for providing an even broader framework in competition laws for dealing with networks in all industries with networks. This is also suggested as terms such as networks and network effects are creeping into competition laws. If such a broader framework is not possible because of the characteristics in each sector of the economy, perhaps a framework can be provided for each sector of the economy in the competition laws. If it is felt that the competition laws are not the best suited laws then the laws in each sector could address these matters.

NETWORKS IN CANADIAN TRANSPORT, BARRIERS TO ENTRY AND COMPETITION

Part I. Definition of Networks, its Importance and Presence in Canadian Transportation

A. Definition of Networks

There is no unique definition of the term network. The Concise Oxford dictionary defines it as an ‘arrangement with intersecting lines & interstices...’ In mathematical topology, a network is defined as ‘...a figure (in a plane or in space) consisting of a finite, non-zero, number of arcs, no two of which intersect except possibly at their end points.’ⁱⁱⁱ Topology has a long history dating back to 1700 to solve the Königsberg bridge problem.ⁱⁱⁱ Some scholars note that this matter dates back even further to the Roman era when the issue of constructing one-way roads arose to deal with congestion. Other attempts at defining it include less tangible routes.^{iv} In economics, the term network gained a foothold with the consideration of its ‘effects’. The use of the term network effects can be traced to Harvey Leibenstein’s use of the word ‘bandwagon effect’^v in 1950 by which he meant ‘the extent to which the demand for a commodity is increased due to the fact that others are also consuming the same commodity’.^{vi} Further use of the term in this context lay largely dormant until the 1980s, except for its application to telecommunications.

B. The Importance of Transportation Networks in Canada

Transportation has played a key role in the development of Canada from the early days before the fur trade, when there was no well-defined network or mechanical form of transportation, to the present day of automation, intelligent transportation and highly sophisticated integrated systems. One source states ‘Canada’s transportation networks form the literal backbone of the country’s economy.’^{vii} There is no unique way to define the ‘importance’ of transportation, as it means different things to different people.^{viii} Some guidance may be provided by the definitions given in dictionaries. For example, the Merriam/Webster Dictionary defines it as – ‘marked by or indicative of significant worth or consequence: valuable in content or relationship’ and the Oxford Advanced Learner’s Dictionary defines it as - having a great effect on people or things; of great value; ...’^{ix} Its importance can be described by economic and non-economic indicators.

In this paper, we shall only mention economic indicators as measured by some common denominators, such as contributions to gross domestic product; employment generated or supported; and revenues generated. The economic importance of the rail, air, road, water, and pipeline transportation industries, can be described as follows:

1. Rail – Rail accounted for \$9.5 billion^x (2017 constant dollars), or 0.4%^{xi} of the GDP (\$2,208b) in 2023. It employed 48,500 people. The volume of total traffic (export, import, domestic, & transshipments) moved by rail was 326 million tonnes; and VIA Rail carried 4.1 million passengers over 1,463.5 million kilometres (roughly 98%). The value of exports by rail was \$102b million and the value of imports was \$69b.^{xii} The revenues of railways were \$19.8 b (CN-\$11.6b, CP-\$6.6b, VIA-\$0.7b, and Regional railways \$0.36b and Shortline railways \$0.5b).^{xiii}

2. Air – Air accounted for \$6.5 billion (2017 constant dollars) 0.3% of the GDP in 2023. It employed 102,857 people in scheduled, non-scheduled and support activities. The volume of traffic moved by Canadian airlines was 88.7 million passengers or 228 billion passenger kilometres and 0.9 million tonnes of goods or 3 billion good tonne kilometres. The value of exports by air was \$73.6 billion and the value of

imports was \$90.3 billion.^{xiv} The operating revenues of airlines were \$35.7 billion (Level I to III air carriers) in 2023 (Canada's two largest airlines Air Canada and WestJet reported operating revenues of \$15.3billion and \$4.6 billion in 2022). In 2023, Air Canada had operating revenue of - \$21.8 billion.

3. Road – Road accounted for \$25.6b (2017 constant dollars) 1.2% of the GDP in 2023 (i.e. Truck \$2.1b, \$3.3b urban transit systems, and \$1.3b taxi and limousine services). It employed 412,500 people in trucking and related activities, 113,900 in buses and urban transit, and 7,650 in taxi and limousine services.^{xv} The value of traffic moved in domestic trade interprovincial merchandise totalled \$241 billion in 2022.^{xvi} The value of exports by truck was \$304,979 million and the value of imports was \$394 billion. The value of road trade with the US was \$556.5 billion. According to Statista in 2022, the industry (private and for-hire) generated almost \$39.55 billion Canadian dollars from almost 63.7 million shipments.^{xvii} The volume of traffic moved by urban transit in 2022 was 1,388.9 million passengers or 1,194.8 million urban transit vehicle-kilometres.^{xviii} The operating revenue reported by transit companies was \$3.9 billion in 2022.^{xix} TFI International Canada's largest for-hire transportation company (ranked in the top ten carriers in US) reported US\$7.5 billion total revenues of in 2023.

4. Water – Water accounted for \$1.7 (2017 constant dollars) 0.078% of the GDP in 2023. It employed 28,103 people. The volume of total traffic handled by the CPA ports was 351.1 million tonnes of cargo and 6 million TEU containers at its five ports of Vancouver-Fraser, Prince Rupert, Montreal, Halifax and Saint John in 2023.^{xx} The total value of exports was \$138.7b and the total value of imports was \$181.7 billion.^{xxi} The operating revenues of the CPA's in 2022 were \$820 million.^{xxii} Besides cargo the number of cruise passenger carried was 3 million in 2023.^{xxiii}

5. Pipelines – Pipelines accounted for \$10.5b (2017 constant dollars) 0.5% of the GDP in 2023. It employed 5,440 people in pipeline transportation of natural gas and 4,800 people in crude oil and other pipeline transportation industries in 2021. Total operating revenues of Canadian natural gas distribution and transport pipeline companies were \$20.6 billion in 2022.^{xxiv} Total operating revenues of Canadian oil pipeline companies were \$17.9 billion in 2022.^{xxv} In 2023, Canadian crude oil exports were \$139 billion, while natural gas exports were \$13billion or 4.2 million barrels per day and 7.5 billion cubic feet of which 85% were by pipelines.^{xxvi} Enbridge Inc. the second largest pipeline company in Canada had total operating revenues in 2022 and 2023 of \$53.3 billion and \$43.6 billion and Canadian Natural Resources Limited had annual revenue of US\$32.5 billion in 2022 and US\$26.6 billion in 2023.

Some of these economic indicators are summarized in the Table 1.

Table 1 – Economic Indicators (2023)

Indicators	Rail	Air	Road	Water	Pipelines
GDP [^]	\$9.5b	\$6.523b	\$25.6b	\$1.7b	
% of GDP	0.43%	0.30%	1.16%	0.078%	
Employment	48,557	102,857	534,103	28,103	10,240 ^s
Revenues	\$19.8b	\$35.7b*	\$39.55b**	\$820m#	\$38.5b
Export Value	\$102b	\$73.6b	\$305b	\$138.7b	
Import Value	\$69b	\$90.3b	\$394b	\$181.8b	
Total Traffic (Tonnes)	325.9m	0.9m		1.4b	
(Passengers)	4.1m	88.7	1,388.9m ^{^^}	3.063m	

[^] 2017 constant dollars. *Class I-III carriers operating revenues. **For-hire – for 2022. #CPAs for 2022.[^] Urban transit. \$ For 2022

From a broader perspective, the transportation and warehousing sector “directly contributed 4.0% to GDP, amounting to \$88.5 billion in monetary terms. This underscores the sector's substantial economic footprint and its importance in driving overall economic activity.”^{xxvii} It also accounted for more than 1.75 million jobs.^{xxviii} Perhaps, a better appreciation of the importance of transportation networks can be found in the fact that of the largest eight companies in Canada four of these - Canadian Natural Resources Limited; Enbridge Inc.; Canadian National Railway Company; and Canadian Pacific Railway Company - are transportation companies or partly involved in transportation.

Before concluding, some of the non-economic indicators should be briefly mentioned to provide a **true** indication of the **importance** of transportation networks in Canada. It fosters *social connectivity*^{xxix} by bringing people and communities together enabling visiting friends and family, socializing activity and commuting to work including access to education, health care and essential services. It enables *emergency response and distribution of emergency supplies* when accidents and natural disasters occur where quick and reliable transportation is vital for saving lives. It provides *access to goods and services* such as food, medicine and consumer goods. It is the engine that drives *economic growth and development* enabling domestic trade and commerce over land spreading nearly 5,000 miles from the Atlantic Ocean to the Pacific Ocean and from the Arctic to the US border reducing geographic barriers. It facilitates *globalization* enabling international trade and commerce over land and sea to the furthest corners of the world. It facilitates *tourism and travel* over continents once impossible to reach.^{xxx} These indicators provide a far more realistic indication of its importance that numbers alone cannot provide.

C. Are Networks Widespread in Canadian Transportation?

In transportation, networks in Canada first developed in rail but became prominent in connection with the development of ‘hub and spokes’ in airlines. They also occur in telecommunications and computers, broadcasting, cable television, finance and electricity. Today, networks are widespread and are part of the global economy, engines of fast growth.^{xxxi}

1. Rail - The development of networks in rail can be traced to rail mergers.^{xxxii} By the early 1900s, three transcontinental lines had been built but insufficient traffic led to massive railroad bankruptcies and to consolidation and the formation of the Canadian National Railways (CN) in 1919. The network movement gathered new steam in 1999 and 2023 after the following mergers and agreements: 1. In 1999, CN merged with Illinois Central (IC), becoming the only railroad in North America to reach three coasts: Pacific, Atlantic and the Gulf of Mexico; 2. In 2023, CP merged with Kansas City forming CPKC to create “the only single-line rail network in North America that connects Canada, the United States and Mexico. CPKC would become the only railroad that runs between the U.S. Northeast and Atlantic Canada to Texas and Mexico, and to the upper U.S. Midwest from Mexico, Texas and Louisiana.”^{xxxiii}; and 3. In 2023, CN, Union Pacific Railroad and GMXT announced the creation of the Falcon Premium intermodal service connecting all CN origin points within Canada and Detroit, Michigan to GMXT terminals in Mexico (Monterrey, Nuevo Leon, and Silao, Guanajuato). It also signed a memorandum of understanding with the Mississippi State Port Authority establishing a new intermodal service from the Port of Gulfport and later acquired Iowa Northern Railway providing options for shipping to and from Iowa.^{xxxiv} By 2022, the railway network consisted of 48,010km of track with CN, CP, VIA and regional and shortline railways owning 45%, 26.8%, 0.6% and 27.6% of the track respectively. Illustrations of the network (Charts1-3) of some of these carriers provide a better indication of its pervasiveness.



Chart 1 - CN Network



Chart 2 - CP Network

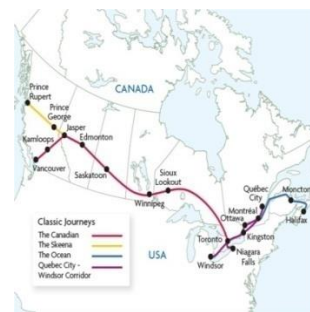


Chart 3 - VIA Network

2. Air - The network of airline services was initially conditioned by Government policy and bilateral agreements.^{xxxv} Transcontinental and international routes were preserved for Trans Continental Airlines (now Air Canada i.e., AC). It was not until 1948, that Canadian Pacific Air Lines (CPAL) was given the right to operate in the Pacific which was later extended to certain parts of the world and across Canada. The era of deregulation, in the mid 1980s, ushered in the concept of 'hub and spoke' leading to a structure of 'networks' and 'alliances'. By the late 1990s, AC and Canadian (i.e., PWA and CPAL) had networks throughout Canada which later evolved into AC and WestJet as the main carriers and smaller carriers such as Porter Airlines. A major boost was given to these networks with Canada's 2006 'Blue Sky Policy' and the continued increase in the number of bilateral agreements. These main carriers^{xxxvi} provided 96.3 million, 53.7 million and 11.0 million domestic daily seat kilometres of the total 207.8 million domestic daily seat kilometres in 2023 or 46.4% 25.9% and 5.3% of the total capacity. There is also a network of airports in Canada and its airspace is "managed by NAV CANADA, a privately run, not-for-profit corporation that owns and operates Canada's civil air navigation system. It operates air traffic control towers at 42 airports and flight service stations (facilities that provide information and services to pilots before, during, and after flights) at 55 airports."^{xxxvii} Networks for Air Canada, WestJet and Nav Canada are shown in Charts 4-6.



Chart 4 - Air Canada Network

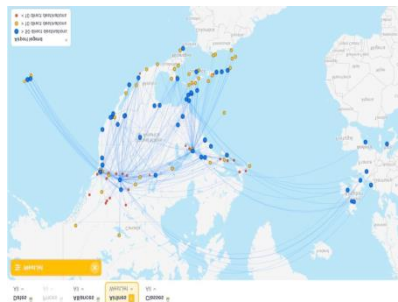


Chart 5 - CP Canada Network

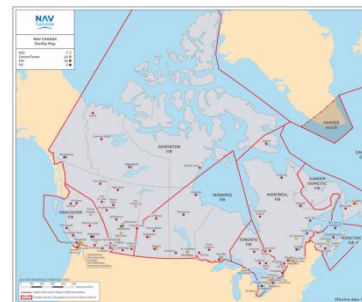


Chart 6 - NAV Canada Network

3. Road - As late as 1931, there was no road network linking all the Canadian provinces.^{xxxviii} Grants made by the Dominion in 1948 led to the completion of the Trans-Canada Highway in 1962. In 2023, the road network exceeded 1.1 million two lane km. The provinces of Ont., Que., Sask., Alta. and BC accounted for 22.2%, 14.1%, 18.3%, 22.2% and 8.1% of the road network or 84.9%.^{xxxix} The internal domestic road infrastructure is complemented by bridges and border crossings to the US, the most recent being the Gordie Howe International Bridge (Charts 7 and 8). In addition, the Confederation Bridge, the longest over ice bridge, links the provinces of PEI and NB and important projects are being planned in BC. e.g. Boundary Road Bridge, George Massey tunnel. The four largest trucking companies engaged in for-hire transportation (Transforce Inc., Day and Ross, Mullen Group Inc., and Bison Transport) have extensive networks in Canada and the US and the few courier companies (Federal Express, United Parcel Service, Puralotor and TFI) have extensive networks not only in Canada and the US but throughout the world.



Chart 7 - National Highway Network

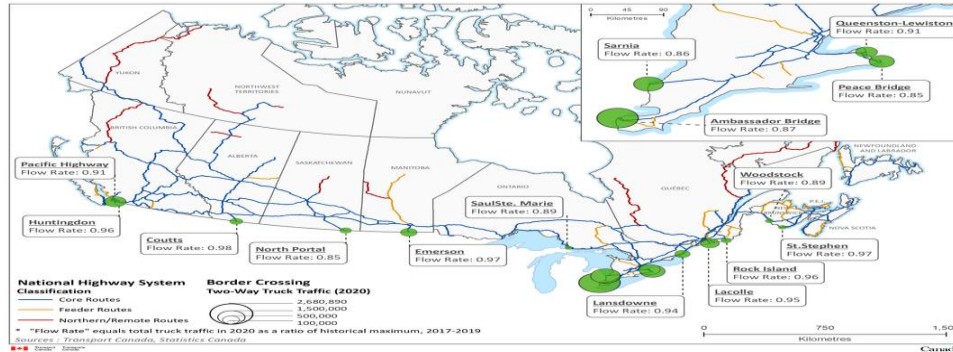


Chart 8 - Truck Border Crossing Network

4. Water - In ocean shipping, Canada does not play a major role and consequently does not have what one would refer to as a network of ocean shipping.^{xi} However, to serve international ocean shipping lines there is a network of ports which consists of 17 Canada Port Authorities in 2023 (Chart 9), together with 35 regional and local ports operated by Transport Canada. The CPA ports in alphabetical order are: Belledune, Halifax, Hamilton-Oshawa, Montréal, Nanaimo, Port Alberni, Prince-Rupert, Québec, Saguenay, Saint John, Sept-Îles, St. John's, Thunder Bay, Toronto, Trois-Rivières, Vancouver Fraser and Windsor. Four of these ports are located in the Atlantic Provinces, five in Québec, four in Ontario and four in British Columbia.^{xli}



Chart 9 - CPA Network

5. Pipelines - Networks in the pipeline industries are of more recent origin. In the natural gas and crude oil industry, the first three pipelines of oil and gas were constructed in the 1940s and 1950s and have since increased. 830,000 kilometres of pipelines (gathering, transmission and delivery lines) exist in an extensive underground network across Canada (CEPA) (Charts 10 and 11). These networks serve specific geographic markets: intra-provincial; interprovincial; and cross-border.

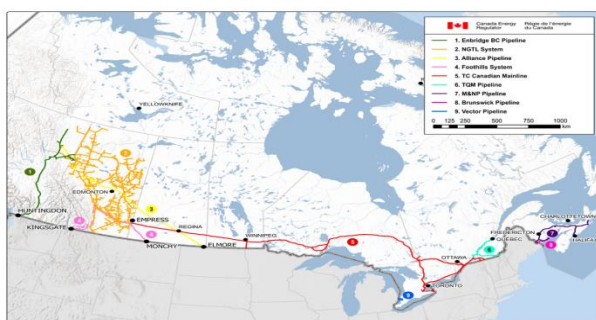


Chart 10 - Natural Gas Pipeline Network

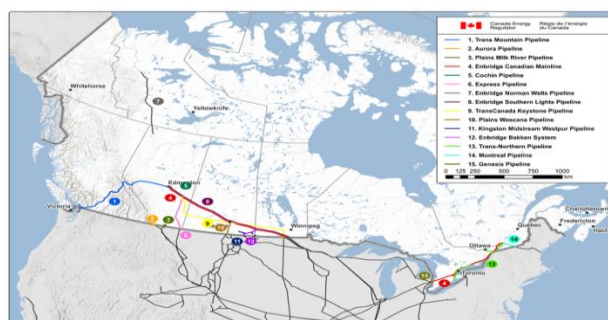


Chart 11 - Natural Oil Pipeline Network

In sum, transportation networks are widespread in Canada, having existed for sometime, and are more developed in certain modes^{xlii} of transportation than others. They provide the link and lifeline to many northern communities. They are akin to arteries which enable life giving blood cells to be carried to various parts of the human body.

D. Are there Gaps in our Transportation Networks^{xliii}

When societies and economies change, the infrastructure and institutions that support them change - including the transportation infrastructure. The failure to do so creates gaps.^{xliv} The transportation network of the early 1960s was not built for the new ‘city-centred’ reality of Canada. Nor was it built for the present volume of trade. This transformation^{xlv} has been accelerated by deregulation, liberalization and globalization. Further, population has increased from 26.1m in 1986 to 41.65m in July 2025 far beyond what was projected at that time. This^{xlvi} has resulted in: the growth and movement of people in and into cities, particularly four highly urbanized areas; a restructuring of the economy, with new products, jobs, markets and geographies of production; a more dynamic, vibrant and competitive economy with new patterns of movement; and an increase in trade. These developments are having a major impact on the overall transportation network; transportation corridors; urban networks and transit; and transportation related assets creating special challenges and gaps in the transportation network. Speeches from the throne recognized that modern infrastructure^{xlvii} is a key to the prosperity of our cities and health of our communities. These observations are not new, and in the early 2000, there was a call for a National Transportation Strategy and for a National Transportation Investment Strategy.^{xlviii}

Thereafter, in 2015, several submissions to the CTA Review^{xlix} spoke of the need for federal leadership on transportation to ensure sufficient and reliable transportation services to support Canada’s long-term economic growth, including, in particular, “trade-enabling” infrastructure. It stated Canada “...will require transport corridors with the capacity to process imports and exports reliably and efficiently, offering fluid and competitive options for shippers to reach commercial and manufacturing centres.”¹ “The Review recommends that the Government of Canada, with input from provinces, territories, and the private sector, develop a comprehensive long-term transportation infrastructure plan, ... The Review recommends that the Government of Canada act to attract increased private sector financing for transportation infrastructure projects ...”^{li}

So, in 2016, to address these concerns the government launched the ‘Investing in Canada Plan’ a long-term federal infrastructure plan involving the investment of \$188 billion over 12 years. Of this about \$6 billion was allocated to transport. But these efforts have fallen short of solving a moving target. “Indeed, eight years into the Federal government’s ‘Investing in Canada Plan’, Canada’s infrastructure deficit is estimated at a minimum of \$150B, and up to a trillion dollars. The lack of this critical urban infrastructure – from roads and water systems to transit, parks, and public housing – weakens Canada’s global competitiveness. And it doesn’t just undermine the potential for place-based prosperity, but also

weakens civic infrastructure.”^{lii} The School of Cities Report goes on to state that “Canada’s cities and smaller communities are facing a looming crisis in deferred maintenance and construction of critical infrastructure, both physical and social.”^{liii}

Further, in 2022 the federal government’s National Supply Chain Task Force in its report estimated that Canada must invest an additional \$110 billion in seaports over the next 50 years. This is out of a whopping \$4.4 trillion in investments the task force says are needed in marine, road, rail and air transportation assets to facilitate economic growth.

Furthermore, in 2024 the annual WESTAC Compass Report highlighted its concern that “The transportation industry in Canada is grappling with growing concerns related to the absence of a comprehensive, long-term infrastructure plan, ... The absence of such a plan is particularly worrying given the critical need to address capacity constraints, infrastructure bottlenecks, and the efficient functioning of trade corridors. To address these concerns effectively, it is imperative that a collaborative effort is undertaken to enhance cooperation among stakeholders within the supply chain.”^{liv}

In sum, the problems of gaps in our infrastructure continue to exist and the difficulty of solving them are like a cat trying to catch its own tail given the uncertainty that the economy is facing due to the Ukrainian and Middle East wars, the recent Tariff uncertainty and the expected shift in world trading partners.

E. Concluding Remarks

In this part, we have examined the definition of networks; the importance and extent, or completeness, of transportation networks in Canada; and whether there are gaps in Canadian transportation networks. Transportation networks are important and widespread in Canada, providing everyday links from home to work, and life lines to diverse regions, together with corridors for our export and import trade. Networks are a strategic tool to gain competitive advantage. Our economic futures are more closely tied to the sustainability of our transportation networks than we might care to admit. Continuing to develop the system must become our priority simply to protect the standard of living.^{lv} Unfortunately, the transportation network that supports the rapid transformation of our society has not been keeping pace. Part of current problems that we face are because we have to act faster to adjust to rapidly changing domestic and international developments.

Part II. Mathematics in Networks and the Economic Theory of Networks in Transportation

A. The Use of Mathematics to Describe Networks

In solving problems in transportation networks, graph theory in mathematics is a fundamental tool.^{lvi} The term ‘graph’ in mathematics has different meanings, here we are concerned with two different meanings.^{lvii} The first is the graphic representation of a function or the graph of a relation (eg. a stock price over time). The second relates to “graph theory”, is a collection of ‘vertices’ or ‘nodes’ and, “links” or ‘edges’.^{lviii} For purposes of this paper, we are concerned with the latter type. Graph theory has been closely tied to its applications^{lix} and its use can be first credited to transportation (Euler- the Konigsberg bridge 1736^{lx}) followed by its application to other fields - electrical networks (Kirchhoff-1847), organic chemistry (Cayley-1857), and puzzles (Hamilton-1857). Its use today has spread and extended to many other fields of study (e.g. computer science, ecology, genetics, physics, telecommunications, transportation networks^{lxi}).

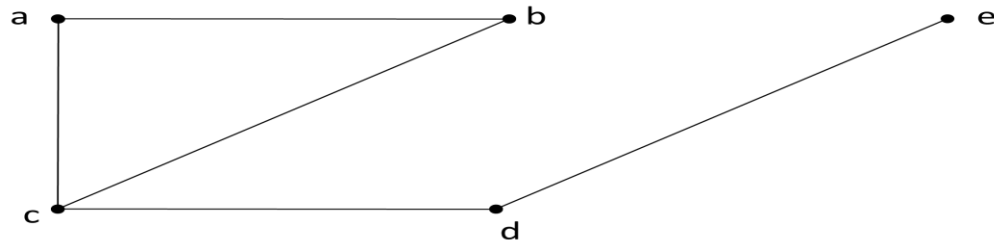
In transportation, graph theory is most commonly used to study problems of:

- 1. Routing**^{lxii} - the one-way street problem, the Konigsberg bridge problem, the Chinese postman problem, the travelling salesman problem, etc; and

2. Networks^{lxiii} - the maximum flow problem, the minimum cost flow problem, the transportation problem, etc.

We shall describe these problems and show how graph theory is used to resolve them. But first, a few terms shall be explained.

Graph components.^{lxiv} A graph 'G' consists of two things: a set V, whose elements are called 'vertices' or 'nodes'; and a set E, of unordered pairs of distinct vertices, called 'edges'.^{lxv} A graph is commonly denoted as G (V, E). In the example of a simple graph G (Graph 1), the set of vertices (points) $V=\{a,b,c,d,e\}$ and the set of edges (lines) $E=\{ab,ac,bc,cd,de\}$.



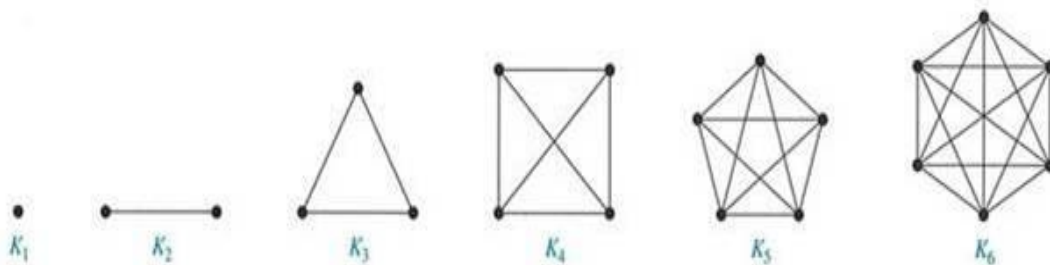
Graph $G=(V,E)$ with Vertices $V=\{a,b,c,d,e\}$ and edges $E=\{ab,ac,bc,cd,de\}$

Graph 1

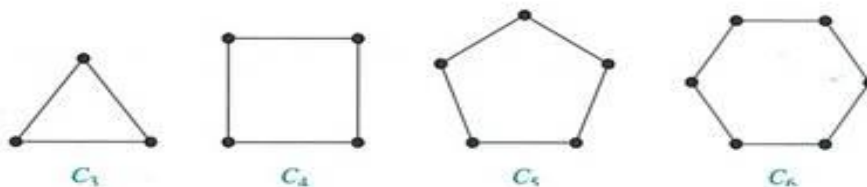
If the edges have a sense of direction, then the graph is usually referred to as a directed graph (digraph). Sometimes multiple connections between the same vertices are allowed (multigraph) and sometimes loops (pseudograph). Two vertices are said to be adjacent (or neighbours) if there is an edge from one to the other. The degree of a vertex is the number of edges at that vertex. In the example above $\deg(a)=2$, $\deg(b)=2$, $\deg(c)=3$, $\deg(d)=2$, $\deg(e)=1$. If we add up the degrees from a graph (here 10) we get twice the number of edges (here 5) because each edge gets counted twice, once for the vertex at either end.

There are some names used for special types of graphs, "null graphs" with no edges, "complete graphs" with every vertex joined to every other vertex, "cycles" which only join the outside of the vertices, "wheels" which add a vertex at the centre (Rosen, p. 448) and other types (Economides p. 110) (Graph 2).^{lxvi}

Complete^{lxvii}



Cycles^{lxviii}



Wheels^{lxix}

Other^{lxx}

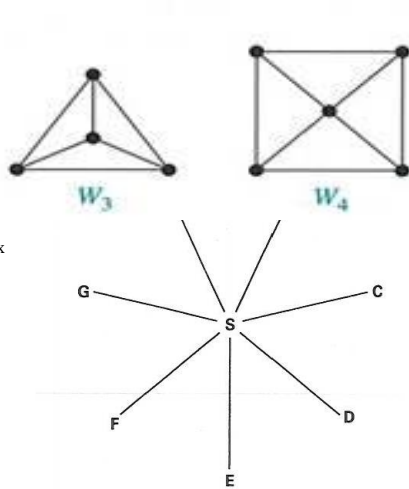


Figure 13.2
A star network

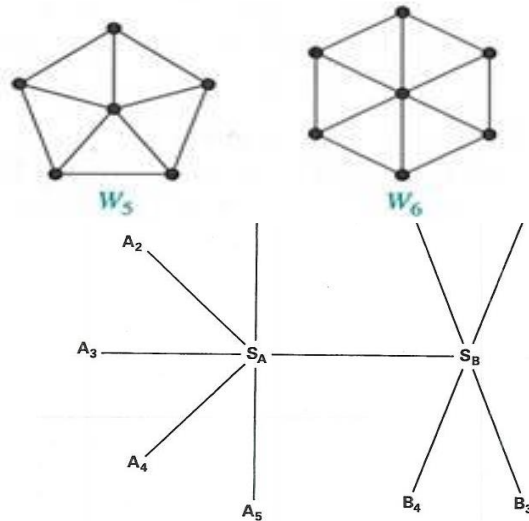


Figure 13.3
A long-distance network (alternatively, an ATM network)

(Economides, pp. 472-474.)

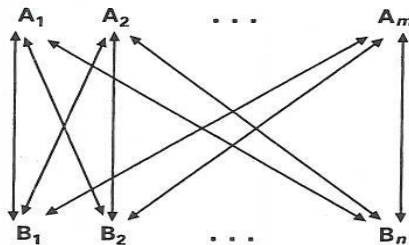


Figure 13.4
A virtual network of complementary goods

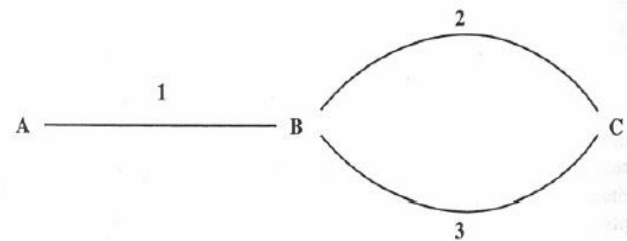


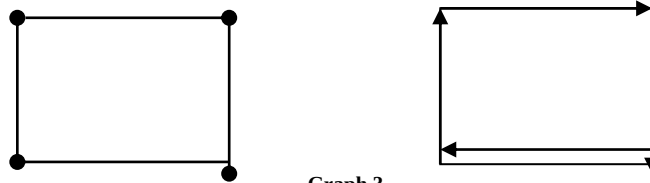
Figure 5.5 A one-sided bottleneck

(Economides, p. 110.)

Graph 2

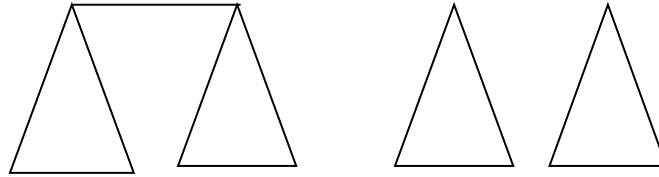
1. Routing^{lxxi}

i) The one-way street problem - Cities often use one-way streets to control the flow of traffic. Their challenge is to ensure they don't end up, with places that drivers can get into and never leave. That is, for every pair of locations (x and y), is it possible to reach x from y and vice versa? Let us take a graph 'G' in the shape of a square with four sides, then let us give it an orientation (i.e., direction to each edge of G or diagraphs going clockwise) (Graph 3) that is strongly connected.^{lxxii} In such a case, it is always possible to get from one vertex to another.



Graph 3

But for other graphs, this may not always be possible. Take, for example, two triangles in one case with a bridge (i.e., a connecting edge) and in another case without a bridge (Graph 4).

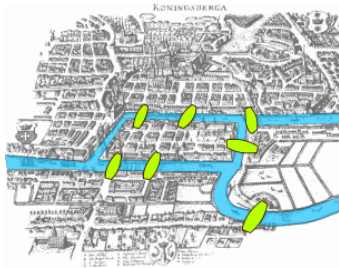


(Roberts, p. 450)

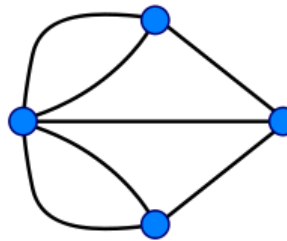
Graph 4

To solve this problem, one has to ensure that Robbins' theorem (which states: *A graph G has a strongly connected orientation if and only if G is connected and has no bridges*) is satisfied. But the theorem does not tell us how to find an assignment for a connected bridgeless graph. One way to do so is to use an algorithm known as *A Depth First Search Algorithm*.^{lxxiii} This algorithm, however, does not tell us whether it is efficient or inefficient in the sense of being the shortest one-way street assignment. Fred Roberts states that there is evidence that no such algorithm exists.^{lxxiv}

ii) The Königsberg bridge problem^{lxxv} - The town of Königsberg had seven bridges and its people wanted to know^{lxxvi} if one could start at some point, cross each bridge exactly once and return to the starting point. L. Euler, whose name has been credited for solving this problem, translated it into a graph theory problem.



The Königsberg Bridge problem, (Wikipedia – Graph Theory)



Graph 5

The problem can be solved if it has a eulerian^{lxxvii} closed chain (Graph 5). A chain or path is eulerian in a multigraph G if it uses every edge of G once and only once. This led to the formulation of Euler's famous theorem (*A multigraph G has an eulerian closed chain if and only if G is connected to isolated vertices and every vertex of G has even degree*). In other words, G must be connected to isolated (has no neighbors) vertices, that is, at most one component has an edge. In addition, each vertex has an even degree (each edge must leave a vertex as often as it enters). Since the Königsberg graph does not have a eulerian closed chain (some vertices are odd degree), the people of Königsberg could not complete the walk as wanted. To solve problems for graphs that are not closed or multidiagraphs other conditions need to be satisfied (see other

theorems by Euler and Good).^{lxxviii} Variations have been added to the original problem by adding one, two and three more bridges or edges and inquiring whether the walk is possible and from which vertex.^{lxxix}

iii) The Chinese postman problem^{lxxx} - The Chinese postman problem or postman problem has been used to describe finding the shortest delivery route that involves starting from a post office in a territory and returning to the same post office. Once again, graph theory is used to solve the problem by building a graph G with each vertex representing a street corner and each edge representing a street. In other words, the mail carrier seeks a closed chain beginning and ending at the same point, using each edge at least once. If the graph has an eulerian chain, one can begin at a point and end at the same point. No chain can give a shorter route. If there is no such eulerian closed chain, modify G , by adding enough copies of each edge to exactly achieve the mail carrier's route. One may be able to do this in more than one way. The solution is to add the smallest number of copies of edges of G to obtain a multigraph which has a eulerian closed chain. In other words, solution to these problems (and others eg. street sweeping, RNA chains, etc.) require the application of a eulerian chain. Variations to the Chinese problem have been studied.

iv) The travelling salesman problem^{lxxxi} - The salesman problem is used to describe a situation when a salesman wishes to visit n different cities, each exactly once, and return to the starting point, in such a way as to minimize cost. Once again, graphs are used to formulate the problem where the cities are denoted by vertices or a complete symmetric digraph. The arcs of the digraph are given a weight, representing its costs (cost from one city to another). To solve this problem, we seek a Hamiltonian cycle in this digraph which has minimum sum of weights. (A Hamiltonian chain or path is one that uses each vertex once and only once). However, not every graph has a Hamiltonian circuit. There are conditions for the existence of a Hamiltonian circuit and cycle in a graph and digraph. These conditions are expressed in theorems by Ore, Dirac, Bondy-Chvátal, Woodall, Ghoulia-Houri. In other words, solution to these problems (and others eg., tournaments, etc.) require the application of a Hamiltonian chain.

v) The shortest route problem^{lxxxii} - The shortest route problem is finding the shortest route between two vertices or cities represented by them in a network. To solve this problem, we use a directed graph network or directed network and place weights indicating length on each arc. If it is a small network with a few arcs one can manually calculate the shortest route and there may be more such routes. But in a large network, finding the shortest route may be very tedious. To avoid doing it manually, an algorithm known as Dijkstra's Algorithm is used on a directed network. This is sometimes called the single-pair shortest path problem to distinguish it from other problems i.e., single-source shortest path problem, single destination shortest path problem and all-pairs shortest path problem. Other algorithms exist for solving these problems (or when weights are negative) such as Bellman-Ford, A* search, Floyd-Warshall, and Johnson's algorithm. Additional algorithms and associated evaluations may be found in Cherkassky et al.^{lxxxiii}

2. Networks^{lxxxiv}

In mathematical topology, network is defined as ...a figure (in a plane or in space) consisting of a finite, non-zero, number of arcs, no two of which intersect except possibly at their end.^{lxxxv} In this sense, it is more restrictive than some of graphs ("null graphs" with no edges, "complete graphs" with every vertex joined to every other vertex, "cycles" which only join the outside of the vertices, "wheels" which add a vertex at the centre) described in the earlier section. Network mathematical problems used in transportation problems include:^{lxxxvi}

i) The maximum flow problem^{lxxxvii} - The maximum flow problem is to find a feasible flow through a single-source, single-sink flow network that is the maximum.^{lxxxviii} The maximum value in a directed network of an s - t flow, as shown in Figure 1, is equal to the minimum capacity of an s - t cut in the network, as stated in the max-flow min-cut theorem. (A cut can be considered as the set C of all arcs that go from vertices in set S to

vertices in set T eg. If $S=\{1,2\}$ and $T=\{3,4,5,6,7\}$ then $C=\{(1,4), (2,3), (2,4)\}$ note $(5,2)$ is excluded as it goes from set T to set S).

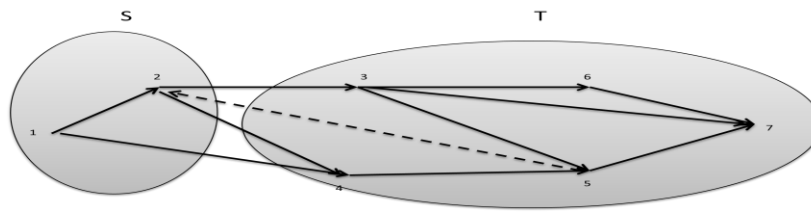


Figure 1. Generic graph

An (s, t) flow is maximum if and only if it admits no augmenting chain from s to t . An augmenting chain C is one in which the flow (x_{ij}) is less than the weight or capacity of the arc (c_{ij}) for each forward arc and the flow (x_{ij}) is greater than 0 for each backward arc. The above theorem is based on the assumption that there exists a maximum flow. If some capacities are not rational numbers, the maximum still exists, though the algorithms for solving it do not necessarily find a maximum. There are a number of algorithms for solving this problem. The best known are: the Ford-Fulkerson; Edmond-Karps; and Dinitz Blocking Flow.^{lxxxix} Besides the above problem, there are a number of interesting applications that follow from the integral flow theorem which could have applications to problems in transportation. These are: Multi-source multi-sink maximum flow problem; Minimum path cover in directed acyclic graph; Maximum cardinality bipartite matching; Maximum flow problem with vertex capacities; Maximum independent path; and Maximum edge-disjoint path.^{xc}

ii) The minimum cost flow problem^{xcii} – The minimum cost flow problem is finding the cheapest possible way of sending a certain amount of flow (positive) from source s to sink t through the network at a minimum cost (i.e., nonnegative capacity (c_{ij}) on each arc and nonnegative cost (a_{ij})). The transportation problem can be viewed as a minimum cost flow problem. Imagine that a particular commodity is stored in n warehouses and is to be shipped to m markets. Let a_i and b_i be the supply and demand at each warehouse and market, respectively. Let a_{ij} be the cost of transportation and let total supply equal to total demand (i.e., $\sum a_i = \sum b_j$). The problem is to find a shipping pattern that minimizes the total transportation cost ($\sum a_{ij} x_{ij}$ $i=1\dots n, j=1\dots m$) subject to certain constraints --- total amount of commodity shipped from the i^{th} warehouse is at most the amount there ($\sum x_{ij} \leq \sum a_i, j=1\dots m$) and total amount of commodity shipped to the j^{th} market is at least the amount demanded ($\sum x_{ij} \leq \sum b_j, i=1\dots n$). Any solution satisfying these two constraints will also satisfy $\sum x_{ij}=a_i, j=1\dots m$; and $\sum x_{ij}=b_j, i=1\dots n$ - since supply equals demand.

Thus, the solution to these problems requires certain assumptions to be satisfied. The problems can be resolved either using the simplex-method or network flow theory. It is worthwhile noting that there is a difference between the transportation problem and transshipment problem. The latter permits shipping via intermediary nodes whereas the former does not. Algorithms have been developed to solve these problems. More general problems are minimum cost maximum flow problem and minimum cost circulation problem.

iii) Hub and spoke network efficiency^{xcii} – A hub and spoke network is a type of topology where spokes (i.e. edges, or arcs or routes) connect to a central point called a hub. The hub and spoke model gained popularity as a transport optimization topology when used by Delta Air Lines in 1956 and has since been used in telecommunications and information. How a hub and spoke network can result in efficiency is described hereafter. First, suppose that consumers can travel between any two points on the border of the circle shown in Figure 2, but cannot travel to Point H. In other words, a passenger can travel from Point A to Point B, Point B to Point D, Point E to Point A, etc, as long as it is not through Point H. This is known

as a point-to-point (PP) network. Now suppose that passengers can also travel through Point H to get to their destinations. This system is known as a hub-and-spoke (HS) network, where Point H is the hub, and the lines connecting this hub to the other eight points are the spokes. A potential consequence of a HS network is that passengers that would travel from Points F to G on a PP network (for example) must instead make a connection at Point H, thus prolonging their total travel times. On the other hand, passengers that want to travel from one side of the wheel to the other, such as Points F to B, might now be permitted to reach their destinations more directly by travelling through Point H. Thus, despite the inconvenience faced by some travellers, Brueckner and Pels (2007) argue that the *overall* cost of transporting passengers is likely lower than under the PP network. This suggests that the HS network is more cost-efficient.

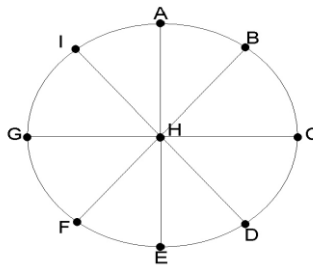


Figure 2^{xciii}

Brueckner and Pels (2007) also argue that the high traffic volumes on the spoke routes allow for higher flight frequencies over the PP system, which can also benefit travellers. For example, passenger demand for PP flights from Points F to G might be insufficient to justify many frequencies; a passenger might be only able to take direct flights at 8:00AM and 4:00PM, for example. However, with a HS network, this passenger might also be permitted to take an indirect flight via Point H at either 10:00AM, noon, or 2:00PM. While the passenger's travel time will likely be longer with the indirect flight, they will also be able to more closely coordinate their first-best departure time with their actual departure time; therefore, welfare improvements can be realized. For these reasons, Brueckner and Pels (2007) argue that nationalism leads to too much circuitousness, since airlines must find ways of taking passengers across international borders that do not violate federal laws.^{xciv}

The advantages of hub and spoke network can also be seen in Chart 12. PP flights in Chart

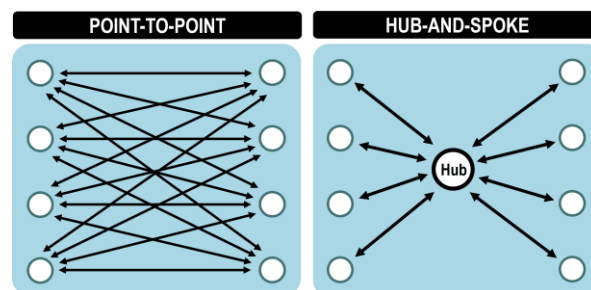


Chart 12^{xcv}

12 requires 16 independent one-way flights (or 32 return flights) whereas using a HS network requires only 8 one-way flights (or 16 return). It not only reduces the number of planes needed but can also increase efficiency by improving load factors from the hub as the carrier may not be full from each origin to each destination in the PP chart.

Finally, HS networks might lead to welfare improvements via greater competition. Brueckner and Spiller (1994) argue that by adding a hub-and-spoke network, competition can increase due to the ability of an airline to just add a spoke onto its existing hub. For example, if foreign carriers are permitted to operate domestic routes in Canada, then they could make Pearson Airport a hub and add spokes across the Canadian domestic market, thus benefiting Canadian travellers.

iv) Graph Neural Networks in Transportation^{xcvi} – Since its inception in 2008,^{xcvii} there has been increasing scholarly attention paid to the applications of Graph Neural Networks (GNNs) in transportation. GNNs are a class of artificial neural networks designed to process data that can be represented as graphs. Unlike traditional neural networks that operate on Euclidean data (like images or text), GNNs are tailored to handle non-Euclidean data structures, making them highly versatile for various applications.^{xcviii} The use of graphs makes algorithms more efficient than traditional machine learning models. The use of GNNs in transportation have demonstrated excellent performance and potential for improving the efficiency, safety, and sustainability of transportation systems. Current research predominantly focuses on traffic forecasting, with other ITS domains, such as autonomous vehicles and demand prediction, receiving less attention.^{xcix} They are also being used in intersection management, parking management, urban planning, and transportation safety.^c There is some use in forecasting railway freight demand, with demonstrated improvements of 18% in freight demand prediction accuracy.^{ci}

The GNN uses all information from the “neighbourhood”, as shown in Figure 3. x defines the state of each node n , x is a function of the labels for each node l_n , labels for each edge $l_{co[n]}$, state of edge $x_{ne[n]}$, and node label $l_{ne[n]}$. Based on the state x_n , and the node label l_n , a decision, or output, o , is produced.

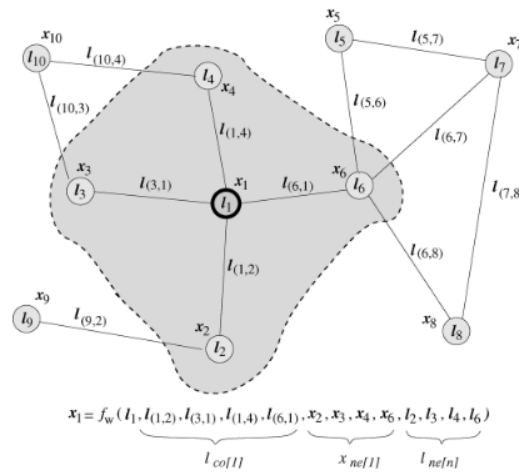


Figure 3. Graph and node “neighbourhood”. Source: Scarselli et al. (2008)

GNNs assign weights to neighbouring nodes’ messages, and reduce graph complexity by grouping similar nodes. GNNs use proximity and relationship between nodes to develop, aggregate, and extract information from neighbouring nodes; and machine learning to iterate and increase confidence in the information extracted. GNNs have an advantage over Bayesian Networks when the data structure is complex and learning is required. They are particularly valuable when handling spatio-temporal problems. However, they lack explainability and transparency.

Since 2019, scholarly attention paid to the applications of GNNs in transportation has increased.^{cii} However, GNN require large-scale and high-quality data to provide significant performance

improvements over traditional methods. As a result, they also require substantially more compute power, which will cost the user more and / or take longer to compute.

v) Bayesian Networks in Transportation^{ciii} -The term Bayesian network was coined by [Judea Pearl](#)^{civ} in 1985 to emphasize: 1. the often subjective nature of the input information; 2. the reliance on Bayes' conditioning as the basis for updating information; 3. the distinction between causal and evidential modes of reasoning.^{cv} In the late 1980s, Pearl's *Probabilistic Reasoning in Intelligent Systems*^[30] and [Neapolitan](#)'s *Probabilistic Reasoning in Expert Systems*^{cvi} summarized their properties and established them as a field of study.

A *Bayesian network* [BN] (also known as a Bayes network, Bayes net, belief network, or decision network) is a [probabilistic graphical model](#) that represents a set of variables and their [conditional dependencies](#) via a [directed acyclic graph](#) [DAG] Figure 4.^{cvi} While it is one of several forms of [causal notation](#), causal networks are special cases of Bayesian networks. Bayesian networks are ideal for taking an event that occurred and predicting the likelihood that any one of several possible known causes was the contributing factor. (Source: WIKI)

BNs are powerful tools in transportation for modelling and analyzing complex systems and making predictions especially when dealing with uncertainty and incomplete data ultimately leading to more efficient and resilient transportation systems. They represent probabilistic relationships between variables using a DAG, making them useful for understanding cause-and-effect relationships and making inferences. BNs are used in several ways in transportation: 1. Traffic flow modelling and forecasting; 2. Travel demand and mode choice; 3. Public transport analysis (eg. bus route design, bus service quality, network-wide problems.); 4. Vulnerability and risk assessment; 5. Condition prediction; 6. Other applications (eg. resilience of transportation; influence of human factors; etc.). BNs are most valuable when transparency and explainability are crucial, and when the analyst wishes to be able to test the effects of new beliefs based on new evidence.

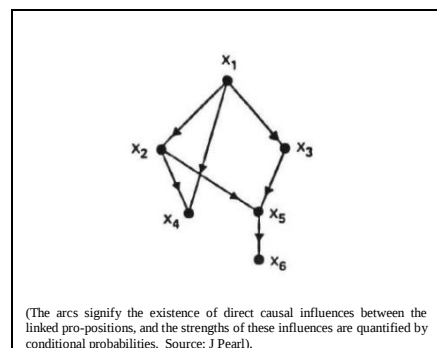


Figure 4. Showing Use of BNs in Transportation

In sum, we have attempted to briefly describe the use of graph theory in mathematics to solve some of the basic network transportation problems. We have attempted to simplify it with the use of graphs and keep it as verbal as possible. Besides graph theory there are other types of mathematics that can be used to solve these problems such as combinatorics, game theory and linear programming techniques. We also briefly touched on graph neural networks and Bayesian networks whose use is becoming increasingly popular in transportation.

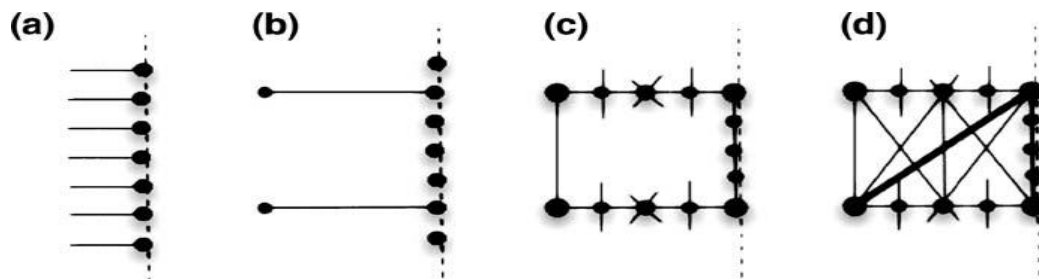
B. The Economic Theory of Networks in Transportation

The concept of network in economics is not new. It was implicit in the work of Quesnay (1758), Cournot (1838) and Pigou (1920). The latter studied a network system in the setting of a transportation network

consisting of two routes and noted that the ‘system-optimized’ solution was distinct from the ‘user-optimized’ solution. More recently, networks in economics appeared in the work of Samuelson (1952), Takyama and Judge (1971), and Dafernos and Nagureny (1985), who identified the isomorphism between traffic network equilibrium problems and spatial equilibrium problems. Some writers have identified the general equilibrium problem known as Walrasian equilibrium as a network equilibrium problem over an abstract network.^{cvi} We summarise the literature on economic theories of networks in terms of three areas of interest to competition in the transportation sector: (1) how transportation networks form and grow; (2) how coalitions form in the transportation sector; and (3) how additional users both increases the value of a network and changes the value for other users.

1. Theory of Network Formation and Growth in Transportation – Network theory has been developed in various branches of science, including economics and transportation. Its emphasis from time to time has shifted. A review of some of the literature and a review of articles does not indicate that there is any general theory of network formation in transportation. Although the theory of how and why networks have formed in one mode of transportation may not apply to another mode. Xie and Levinson find that studies have developed along three main streams: geography of transport networks; optimization and design of networks; and science of networks. Two other streams worthy of mention are: statistical analysis of networks and economics of networks.^{cix}

i) *Geography of transport networks (1960s)*: The geography of transport network models analyse transportation networks in terms of their structural formation/transformation and topological changes. These models first used graph theory to simulate continuous growth of transportation networks beginning with: a few scattered nodes representing ports along the coast; a few roads penetrating inland from these ports; a few inland feeders and connecting ports because of trading; and links developed to interconnect developed nodes (Graph 6).^{cx}



Graph 6 - (Xie and Levinsen, p. 293.)

Other studies, instead of following the above historical growth pattern, replicated observed networks attempting to simulate the changing topology. For example, in rail, the first link is added to connect the two largest settlements and then links are gradually added or as a tree branching out to connect outlying peripheral nodes. This first stream of network studies became dormant for thirty years^{cx} as they were criticized for failing to emphasize the mechanisms as to why and how networks form and grow.

ii) *Optimization and design of networks (1970s)*: The optimization network models determine cost minimization of building and maintaining a network, or the optimal changes in transport supply (existing links or on networks) that minimize user costs on the network under budgetary constraints. The optimization models were developed with the availability of traffic flows and demand forecasting. Since then, the concept of a bi-level optimal network design has dominated consideration of the evolution of networks within urban transportation planning. The lower-level represents the demand-performance equilibrium for a given investment, while the upper level represents the investment decision-making of the transport planner to maximize social welfare based on the unique equilibrium flow patterns from the lower-level problem. This second stream has been subject to two main criticisms: it neglects the

continuous interplay between many factors in shaping the structure of transportation networks; and it lacks empirical evidence to show that transportation networks over time actually follow an optimal design.

iii) *Science of networks (2000s)*: The science of networks examines complex networks. It is based on the observation of a unique power-law distribution of a variety of ‘scale-free’ networks (such as World Wide Web, citation networks, metabolic networks, etc).^{cxii} As new nodes enter a free-scale network, they are more likely to get connected to highly connected nodes than less connected nodes, a process called ‘preferential treatment’.^{cxiii} In transportation, particularly surface, spatial constraints, limit the relevance and applicability of this growth mechanism of preferential attachment.^{cxiv} It may, however, provide insights into: hub and spoke networks (non-geographical air transportation networks); independent node connection to established and important nodes; and self-organization and order into large scale networks. Recent work has concentrated on self-organization in complex systems and agent-based simulation to interpret dynamics of transportation networks. This third stream is subject to the criticism that it may not apply to most transportation networks.^{cxv}

iv) *Statistical analysis of networks (1975-)*: The statistical analysis of networks investigates the temporal change of transportation supply based on historical observations.^{cxvi} The statistical analysis grew with the availability of appropriate types of data. They relate the change of transportation supply to the demographic and socio-economic characteristics of tributary areas, as well as traffic conditions and other attributes of infrastructure. Simultaneous equations were used to examine mutual causality of demand and supply (transit, roads, infrastructure, etc.).

v) *Economics of networks (1990s)*: The economics of network growth examines various economic dimensions of network growth, ranging from traditional transportation economics to public finance, path dependence, coalition formation network and network effects. Transportation economics at the micro level examines network pricing, ownership structures and capacity investment and at the macro level examines the development of all modes of transport as a mix of private and government initiatives. Public finance relates to the provision of networks as a public good. Path dependence (present network system depends on the past) indicates that it may lead to lock-ins and market failure that are regrettable and difficult to change even in a world characterized by maximizing behaviour. Coalition formation models networks as the formation of links. They have developed as: strategic interaction models, random models and game theoretic models. The economic stream is theoretical in approach and were developed more to explain networks in other markets. Network effects examine the externalities (positive and negative) that result due to the demand and supply of networks. We shall examine coalition models and the network effects in greater detail hereafter.

2. Coalition formation models networks^{cxvii}- i) *Strategic interaction models*: The best known of these models is the connections model. This model (Jackson and Wolinsky) reflects that people benefit from being well connected to each other.^{cxviii} In this model, the payoff to agent i in a network g is:

$$u_i(g) = \sum_{j \neq i} \delta l(ij) - d_i c$$

where $l(ij)$ is the number of links in the shortest path between i and j in g (setting $l(ij)=\infty$ if there is no path between i and j), d_i is i 's degree (the links that i maintains in g), and c is a parameter representing the cost of a link.^{cxix} So people benefit from maintaining direct connections that link one to another and also indirect benefits. The stability/equilibrium concept incorporates the idea that mutual consent is needed to form a relationship, but people can unilaterally sever a relationship. “A network g is pairwise stable if: (a) if there is an i and ij not in g such that $u_i(g+ij) > u_i(g)$ then $u_j(g+ij) < u_j(g)$; and (b) for all ij in g and i $u_i(g) \geq u_i(g-ij)$ ’.^{cxx} If costs are low and below benefits links are formed and are pairwise stable. If costs are prohibitively high, no links are formed. In cases when the costs are low or high, then the total utility maximizing networks is the unique pairwise stable network. When costs are intermediate, then the total utility maximizing network is a star^{cxxi}, but stars^{cxvii} will often not be pair wise stable even when they

maximize total utility. Other considerations have resulted in this basic model, being extended to include them.^{cxiii} Examples of strategic interaction models include: spatial connections model, free trade models, market sharing models, social markets model, and co-author model.

ii) *The random models:* Random models of network formation originate from the random-graphs literature, mainly developed by mathematicians and physicists. In these models, the reason why a link is formed is pure chance. This literature builds networks either through a purely stochastic process where links appear at random according to some distribution or through some algorithm for building links. This approach is mainly dynamic and provides insight into how networks form.^{cxiv}

iii) *Game theoretic models:* Game theoretic models of network formation provide novel insight into the patterns that might emerge, and into the tensions between individual incentives to maintain relationships and overall welfare. It takes the network structure as given and studies how the network structure impacts on outcomes and individual decisions. There can be multiple equilibria, and such models can be difficult to solve.^{cxv}

3. Network Effects and Externalities in Transportation – Network effects or network externalities are distinct concepts, though related.^{cxvi} Network effects describe the increasing value of a transportation network as more users or connections are added. Network externalities describe the external benefits or costs that arise when an additional user impacts other users (passengers or airlines) of the network; it describes those benefits or costs that are ‘external to other’ users. The theory of network externalities advances the notion that benefits or costs may arise on the supply-side or the demand-side that are not taken into account in the pricing mechanism. On the supply-side, the joint provision of service by members may result in economies or diseconomies that are not captured or paid for by providers of the network. Similarly, on the demand-side, externalities may arise because they are not captured or paid for by users of the network. These externalities arise because of the subtle interdependencies in the welfare of different units - interdependencies which cannot readily be reflected in the pricing arrangement.^{cxvii} This is because it cannot be easily measured or because mechanisms do not exist to collect them (benefits or costs) or to collect them efficiently. This has implications for the allocation of resources even in perfectly competitive markets.^{cxviii} These externalities provide the basis for the theory.

Examples of externalities can be found in transportation. On the supply-side, the establishment of a shipping line at a port may lead to expenditures to create a pool of related services which a new shipping line does not have to pay for. Or the expansion of an industry or a shipping line may make it cheaper for other shipping lines to operate because of lower cost in the supply of inputs. On the demand-side, the increase in cars or trucks on a highway network from a new lane can increase congestion and ultimately result in gridlock which increases the cost to all vehicles which is not taken into account in the consumption or production pricing of transport services. Or the increase can result in more noise or air pollution whose costs do not have to be borne by the users of the highway. Or adding a new spoke to an airport hub, increases the cost on other passengers because of increased crowding at the airport similarly, it increases the cost to other airlines due to increase traffic congestion.

The special features of markets with network effects have been described by Professor Economides. Those applicable to transport in our opinion are italicized:

First, a firm can make money from either side of the network.

Second, an additional user of the network is not rewarded for the benefit it brings to others.

Third, the pace of market penetration (market expansion) is much faster in network industries than in non-network industries.

Fourth, markets with strong network effects where firms can choose their own technical standards [eg. different rail gauges] are ‘winner-take-most’ markets resulting in extreme market share and profit inequality.

Fifth, in industries with significant network externalities, under conditions of incompatibility between competing platforms, monopoly may maximize social surplus.

Sixth, inequality is natural in the market structure of network industries.

Seventh, free entry in network industries does not lead to perfect competition and eliminating barriers may not significantly affect market structure.

Eighth, ‘winner takes most’ is the natural equilibrium in these markets.

Ninth, competition *for the market* takes precedence over competition *in the market* at least initially.

Tenth, is the importance of path dependence – today’s sales depend on past number sold.

Table II summarises network models and their application in, and relevance to, transportation networks. In sum, studies to model the evolution and growth of transportation networks have ranged from geographical studies that aim to replicate geometries based on intuitive and heuristic rules, optimization studies that predict optimal network designs subject to an explicit objective function, to simulation studies that model network formation employing agent-based methods. Economic studies to model transportation networks concentrate on strategic interaction models, random models and game theoretic models, their focus is more on networks, network effects and network externalities than on transportation. So to date, there is no general economic theory on why and how networks are formed that is empirically verifiable.

Table II – The Application of Network Models to Transportation Systems

Category	Model type	Main value	Current application
Network formation and growth	Geography of networks	Analyse historical growth patterns simulate changing topology	Limited application; does not explain why and how networks grow
	Optimization and design	Identify minimal cost design and management for a network owner or its users.	Widely used to model traffic flows, future traffic demand, and lifecycle asset costs
	Science of networks	Analyse effects of preferential treatment in networks where this is relevant	Limited preferential attachment due to surface and spatial constraints. Potential value in hub and spoke networks
	Statistical analysis	Analyse historical patterns	
	Economics of networks		
Coalition formation models	Strategic interaction models		
	Random models		
	Game theoretic models		
Network effects & externalities	Network effects		
	Externalities		

C. Network Pricing in Transportation

Pricing in transportation networks has attracted a great deal of attention, so we briefly describe it under a monopoly/competition scenario, then under Ramsey pricing, given that many transportation networks are declining cost industries, and then under optimal pricing, given the presence of externalities.

i) Monopoly Pricing - Competitive Pricing

A profit-maximizing monopolist determines its price on its average revenue curve or demand curve by equating marginal revenue and marginal cost, for a product or price.^{cxxix} Prices are higher in a monopoly than when there is competition, resulting in inefficiency indicated by dead weight loss as a result of the lower output.[“] Economides and Himmelberg (1995) show that a monopolist who is unable to price-discriminate will support a smaller network and charge higher prices than perfectly competitive firms. ... Thus, consumers and total surplus will be lower in monopoly than in perfect competition.”^{cxxx} Some transportation networks, such as railways and pipelines, are natural monopolies due to high fixed costs and economies of scale. In these industries, price cap regulation or Ramsey type policies are often introduced by regulators to ensure consumers are not unduly exploited.

In rail, for instance, interswitching rules and arbitration are available to limit overcharging. In pipeline, the Canada Energy Regulator ensures rates are “just and reasonable”. However, even with these regulations, users in more monopolistic situations such as air or ferries to remote locations, are often charged well above competitive rates.

Monopolies also tend to engage in more price discrimination, in which they charge different rates to different customers to maximize returns. This practice is especially common in the air industry.

Finally, service improvements are slower and efficiency is lower in monopolies. Table III summarises monopoly pricing practices by industry, from roughly most to least beholden to monopolistic pricing. While there are regulations in place to minimize these effects, they still occur, particularly affecting more remote location and low-volume shippers.

Table III– Monopoly pricing practices by transportation sector in Canada

Sector	Prevalence of monopoly	Pricing effects
Pipeline	High: Natural monopoly by route. Parallel routes rare due to exorbitant construction costs.	High pricing in peak periods. Limited service improvement.
Rail	High: duopoly to regional monopoly. <u>Shippers often have a single rail line available.</u>	Captive shippers pay higher rates. In addition, low-volume shippers can be neglected.
Marine shipping	Global oligopoly; local monopolies. Global alliances coordinate capacity and sailings, reducing competition. Domestically, often single supplier.	Globally: Higher rates during peak demand Domestically: Take-it-or leave-it charges
Air	Localised. Local monopolies in smaller remote markets where there is a single airline	Price discrimination: Higher fares and limited service frequency
Road	Niche. Private toll roads or bridges only. Otherwise highly competitive sector.	

In network monopolies that are not natural monopolies, pricing such as linear pricing, price discrimination and two-part tariffs can prevail. The pricing strategies of a monopolist are influenced by a number of factors such as network externalities, incentive to expand the network, growth expectations, competition from other hubs or transportation modes, lower price for increase use of other routes on the network than use of a single route, and incentives for growth or services and adoption. However, due to Canadian regulation, such deliberate monopolies are rare or non-existent.

ii) Ramsey Pricing

Ramsey Pricing involves adding a markup over marginal cost, the size of which varies inversely with the elasticity of demand of the purchaser. Ramsey pricing resulted from the insightful work of Frank Ramsey and is particularly useful in resolving the dilemma in decreasing cost industries. In such industries, under marginal cost pricing, if welfare is to be maximized and if a firm is to continue production, the firm must receive subsidies. This is because the cost of the welfare maximizing output is greater than the revenue. The issue is how to cover these losses.

Economists at one time believed that these losses should be covered by subsidies. The problems of collecting the subsidies raised problems of arbitrariness in assessment and administrative costs. This arbitrariness is avoided through Ramsey pricing, as collecting the losses is achieved through a markup which varies with the reciprocal of the elasticity of demand of the purchaser, an indication of the value to the purchaser. Restricting this differential pricing is likely to cause welfare to fall since it allows firms to cover their total costs while imposing the least amount of distortion on allocation of resources.

The application of the above Ramsey pricing has been used in ocean shipping, where the industry displays characteristics of being a decreasing cost industry. Given the number of carriers on a shipping route, the applicability of Ramsey pricing has been questioned. Further, the Ramsey pricing model applies to a firm facing no fringe competition.^{cxxxix} This model is generally considered more as a normative model or a model used by public utility regulators. Finally, even if prices are sustainable allowing profits to be maximized it cannot be presumed that shipping conferences will adopt this pricing.

Ramsey pricing – or a version of it - is only explicitly applied in the rail sector in Canadian transportation, through rail interswitching rates^{cxxxix}. However, the application is *ad hoc* and challenging.

In the air sector, there is substantial Ramsey-like pricing – not by regulators, but by the business themselves. Airlines, for example, deploy Ramsey-like price discrimination by charging higher prices to business travelers (inelastic demand) and less to leisure travelers who are more flexible. Similarly, NAV Canada charges commercial airlines substantially more than general aviation aircraft. And airport authorities charge more for airport services such as parking and retail, than for landing fees. This is because once travelers arrive at the airport, their demand is inelastic; they have already committed to travel.

Marine shippers used to use Ramsey principles, charging more for time-sensitive cargo. This practice has become less common. Canadian ports and ferries deploy Ramsey-like pricing by offering discounts to cruise ships in off-peak season, and charging more to commercial ships.

In the pipeline industry, Ramsey pricing could improve efficiency, but the regulator demands cost-of-service pricing.

M. Boiteux^{cxxxix} builds on the Ramsey framework, it is a practical implementation that address the complexities of cost allocation and pricing in real-world monopoly situations, especially with fixed costs and network effects. While the above pricing scheme was designed to solve the dilemma of decreasing cost industries, it does not provide a scheme for the best pricing in the presence of externalities (congestion, pollution, network effects or externalities) in transportation. In other words, a problem that arises when dealing with transportation is how to efficiently produce and price for services where there are externalities?

iii) Pigovian (“optimal”) pricing

An externality occurs when consumers or firms do not bear the full cost that their actions do to others (good or harm). To shed light on this issue, economic theory dictates that in the absence of: monopoly power, decreasing long run costs and externalities (or missing markets) marginal social cost pricing will generate an optimal result.^{cxxxix} In transportation, these conditions are rarely satisfied particularly the environment where externalities abound,^{cxxxix} in addition, as indicated in the previous paragraph, the monopolist often has decreasing long run cost. In situations where there is monopoly power or decreasing long run costs, production of transportation services is less than what would arise under marginal social cost pricing (profit maximizing or losses). In situations where only externalities arise,^{cxxxix} consumption and production of transportation services will not occur **according to marginal social cost pricing** because it is often not possible: to exclude those who consume the service and do not pay for the service; or to capture certain cost from those who produce the service but do not pay for those costs. Here, production or consumption will be less or more than is optimal.

Where external costs exist, there would be a divergence between marginal private costs (MPC) and marginal social costs (MSC). As is evident from figure 5, the private individual or company would like to produce more than would be produced under marginal social cost pricing (i.e., $Q_1 > Q_2$) determined by the intersection of MPC with the demand curve (i.e., the private marginal benefits or social marginal benefit curves) leading to a deadweight loss. At output Q_1 , the social marginal cost is greater than the private marginal cost. To resolve this, a tax or fee would have to be

levied on the private individual or company equal to the difference between the two costs to bring the price to P_3 i.e., CD (or marginal external cost).

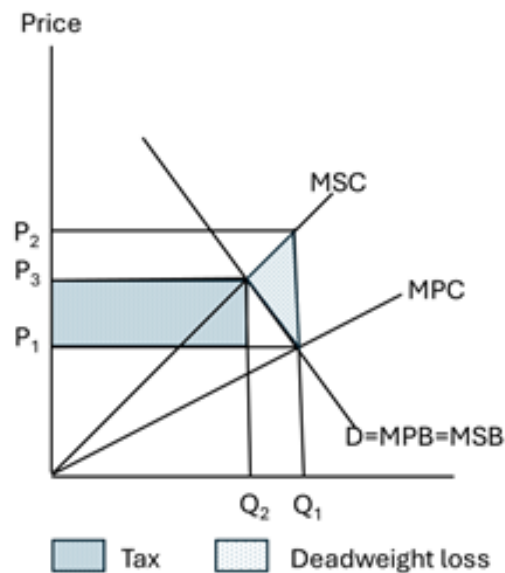


Figure 5

What about marginal social benefits (MSB)? If MSB arising from externalities is greater than marginal private benefits the private individual or company will produce less than what is optimal? In other words, if security is an externality the private individual or company may not be able to capture all the benefits and will be prepared to provide security protection that is less than is optimal. Figure 6 illustrates the need for a subsidy that lowers the price from P_1 to P_3 that increases consumption from Q_1 to Q_2 .

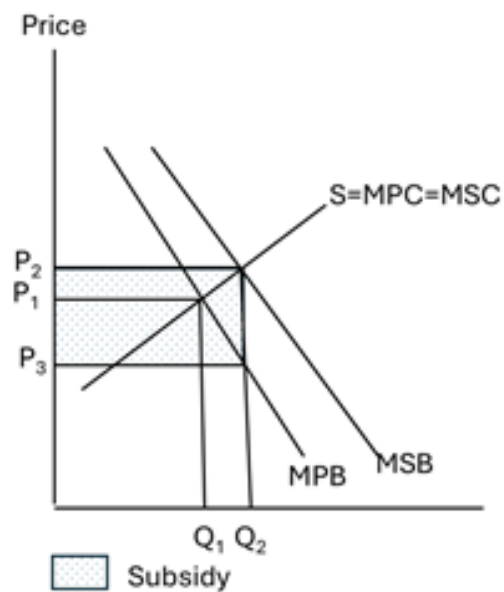


Figure 6

Optimal pricing in transportation networks aims to balance multiple objectives—economic efficiency, financial viability, and social equity—by setting prices that reflect not only the direct costs of providing service but also the broader impacts on users and society. Theoretical and applied research in this area has evolved to address the complexities of real-world networks, including the presence of externalities (such as congestion and pollution), network effects, and the natural monopoly characteristics of many transport sectors. It can be described as:

1. Marginal Social Cost Pricing in Networks^{xxxxvii}

a) Marginal Social Cost Pricing and Pigovian Tolls

The classic Pigovian approach prescribes that, to achieve economic efficiency, prices should be set equal to the marginal social cost (MSC) of each trip or service. This means that users pay not only for the direct costs they impose (e.g., fuel, maintenance) but also for the external costs their usage creates—such as congestion delays, emissions, and noise. In practice, this is often implemented through congestion pricing or environmental tolls, which internalize these externalities and guide users toward socially optimal travel choices.

- **Congestion Pricing:** Charges are higher during peak periods to reflect the additional congestion each user imposes on others, incentivizing shifts to off-peak travel or alternative modes.
- **Environmental Pricing:** Fees or taxes are levied to account for pollution or noise externalities, encouraging cleaner transport choices.

b) Optimal Pricing in Networks with Externalities

Recent research (e.g., Candogan, Bimpikis, & Ozdaglar) extends the Pigovian framework to complex networks, showing that optimal pricing must account for the interdependencies between users: the actions of one traveler can affect the costs and benefits experienced by others, not just through congestion but also via network effects (where the value of the network increases with more users). The optimal toll or price on each link or service should therefore reflect both the direct marginal cost and the incremental externality imposed on the rest of the network.

c) Network Effects and Natural Monopoly

Many transportation networks (e.g., rail, pipelines, urban transit) are natural monopolies, characterized by high fixed costs and economies of scale. In such cases, marginal cost pricing alone may not generate enough revenue to cover total costs, potentially requiring subsidies or two-part tariffs (a fixed fee plus a usage charge). Network effects—where the value of the service increases as more users join—can further complicate pricing, as they create positive externalities that are not captured by individual users' willingness to pay.

d) Summary Table of Pricing Approaches

Scenario	Optimal Price Formula	Notes
No externalities, no network effects	$(p^* = MC)$	Classic marginal cost pricing
With congestion externality	$(p^* = MC + \text{MEC})$	Pigovian tolls
With positive network effects	$(p^* = MC - V'(n))$	May require subsidies
Natural monopoly (Ramsey) minimizes welfare loss while ensuring cost recovery ($p < AC$)	$(\frac{p_i - MC_i}{p_i} = \lambda \cdot \frac{1}{\epsilon_i})$	Markups vary by elasticity

Optimal price = p^* . Marginal cost = MC . Marginal external cost = MEC . Marginal network benefit = $V'(n)$. (p_i) = the price for user/class (i). p = price. AC = average cost. frac = fraction. (MC_i) = the marginal cost for i . λ = a multiplier chosen so that total revenue covers total cost. $\cdot$ = direct marginal cost multiplied. ϵ_i = the price elasticity of demand.

2. Practical Strategies for Optimal Pricing

Optimal pricing for transportation networks is not one-size-fits-all. Strategies include:

- **Congestion Pricing:** Dynamic tolls or fares that rise during peak demand to reduce congestion and improve network efficiency.
- **Distance-Based or OD-Based Pricing:** Fares that reflect the length or complexity of a trip, aligning payment more closely with resource use.
- **Dynamic Pricing Models:** Fares with real-time adjustments based on demand, service quality, and network conditions.

- **Discounted or Free Fares:** Discounted or free fares used to promote sustainable modes (e.g., public transit) or to achieve social equity goals.
- **Two-Part Tariffs:** Two-part tariffs where a fixed access fee plus a variable usage charge, often used in natural monopoly settings to ensure cost recovery.

The ideal approach depends on the network's objectives—whether maximizing societal welfare, ensuring financial sustainability, or promoting modal shift.

3. Balancing Efficiency and Financial Viability

A key challenge is that **marginal cost pricing** (even when adjusted for externalities) may not cover the average cost in industries with high fixed costs, such as public transit or pipelines. This creates a tension between economic efficiency and financial viability. Solutions include:

- **Subsidies:** Public funding to bridge the gap between revenue from efficient pricing and total costs.
- **Ramsey Pricing:** Differential markups over marginal cost, higher for users with less elastic demand, to minimize welfare loss while achieving cost recovery.
- **Broader Policy Coordination:** Integrating pricing with land use, supply planning, and investment decisions to internalize externalities and promote efficient network development.

D. Concluding Remarks

In this part, we have examined: the use of mathematics to describe networks; the economic theory of networks in transportation; and network pricing in transportation. The use of mathematics to describe networks is not new and has been used to show the existence of paths and most efficient path in networks, to solve minimum cost and to show maximum flow problems in transportation. Recent developments in the use of graph neural networks and Bayesian networks in transportation have shown the potential for improving the efficiency, safety, and sustainability of transportation systems together with traffic forecasting and making predictions especially when dealing with uncertainty and incomplete data ultimately leading to more efficient and resilient transportation systems. Network pricing in transportation has also shown increased emphasis on taking into account externalities in transportation due to pollution and congestion in arriving at optimal pricing. These developments provide further testimony to the importance of networks in transportation as they are widespread in Canada.

Part III. Networks in Transportation Do They Create Barriers to Entry?

A. Definition of Barriers to Entry

The definition of 'barrier to entry' is an elusive concept. Several attempts have been made by economists to define the term beginning in 1956 with Joe Bain's classic treatise *Barriers to New Competition*. This was followed by attempts from Stigler, Ferguson, Fisher, Von Weizsacker, Carlton and Perloff, McAfee, Mialon and Williams and antitrust authorities each providing their own definitions. While these attempts shed their own light, it has not resulted in any agreement on a unique definition which led to the following statement in a document published by the OECD. "The term 'barriers to entry' has become so controversial that it is now difficult to use it in a widely acceptable manner. In recent years, some commentators have deemphasised this problem, arguing that the debate over the meaning of 'barriers to entry' is not essential for competition policy."^{xxxviii}

In light of the above, the emphasis has shifted to the 'condition of entry'. It is divided into two basic types: structural; and strategic. The structural type consists of: absolute cost advantage; economies of scale; economies of scope; high capital costs; reputational effects; network effects; legal/regulatory barriers; barriers to exit; first mover advantages; and vertical integration. The strategic type consists of: predatory pricing; limit pricing; intentional over-investment in capacity and sunk costs; product differentiation and advertising; fidelity rebates and bundled rebates; exclusive dealing arrangements; tying; and patent hoarding. The strategic or behavioural category includes entry conditions that were intentionally created or enhanced by the incumbent often for purpose of deterring entry by a competitor

rather than characteristics of the structural aspects of an industry. The two types can interact and should not be considered in isolation in any particular case. The OECD study indicates that ‘sunk costs’ permeates this discussion and deserve special attention.

B. How are Barriers to Entry Treated under competition laws in Canada, USA, EU, Australia and New Zealand?

1. Canada

The term ‘barriers to entry’ appears under the merger provisions in section 93(d) of the *Competition Act*. In this section, three types of barriers are mentioned: tariff and non-tariff barriers to international trade; interprovincial barriers to trade; and regulatory barriers over entry. These barriers are discussed in the *Merger Enforcement Guidelines* (MEG).^{cxix} They can take many forms, ranging from absolute restrictions that preclude entry, to sunk costs and other factors that raise the costs and risks associated with entry and thereby deter it.

The MEG emphasized the importance of sunk costs (costs not recoverable if the firm exits). Acquiring market information, developing and testing product designs, installing equipment, engaging personnel and setting up distribution systems are all identified as startup sunk costs together with investments in market-specific assets and in learning how to optimize the use of these assets; product differentiation-related advantages enjoyed by incumbents; or disadvantages presented by the strategic behaviour of incumbents. In addition, the investment required to establish a reputation as a reliable or quality seller is also considered a sunk cost constituting a barrier to entry.

The MEG also outlined other types of barriers to entry such as: long-term exclusive contracts with automatic renewals, rights of first refusal, most favoured customer or “meet or release” clauses or termination fees. Other impediments to entry are economies of scale (where there are some sunk costs), maturity of the market, control over access to scarce or non-duplicable resources such as technology, land, natural resources and distribution channels, network effects, and capital costs.

Besides the merger provisions, it is worthwhile noting that while the term ‘barriers to entry’ is not specifically mentioned in the abuse of dominance provisions in section 79(1) or the anti-competitive acts stated in section 78 of the *Competition Act* their consideration arises in the context of dominance, market power and its abuse. For example, in the *NutraSweet* case, the Competition Tribunal was of the opinion that there were significant barriers to entry into the aspartame market due to process patents associated with producing aspartame held by incumbents, significant economies of scale and sunk costs, and a long start-up time of around two years. And in the *Tele-Direct* case, given the requirement of significant sunk costs and the reputation of the incumbent, as well as the incumbent’s affiliation with telephone companies, the Competition Tribunal concluded that barriers to entry to the telephone directory market were significant.

2. United States

The US DOJ in its 2023 merger guidelines addresses ‘raising barriers to entry and competition’. A merger may create or enhance barriers to entry or expansion by rivals that limit the capabilities or competitive incentives of other firms. Barriers to entry can entrench a dominant position even if the nature of future entry is uncertain, if the identities of future entrants are unknown, or if there is more than one mechanism through which the merged firm might create entry barriers. Some examples of ways in which a merger may raise barriers to entry or competition include: switching costs; interfering with the use of competitive alternatives; and depriving rivals of scale economies or network effects. On the latter it states “Scale economies and network effects can serve as a barrier to entry and competition. Depriving rivals of access to scale economies and network effects can therefore entrench a dominant position. If a merger enables a dominant firm to reduce would-be rivals’ access to additional scale or customers by acquiring a product that affects access such as a customer acquisition channel, the merged firm can limit

the ability of rivals to improve their own products and compete more effectively [acquisition of network participants]. Limiting access by rivals to customers in the short run can lead to long run entrenchment of a dominant position and tend to create monopoly power.”^{cxl} In its 1982 Merger Guidelines regarding vertical mergers it states “In certain circumstances, the vertical integration resulting from vertical mergers could create competitively objectionable barriers to entry. Stated generally, three conditions are necessary (but not sufficient) for this problem to exist. First, the degree of vertical integration between the two markets must be so extensive that entrants to one market (the “primary market”) also would have to enter the other market (the “secondary market”) simultaneously. Second, the requirement of entry at the secondary level must make entry at the primary level significantly more difficult and less likely to occur. Finally, the structure and other characteristics of the primary market must be otherwise so conducive to non-competitive performance that the increased difficulty of entry is likely to affect its performance.” The three conditions are elaborated upon: Need for Two-Level Entry; Increased Difficulty of Simultaneous Entry to Both Markets – due to Increased Cost of Capital as a Barrier to Entry and Economies of Scale as a Barrier to Entry; and Structure and Performance of the Primary Market.

3. EU

The term ‘barrier to entry’ appears in the treatment of both the articles dealing with ‘dominance’ and ‘merger’. In the Guidance document to dominance under the clause on ‘expansion or entry’^{cxli} barriers to entry is stated. “Barriers to expansion or entry can take various forms. They may be legal barriers, such as tariffs or quotas, or they may take the form of advantages specifically enjoyed by the dominant undertaking, such as economies of scale and scope, privileged access to essential inputs or natural resources, important technologies or an established distribution and sales network. They may also include costs and other impediments, for instance resulting from network effects, faced by customers in switching to a new supplier. The dominant undertaking's own conduct may also create barriers to entry, for example where it has made significant investments which entrants or competitors would have to match, or where it has concluded long-term contracts with its customers that have appreciable foreclosing effects. Persistently high market shares may be indicative of the existence of barriers to entry and expansion.”^{cxlii}

In the Horizontal Merger Guidance document on mergers, section six is concerned with entry under which it addresses ‘barriers to entry’.^{cxliii} “Potential entrants may encounter barriers to entry which determine entry risks and costs and thus have an impact on the profitability of entry. Barriers to entry can take various forms: (a) Legal advantages encompass situations where regulatory barriers limit the number of market participants by, for example, restricting the number of licences. They also cover tariff and non-tariff trade barriers. (b) The incumbents may also enjoy technical advantages, such as preferential access to essential facilities, natural resources, innovation and R & D, or intellectual property rights, which make it difficult for any firm to compete successfully. For instance, in certain industries, it might be difficult to obtain essential input materials, or patents might protect products or processes. Other factors such as economies of scale and scope, distribution and sales networks, access to important technologies, may also constitute barriers to entry. (c) Furthermore, barriers to entry may also exist because of the established position of the incumbent firms on the market. In particular, it may be difficult to enter a particular industry because experience or reputation is necessary to compete effectively, both of which may be difficult to obtain as an entrant. Factors such as consumer loyalty to a particular brand, the closeness of relationships between suppliers and customers, the importance of promotion or advertising, or other advantages relating to reputation will be taken into account in this context. Barriers to entry also encompass situations where the incumbents have already committed to building large excess capacity, or where the costs faced by customers in switching to a new supplier may inhibit entry.”^{cxliv}

4. Australia

The term height of barrier to entry to the market appears in section 50(3)(b) of the merger provision in the *Australian Competition and Consumer Act*. The meaning of this is elaborated at great length in the Australian Merger Guidelines. It states that “A barrier to entry is any factor that prevents or hinders

effective new entry that would otherwise be capable of defeating a price increase caused by a merger” (p. 36). Exit may likewise also act as a barrier to entry.

It indicates three major types of barriers to entry:

1. Legal or regulatory barriers, including but not limited to: a. licensing conditions, tariffs, explicit restrictions on the number of market participants and other government regulations; b. legally enforceable intellectual property rights; and environmental regulations that raise the costs of entry or limit the ability for customers to switch suppliers.

2. Structural or technological barriers, including but not limited to: the existence of sunk costs, which increase the risks of, and costs associated with, failed entry and include factors such as product development, advertising or promotion to establish a sufficient reputation in the market and construction of specialised facilities — the high risk and costs associated with failed entry may deter new entry; substantial economies of scale, which may limit the viability of entry below a certain minimum efficient scale; high customer switching costs, such as search costs, transaction costs and market specific behaviour (including customer inertia to switching suppliers); mature markets or markets with declining levels of demand growth; access to key production or supply assets, important technologies or distribution channels; the existence of significant network effects.

3. Strategic barriers that arise because of actions or threatened actions by incumbents to deter new entry, including but not limited to: risk of retaliatory action by incumbents against new entry, such as price wars or temporarily pricing below cost; creation and maintenance of excess capacity by incumbents that can be deployed against new entry; creation of strategic customer switching costs through contracting, such as exclusive long-term contracts and termination fees; brand proliferation by incumbents, which may crowd out the product space leaving insufficient opportunities for new firms to recover any sunk entry costs (pp. 37-38).

The ACCC takes the view that new entry must be timely, likely and sufficient in scope and nature to be effective. Barriers to expansion by entrants can also pose a barrier. If the ability of an entrant to expand is limited or delayed it can discourage entry.

5. New Zealand

The *New Zealand Commerce Commission Mergers and Acquisitions Guidelines* examines entry and expansion using a LET test (i.e. Likely, and sufficient in Extent and Timely). It acknowledges that obstacles to entry and expansion that firms face are relevant to the LET test. Under the heading of Conditions of Entry and Expansion it points to four conditions: profitability of entry (costs and risks); structural; regulatory and strategic.

Structural conditions are associated with the technologies, resources or inputs a firm would need to enter or expand. These include: economies of scale, which refers to per unit costs falling as production increases; economies of scope, which refer to when per unit costs fall when more than one product is produced (or transported etc); switching costs, which are costs a customer incurs when switching to use a new supplier; network effects, which refer to when a product or service becomes more valuable the more users it attracts (for example, a new entrant in the social media sector may be at a disadvantage to a competitor that already has a well-established customer base); sunk costs; and the difficulties a firm would face in accessing required inputs or product distribution channels.

Regulatory conditions include: resource management or other planning consent requirements; licensing requirements for a business or product; regulations governing standards and quality; and intellectual property rights, which may mean that, for example, entry is not possible while a product is patent protected.

Strategic conditions arise where incumbent firms take action to discourage prospective entrants or expansion, such as by: raising customers' switching costs (for example, by establishing long-term contracts or establishing strong customer loyalty through points programs); and signalling through present or past conduct that entry would provoke an aggressive response.

C. Are there Barriers to entry in Canadian Transport Network Industries – A Review of a Few Studies

The barriers to entry in the Canadian transport network industry, varies from sector to sector. A review of a few studies in this area is provided in each of these sectors.

1. Rail

a. *Barriers to entry into the Rail Industry* (1992) – Nash and Preston in their study of the rail industry indicate that “The most obvious barrier to entry in the railway industry is the sunk cost of infrastructure.”^{cxliv} This is so because fixed costs (infrastructure, signalling and terminals) are a large proportion of total costs where infrastructure has a long asset life, is geographically-specific, cannot be deployed elsewhere and has minimal scrap value. Other barriers included in sunk costs are training staff, the lack of second hand market for rolling stock, maintenance and depot facilities, advertising and promotion, access to travel agents and seat reservation systems. The railway industry is also subject to indivisibilities and economies of scale. Being a multiple product industry (different origin/destinations at different times or passenger/freight) it is also subject to joint costs which may give rise to economies of scope. Given these characteristics the industry is considered to be one with declining long run costs or a natural monopoly. Other types of barriers are network operations which exhibit economies of scale and economies of density, this means that efficient operations have to be at a large scale. Access to capital could also be a barrier to entry as entry at a large scale would require large amounts of capital. There are also strategic barriers that a new entrant may have to face and for international traffic there may be other barriers.

b. *NTARC* (1993) and *CTAR* (2001) – In the National Transportation Act Review Commission (NTARC) and Canada Transportation Act Review (CTAR) reports, the Commissions recognized certain characteristics of the rail industry that are barriers to entry for a new railway or entry of a new competitive railway along corridors abandoned by existing main line carriers, besides economies of scale and sunk costs. First, the NTARC indicates that there is “... a lack of venture capital to support those who are interested.”^{cxlvi} The Canada Transportation Act Review states “Railways are among the most capital-intensive businesses. Capital invested in railways is relatively immobile for the short and medium term. This provides a significant barrier to the entry of new competitors on specific corridors and injects an element of caution into significant new investments by existing companies.”^{cxlvii} Second, the lack of entrepreneurs and entrepreneurial skill is also a barrier to entry. According to the NTARC “..., there appears to be a lack of Canadian entrepreneurs ready to bid for available lines ...”^{cxlviii} Third, the size of the market is limited which acts as a barrier to entry. CTAR states “Many short lines lack the traffic base to accommodate such investments, and it remains to be seen what will happen to railways that cannot afford to upgrade to handle heavier carriers’.”^{cxlix} Fourth, regulatory barriers can also create entry barriers. The possibility of obtaining voluntary running agreements on the tracks of Class I carriers is not promising. “The Panel notes, however, that individual short lines may be more vulnerable than the mainline railways to the financial impact of any single regulatory decision (especially regarding running rights or freight rates), since a short line’s single shipper may account for as much as a third of the short line’s total traffic.”^{cli} The regulatory requirements to obtain the necessary land or rights-of-way to build new tracks or infrastructure pose no less of a challenge together with the exit provisions relating to transfer, discontinuance and sale.^{cli} Finally, CTAR recognized there is a considerable time lag between capital invested and results.

c. *Competition Bureau* (2015) - In the rail sector, the Competition Bureau emphasized absolute cost advantages and economies of large scale.^{clii} It stated “The rail sector is characterized by high barriers to entry. In Canada, railway companies are generally responsible for providing their own infrastructure, including track and roadbed, signalling and terminals.^{cliii} These investments are both large and sunk as once they are made they cannot be re-deployed elsewhere and have minimal scrap value. Rail markets involve economies of scale and scope. Essentially this means that marginal or incremental costs are below average costs, so that a railway's average cost of transportation decreases as it gets larger, either from an increased scale of production or a more diverse traffic base. In addition, railways may struggle to obtain the necessary land or rights-of-way to build new tracks or infrastructure, especially within urban areas or at high-congestion ports and terminals. These high barriers to entry make it unlikely that a new facilities-based railway will enter the Canadian market, and limit the ability of existing Canadian or foreign railways to expand into additional markets.”

2. Air

a. *Restructuring Canada's airline industry: fostering competition and Protecting the public interest, House of Commons Transport Committee Report (1999)* – “The Committee believes that barriers to entry must, to the extent possible, be removed. Otherwise, the emergence of new carriers might be inhibited, as might the expansion of existing carriers. We are convinced that, if re-regulation is to be avoided, a pro-competitive environment must exist. Removal of barriers to entry is critical in ensuring this environment. In our view, every opportunity must be taken to promote and create competition. This, in turn, will benefit consumers.” In this insightful study it examined barriers to entry such as predatory behaviour, ownership limits, slots, airport facilities, computer reservation systems, frequent flyer programs, interlining and code sharing. Most of these barriers have been addressed in amendments to regulations. It also made recommendations on fostering competition such as modified sixth-freedom rights, reciprocal cabotage, Canada-only carriers, etc. “The Committee is firmly of the opinion that eliminating barriers to entry will result in a healthy, competitive airline industry with benefits for everyone”^{cliv}

b. *Vision and Balance, Report of the Canada Transportation Review Panel (2001)* - The Review Panel recognized the existence of formidable impediments confronting existing independent carriers and new entrants. It indicated that the high-risk nature of the airline industry tends to discourage entry because airlines have high fixed costs relative to revenues, and that a small change in load factors or fare levels can have a large impact on profits. Three types of entry barriers were singled out by the Panel in the Canadian airline industry: the access to airport facilities and the inordinate influence over key airport decisions that the dominant carrier may have; the frequent flyer plan as it provides competitive advantages to the dominant carrier; and the excessive rates for interlining and other services to foreign airlines outside the alliance that the dominance carrier belongs to.

To indicate the importance of these entry barriers, the Review Panel indicates the undertakings Air Canada made to gain approval of its CAI (Canadian Airlines International) acquisition. “Air Canada has given up a number of peak-hour slots at Pearson and made available facilities at selected airports where it had preferred or exclusive use of more than 60% of facilities. Air Canada must also offer interlining and joint fares to other Canadian carriers belonging to the International Air Transport Association and, for a five-year period, sell access to its Aeroplan to Canadian carriers below a size threshold (\$250 million in domestic passenger revenues).”^{clv} It was believed that with the takeover of CAI, Air Canada should have a denser network that should produce cost savings from better aircraft utilization (including larger planes, higher load factors, and increased aircraft use) and more efficient use of ground personnel and equipment.

c. *Competition Bureau* (2015) - The Competition Bureau emphasized absolute cost advantages and economies of large scale in its submission in early 2015 to the Canada Transportation Act Review Panel. It stated “Especially given the small number of incumbent carriers, competition in Canadian airline

markets is crucially dependent on entry conditions. The magnitude of barriers to entry in turn is dependent upon a number of factors and is likely to differ across relevant markets. Entry by WestJet and Porter demonstrates that barriers to entry can be overcome in some markets. However, a string of failed entrants (e.g. Canada 3000/Royal Airlines, Roots Air, Jetsgo and Zoom) have proven that achieving sustained profitable operations in Canadian markets is risky, and by no means assured.”^{clvi} The following paragraphs discuss how existing regulations and legislation interact with market conditions to create or amplify barriers to entry.

To operate on a viable scale, a potential entrant requires an ability to attract feeder traffic at both ends of a route. Incumbent carriers develop flight networks that centralize large volumes of passenger traffic into hubs and consequently limit a potential entrant's access to the volume of feeder traffic necessary to compete effectively. Canada's current foreign ownership restrictions and prohibition on cabotage hinder the airline industry's ability to generate greater feed traffic beyond the major international gateways.^{clvii}

Access to capital is of primary importance for new carriers or existing carriers wishing to expand their operations or renew their fleet. New carriers must raise a significant amount in capital or, in the alternative, show their ability to raise capital in order to obtain the required regulatory approvals from the Agency and Transport Canada. Carriers looking to expand their network and enter into international routes often benefit from securing international alliances to attract travellers.^{clviii} Members of international alliances need to rely on a Global Distribution System for reservations; such systems are more expensive than smaller systems and may be cost-prohibitive for smaller-sized airlines. Issues surrounding access to capital are rendered more complex as a result of Canada's current foreign ownership restrictions.

Successful entry is conditional on access to essential airport facilities such as gates, take-off and landing slots, counters, and ground-handling services at origin and destination points.^{clix} “Control over access to scarce airport resources could represent an advantage for incumbent carriers and deter entry. Additionally, incumbent air carriers may exercise significant influence on airport authorities and engage in strategic behaviour to limit airport policies that would facilitate entry. Such strategic behaviour by incumbent carriers may take the form of restrictive slot allocation agreements and gate leasing agreements that limit access by other carriers, even to unused gates. Undue influence exercised by incumbent carriers over infrastructure use and expansion plans may also deter entry.”^{clx}

d. *Pathways: Connecting Canada's Transportation System to the World Report (2015)* - The Review was concerned with the three major components of competitiveness: cost, access, and user experience, occasionally referring to the barriers to entry. It recognized that demand for air travel is known to be extremely price-elastic, so small price changes can have pronounced impacts on travel decisions. Low traffic volumes limit economies of scale (larger aircraft can realize lower operating and fuel costs per passenger) and dissuade new entry into the market; this ensures high airfares that depress travel and so perpetuate the problem. Canadians continue to pay relatively high airfares, in part due to the lack of competition on many routes. The Review indicated that small, privately held carriers, prospective start-ups, industry analysts, and others report that the 25 percent foreign ownership limit is a barrier to entry. In contrast to larger markets like the U.S., there may not be enough capital in Canada to finance 75 percent of a new national carrier. It also indicated that the Government of Canada commit to making more open international air services agreements.

The Review recognized that industries tend to develop in clusters around transportation hubs, whether they are directly related to air services—such as warehousing and logistics—or to manufacturing and export services, such as information technology, communications, insurance, and finance. Other countries recognize the importance of aviation and hubs for trade and investment, and they support their development. At these hubs, transit traffic can account for as much as 25 to 50 percent of airline seats on major international routes. So control of a hub by a dominant carrier can create a barrier to entry. The

Review heard concerns that airports and carriers may potentially abuse a dominant market position, absent common rules and appeal mechanisms applicable to all airports, on such issues as fee charging, competing in the same business as their tenants, and disadvantaging rival carriers in relation to landing rights, slots, and gate access.

In other words, it recognized structural barriers to entry such as hubs which dominant carriers control and have access to transit traffic, regulatory barriers such as ownership restrictions and restrictions in international air agreements. It also recognized the presence of behavioural barriers to entry such as abuse of a dominant market position.^{clxi}

e. Cleared for take-off: Elevating airline competition – (2025) - In 2025, the Competition Bureau released its study on competition in the airlines in Canada. It found that “despite the recent entry and expansion of new airlines, the domestic market remains highly concentrated and competition from new sources remains fragile. At major airports across the country, Air Canada and WestJet together account for roughly half to three quarters of all domestic passenger traffic. The Bureau’s report outlines three areas of focus for governments to create the right conditions for competition in the industry. These are: 1. Prioritizing competition in Canada’s aviation policy, including in the review of airline mergers and collaborations. 2. Leveraging international capital and experience to strengthen domestic competition, including reducing barriers to foreign ownership. 3. Supporting northern and remote market access, including tailoring regulations to the northern context.”^{clxii}

Regarding entry barriers, the report states “multiple barriers can block or discourage new airlines from entering the market. ... They range from direct restrictions on operating airlines, to high start-up costs and other factors that reduce potential profits.” New airlines face distinct challenges compared to established carriers: The key challenges that new airlines face are: high start-up costs and slow revenue growth; difficulty developing brand recognition; small scale (i.e. fewer planes, less-frequent service, and limited route networks); lack of access to interline agreement and alliances; and loyalty programs that favour incumbents. High barriers to entry means less competitive pressure on existing airlines.

To deal with these barriers the report makes ten recommendations in the above mentioned three areas. These are: 1. Make competition the priority when reviewing airline mergers and collaborations (by removing the Minister of Transport override powers). 2. Remove barriers that limit smaller airports from competing with major hubs (by eliminating international flight exclusivity clauses, expanding advantages to secondary airports eg. security, technology). 3. Improve the publication of airline industry data. 4. Consider reviewing the airport oversight and funding model (by improving airline access to airports). 5. Increase the single-investor foreign ownership limit for Canadian airlines to 49%. 6. Allow up to 100% foreign ownership for domestic-only Canadian airlines. 7. Work with other countries to remove foreign competition restrictions in international agreements (by permitting *cabotage* or other restrictions). 8. Coordinate leadership of northern and remote aviation. 9. Tailor regulations to the northern context. 10. Leverage government investments and tools to promote competition (by upgrading northern airports, developing open-access facilities, etc.).

3. Road

a. Why is the trucking industry so fragmented? (2023) - A recent review of the trucking industry indicates that it is fragmented. It states “Overall, the combination of low barriers to entry, different types of freight, regional differences, and independent contractors has resulted in a fragmented trucking industry with many small companies competing for business.”^{clxiii} First, compared to other industries, the trucking industry has relatively low barriers to entry because it is relatively easy for someone to start their own trucking company with just a few trucks and a willingness to work hard. This results in a large number of small trucking companies competing in the industry. Second, the trucking industry is fragmented because there are many different types of freight that need to be transported. Some companies specialize in

hauling certain types of freight, such as refrigerated goods, while others may focus on oversized or hazardous materials. This results in a fragmented industry with many different types of trucking companies. Third, the trucking industry is also fragmented because it is often organized by region. There are many small trucking companies that operate in specific regions, and they may not have the resources to expand beyond their local area. The varying internal provincial regulations create barriers. This results in a fragmented industry with many small, regional trucking companies. Fourth, many truck drivers are independent contractors who work for themselves or for small trucking companies. They may not be affiliated with larger carriers, which results in a fragmented industry with many independent operators.

b. *Economics of Scale in the US Truckload Industry* (2005) – The author begins by reviewing past studies on scale economies in the trucking industry.^{clxiv} He indicates that while previous studies did not find evidence of economies of scale, it has been several years since those works were published, and there was reason to believe that results may now be different. The study finds that the extremely large truckload carriers apparently have a cost advantage over smaller carriers. The industry is changing and barriers to entry are emerging: large carriers are growing disproportionately to the industry average; capacity constraints are indicative of emerging barriers to entry; entrants into the market are being dissuaded by higher fuel prices, lack of driver availability, higher insurance costs, and more expensive equipment due to recent emission standards. “If the current trends continue, larger carriers will seize greater shares of the market and perhaps realize even greater increasing returns to scale. The overall affect will be a more efficient market, as long as sufficient competition remains. The present state of the industry requires no economic regulation from the government. At this point, government should encourage mergers and acquisitions, which should lower the 'overall costs of truckload transportation. As the larger carriers become dominant, government should focus' on facilitating competition so that their power is not abused. As larger companies begin to realize greater returns to scale it will be increasingly hard to maintain a competitive advantage as a smaller carrier. Therefore, corporate strategies should focus on growth and strong mergers.”^{clxv}

c. *Fedex and Barriers to Entry* (2016) and *United Parcel Services (UPS) Porter Five Forces Analysis* (2023) – Courier transportation is one of the segments of ground transportation. The well established companies have large domestic and international networks both air and ground. In considering the barriers to entry, the Fedex study states ““When you think of the parcel/package delivery service, only a few key players come to mind. The major competitors in this space within the domestic U.S. includes FedEx, UPS and USPS. Occasionally you might also see DHL. With the demand in this industry continuing to increase due to eCommerce, one might wonder why additional competitors aren’t trying to break into this space. The answer is simple – the cost of entry to compete and economies of scale. A large capital investment is required to enter into this industry where fast, global delivery is expected – at a low price. Establishing a network of planes, trucks, couriers, etc. would have astronomical costs and having the ability to compete with the existing margins offered by the existing competitors would not be feasible as you tried to break even from your initial investment. Additionally, you also have to compete against very well known, trusted companies. This brings to mind one of the old FedEx commercials where a man shipped something using a “no name” carrier and the package didn’t get there. His boss was upset and said “You should have used FedEx!!!” If you were given the opportunity to try out a new carrier that you never heard of, it would be unlikely you would be willing to take the risk. Even as the existing companies look to expand into new markets, acquisitions seem to be the preferred approach. As FedEx looked to expand its ground network in Europe, TNT was acquired instead of building a network from scratch. In this industry, the threat of entry of new competitors will remain low for the foreseeable future.”^{clxvi}

In reviewing the threat of new entrants, the UPS study states “On a global scale, the courier service business requires many fixed capital investments in automobiles, warehouses, and employees. The large, fixed capital investment will make the threat of new entrants low. Also, the already established players

like UPS, FedEx, DHL, etc. have been in operation for a long time. They have optimized all their operations to operate at a very low cost with profitability. It is very difficult for any new player to establish a competitive cost structure and match their massive distribution reach. However, there can be players operating at the local level with less capital investment and can give competition to big courier services domestically like delivery, blue Dart in India, and other players in other countries. Still, they may not be able to compete with worldwide courier services like UPS. So, the threat of new entrants in the courier industry globally is low.”^{clxvii}

In brief, these two studies point to the following barriers to entry: multiple entry (eg. ground, air, etc.); large investments to entry (that result in economies of scale or scope); networks (that results in network economies); reputation (that results from brand names and sunk costs of advertising); maturity (that results from being in the market for several years).

4. Water

a. Shipping Conference Arrangements and Practices, Restrictive Trade Practices Commission (1965) - The Restrictive Trade Practices Commission determined that the shipping conference did hinder competition and take advantage of shippers. Its main criticism was against exclusive patronage contracts. However, it declined to apply the Combines Investigation Act to shipping conferences. It maintained that "Although the member lines lessened competition within the meaning of the *Combines Investigation Act*, the public interest would not be served by excessive rate competition and instability in the liner trades.”^{clxviii} Excessive entry and unrestrained competition, resulting in instability and destructive competition^{clxix} would force carriers to exit or combine and erect barriers which would prevent entry through closed conferences. Implicit in its reasoning was the industry was subject to declining average costs relative to the size of the market which would act as a barrier to entering this industry.

b. *FMC (1989) / FTC (1989) / DOJ (1990) / ACCOS (1992)* - To prepare for the revisions of the US Shipping Act of 1984, a number of studies were carried out which considered the matter of economies of scale.^{clxx} Their findings will be briefly indicated. The Federal Maritime Commission (FMC) Section 18 Report states that, “since the economies in ships’ size have apparently not yet been exhausted, it seems reasonable to conclude that, in general, lines operating in deep-sea liner trades are faced with long-run decreasing costs.”^{clxxi} The Report further cites a study by Gilman et al. that showed economies related to ship size on both short-sea and deep-sea routes, and points out that ships larger than twice the size of those evaluated by Gilman had been introduced into the industry by 1989.^{clxxii}

The Federal Trade Commission (FTC) stated “a necessary precondition for either outcome [monopolistic or oligopolistic structure] is the existence of substantial economies of scale. This means that larger firms can provide services at lower average cost than smaller firms. Econometric studies of this industry suggest that economies of scale do not exist in maritime transportation. In sum, the evidence suggests that large firms in the ocean shipping industry do not enjoy a cost advantage over smaller firms, and that entry and exit into the industry is largely unobstructed. Such conditions weaken the argument that regulation is needed to prevent the industry from evolving into one dominated by a few large firms capable of wielding substantial market power.”^{clxxiii} The study also examined the argument of destructive competition which “may occur in industries characterized by fluctuating demand and a high ratio of sunk to total costs. High market-specific sunk costs are a key condition for destructive competition.”^{clxxiv} It accordingly held that “Ocean liner markets fail to exhibit the high market-specific sunk costs that are a key condition for destructive competition.”^{clxxv}

The Department of Justice (“DOJ”) in its evaluation of whether regulated conferences are necessary to prevent single-firm monopoly or destructive competition, the DOJ’s 1977 report concludes that the industry is not characterized by natural monopoly and that “There is no evidence that the shipping industry is characterized by economies of scale so large that there is room for only one firm in the trade.

In fact there is evidence that virtually all economies of scale are typically achieved by a service involving three ships. Thus with the exception of routes with a very small volume of trade, there is no reason to fear any inevitable tendency toward monopoly.”^{clxxvi} It continued to maintain such views in its 1990 analysis of the Act supporting abolition of antitrust immunity for shipping conferences.^{clxxvii}

The Report of the Advisory Commission on Conferences in Ocean Shipping (ACCOS) emphasized the structural changes taking place in the liner shipping industry and the impact these changes were having on the efficient firm size is significant. The previous relevant market may have been the individual trade lane, but the current liner operators are building global networks. Substantial financial and operational barriers do exist in developing these large scale multi-trade networks, and the scope of liner operations has definitely moved from isolated individual trade lanes, to multiple, inter-connected trade routes and global operations.^{clxxviii} A submission to ACCOS concludes that liner shipping is characterized by: (1) significant economies of scale, with marginal costs below average costs at relevant levels of output; (2) large investment requirements, and consequent barriers to entry and exit; and (3) the provision of essential services.^{clxxix}

In brief, the discussion in the above studies is whether the industry exhibits economies of scale which is a barriers to entry. While there may be no consensus on this issue on an individual trade lane and when these economies are exhausted, the industry has evolved to building global networks which have substantial barriers to entry both in their capital requirements and multi-scale networks.

c. *Economies of scale in international liner shipping and ongoing industry consolidation: an application of Stigler’s Survivorship principle (2000)* - This dissertation “has shown that economies of scale do exist in liner shipping. The data show that the existence of economies of scale at both the firm and plant level is most pronounced during the period 1987-1997, subsequent to significant regulatory changes under the *Shipping Act of 1984*. Economies of scale in liner shipping have been increasing in response to technology-driven productivity growth, regulatory changes, and higher world-wide trade flows. The pursuit of economies of scale also appears to be contributing (only one reason, but a major one) to the consolidation that is occurring in the liner shipping industry today via both mergers and acquisitions, and the formation of global strategic alliances. As carriers continue their pursuit of competitive advantages, it is likely that the consolidation currently taking place in the industry will continue.”^{clxxx}

5. Pipeline

a. *What we do. Ontario Energy Board; Natural Monopoly in Canadian Interprovincial Gas Pipelines, Clyde Vincent Pawluk, 1995* -The Ontario Energy Board states “Many industries in Canada are subject to some form of regulation governing what they can and cannot do. Energy utilities are more closely regulated than many other industries because of the unique characteristics surrounding energy supply and delivery. Unlike many other industries in which there are numerous companies competing to sell the same product or service, electricity and natural gas distribution and transmission are considered to be *natural monopolies*.”^{clxxxi} Regulation is a way to address the natural monopoly position of energy utilities.” The cost to transport natural gas from Western Canada and the United States to Ontario continues to be regulated. The National Energy Board approves the Transportation tolls and charge. In other words, the characteristics of the transmission of natural gas industry are a major barrier to entry.

Vincent Pawluk estimated whether there is natural monopoly in the transmission of gas for Trans Canada Pipe Lines (TCPL). He states “The results of the natural monopoly tests present a consistent view of TCPL. Namely, that TCPL is a natural monopoly, and as such should continue to operate exclusively in its markets.”^{clxxxii} “... we have shown that TCPL experiences cost complementarities, and hence economies of scope. Economies of scope provide necessary evidence for natural monopoly while cost complementarities provides sufficient evidence for natural monopoly.”^{clxxxiii} ... Hence, we have shown both necessary and sufficient evidence to conclude that TCPL is a natural monopoly.”^{clxxxiv} In addition to

this, other test results support the conclusion that TCPL is a natural monopoly. Indeed, perhaps the most convincing evidences that TCPL is a natural monopoly are the results from the economies of scale test (in the single product setting) and the results of the subadditivity tests. Economies of scale tells us that it is better to build a single large pipe rather than several smaller pipes to carry the same volume of gas.^{clxxxv}

b. *Pipeline problems persist in Canadian oil and Gas (2019)* - This report states “It has been a long and difficult stretch for Canadian oil and gas, with legal challenges, political decisions and takeaway capacity issues all serving to put pressure on an already stymied industry. A confluence of challenges—including, most prominently, persisting uncertainty around the Trans Mountain Pipeline—continue to negatively affect the sector in Canada.”^{clxxxvi} Pipeline and other midstream infrastructure, continues to be a focal point. Production curtailment was from January 1 to December 31 2019 by the Government of Alberta. The Government of Canada took measures (purchase of) to deal with the problem and introduced Bill-69.^{clxxxvii} But concerns were expressed about Bill C-69 indicating that it will make the regulatory and environmental review process more onerous, raise the risk of litigation and generally have a chilling effect on foreign investment to Canada. The government of Alberta launched a constitutional challenge against Bill C-69 in the Alberta Court of Appeal which was successful (May 2022). The matter then was taken to the Supreme Court which also ruled that the federal Impact Assessment Act was unconstitutional (October 2023). In 2024, the Government introduced legislation to amend the Act which received Royal Assent on June 20, 2024. This indicates the presence of regulatory barriers to entering the natural and oil gas pipelines as one study states “... new pipeline projects in Canada continue to face delays related to environmental and regulatory impediments as well as political opposition.”^{clxxxviii} In addition, there are also barriers in construction of pipelines and economies of scale in transportation which raises the barriers to entry. They may also be barriers to exit.

c. *Economics of Gas Transportation by Pipeline and LNG (2022)* – G. Molnar in his book examines cost of natural gas transportation. He highlights two types of cost: 1. *High upfront costs* - “Natural gas pipeline projects are capital intensive by nature. High upfront investment costs typically account for over 90% of total costs occurring through the lifespan of a gas pipeline (~40 years), whilst operating expenses (e.g. fuel costs associated with gas compression, maintenance and repairs, staff, etc.) usually account for up to 5–10% of total costs. Consequently, the initial design of the project and the optimization of capital expenditures needs careful consideration as it has a disproportionate impact on the overall economics of the project.” 2. *Long run decreasing costs* - Natural gas transportation via pipelines naturally results in economies of scale. Whilst the throughput capacity of a pipeline is increasing following the $\pi r^2 L$ formula—where r stands for the radius (half of the diameter) and L for the length of the pipeline—the material costs required for the construction of the line pipe is increasing in line with the $2\pi r L$ formula. Consequently, unit transport costs for the same level of utilization are usually lower for pipelines with larger diameters and built in similar external environment. Moreover, some of the costs associated with pipeline construction are fixed (design, permits) or increase insignificantly compared to a higher design and working capacity of the pipeline system. Further, it should be noted that several smaller compressor units will have a higher cost per MW compared to a larger unit with same compressing power due to economies of scale.”

d. *Oil Pipeline Deregulation, Report of the U.S. Department of Justice (1986)* – The DOJ described oil pipeline industry as a natural monopoly. It held that pipelines exhibit three economic characteristics that can result in market power. “First, oil pipelines are a highly efficient mode for long distance transportation of petroleum. Only water transportation, particularly ocean-going tankers, can rival the efficiency of oil pipelines, and water transportation is not available in many locations. Second, oil pipelines feature economies of scale over a large range of throughput volume. Some costs, such as those for right-of-way and communications equipment, are invariant to pipeline throughput. Steel pipe costs and power costs also exhibit economies of scale. The friction within a pipeline and the cost of pipe are roughly proportional to the diameter of the pipeline, while its throughput volume is roughly proportional

to the square of its diameter. Thus, the per barrel cost of pipeline transportation tends to fall with increased output, giving oil pipelines the economic characteristic of a natural monopoly. Third, unlike other modes of transportation, oil pipelines are not mobile. Thus, oil pipelines are not an example of an industry that, due to "hit and run entry," can perform competitively even in highly concentrated markets."^{cxix} It also indicates that "Economies of scale generally make it very difficult for a new pipeline to enter into competition with an existing pipeline in any origin or destination market."^{cxc}

D. Are Canadian Transportation Networks Barriers to Entry and Competition?

In considering whether transport networks are barriers to entry and competition we shall consider structural barriers to entry emphasized in the literature that arise from: absolute cost advantages over potential entrants; product differentiation advantages over potential entrants; and economies of large scale.^{cxi} Our approach here is not based on a in depth study of the characteristics of various transportation modes or any statistical investigation but information and conclusions from various studies and sources reviewed. We then consider strategic barriers to entry based on behaviour of firms to deter entry.

Structural Barriers to Entry

1. Do Transportation Network Industries have Absolute Cost Advantages? By *absolute cost advantages* we mean established firms have no cost advantages in the purchase of factors of production; the entrant would have no perceptible effect on the going level of any factor price; and the established firm has no preferred access to productive techniques. They arise from: control of production techniques (*essential facilities*, patents, IP); imperfections in the market or ownership or control of strategic factors (*scarce resources*); limitations of the suppliers of productive factors in specific markets (*regulatory barriers*); money market conditions (*large investments, higher interest rates for potential entrants*); and sunk costs. Being spatial and geographic established transportation network industries have an absolute cost advantage, in some modes more than in others.

Essential facilities: In rail, air, and water restrictions to essential facilities creates a barrier to entry. In rail there are rail lines, in air slots, gates, airport facilities, etc. and in water port terminals. For example, denial to Ferroequus Railway Co. of running rights on CN track, access restriction to the computer reservation system in air.

Scarce resource: In rail, air, water and pipelines, a major entry barrier is land as it is a *scarce resource*. Building new railway tracks or an airport with runways or new sea port terminal or pipeline is usually not possible. The price of land would certainly increase if there was any knowledge that a firm intended to build. Established firms have an absolute advantage. In road, building new terminals for truck transportation or passenger bus transportation may not need too much land and the absolute cost advantage may not be too great.

Sunk costs: In rail and pipelines transmissions *sunk costs* pose a formidable barrier to entry. This makes market penetration by a new entrant in most transportation network industries much slower than would occur in non-network industries or those with large sunk costs. In air, water and road, sunk costs are not a significant barrier to entry though they may be some sunk costs. For example: in air "entry costs involve setting up a reservation system, labour contracts, renting airport space and maintenance operations. Industry exit is easier, but these become sunk costs;"^{cxcii} in water building new terminals become a sunk costs should the shipping line choose to leave that port.

Large capital investments: In rail and pipelines were *large capital investments* are needed entry becomes difficult. If multiple entry (eg. ground, air, etc. simultaneously) is needed to enter into an entire network the capital investment barrier to entry is raised. If part of this investment involves sunk costs the money market conditions may not be favourable to a new entrant as it will generally be faced with higher interest

cost in borrowing money. In most network industries a new entrant enters with a point-to-point service rather than with an entire hub and spoke network of services, as the capital investment would be too large.

Regulatory and political: In rail, air, and pipelines *regulatory and political barriers* exist. Not only have new entrants to obtain federal approval but also provincial approval, as usually networks go through provinces. If they cross international boundaries approval is also needed from foreign regulatory agencies. Examples are: in rail, the recent merger of CP and KCS indicates the hurdle; in air, restrictions on the area of operation and number of carriers in bilateral agreements, cabotage, protection, ownership limits highlights these barriers^{cxci}; in pipeline, cancellation of permits for the Keystone XL pipeline in the US, the criticism of Bill C-69 and the tug-of-war between the federal government and Alberta is indicative of the problems, etc. In road the regulatory and political barriers do not generally exist and in case of a few barriers (repositioning of trucks, etc.) they apply to both established carriers and new entrants. Regulatory barriers to exit may also be present in rail, air and pipelines.

2. Do Transportation Network Industries have Product Differentiation Advantages? By *product differentiation advantages* we mean the preferences that buyers have for established networks over new networks. They arise from: brand names and company reputation; superior product designs through control of patents; and ownership or control of favoured distributive outlets.

Company Reputation: The rail, air, and pipeline transportation companies in Canada have established reputations not only national but also international. They have long histories as *iconic companies* in Canada with a great deal of government intervention and patronage. They have product differentiation advantages arising from their favoured locational advantages such as being down town or near the city. Their company reputation arises largely from their experience and number of years of being in business and continued expenditures on advertising to building up brand names and service. They have all become a fabric of the well recognized companies in Canada not just transportation companies. This would indicate that the barrier to entry to be high. In road transportation, the large trucking companies (TFI, Canadian National Transportation, Mullen Group Inc., Day and Ross, and Bison Transport) and courier companies all have their reputation some of them are well known international companies operating throughout the globe (UPS, Fedex, etc) with their international networks.

Product differentiation: The rail, air and pipelines all have their own logos and trade names. These logos have become synonymous with the companies and recognized by all Canadians. The companies place a lot of emphasis on product differentiation for example: CN's recent "Falcon Premium Intermodal Service" and CP's The first "single-line rail network connecting Canada, the U.S. and Mexico"; and Air Canada's "Aeroplan" and "Member of Star Alliance" "Free WiFi" and WestJet's MemorEase™). These product differentiation advantages give the incumbent considerable advantage over any competitor. In road especially in the Courier segment the carriers have their well established logos and trade names, and their own intellectual properties. They consider themselves high tech companies with their own logistics developments.

Ownership or control of favoured distributive outlets: In rail and air, the network companies own their own distributive outlets, each specializing from special geographic locations. For example: in rail, CN has its exclusive locations in Autoport in Halifax, Edmonton, Saskatoon and Prince Rupert etc. and CP in Calgary and Regina with its own transload facility with Maersk at the Port of Vancouver and logistics centre at Port Saint John; etc.; in air, Air Canada dominates the flights from Terminal 1 and 2 in Toronto and WestJet has made Calgary its hub from which it operates and entered into partnership with the government of Alberta, specializing in traffic in Western Canada. Many of these barriers – slots, airport facilities, computer reservation systems, frequent flyer programs, interlining and code sharing – were examined in a well written report by the House of Commons Transport Committee Report at the time of restructuring Canadian airlines in 1999.^{cxci}

3. Do Transportation Network Industries have Economies of Large Scale? By *economies of large scale* we mean declines in cost as output increases. They arise from: real economies of large scale production or distribution (arising from indivisibilities of factors of production); pecuniary economies (bargaining) of large scale production; pecuniary economies of large scale advertising or sales.^{CXCV}

Economies of scale: In rail and pipelines it is usually held that there are economies of scale and economies of scope, or they are natural monopolies. In these transportation modes, their characteristics are an insurmountable barrier to entry. An entrant is likely to be faced with excessive price competition which eventually will lead to the demise of the incumbent or the new entrant resulting in monopoly (often calling for some type of intervention eg. government ownership and regulation of the certain parts of the infrastructure that give rise to its natural monopoly or competitive provisions in regulation if the mode is privately owned). In air and water, there may be economies of scale to some extent but are not considered a major barrier to entry. These industries are not considered a natural monopoly. The observed growth in some companies (Air Canada and WestJet) suggest that there may be some economies of scale or if there are diseconomies of scale it is outweighed by economies of scope or / and network economies / or by some political decision.^{CXCVI} In road, the fragmented state of the industry indicates that there are limited economies of scale but the continued growth of the large companies (eg. TFI) suggest that if there are any diseconomies they are outweighed by economies of scope or network economies.

Network economies: In rail, air, road, water and pipeline transportation companies there are usually large networks. On the supply side, networks bring benefits to owners or suppliers of these services (through increases in load factor or traffic density) as it lowers the cost of transportation. In rail and pipelines, networks are typically vertically integrated providing the network a larger flow of traffic to the end destination. For example, in the CPKC merger, CP was able to carry large amounts of traffic to Mexico after the merger lowering its cost rather than having to switch the traffic to another carrier in the US for carriage to Mexico. In air, water and road where hub and spoke networks are more common, it enables higher load factor on any route and throughout the network.

On the demand side, the users of the network also benefits from better services and lower prices if the lower costs are transmitted to the user and through the possibility of more users desiring to join the network in some network industries which could lead to even further lower prices. In addition, the pace of market penetration or expansion is much faster in network industries than in non-network industries. These networks effects (resulting from suppliers and demanders) can create significant barriers to entry for a new entrant, especially if a minimum quantity of services are needed for it to survive, making it challenging for it to gain a toehold in the market. It is not surprising that phrases such as ‘winner-takes-all’ or ‘winner-takes-most’ has been used in the economics on the subject together with an expectation of market dominance and small number of competitors if any. The evidence of network economies can be seen in the increase in the networks of rail, air, road, water and pipeline transportation companies in Canada together with an increase in alliances in water, code sharing and interlining agreements in air, etc.

Pecuniary economies: Pecuniary economies of large scale advertising or sales for network transportation companies in all modes can be expected. As the company grows larger, it can afford to increase its expenditure on marketing and advertising to boost the sales of its products or services. In addition, the larger firm can also negotiate better rates for advertising in various media due to their size. However, in general, the existence of pecuniary economies, in various transportation modes if any, are not considered to be so significant that the barriers to entry are insurmountable barriers.

Before concluding this section it should be emphasized that there are also strategic barriers to entry besides the structural barriers to entry examined above.

Strategic Barriers to Entry

Strategy or behaviour by incumbent carriers can create barriers to deter entry by a potential competitor. There are various types of anti-competitive behaviour (predatory pricing; limit pricing; intentional over-investment in capacity and sunk costs; product differentiation and advertising; fidelity rebates and bundled rebates; tying devices – loyalty points; exclusive dealing arrangements; patent hoarding; and agreements with other providers of service or infrastructure in the supply chain) that can deter entry, some are typically used by certain types of transportation networks

Anti-competitive behaviour:

In rail, the use anti-competitive behaviour as a strategic behaviour is more masked. Prior to deregulation, the two major railways in Canada were allowed to collude on rates. After deregulation to introduce efficiency, provisions were introduced to deal with rationalization. The railways attempted to de-marketing its lines to rationalize its rail tracks so as to discourage new entrants. So the government introduced legislation to deal with lines that the railways planned to abandon. To deal with competition, a number of competitive provisions were introduced (eg. confidential contracting, interswitching, competitive line rates (CLR), running rights (RR), and final offer arbitration). The railways have been accused of attempting to nullify the competitive provisions that were introduced in the legislation, namely the interswitching or extended interswitching provisions, the CLR provision and the RR provision. There are examples of use of this strategic behaviour: the refusal to grant RR to the fledgling rail company Ferrocarril Railway Co. by CN;^{cxvii} the conditions imposed on CN in the BC Rail purchase;^{cxviii} the post new millennium history on failure to be able to use the competitive provisions and regulatory attempts to make them workable, etc.

In air, predatory behaviour is not a new anti-competitive strategic barrier to entry. “In the *Policy Framework for Airline Restructuring* presented to the Committee, the Minister of Transport identified predatory behaviour as a concern to be addressed within the context of fostering competition. In particular, the Policy Framework notes that “small and new entrant carriers are potentially vulnerable to excessively aggressive competitive attacks from a larger, established airline. ... The Committee believes that predatory behaviour is a barrier to entry that must be explored, and urges the government to examine the manner in which such behaviour is defined and controlled in other countries. Allowing a dominant carrier to engage in predatory behaviour would greatly inhibit competition in the airline industry, with negative repercussions for the industry and for consumers, airline employees and communities across Canada.”^{cxix} There are various types of predatory behaviour: low fares to harm competitors, excessive expansion of capacity, the matching of routes, selling below variable costs, modifying frequent flyer programs and restricting access (slots, facilities, etc.), pre-emptive behaviour to prevent entry, setting up and use of a subsidiary as low cost carrier, etc. Exactly specifying predatory behaviour is somewhat illusive as it keeps changing over time. There are various examples of predatory behaviour: in 2001 CanJet accused Air Canada of new round of airfare cuts in Canjet’s territory in eastern Canada;^{cc} in 2012, the Competition Bureau obtained a consent agreement against strategic Alliance between Air Canada and United-Continental Holdings; in 2023, Air Canada and WestJet were accused of anti-competitive behaviour and possible collusion (market division and allocation of markets by withdrawing services) and the Greater Saskatoon Chamber of Commerce called for an investigation; in 2024, Flair warns that Ottawa must react to predatory behaviour of incumbents (Swoops creation by WestJet to quell competition from Flair);^{cci} and in 2024, the Competition Bureau exercised its new powers and obtained court orders requiring Air Canada and WestJet to hand over information for the watchdog’s market study into airline competition. While these point to overt types of behaviour, covert types of behaviour exist which sets up new barriers to entry even more difficult. Examples of this abound – loyalty schemes, maintaining excess capacity where entry is likely, control over slots, etc.

In road, since the industry is fragmented and competitive, significant entry barriers do not exist. This does not mean that road carriers are not involved in any anti-competitive acts. Past records indicates a

few convictions of price collusion, bid-rigging and anti-competitive clauses in waste management companies^{ccii} and dissolution of a merger designed to prevent a new entrant.^{cciii} While the largest trucking companies have been engaged in a fair amount of merger activity in the last ten years it does not appear to have been done to deter entry.

In water, anti-competitive behaviour such as rate fixing, fidelity rebates, exclusive dealing arrangements, tying, denying use of port or other facilities and predatory pricing through the use of fighting ships led to the shipping conferences shipping exemption from the competition laws. Some of these activities still receive an exemption from the competition laws but new types of agreements – discussion agreements, co-operative agreements, co-consortia, joint ventures, alliances – between shipping lines have become more prominent. There are also agreements with ports, marine terminal operators and other inland carriers. These agreements make it difficult for a new shipping line to enter or for an existing shipping line to provide service on any new route. If these agreements are long term, it could act as a more strategic barrier to entry.

In pipelines, there have been occasional instances that have raised concerns about competition. On July 27, 2022, the Competition Bureau registered a consent agreement with the Competition Tribunal regarding a joint venture between Pembina Pipeline Corporation and KKR's Global Infrastructure Funds.^{cciv} Its earlier acquisitions (Veresen; Kinder Morgan Canada Ltd.; and Enbridge) were cleared by the Competition Bureau.

In sum, we believe that there are barriers to entry in network transportation industries that range from high to medium to low depending on the mode and the specifics of each situation and whether **sunk** costs play an important role. As a result, network effects have resulted in a market structure dominated by a few firms where bigger is better, in some modes of transportation.^{ccv} It should also be noted that strategic entry barriers (ranging from all types of collusion to anti-competitive practices) have played an important role in erecting barriers to entry which anti-trust authorities have attempted to address from time to time. The two types of barriers can also interact and should not be considered in isolation.

E. Concluding Remarks

In this part we have examined: How are barriers to entry defined? How are barriers to entry treated under Competition laws in Canada, USA, EU, Australia and New Zealand?; Are there Barriers to entry in Canadian Transport Industries - A review of a Few Studies?; and Are Canadian Transportation Networks Barriers to Entry and Competition? The term 'barriers to entry' is extensively treated in the guidelines for dominance and merger provisions and occasionally the term may be used in the law itself, even though there is lack of agreement on the definition of barriers to entry in the economic literature. We examined a few studies on each transportation mode on barriers to entry in Canada. These studies confirm the importance of existence of barriers to entry in certain modes. The Canadian network transportation industries are then examined under structural barriers and strategic barriers. The barriers range from high to medium to low depending on the mode and the specifics of each situation. These networks require large fixed costs resulting in economies of scale and scope and are often described as natural monopolies. Usually, these networks require the use of scarce resources, large capital investments, investments that are sunk, together with political and regulatory approval. These characteristics result in economies of scale, network economies and pecuniary economies. Since networks have their own characteristics, product differentiation advantages associated with networks create additional barriers. This all raises entry barriers making entry of a new firm difficult if not impossible. As a result, networks have resulted in a market structure dominated by one or two firms where bigger is better, in some modes of transportation.

The evolution in many network transportation industries provides testimony to this. In Canada, the railways have evolved into two Class I carriers and the airlines into two dominant carriers. In US, the

railways have evolved into four Class I carriers—Union Pacific, BNSF, CSX and NS from 33 Class I railways in 1980,^{ccvi} and the airlines’ have evolved into three legacy network carriers—American Airlines, Delta Air Lines, and United Airlines from 11 trunk carriers in 1978. In ocean transportation, the world shipping industry has evolved into a few major alliances. Concern about competition and the structure of transportation networks has led President Joe Biden to sign an Executive Order entitled “Promoting Competition in the American Economy” on July 9, 2021. “The Order identified multiple modes of transportation—air travel, rail and shipping—as being dominated by large corporations. As a result, the administration said in the Fact Sheet accompanying the Order that this environment has led to the reduction of competition, higher prices and additional fees.”^{ccvii} The Order also calls on the federal government’s two antitrust agencies, the Federal Trade Commission and the Department of Justice Antitrust Division, to adopt a number of changes to antitrust policy and enforcement.

Part IV - How are Networks in Transportation Treated under laws in Canada and other Jurisdictions?

A. Under the Competition Act in Canada

In Canada, networks or network effects until recently were not specifically mentioned in any provision of the *Competition Act*. The recognition that networks can create barriers to entry or have an effect on barriers to entry is an important step forward in recognizing it as a source of market power. They could raise concern if they result in anti-competitive acts leading to collusion, the abuse of dominance, predatory behaviour, and misleading advertising together with mergers that increase market power. The fact that many of these network industries fall under other laws in Canada and may be subject to the regulated conduct defence has led to advocacy as an important forum for addressing the barriers to competition they create.

Collusion: Collusive behaviour is facilitated in networks that are horizontal since there are typically fewer competitors than in non-network industries. In addition, it is easier to achieve and enforce collusive behaviour by competitors in such industries than in non-network industries. The likelihood that ‘tacit collusion’ occurs is a major concern in industries characterized by few competitors. In June 2022, amendments were made to the *Competition Act*.^{ccviii} For agreements or arrangements, the factors have been updated in s.90.1(2) to include: network effects within the market; etc. that the Competition Tribunal may have regard to in determining if it prevents or lessens, has prevented or lessened or is likely to prevent or lessen competition substantially in a market.

Abuse of Dominance: Network effects result in a market structure dominated by a few firms where bigger is better. It creates barriers to entry which tend to insulate an existing network from competition thereby enhancing its market power. Since costs of building a network in transportation are generally sunk, it enhances the barrier to entry. This makes market penetration by a new entrant much slower than would occur in non-network industries. These entry barriers increase the likely duration and the value of market power or monopoly power. It thus increases the incentive and the likelihood that the dominant carrier will engage in anti-competitive acts to maintain its dominance or for a new carrier to attempt to obtain its market power. The anti-competitive acts (s. 78) can range from: denying access, tying, entering exclusive agreements, refusing to supply, etc. In 2022, the factors that the Competition Tribunal may consider that have the effect of preventing or lessening competition substantially in a market have been updated in s.79(4) to include: the effect of the conduct on barriers to entry in the market, including network effects; etc. in assessing abuse of a dominant position.^{ccix} Recently (December 2023), the *Competition Act* was amended to deal with these matters in three important ways: providing for the initiation of a market study; extending the list of anti-competitive acts by adding the practice of “directly or indirectly imposing excessive and unfair selling prices”; and lowering the test (anti-competitive intent or effect requirement and not both as previously required) that the Competition Tribunal would need before it can make a prohibition order against a dominant firm.

From a transportation perspective, the Competition Bureau played a significant role in the restructuring of the Canadian Airlines in late 1999 and to the amendments in both the Competition Act in 2000 and the Canada Transportation Act in 2000. The amendments introduced cease and desist powers that would allow the Commissioner of Competition to order an airline to cease behaviour that the Commissioner believes likely to cause harm to either competition or a competitor that could not be remedied by the Competition Tribunal. It also added anticompetitive acts specific to the airline industry in the Competition Act (denial of essential facilities – regulations further describe them). In addition, it amended a section (s.78) dealing with abuse of dominance giving the Governor-in-Council the power to specify additional airline specific anticompetitive acts that would apply to s.79 of the *Competition Act*.

Predatory Behaviour: Predatory behaviour and predatory strategies are more likely in industries where the future payoff of such behaviour is greater. Since, in network industries, the winner takes the most, behaviour such as price discrimination or selling below costs to drive out a new entrant are more likely than in non-network industries. Further, the likelihood of success of such a strategy is higher for an established network firm given entry barriers faced by a new or potential entrant. In 2009, the former criminal predatory pricing provision was repealed and predatory pricing could only be challenged by the Competition Bureau under section 79 of the Competition Act (abuse of dominance). The WestJet/Swoop and Flair investigation over predatory pricing by Swoop (which was discontinued) is a good example.

Misleading Advertising: In the June 2022, amendments to the *Competition Act* expressly recognized a harmful business practice by airline companies known as ‘drip pricing’ - where a headline price is advertised followed by successive additional charges (s.74.1(1.1)). The objective of drip pricing is to gain a consumer's interest in a misleadingly low headline price without the true final price being disclosed until the consumer has invested time and effort in the purchase process and made a decision to purchase. In Europe, this practice on air fares is banned and in the US, laws against it (known as junk fees) are expected in the near future. A similar practice under ‘demurrage charges’ and ‘detention charges’ led to amendments in the US to the shipping law - *Ocean Shipping Reform Act of 2022*.

Mergers: Vertical mergers in network industries have attracted a great deal of attention, especially among railways. Concerns about leveraging of market power from one network to another have been raised, but Chicago economists have claimed that the leveraging theory does not apply to a bottleneck monopolist. Econometric tests and other economists do not support their view.^{ccx} Further, the effect of integration on connected vertical networks is neglected. The above has important implications for antitrust enforcement as it increases the incentives for network industries to obtain or maintain market power or to engage in anti-competitive behaviour leading to such power. It also alerts antitrust enforcers and courts to certain types of antitrust strategies and point to certain characteristics of the market. Vertical mergers under the Canadian Merger Enforcement Guidelines only raise concerns in a few circumstances for example, if it increases barriers to entry (eg. foreclosure); and if it facilitates interdependence and coordinated behaviour so that it prevents or lessens competition substantially.

The 2000 amendments transfer from the Commissioner of Competition the final power to approve or disallow a merger involving air transport. However, the Commissioner will report to the Minister of Transport any concern the Commissioner has with the transaction. The Minister then makes recommendation to the G-I-C who ultimately decides whether or not the transaction is approved. In the 2022 amendments, network effects are mentioned in the factors that the Competition Tribunal may consider that prevents or lessens, or is likely to prevent or lessen, competition substantially in s.93 (g.1) in assessing mergers or proposed mergers. It is updated to include: network effects within the market; etc. Recently, the 2023 amendments to the *Competition Act* have removed the ‘efficiency defence’ from the merger provision which prevented the Competition Tribunal from making an order unless the parties could demonstrate that efficiency gains outweighed the merger’s anti-competitive effects.

Advocacy: Advocacy through regulatory interventions has played an important tool for promoting competition since it was introduced in the Competition Act in 1976. It empowers the Commissioner to make representation and call evidence before any federal board, commission or other tribunal on the maintenance of competition whenever such representations are relevant to a matter before the federal board that carries on regulatory activities and to the factors that it is entitled to take into consideration in determining the matter. He/she may also make representation at the request of the federal board or when he/she is directed by the Minister of Industry. Amendments to this section also enable the making of representation at the request or with the consent of any provincial boards together with deletion of the term ‘maintenance’ (ss.125-126). Many interventions were made since the advocacy provisions were introduced in 1976. These interventions typically emphasis the structural characteristics of the industry, the barriers to entry, the removal of regulatory barriers to entry and how permitting entry of a competitor will enhance competition.

Antitrust Strategies and Characteristics: The types of antitrust strategies of network industries that have attracted attention are: denying access to new entrants and rivals; merging with vertical networks to exclude competitors; foreclosing entry by tying or through exclusionary agreement or through control of access to standards; and drip pricing.^{ccxi}

Jurisprudence: Courts in Canada have dealt with denial of access to essential facilities under preemption of scarce facilities or resources in section 79 (abuse of dominance provision). It is closely related to the essential facilities doctrine in US jurisprudence.^{ccxii} A few noteworthy cases that dealt with this issue are: *A.C. Nielsen* (a sole supplier in Canada of sales reports), *Gemini* (control of the computer reservation systems by the merger of the two dominant air carriers), and *Interac* (control of the supply of shared electronic network services for consumer-initiated shared electronic financial services). In these cases, access issues were generally resolved through measures which change the incentives facing the parties, or by ensuring adequate access without price regulation.^{ccxiii}

Cases involving other sections of the Act were: the international air cargo services where the Competition Bureau fined nine international carriers^{ccxiv} over \$25 million for fixing fuel and other surcharges from 2002 to 2006; the merger and strategic Alliance between Air Canada and United-Continental Holdings. The Bureau concluded that the joint venture would lead to a monopoly on ten trans-border routes, and substantially reduce competition on nine others and filed an application with the Competition Tribunal. In October 2012, a Consent Agreement was reached, pursuant to which the parties are prohibited from implementing their joint venture agreement, or coordinating pursuant to their prior agreements, with respect to 14 high demand trans border routes. In 2017, the Bureau conducted investigations into three matters: a codeshare agreement between First Air and Canadian North, a merger between First Air and Calm Air, and allegations of predatory pricing against First Air and Canadian North. The Bureau closed its investigation given the termination of the code sharing agreement and the lack of evidence about the merger and predatory pricing to challenge the airlines’ actions.^{ccxv} In 2020-21, the proposed purchase of Air Transat by Air Canada was approved by the Minister of Transport after the government concluded that the purchase was in the interest of the public interest despite the Commissioner of Competition’s concern (the purchase was ultimately not made because Air Canada withdrew its offer).^{ccxvi} In 2022-23, the acquisition of Sunwing Airlines by WestJet was approved by the Minister of Transport "subject to strict terms and conditions that are in the interest of Canadians," after the government concluded that the purchase was in the interest of the public interest despite the Commissioner of Competition’s concern.^{ccxvii}

Recently, attention has shifted to ‘drip pricing’ when the Canadian *Competition Tribunal* in 2024 ordered Cineplex to pay a record penalty of nearly \$39 million for drip pricing (which is being appealed); and in the US when ocean shipping lines Hapag-Lloyd and Ocean Network Express were fined for detention and demurrage fees and the latter was required to refund or waive the contested detention and demurrage fees

to the shippers involved in the case. In addition, to the above, regulatory interventions have played a very important role in promoting competition together with introducing amendments that have been made to regulatory laws.

In sum, until the 2022 amendments, networks were not specially referred to in any provision of the *Competition Act* though anti-competitive practices that may arise in such industries raise greater concern in light of the structural characteristics of these industries. However, a great deal of care should be exercised in drawing any conclusions from their market structure. Attempts to increase competition have emphasized access within the existing structure rather than creating competition with new competitive networks. Professor Economides concludes his research on competition policy in network industries by noting that ...the legal system does not yet have a framework for analysis of competition policy issues in network industries. ... economic theory of networks is so inadequate and unsettled that there is no commonly accepted body of knowledge on market structure with network externalities, based on which one could evaluate deviations toward anti-competitive behaviour.^{ccxviii} Emphasis at the present has shifted to strategic entry barriers which was highlighted in ocean shipping and in airlines network industries. It should also be mentioned that these network industries are usually regulated industries which often contain competitive provisions (such as full price disclosure in the airline industry, and running rights, competitive line rates, interswitching, final offer arbitration in the railway industry) that may be subject to the regulated conduct defence.

B. Under Other Transportation Acts in Canada

Besides the *Competition Act*, transport networks are also dealt with under transportation acts. We restrict the treatment of networks to the major Canadian transportation laws at the present time, the *Canada Transportation Act* (CTA), the *Motor Vehicle Transport Act* (MVTA), the *Shipping Conference Exemption Act* (SCEA), and the *Canadian Energy Regulator Act* (CERA), unless specifically mentioned. Since the CTA law is basically concerned with rail and air transportation, it shall be examined separately. The Table hereafter provides a brief history of each mode and the barriers to competition.

	CTA		MVTA	SCEA	CERA
	Rail	Air	Road	Water	Pipelines
History	Railways have a long history of regulation in Canada. ^{ccxx} The word 'network' has not explicitly found its way into Canadian laws dealing with railways. However, it can be held that it is implied in the word transportation 'system' which can be conceptualized as the set of relationships between nodes, networks, and demand. ^{ccxx} The Canadian government recognized the network characteristics of the railways. This was recognized as early as 1888 in the running rights provisions, then in the 1902 interswitching provisions and more recently in the national transport policy, rail rationalization provisions, etc. which finally found its way in the <i>Canada Transportation Act, 1996</i> . Under its predecessor (National Transportation Act, 1967), the Canada Transportation Agency was set up in 1967. The Canadian Transportation Agency (CTA) is an independent, quasi-judicial tribunal and economic regulator. It makes decisions and determinations on a wide range of matters involving air, rail and marine modes of transportation under the authority of Parliament, as set out in the <i>Canada Transportation Act</i> and other legislation. Regulations in rail (freight and passenger) both	Air transportation economic regulation began with the passage of the <i>Trans Canada Airlines Act</i> in 1937 which provided for the creation and preservation of a virtual monopoly for Trans Canada Airlines (now Air Canada) in domestic and transcontinental areas, though regulation began much earlier under the <i>Air Board Act</i> of 1919. From then onwards to the mid 1980s, economic regulation increased and was basically governed by the <i>Aeronautics Act</i> , the <i>Air Carrier Regulations</i> and the <i>National Transportation Act</i> of 1967. The Canadian government recognized the network characteristics of the airline industry through market division and route allocation. It was only in 1948 that Canadian Pacific Air Lines was permitted to carry the Canadian flag in the Pacific though it was formed in 1942 (formerly United Air Services Limited formed in 1941 from an amalgamation of 11 aircraft operations). Competition between air services over the same route was not permitted. The regional carrier policy restricted regional carriers to Northern Canada and were to operate regional domestic routes and supplement the domestic mainline operations of the two mainline carriers. It was only in 1960 that	Highway transport in the early 1920s was regulated by the Provinces. Since 1954, jurisdiction over highway transport was divided between the federal and provincial governments as a result of a case brought before the Supreme Court which gave responsibility for extra-provincial highway transport to the federal government. However, regulatory control over highway transport continued to be exercised by the Provinces as Federal economic regulatory responsibilities for extra-provincial commercial highway traffic, have been delegated to the provinces since the passage of the <i>Motor Vehicle Transport Act</i> in 1954. ^{ccxxi} Before regulatory reforms were introduced in 1987, economic regulation of highway transport was extensive. Economic regulation of highway passenger and traffic carriers covered: 1) Entry-Exit and Transfer Control; 2) Rate regulation; 3) Rate filing; and 4) Authority restrictions (i.e., restrictions on goods that can be carried, origin and destination and	Ocean transportation in Canada goes back to more than a century. Shipping conferences (a group of two or more ships which provides international liner services through an agreement or agreements for the carriage of cargo on a particular route or routes) provided transportation of most goods from Canadian ports to other parts of the world, though occasionally an independent carrier provided service. It thus provided for a network ^{ccxxii} of services between different parts of the globe. Despite complaints about the unfair practices of shipping conference in the 1920, no specific laws were passed. It was not until 1970 that the first law was passed, the <i>Shipping Conferences Exemption Act</i> . The Act was based on the recommendations of the Restrictive Trade Practices Commission. Hearings before the Commission were held as a result an investigation	Pipeline transportation in Canada is relatively new compared to the more conventional forms of transportation. Pipeline transportation accounts for a substantial portion of all freight ton-miles by various transport modes and pipelines are used to transport: crude oil; other oil products and natural gas. ^{ccxxiii} Pipeline transportation of crude oil can be traced to the 1940s to the early 1950s. The first three major crude oil trunklines were the Interprovincial Pipe Line (IPL), the Transmountain Pipeline, and the Montreal-Portland. Pipeline transportation of natural gas began at a much later date in Western Canada, the mid 1950s. The first three pipelines in the natural gas industry were: the Trans-Canada Pipeline (TCPL), the Westcoast Transmission Line (WTL), and the Alberta Gas Trunk Line (AGTL). Both the transmission and marketing of natural gas were regulated from 'end to end', there was no free market. By the mid 1980s, the major facets of economic regulation were: 1. the price of natural gas at the initial point of delivery to the pipeline transporter was set by the National Gas Pricing Agreement of 1975; 2. the tolls for

	federal and provincial are extensive ranging from entry, competition, level of service to safety. The Act as it pertains to barriers to entry and competition will be described.	Mr. S. Wheatcroft was commissioned by the Minister of Transport George Hees to study the notion of competition in airline services as the Minister was of the opinion that the time had come for the introduction of some measure of competition on the transcontinental routes. But it was not until May 1984 that the Minister of Transport Lloyd Axworthy announced a New Canadian Air Policy with competition as the heart of it. The period of deregulation that followed not only brought about a change in the structure of the industry but led to the concept of 'hub and spoke' replacing the well defined role of national, regional and local carriers with a structure involving 'networks' and 'alliances'. A period of intense competition among the two transcontinental carriers and their family of carriers formed from a series of acquisition, mergers and alliances led to bankruptcies and the present structure of two main network carriers in Canada: Air Canada and Westjet. The Act as it pertains to barriers to entry and competition will be described.	routes, etc.). This Act is divided into three parts: Part I allows each province to licence extra-provincial <u>bus</u> undertakings; Part II of the Act allows each province to licence <u>extra-provincial operations</u> of extra-provincial <u>truck</u> undertakings; and Part III allows each province to licence <u>extra-provincial truck undertakings</u> involved in <u>intra-provincial operations</u>. Highway transport in Canada includes private trucking, for-hire trucking, courier services, and busing (i.e., urban transport, intercity busing, and school buses). The network characteristics of highway transportation was recognized by the fact that these licenses were not just from origin to destination but the exact route the carrier proposed to take. It was not until February 27, 1985 that the Council of Transportation of Ministers signed a Memorandum of Understanding proposing changes related to entry, elimination of rates, exemption of commodities from economic regulation and streamlining the application process. General principles underlying regulatory reform of transport were later embodied in Bill C-127 (<i>An Act Respecting Motor Vehicle Transport by Extra-Provincial Undertakings</i>) and Bill C-126 (<i>An Act Respecting National Transportation</i>). The Act as it pertains to barriers to entry and competition will be described.	and charges by the Director of Investigation and Research of the <i>Combines Investigation Act</i> that the Eastern Canada-United Kingdom Shipping Conference refused to release a shipper from its exclusive patronage contract. The Act granted an exemption for shipping conference agreements from the <i>Combines Investigation Act</i>. The philosophy behind the exemption was the public interest would not be served by excessive rate competition and instability in the liner trade. The Act was amended in 1979, 1987 and 2001 to strengthen the bargaining position of shippers and to reduce the scope of the exemption by introducing competitive clauses. The Act as it pertains to barriers to entry and competition will be described.	transportation service were regulated and set by the National Energy Board (NEB); and, 3. the resale price to the distributors by the pipeline transporter was regulated by the setting of 'city gate' prices. Even after deregulation in 1985, interprovincial and international pipeline construction continued to be under NEB jurisdiction. In addition, interprovincial and international pipeline costs continued to require approval by the NEB and local distribution costs continued to be regulated by provincial boards/commissions/directly by a provincial government. In regulating pipeline rates, the prov. authorities and the NEB must ensure that rates are just and reasonable.^{ccxiv} Since tolls continue to account for a large percentage of delivered price, the cost of transportation or transportation tolls continues to attract great attention. Intra provincial regulations also exist besides federal economic regulations indicated above. In BC, Alberta, Saskatchewan, Manitoba and Ontario which have most of the pipelines: entry (i.e., intraprovincial construction of pipelines), approval of sale, tariff filing and tariff approval (for common carriers) requirements have to be met. The requirements for starting a pipeline are time consuming. In 2019, <i>Canadian Energy Regulator Act</i> was passed replacing the <i>National Energy Board Act</i>. The purpose of this Act is to regulate certain energy matters within Parliament's jurisdiction. Its purpose as it relates to pipeline transmission is: to ensure that pipelines and power lines as well as facilities, equipment or systems related to offshore renewable energy projects, are constructed, operated and abandoned in a manner that is safe, secure and efficient and that protects people, property and the environment; and to ensure that regulatory hearings and decision-making processes related to those energy matters are fair, inclusive, transparent and efficient. The important sections as it relates to barriers to entry and competition are indicated.
Entry	Before a business can operate a railway in Canada it needs an operating authority - federal for a interprovincial rail carrier or provincial for a intraprovincial rail carrier. Regulations also control the construction of new tracks. The entry condition into the rail network business has been discussed extensively in the rail industry not so much because of this regulatory barrier but because of the entry barrier of sunk costs that characterize this industry.	Before a business can operate an airline in Canada it needs a license. To obtain a license the applicant must be a Canadian, hold a Canadian aviation document (usually air operator certificate), hold the prescribed liability insurance coverage for the service and meet the prescribed financial requirements. Entry is no longer based on the standards of public convenience and necessity but an applicant must be 'fit, willing and able', further those licenses can no longer be restricted. The requirement that an applicant be a Canadian has been considered a barrier to entry of a person or corporation that is non-Canadian as it constrains ownership to 49 percent. The Competition Bureau has advocated that this ownership requirement should be dropped so that foreign ownership could be 100 percent, as permitted in	Before a business can operate a trucking company in Canada it needs a license. To obtain a license, the 'public convenience and necessity test' is replaced by a 'fitness' entry test and a 'reverse onus' public interest test. Ownership requirements were removed in 2004 as a result of NAFTA.	Regulation of entry into a conference is controlled by the conference together with expulsion from it. Entry into was closed.	The Canadian Energy Regulatory (CER) is empowered to oversee the construction, operation and abandonment of pipelines, as well as abandoned facilities (s. 11(b)). The CER assesses applications for pipeline projects to determine whether the project is in the Canadian public interest. Under section 179(1), a person, other than a company, must not construct, operate or abandon a pipeline. It needs a construction and operation certificate (s. 198 (a) and s.180(1)(a)) and conditions are attached to it. After an application for such a certificate (Public Convenience and Necessity), a report is made after considering a list of factors (12) and a recommendation is made subject to purview of the Governor-in-Council. There is also an environmental test under the Impact Assessment Act.^{ccxv}

		Australia and New Zealand.			
Competition Collusion	To deal with concerns of collusion after 1987, the railways: right to discuss and set rates collectively were abolished; and serving competing points are no longer required to consent to agreed charges between these points before they are established. Before 1987, regulation permitted: the collaboration by the railways to establish common rates and to exchange cost information with an exemption from the provisions of the <i>Combines Investigation Act</i> (now the <i>Competition Act</i>) (s. 279 RA); and agreed charges to meet intermodal competition for most or all of a shipper's traffic.			Agreements covering agreed tariffs, patronage contracts, dual rates, allocation or ports, times of sailing or kinds of service; sharing of profits or losses were granted an exemption.	
Dominance	To deal with concerns of dominance resulting from monopoly power and captive shippers there are three important provisions: interswitching, extended interswitching and competitive line rates. The last two were introduced in the <i>National Transportation Act, 1987</i> together with other competitive provisions such as confidential contracting and encouraging the formation of short lines and regional lines. To make these provisions more effective, in 1987 the interswitching limits were extended (to 30 km from 6.4km). Further, in 1996, the public interest test attached to these provisions were removed but a substantial harm test was added. Furthermore, in 2007, this test was removed from these provisions. In 2014, the interswitching limits were extended (to 160km) for three provinces (Alberta, Saskatchewan and Manitoba) with a sunset clause which was being considered for extension in 2023. There is also the interswitching regulations under the jurisdiction of the Canadian Transportation Agency which determine the effectiveness of interswitching as a source of competition as the Agency determines the cost of interswitching a rail car and the rate that applies for rail cars in different blocks (eg. 1-30 cars, 40-60 cars, etc) together with other matters. In 2016, Bill C-49 introduced the Long-haul Interswitching provision to replace the competitive line rate provision but comments indicate that it is more restrictive than the previous provision and to date it has never been used. To deal with dominance and captive shippers, the Act also contains a running rights provision with a substantial harm test which was also specifically extended to grain shipping to protect grain shippers in the event a railway breaches its level of service obligations. A provision was added in 1996 indicating that nothing in or done under the authority of the Act affects the operation of the <i>Competition Act</i>	Regarding domestic air services, the CTA has increased powers to review prices and prevent gouging on monopoly routes together with restored powers to deal with conditions of carriage for domestic service. In addition an Air Travel Complaints Commissioner is to review and resolve complaints. To ensure fair competition in air pricing, tariffs for domestic air service have to be made public (s. 67). Further the tariff has to be adhered to. Further, the holder of a domestic licence shall not advertise or apply any term or condition of carriage that is suspended or has been disallowed. Furthermore, the Agency shall make regulations respecting advertising in all media, including on the Internet, of prices for air services s. 86.1. It requires a carrier who advertises a price for an air service to include in the price all costs to the carrier of providing the service and to indicate in the advertisement all fees, charges and taxes collected by the carrier on behalf of another person in respect of the service, so as to enable a purchaser of the service to readily determine the total amount to be paid for the service. There are also provisions applicable to unreasonable fares or rates, and unreasonable or unduly discriminatory terms or conditions. On December 12, 2012, the Canadian Transportation Agency developed regulations under the <i>Air Transportation Regulations</i>. The key features of the regulation were: 1. air carriers will be required to include all fees, charges and taxes in their advertised prices for air services or full price disclosure; and 2. air carriers could face fines up to \$25,000. The regulations support two key objectives: 1. to enable consumers to easily determine the total advertised air price; and 2. to promote fair competition between all advertisers in the air travel industry.^{CCXXIV} Regarding international air services, such services are governed by bilateral agreements and occasionally by multilateral agreements. Where there is conflict between an international agreement or convention to which Canada is a party and the <i>Competition Act</i>, the former shall prevail. International air transportation liberalization with other countries began in 1995 with the Canada-United States Open	On December 31, 1992, rate regulation was discontinued; and restrictions on existing licences expired on January 1, 1993, for example extra-provincial licences were not limited to specific commodities or specific routes to permit greater competition. The revised <i>Motor Vehicle Transport Act, 1987</i> (i.e., MVTA) left regulation of intra-provincial operations by extra-provincial truck undertakings (Part III of the MVTA) and regulation of busing (Part I) unchanged. At the provincial level, provinces also began to introduce regulatory reforms for intra-provincial carriers. The last vestiges of provincial economic regulation of intraprovincial trucking expired on January 1, 2000. Trucking is no longer subject to entry or tariff filling or tariff regulation in any part of Canada. Intra provincial regulation of passenger regulation buses continued and entry regulation into the taxi was dealt with at a much later date in most cities.^{CCXXVII}	To protect competition the exemption was lost if the conference: agreed to use a non-conference vessel for preventing or lessening unduly competition (i.e. the use of fighting ships against independents or non-conference vessels); the refusal to transport goods by a shipper for use of a non-conference vessel; and the prevention or limitation in the use of port or other facilities by a non-conference ocean carrier. To improve the bargaining position of shippers vis-à-vis the conferences, in 1979 members of a shipping conference were obliged to meet with a shipper group when requested in writing and to provide information sufficient for the satisfactory conduct of the meeting. The exemption was also lost if the conference engages in predatory pricing as a result of the 1987 amendments. The amendments also introduced other competitive provisions: restriction of the exemption to only conferences (i.e. it excludes agreements between conferences and between conferences and independents); restriction of the exemption to loyalty contracts that do not cover 'all' cargo; restriction of the exemption to only ocean rates (i.e. it does not cover multimodal rates eg. with railways or trucking). It also required provision for service contracts and independent action on rates. In 2001, the <i>Shipping Conferences Exemption Act 1987</i> was amended providing for: a reduction of notice period required for independent action on tariffs to five days from fifteen days; a provision for mandatory individual service contracts; a provision for filing documents electronically; and a deletion of the requirement to file tariffs	The regulator is also empowered to make orders with respect to traffic, tolls and tariffs and overseeing matters relating to traffic, tolls and tariffs (s.11(c)) and under section 226, the Commission may make orders with respect to all matters relating to traffic, tolls or tariffs. Part III (ss. 225-240) deals with it in detail. Tariffs have to be filed (s.227) and only tolls in the approved tariffs can be charged (s.229). Toll must be just and reasonable and should not be discriminatory (s.230). Provision also exists for interim tolls (s.232). The Commission may disallow or suspend a tariff (ss. 233-234). According to section 235, a company must not make any unjust discrimination in tolls, service or facilities against any person or locality and the burden of proving it rests on the company (s. 236). Further, under s. 237(1) there is a penalty if a company or shipper, or an officer, employee or agent or mandatory of a company or shipper, is guilty of an offence punishable on summary conviction if they: (a) offer, grant, give, solicit, accept or receive a rebate, concession or discrimination that allows a person to obtain transmission of hydrocarbons or any other commodity by a company at a rate less than that named in the tariffs then in effect; or (b) knowingly are party or privy to a false billing, false classification, false report or other device that has the effect set out in paragraph (a).

		Skies Agreement. On May 21, 2001, the Government announced its new multiple designation policy that allows an air carrier to apply to operate international scheduled service to any market regardless of market size. Previously, the policy allowed for designation of multiple carriers only in markets that exceeded 300,000 one way passenger trips. The threshold was removed to encourage competition, innovation and growth in the industry and to provide consumers with increased choice. On November 27, 2006, the government announced its Blue Skies policy for international air transportation.^{ccsom} This policy will create opportunities for travellers, businesses and the air industry and encourage the development of new markets, new services and greater competition promoting connectivity between all Canadian regions and the world. For travellers, this means more choices in terms of destinations, flights and routes. Under the new policy, the focus will be to pursue the negotiation of open skies type agreements when it is in Canada's overall interest. It also extends the international cargo transshipment program to all airports on application.		and individual service contracts.	
<i>Transfers and Rationalization</i>	Before 1987, considering abandonment or rationalization of lines and service and related matters of service was dealt with under section 256 of the Railway Act and reviewing mergers and acquisition of a transport enterprise by another enterprise was dealt with under section 27 of the National Transportation Act 1967. The real impetus to use transfers as a form of entry was due to the Canadian Transportation Act 1996. First, lines must be offered for sale before they are abandoned and governments are offered ample opportunity to acquire such lines when no interested party is found. Second, to provide for rail rationalization along more commercial lines and to make it a less adversarial process and more conducive to the sale or lease to new operators, revisions were made to the old act. Third, the new Act introduces a new statutory requirement for federal railways to issue a three-year network plan. This is intended to protect the public interest by providing an opportunity to interested parties to purchase lines to be discontinued or sold. Amendments were made in 2000 by requiring compensation (transitional) of \$10,000 per mile for three years to affected municipalities or districts when a grain line is closed, operation of the remaining part of the branch line for three years, discouraging de-marketing (i.e., purposefully deferring maintenance to make operations uneconomic) of grain lines by ordering improvement of services and identification of lines for discontinuance in the three year plan.				
<i>Mergers</i>	Mergers in rail (horizontal or vertical) usually attract a great deal of attention not only from rail regulators, antitrust agencies, competitive carriers, shippers but	Where a proposed transaction involving a transportation undertaking is subject to mandatory pre-merger notification under the <i>Competition Act</i>, it must	Mergers and acquisitions are treated under sec 53.1(1) of the <i>Canada Transportation Act</i>. In brief it involves a		The act also regulates sale, transfer and mergers. According to section 181(1), a company must not, unless the Commission has, by order, granted it leave to

	also local politicians. The most recent rail merger between Canadian Pacific in Canada and Kansas City Southern in the US is a good example and so is the CN and British Columbia Railway Company merger in Canada in 2004. It took more than a year for the STB in the US to approve the transaction. The review of Canadian rail mergers in Canada has followed a chequered past: from the Canadian Transport Agency under the NTA to the Competition Bureau under the Competition Act and in June 2007 (Bill C-11) to both (see s. 53.1(1) CTA). In brief it involves a public interest process and a process under the Competition Act. "In particular, where a proposed transaction involving a transportation undertaking is subject to mandatory pre-merger notification under the <i>Competition Act</i>, it must also be notified to the Minister of Transport, who considers whether the proposed transaction raises issues with respect to the public interest as is relates to national transportation. If a public interest review is triggered under the CTA, this process will take the place of the general merger review process under the <i>Competition Act</i>. The Minister of Transport may direct the Agency or another person to examine public interest issues and deliver a report which, along with a report from the Commissioner on competition issues, will inform the Minister of Transport's recommendation to Cabinet regarding whether the proposed transaction should be approved."	also be notified to the Minister of Transport, who considers whether the proposed transaction raises issues with respect to the public interest as is relates to national transportation (s.53.1(1)). The notification has also to be made to the Agency to determine if the air transportation undertaking is Canadian. If a public interest review is triggered under the CTA, this process will take the place of the general merger review process under the <i>Competition Act</i>. The Minister of Transport may direct the Agency or another person to examine public interest issues and deliver a report which, along with a report from the Commissioner on competition issues, will inform the Minister of Transport's recommendation to Cabinet regarding whether the proposed transaction should be approved. Review of arrangements involving two or more transportation undertakings (not covered in s. 53.1(1)) providing air services is stated in s 53.3 of the CTA. The person proposing the arrangement shall have to notify the Minister of Transport and the Commissioner of Competition. If the Minister is of the opinion that the proposed arrangement raises significant considerations with respect to public interest the arrangement is subject to the review process set out in s. 53.73. The Minister shall appoint a person to examine the proposed arrangement. The Commissioner also prepares a report on any concerns regarding potential prevention or lessening of competition. The report is provided to the person proposing the arrangement who has to address any concerns with respect to the public interest and competition concerns raised in the report. A preliminary decision is provided by the Minister and after the applicant addresses any additional concerns a final decision and summary is given by the Minister. The Minister may specify any terms and conditions relating to the public interest and competition that the Minister considers appropriate.	public interest process and a process under the Competition Act. "In particular, where a proposed transaction involving a transportation undertaking is subject to mandatory pre-merger notification under the <i>Competition Act</i>, it must also be notified to the Minister of Transport, who considers whether the proposed transaction raises issues with respect to the public interest as is relates to national transportation. If a public interest review is triggered under the CTA, this process will take the place of the general merger review process under the <i>Competition Act</i>. The Minister of Transport may direct the Agency or another person to examine public interest issues and deliver a report which, along with a report from the Commissioner on competition issues, will inform the Minister of Transport's recommendation to Cabinet regarding whether the proposed transaction should be approved.	do so: sell or otherwise transfer, or lease, in whole or in part, its pipeline or its abandoned pipeline to any person; purchase or otherwise acquire, or lease, in whole or in part, any pipeline or abandoned pipeline from any person; or if it is authorized to construct or operate a pipeline or if it owns an abandoned pipeline, amalgamate with any other company. Recommendations on sale and transfer are also subject to purview by the Governor-in-Council. Before concluding, it is worthwhile noting that intra provincial regulations also exist besides federal economic regulations indicated above. In BC, Alberta, Saskatchewan, Manitoba and Ontario which have most of the pipelines: entry i.e., intraprovincial construction of pipelines, approval of sale, tariff filing and tariff approval (for common carriers) are required.
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In sum, the above sector legislation in transport indicates the regulatory barriers in each transport sector that has to be satisfied to enter and continue operations in these transportation networks. The Canadian government recognized the network characteristics of transport industries for example in the railways through running rights, interswitching and rationalization provisions; in air through its earlier policy of market division and route allocation; in road through the fact that initially licenses were not just from origin to destination but the exact route the carrier proposed to take, etc.

C. Other Jurisdictions – US, EU, Australia and New Zealand

1. United States

In the US, under its antitrust law, network industries are not subject to any special rules. However, anti-competitive conduct involving networks which result in monopolization, attempted monopolization, and conspiracies to monopolize are dealt with under Section 2 of the *Sherman Act*. In addition, anti-competitive conduct can also be dealt with under Section 1 of the *Sherman Act* where it involves concerted action by two or more networks. While the law does not specifically mention network effects it has found its way into the merger enforcement guidelines when networks can affect concentration, limiting access and extending and entrenching a dominant position. Mergers are examined under section

7 of the *Clayton Act* and the pre-merger notification provisions of the 1976 *Hart-Scott Rodino Act*. Regarding mergers, the US has issued Horizontal Merger Guidelines and sectoral specific guidelines e.g., rail mergers. Regarding dominant position in the Guidelines, consideration is given to when a merger will entrench or extend a dominant position and if it raises barriers to entry for example depriving rivals of scale economies or network effects. It states “Scale economies and network effects can serve as a barrier to entry and competition. Depriving rivals of access to scale economies and network effects can therefore entrench a dominant position. If a merger enables a dominant firm to reduce would-be rivals’ access to additional scale or customers by acquiring a product that affects access such as a customer acquisition channel, the merged firm can limit the ability of rivals to improve their own products and compete more effectively [acquisition of network participants]. Limiting access by rivals to customers in the short run can lead to long run entrenchment of a dominant position and tend to create monopoly power.”^{ccxxix} Networks are receiving more and more attention and five jurisdictions have entered into a “Multilateral Mutual Assistance and Cooperation Framework for Competition Authorities”.^{ccxxx}

Under sector legislation, it is worthwhile noting that transport network industries have barriers to entry. In **rail transportation**, a certificate of public convenience and necessity authorizing the construction, acquisition or operation of railroad lines for noncarriers is required from the Surface Transport Board (STB). To introduce competition among railways, in 1980 the US government passed the *Staggers Rail Act of 1980* to abolish collective rate-making; and to require access (where bottleneck control is exerted).^{ccxxxi} Section 49 U.S.C. § 10707 deals with market dominance in rail rate proceedings. To deal with dominance and captive shippers the STB has the authority to set a “reasonable” maximum price for common carriage in case of complaints where there is no economically viable other transportation option. It is also authorized to grant, competitive access and reciprocal switching. Proposed abandonment and discontinuance of rail lines fall under the jurisdiction of the STB. Mergers (‘significant’ or ‘minor’) have to be approved by the STB when it is in the public interest unless there is a significant lessening of competition and the STB may impose conditions on the transaction. ‘Major or Class I’ mergers rarely occur. The Surface Transportation Board has its own guidelines on rail mergers. The new guidelines which govern major rail mergers involving two or more Class Is require applicants to demonstrate that a transaction would *enhance* competition where necessary to offset a merger’s negative effects, and fully address service issues, including the development of a service reliability plan. Post-approval monitoring of merger implementations have been expanded.

In **air transportation**, the industry was deregulated and fixing prices, setting routes, and prohibiting entry by new competitors were phased out. To enter the airline business, an Air Operators Certificate (AOC) is required from the Federal Aviation Authority (FAA) to operate an airline (which include liability insurance, funding, sufficient infrastructure, residency, citizenship, etc.). Regarding domestic services, the provisions relating to competition are stated in its policy statement in sections 49 U.S.C. 40101(a)(4) to (15). The Department of Transport (DOT) retains independent statutory authority under 49 U.S.C. 41712 to prohibit unfair methods of competition in air transportation to further its statutory objectives to prevent predatory or anticompetitive practices and to avoid unreasonable industry concentration (49 U.S.C. 40101). For international air transport, factors to be considered are stated in 49 U.S.C. 40101(e)(1) to (10) by the Secretary of State and Secretary of Transportation together with the strengthening of competition among air carriers operating in the US to prevent unreasonable concentration in the air carrier industry U.S.C. 40101(f). Airline mergers follow three stages (including how it affects competition).

In **road transport**, the *Motor Carriers Act of 1980* began the process of deregulation which was finalized in 1994. Entry into trucking requires an operating authority (which requires safety; fitness; and proof of insurance). Regarding competition, rates (except household goods and "non-contiguous domestic trade zone" traffic) have no longer to be filed. The Interstate Commerce Commission (ICC) will retain jurisdiction over resolving rate disputes involving the applicability or "reasonableness" of a rate. Antitrust immunity for collective rate making is eliminated. Mergers and acquisitions are treated under Transfer of Operating Authority s.365.401 and are approved if the conditions are met (public interest and safety).

In **water transportation**, the Shipping Act of 1984 and its amendments in 1998, 2018 and 2022 regulate the industry. Entry into a conference or alliance is controlled by the conference or alliance. Filed agreements with the FMC are exempted from seven types of acts and vessel operating common carriers and marine terminal operators agreements can also engage in various activities. Competition is maintained through restrictions on the exemptions or prohibited acts. Amendments were introduced to protect marine terminal, tug boat operators and shippers. Mergers fall under the jurisdiction of the Department of Justice.

In **pipeline transportation**, the *Energy Policy Act* and the *Natural Gas Wellhead Decontrol Act* were passed in 1992 and 1989, respectfully, which together with rule making by the FERC (Federal Energy Regulatory Commission) led to deregulation of oil and gas pipelines. Entry and exist approval is not required by oil pipeline transportation whereas it is required for gas pipeline. Competition of rates and charges of oil pipelines is dealt with under sections 1 and 6 of the Interstate Commerce Act (ICA) and those of natural gas is dealt with under section 4 of the *Natural Gas Act* (NGA) to ensure it is just and reasonable, non-discriminatory and filed. Mergers and acquisition of oil companies are not regulated by the FERC but require evaluation in the case of gas pipelines under the under the Federal Power Act to ensure it is consistent with the public interest. Guidelines to deal with barriers to entry exist together with State jurisdiction.

2. EEC

In the EEC, under its competition law transport network industries are subject to Articles 101 (on cartels and agreements that prohibits disruption of free competition) and 102 (on dominance that prohibits abuse) on the *Functioning of the European Union* (TFEU) (formerly Articles 81 and 82 of the *Treaty of Rome*). The Treaty also contains Articles on Transport (90 to 100 in Part VI) that apply to rail, road and inland water. The European Commission issued a Guidance document on dominance which deals with barriers to entry which draws attention to networks and network effects and has adopted competition rules to access agreements in the network telecommunications sector. Mergers are dealt with under Council Regulation (EC) No 139/2004. Its assessment of mergers is described in the Guidelines on Horizontal Merger (HMG)^{ccxxxii} which focus' on mergers that raise competition concerns.^{ccxxxiii} Various forms of barriers to entry have been described and it acknowledges that scale economies or network effects may make entry unprofitable unless the entrant can obtain a sufficiently large market share. Changes are expected in the HMG based on the recommendations of the *Draghi Report* which stresses that both scale and innovation are critical to compete rather than just low prices. Its proposed reforms call for a realignment of competition policy with the realities of these markets, characterized by high fixed costs, network effects and "winner-take-all" dynamics, as well as the key objectives of the Clean Industrial Deal.^{ccxxxiv}

Under sector legislation, it is worthwhile noting that transport network industries have barriers to entry. In **rail transportation**, regulatory reforms were introduced in four packages in 1991, 2004, 2007 and 2016 to introduce competition. Entry into rail requires a license to operate and a certificate for a train driver which is valid in all member states. Competition reforms were introduced to improve service and competition through licensing, vertical separation of infrastructure ownership from operation, open access to new entrants, regulation of track charges, allocation of track capacity, harmonized interoperability, and competitive tendering. Abuse of dominance and merger on intra state matters are dealt with under the states' own competition laws and interstate matters are dealt with under the TFEU.

In **air transportation**, industry regulatory reforms were introduced in three packages in 1987, 1990 and 1993. Community air carriers can freely set fares for passengers and cargo and have access to any intra-EU route without any permit or authorisation. Common rules have since been adopted to ensure the proper functioning of the single EU aviation market. Entry by air carriers requires an air operator certificate including requirements such as member state nationality, liability coverage and ability to ensure safety of operations. To ensure competition and access, besides the TFEU, Regulation EU 2019/712 deals with discriminatory practices and subsidies of non-EU countries and Council Regulation

EEC No. 95/93 provides for fairer access to airports and airport services. Competition for handling ground services, levying of airport charges and fair access through distribution networks are dealt with under Directives 96/67EC, Directive 2009/12/EC and Regulation EC No. 80/2009. Abuse of dominance and merger on intra state matters are dealt with under the states' own competition laws and interstate matters are dealt with under the TFEU.

In **road transport**, the process of liberalization for: road haulage and cabotage; and road passenger service began in 1992 and continued thereafter through 'Europe on the Move' legislative initiative, leasing of vehicles, electronic exchange of regulatory information and rules on cabotage for both road haulage and international bus and coach.^{ccxxxv} Entry into haulage and international bus and coach passenger services requires authorization (four qualitative criteria) and there are conditions for withdrawal of service. In addition, a member state can impose its own requirements that are non-discriminatory. Competition within an EU member state by other members (i.e. cabotage) is limited. Abuse of dominance and merger on intra state matters are dealt with under the states' own competition laws and interstate matters are dealt with under the TFEU.

In **water transportation**, Articles 101 and 102 of the TFEU are now fully applicable to the ocean transport sector as the exemption to price agreements of conference and consortia were ended in 2006 and 2024. Entry into ocean carrier agreements is determined by the carriers. To ensure competition in ocean water transportation ocean carriers are subject to the TFEU. Abuse of dominance and merger on intra state matters are dealt with under the states' own competition laws and interstate matters are dealt with under the TFEU.

In **pipeline transportation**, the directives of 1989 provided for facilitating entry into the natural gas market and transparency of gas prices to industrial end-users. After the formation of the EU, five energy packages were passed. The first 1998 energy package of gas introduced a liberalization of national energy markets. The second 2003 energy package allowed industrial and domestic consumers to choose their own gas suppliers from a wider range of competitors. The *third* 2009 energy package introduced rules on ownership separation of energy supply and generation from transmission networks (unbundling of sale and operation), third-country ownership of European transmission and access to exchanges and transmission networks. The *fourth* energy package adopted in 2019 introduced new rules for renewable energy, consumer incentives and limits on subsidies to power plants, such as capacity mechanisms. The *fifth* energy package adopted in 2024, 'Fit For 55', aligns the Union's energy targets with its new net-zero climate ambitions and extends the gas package to hydrogen. Entry into pipeline operations requires authorization and is provided for in Article 4 of 2009/73/EC. It also provides for ownership/control of European transmission system operators by a third-country person or persons. To ensure competition, three packages of reform dealt with access by third parties; choice of consumer to choose their own supplier; unbundling of transmission function from other functions; and ownership separation of energy supply and generation from transmission networks. Competition was further permitted in 2019 by allowing non-EU member pipelines into the EU provided they comply with rules applicable to EU carriers. Abuse of dominance and merger on intra state matters are dealt with under the states' own competition laws and interstate matters are dealt with under the TFEU.

3. Australia

In Australia, under competition laws - *Misuse of Market Power Act*. *Competition and Consumer Act 2010 (Cth)* - network industries are not subject to special provisions. However, anti-competitive conduct resulting from networks which result in cartels and misuse of market power are dealt with under sections 45 and 46 on misuse of market power. In addition, other sections can also deal with anti-competitive practices together with mergers which could have such effects. While the law does not specifically mention **network effects** it has found its way into the *Merger Guidelines* which acknowledges it as one type of structural or technological factor that can create a barrier to entry. In its description of height of barriers to entry some of the factors that may give rise to it are: sunk costs, economies of scale, and the existence of significant network effects. The guidelines also refers to distribution networks.

Under sector legislation, it is worthwhile noting that transport network industries have barriers to entry. In **rail transportation**, an authority indicates its limit and is required to start or to move. Above rail operators (i.e. running trains and hauling freight) have to satisfy rolling stock standards, safety, etc. and below-rail operators (i.e. funding and managing rail infrastructure) have to negotiate a network access agreement and satisfy the requirements needed by the above rail operators. To ensure competition, Part IIIA of the *Competition and Consumer Act 2010 (Cth)* establishes a legal regime to facilitate third party access to services provided through facilities with natural monopoly characteristics. The ACCC checks that the access charges are consistent with pricing principles in the National Access Regime. The states access regime is regulated under its own access laws and so are its access charges. Misuse of Market Power and mergers are examined by the ACCC. There are regulations pertaining to the construction and decommissioning of a railway.

In **air transportation**, the industry was deregulated in 1990 and airports were privatized by 2003. Airline operators must hold an air operator's certificate (AOC) to operate an aircraft under the Civil Aviation Act and must also meet safety requirements. The Air Navigation Act together with bilateral agreements cover international air services. To permit competition the Airlines Agreement (Termination) Act 1990 was introduced. Types of competitive behaviour that raise an issue are considered under Part IV of the Act, by the ACCC together with misleading advertising on air fares and deceptive practices, mergers, joint ventures and agreements. Consumer protection measures for travellers are dealt with under the Australian Consumer Law.

In **road transport**, entry is open but everyone who drives on Australia roads is required to have the correct licence as required by the Heavy Vehicle National Law (HVNL) for their vehicle type so they are able to handle it safely. If you drive a bus, taxi or shuttle, you must have a licence and meet all the requirements in the Taxis and Hire Vehicles Act 2016 and the 2017 Regulation or laws of other states and conditions attached to a license have to be satisfied together with safety standards including medical and police certificates. Pricing practice and practices involving competition fall under the *Misuse of Market Power Act*. The taxi acts or regulations contain fines for not adhering to the fare and all jurisdictions currently regulate maximum metered fares for metropolitan areas, with the majority also regulating maximum fares for regional areas (except Victoria). Misleading or deceptive conduct and false and misleading representations by road carriers are covered under the *Competition and Consumer Act 2010* and mergers are reviewed by the ACCC.

In **water transportation**, entry into existing ocean carrier agreements (alliance and other agreements) is determined by the carriers. Shipping conference agreements are given an exemption under Part X of the *Competition and Consumer Amendment* and the misuse of market power is examined under s. 46 of the *Consumer Amendment (Misuse of Market Power) Act 2017* together with the mergers under s. 50.

In **pipeline transportation**, a license is needed to construct or operate a pipeline under section 217 of the Offshore Petroleum and Greenhouse Gas Storage Act 2006 (OPGGS) this also applies to a petroleum pipeline and ancillary storage tanks and facilities. To ensure competition, the National Gas Law (NGL) contains a number of provisions.^{ccxxxvi} Retail prices (in the distribution market) were deregulated between 2002-2007. Acquisition or mergers of pipelines are considered by the ACCC and abandonment requires consent (section 228 of the OPGGS Act).

4. New Zealand

In New Zealand, under its competition law - the *Commerce Act* – network industries have not been signalled out for any special treatment but anti-competitive acts are generally dealt with under *Contracts, Arrangements, Cartels, Misuse of Market Power, Mergers, etc.* It is worthwhile noting, that **network effect** appears in its merger and acquisition guidelines under structural conditions together with economies of scale; economies of scope; switching costs; sunk costs; and the difficulties a firm would face in accessing required inputs or product distribution channels that the Commission uses in its LET (i.e. Likely, and sufficient in Extent and Timely) test when it examines entry and expansion.

Under sector legislation, it is worthwhile noting that transport network industries have barriers to entry. In **rail transportation**, rail operators and access providers must hold licences.^{ccxxxvii} Safety standards have to be satisfied. Under the Railways Act 2005 any operator who meets safety-related licence conditions can start a rail service when they negotiate access to the ONTRACK rail network. A licence may not be transferred or assigned to any person without prior written consent and closure of railways require approval.

In **air transportation**, air carriers must hold a licence to provide service, and restrictions on domestic services have been removed. The Air Licensing Act does provide for an investigation of fares by dominant licensee and can impose price controls and prescribe prices.^{ccxxxviii} Mergers, joint ventures and agreements are reviewed by the Commerce Commission but the Minister of Transport can authorise alliance and code-share agreements of international air carriage competition.

In **road transport**, the industry was deregulated in 1986. All commercial vehicles must have a valid certificate of fitness and warrant of fitness and conditions are attached to a license together with safety standards. Pricing practices of a dominant licensee that has the effect of eliminating competition, restricting entry, deterring competitive pricing and harming users^{ccxxxix} are subject to control by the licensing authority and the maximum and minimum charges for taxicabs can be prescribed. Mergers and acquisitions in trucking are reviewed by the Commerce Commission.

In **water transportation**, entry into existing ocean carrier agreements is determined by the carriers. The exemption to shipping conference agreements was ended in 2019 and anticompetitive practices are dealt with under the *Commerce Act*.

In **pipeline transportation**, authorization is needed to construct or operate a pipeline and health and safety regulations have to be met. Prices for transmission are regulated by the Commerce Commission under the *Commerce Act*. Access to a pipeline is covered in Section 43F of the Gas Act 1992 and the Petroleum Amendment Act 1962 provides for the application for the use of a pipeline by other persons. The authorisation for transfer of a pipeline needs consent of the Minister^{ccxl} this also applies to notification or abandonment.

In sum, networks have been specifically recognized in these jurisdictions not only in their antitrust or competition laws through the barriers they create because of its natural monopoly characteristics arising from scale and scope economies but also because of the sunk costs that are sometime required to enter into the industry. Given the network characteristics of these industries increased attention is being paid to network effects not only in one transport mode but also because of the need to enter in several transport modes to provide end-to-end services. Apart from these structural characteristics, the behaviour of these industries through anti-competitive practices has accentuated the effects that these network industries can have on consumer welfare. The fact that the EU has specific regulations for telecommunication networks and has recently called for reforms in network industries emphasises the growing importance of this form of industry organization.

D. Concluding Remarks

In this part, we have examined how networks in transportation are treated in Canada under the Competition Act and other sector transportation laws in considerable detail. A brief description of how these transportation networks are dealt with in US, EU, Australia and New Zealand is described. Governments have long recognized that transportation developed as networks and have sector legislation on each mode. However, based on a review of transportation laws on networks it is our opinion that transportation industries that operate as networks are special forms of industry organization that deserve special attention that are not given the importance that they should receive in competition laws. This is suggested by the entry of the word network or network effects into competition law guidelines or competition laws and the recent emphasis shown in the *Draghi Report* which proposes reforms that call for a realignment of competition policy with the realities that network markets are characterized by high fixed costs, network effects and “winner-take-all” dynamics.

Part V. A Suggested Framework for Treating Competition Policy in Transportation Network Industries

Professor Economides concludes his research on competition policy in network industries by noting that ...the legal system does not yet have a framework for analysis of competition policy issues in network industries. So we suggest a framework for transportation network industries. A framework for analyzing competition policy issues in transportation network industries typically involves identifying the unique characteristics of transportation network markets, such as high fixed costs, sunk costs, economies of scale and scope, network effects and potential for market power, and then applying first a structural approach and then a behavioural or strategic approach to assess potential anti-competitive behaviours. It would include: market definition, market power analysis, competitive analysis i.e. identification of potential competitive concerns (for example: abuse of dominance or misuse of market power, price discrimination, exclusionary conduct or creation of barriers to entry).

Key Elements of the Suggested Framework For Transportation Networks

1. Market definition Encompasses: A. Product or service market B. Geographic markets in each mode	2. Market power analysis (A Structural Approach) Encompasses: A. Market Share Analysis involves breaking up the study into: - i. Market share. ii. Number of competitors. iii. Concentration ratios. B. Barriers to Entry Analysis involves studying: - i. Types of entry barriers and characteristics of the market. ii. Evaluating the strength of these barriers by mode. iii. Switching Cost Analysis and their strength.	3. Competitive analysis (A Strategic or Behavioural Approach) Encompasses:. i. Collusion/ Abuse Market Power /Exclusionary Conduct. ii. Evaluating the behaviour / concerns by mode.	4. Options to promote competition and consumer welfare
A. Product or service market Adam Smith is considered the first economist to have defined an economic market, though the notion of markets existed long before that time. The emergence of antitrust laws led to the need to define a market (product or service) for analysis which is considered an antitrust market. It is used here in this latter sense. One criteria to define the market used by antitrust practitioners is a small but significant non-transitory hypothetical increase in price (SSNIP) (usually 5% for a year). If consumers react to this hypothetical price increase by buying or shifting to other similar services, then those services are included in the relevant market and the test is repeated with the next identified substitutable service until the consumer does not buy other services. One has to find out whether and how consumers	A. Market Share Analysis <i>i. Market share.</i> Market share is that part or percentage of the transportation antitrust service market of the total service market that each participant in the market provides. Market shares in transportation can be measured in several ways depending on whether the transportation service is passenger service or freight service. For example in passenger service, the number of passengers on a route, capacity on a route, revenue passenger miles or kilometres on a route, flights or frequency of flights, etc. For freight service, in ocean transportation the number of twenty foot containers, total revenue generated, types of cargo, etc. in rail transportation total revenue, revenue ton miles, carloads, revenue by commodities, etc. in pipelines total revenue, cubic meters (m ³) or 3.38 million barrels (MMb), capacity, etc. The use of capacity (by competitors or potential competitors) in determining the total for calculating market share is a less accurate measure of determining market share but is useful for other purposes. Different antitrust agencies have their own approach to dealing with the inclusion of capacity in determining the total market. In other words, one has to determine what should be included in the total service market (the denominator) and each provider of the service (the numerators). Broader definitions of market share that is market share for the entire substitutable network could also be calculated. For example, in the air passenger market it can be calculated by dividing the number of passengers an airline carries by the total number of passengers transported at a specific airport. One could also use number of flights instead of passengers. If this airline	A. Strategic or Behavioural Approach <i>i. Collusion/ Abuse Market Power./Exclusionary Conduct</i> These terms are defined in the competition or antitrust laws of each jurisdiction. <i>ii. Evaluating the behaviour / concerns by mode</i> Rail: <i>Collusion</i> on rates is no longer permitted between Canadian railways. After deregulation in 1985, the railways were required to compete. To circumvent this, their anti-competitive behaviour as a strategy became more masked. First, the railways attempted to de-market its lines to rationalize its rail tracks so as to discourage new entrants. The government then introduced legislation to deal with lines that the railways planned to abandon. Second, the railways have been accused of attempting to nullify the competitive provisions that were introduced in the legislation, namely the interswitching or extended interswitching provisions, the	Based on the above market power and competitive analysis and regulatory developments in Canadian transportation networks the following options are suggested to promote competition and consumer welfare under - A. Regulatory Proposals; B. Policy Proposals – for the various transportation modes. A. Regulatory Proposals i. Under Competition Laws or/and ii. Under Transportation Laws Rail - a. introduce new regulations to address the captive shippers; and b. revise the Long haul interswitching provision which replaced the competitive line rate (CLR) to make it easier for shippers to obtain a competitive rate. The Long haul interswitching

would shift their behaviour due to a price increase of the services in a network or throughout the network. In other words, first what services compete or are substitutable, and second how to measure it.^{cxdi} Substitutable services or products for antitrust purposes have been defined by Canadian Courts. For instance in <i>Canada (Director of Investigation and Research) v. Southam Inc.</i> the court held that <i>direct evidence of substitutability</i> includes both statistical evidence of buyer price sensitivity and anecdotal evidence, emanating from buyers on past or hypothetical responses to price changes. <i>Indirect evidence of substitutability</i> may be garnered from certain practical indicia, such as functional interchangeability and industry views/behaviour. Since direct evidence of substitutability is generally not readily available one generally relies on functional interchangeability and industry views. Even in the face of evidence disclosing low-demand elasticity (i.e., direct evidence that products are not substitutable), product substitutability may nevertheless be shown to exist, based upon indirect evidence such as functional interchangeability and industry views/behaviour.^{cxlii} Here the market definition involves comparing substitutable transportation networks. But as defined earlier a network is neither a product or a service. To circumvent this issue, we shall consider it as identifying substitutable services offered in transportation networks. If Y^1 is a network configuration where	has a subsidiary or an alliance carrier also operating in the same market, the market share of the carrier would have to include the passengers by its subsidiary and the alliance carrier. It could also include indirect flights. For example, suppose you have Carrier A flying from Toronto to Vancouver carrying 100 passengers, its subsidiary B also carrying 30 passengers, its alliance carrier C carrying 20 passenger from Toronto via Chicago to Vancouver and carrier D and E each carrying 50 passengers each, then the total market would be 250 passengers. The market share of A and its allies would be 150/250 or 3/5 and the market share of D and E would each be 50/250 or 1/5. If one did this for all the substitutable services (i.e. Toronto to Vancouver, ,, Toronto to St. John's one could calculate the market share of the carrier from Toronto) of carrier A from the airport and those of carriers D and E, one would obtain the market share for the substitutable networks. <i>ii. Number of competitors.</i> The number of competitors in the market determines the market structure of the industry. If there is only one, two, few or many determines if the market is a monopoly, duopoly, oligopoly or perfectly competitive. The market structure is of importance because it enables one to predict the outcome of price, output and welfare. Ranking the number of competitors and differences in size also gives one an indication of the end results. When listing competitors, one should not include subsidiary or alliance companies as direct competitors they should be grouped as one entity. This is because a subsidiary is owned and controlled by the parent company while an alliance is a collaborative agreement between the companies where they share the same objective. It is important to take this into account when calculating market shares otherwise the numerators may not reflect the correct number. <i>iii. Concentration ratios.</i> a) The meaning of economic concentration The concentration ratio and Herfindahl-Hirschmann index (HHI) are two measures of concentration usually used in structure-conduct-performance studies. The first is the sum of the market share of firms in descending order (largest, second largest, etc). In other words, $CR = \sum s_i \text{ where } s_1 > s_2 > s_3 \dots$ Thus a four firm concentration ratio would involve four firms and a eight firm concentration ratio would involve eight firms. The second is simply the sum of the squares of market shares for all firms in an industry. In other words, $HHI = \sum s_i^2$ The HHI varies between 0 and 1. The closer it is to 1, the more concentrated the industry. The HHI is less than the CR (i.e. $\sum s_i^2 < \sum s_i$ for s_i between 0 and 1) except in situations where the entire output is produced by one firm or a monopoly in which case both are equal to 1. For example, if there are five firms each producing 20% of the industry output, the HHI is 0.2 and the CR4 is 0.8. The HHI also typically conveys more information than a CR4. For example, if there are six firms, one with 50% of the market and the other five with 10%, the CR4 is 0.8 but the HHI in the case of five firms is 0.2 and in the case of six firms is 0.3,	competitive line rates provision now the long haul interswitching (LRI) and the running rights (RR) provision. Evidence of this is: the refusal to grant RR to the fledgling rail company Ferroequus Railway Co. by CN; the conditions imposed on CN in the BC Rail purchase; the post new millennium history of failure to be able to use the competitive provisions in the <i>Canadian Transportation Act</i>, the repeated legislative changes to make them workable, the number of times these competitive provision have been used, etc. Given the characteristics of the industry, reforms in the EU, Australia and New Zealand attempted to resolve this matter in a different way. These jurisdictions separated the competitive parts (operation) from the monopoly parts (track) of the industry and regulated the latter. This approach was never favourably viewed by railway companies in Canada and the U.S. so the government introduced provisions in the legislation to enhance competition. It proved to have limited success in Canada as described above and in the U.S. resulting in further attempts to maintain or introduce competition. In the US, a near moratorium between Class I rail mergers was adopted (an exception was the recent merger of CP and KC with trackage rights, the first merger in twenty years). The STB also attempted to make the reciprocal switching regulations more acceptable to shippers by adopting a new standard in 2016 and a final rule on April 30, 2024.^{cxliix} Air: <i>Abuse or misuse of market power</i> is an alleged anti-competitive strategic barrier to entry. One type of abuse is predatory behaviour. "In the Policy Framework for Airline Restructuring presented to the Committee, the Minister of Transport identified predatory behaviour as a concern to be addressed within the context of fostering competition. In	provision (introduced in 2016) is more restrictive than its predecessor the CLR and to date it has never been used. The purpose of the revision was to ensure that the CLR would work. Air - a. remove foreign ownership restriction on airlines that operate within Canada; b. consider tightening passenger rights, increase fines and speedup processing of compensation claims; and c. review loyalty and tying devices used by airlines. Water - a. repeal the exemption to shipping conferences and any exemption to consortia from the provisions of the Competition Act; b. remove the duty on importation of foreign built ships and remove the licensing of foreign ships in the Coasting Trade Act when there is lack of competition; and c. follow the amendments proposed in 2022 regarding ensuring that the ports remain competitive B. Policy Proposals Rail - a. monitor the efficacy of the interswitching provision to 160 kilometres to see if it is effective. Air - a. liberalize of air bilateral agreements through modified sixth freedom passenger traffic rights (e.g. Vancouver-Chicago-Montreal); b. remove cabotage rights or permit modified removal, such as agreeing to a North American Common Aviation Market between Canada, United States
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$Y^i = y^i + z^i$ are the smaller networks in Y^i of airline I and X^i is a network configuration where $X^i = x^i + z^i$ are the smaller networks in X^i of airline II. Each of the smaller networks z^i, x^i, y^i have services each indicated by segments $e_i = \{A, B\}$, $e_{ii} = \{C, B\}$, $e_{iii} = \{D, E\}$... If the network z^i where I and II each provide the same services then their network of each are substitutable (after examining direct and indirect evidence). The networks x^i and y^i where I and II provide different services in their network are not substitutable. Different segments in e_i are not substitutable, i.e. $e_i = \{A, B\}$ is not substitutable for $e_i = \{A, C\}$. In other words, if there are two network airlines that offer the same origin-destination services then the services of the networks are substitutable (assuming the hypothetical test cannot be applied but based on functional interchangeability and industry views). However, <i>each</i> origin-destination service in the network is not substitutable for any other origin-destination service in the network (i.e. a flight from Toronto to Vancouver is not a substitute for a flight from Toronto to Winnipeg). In general, a network of an airline does not offer the same origin-destination services. In such situations, only that part of the network of the two airlines is substitutable which offers the same origin-destination services, the other part of the network which offers different origin-destination services is not substitutable. As previously stated even in that part of the network where the origin-destination services are substitutable, one origin-	reflecting the larger variation in relative firm size even though the number of firms is greater.^{ccxliii} By scaling the HHI by 10,000, market shares can be measured as percentages, a practice used by antitrust authorities in the U.S. Antitrust interest in concentration is because increases in it can facilitate collusion among firms and interdependent behaviour. As a result, competition will seldom occur in an industry when concentration is very high. Whether concentration poses a serious threat to competition will vary with the ease with which new firms can enter the industry, the rate of growth of the industry, closeness of substitute products made by other industries and their competitive organization and other factors. On occasion, increases in concentration may sometimes increase competition, a situation that may arise when small inefficient firms merge to face larger rivals. Concentration by itself does not indicate the extent of competition in a market. On occasion a market with only two aggressive competitors could exhibit more competitive results than if there were six competitors. The behaviour of the firms in the market has to be examined. Most antitrust authorities use concentration as a starting point in their analysis of mergers since they have shed their structural approach to merger analysis.^{ccxliv} B. Barriers to Entry Analysis It involves examining the problems in entering a market. The problems or conditions of entry are important as it constrains the behaviour of competitors in the market. If entering a market is sufficiently easy, it is unlikely to pose a problem for a potential entrant and restricts the behaviour of any competitor in the market. On the other hand, if a potential entrant is faced with barriers, the competitors in the market can engage in anti-competitive behaviour. To learn about the barriers one must know the characteristics of the market as barriers can take various forms and are different in different markets. An evaluation of the strength of these barriers provides one an idea of their significance or importance. When entry barriers are low, the competitors in the market are likely to be constrained by entry. Conversely, when entry barriers are high, competitors in the market would not be significantly constrained by entry. <i>i. Types of entry barriers and characteristics of the market</i> Attempts at analysing barriers to entry can be credited to Joe Bain's classic treatise <i>Barriers to New Competition</i> and was later popularized by Michael E. Porter's Five Forces framework to assess the level of difficulty for new entrants to enter a particular market or industry. The barriers to entry emphasized in the economics literature and industry are: Regulations: Regulations (federal, provincial, local, industry) can create barriers to entry. There are various types of regulatory barriers: licence to operate, environmental and safety regulatory certifications, insurance requirements, restrictions on the number of licenses, tariff and non-tariff impositions, legally enforceable intellectual property rights, regulations governing standards and quality, etc. All these requirements pose a hurdle before a new company can enter the market.	particular, the Policy Framework notes that "small and new entrant carriers are potentially vulnerable to excessively aggressive competitive attacks from a larger, established airline." There are various types of predatory behaviour: low fares to harm competitors excessive expansion of capacity, the matching of routes, selling below variable costs, modifying frequent flyer programs and restricting access (slots, facilities, etc.), pre-emptive behaviour to prevent entry, setting up and use of a subsidiary as a low cost carrier, etc. Exactly specifying predatory behaviour is somewhat illusive because it keeps on changing over time. There are various examples of predatory behaviour in Canada: in 2001 CanJet accused Air Canada of a new round of airfare cuts in Canjet's territory in eastern Canada; in 2012, the Competition Bureau obtained a consent agreement against strategic Alliance between Air Canada and United-Continental Holdings; in 2023, Air Canada and WestJet were accused of anti-competitive behaviour and possible collusion - and the Greater Saskatoon Chamber of Commerce called for an investigation (into market division and market allocation by withdrawal of services); in 2024, Flair warned that Ottawa must react to predatory behaviour of incumbents (Swoops creation by WestJet to quell competition from Flair); and in 2024, the Competition Bureau exercised its new powers and obtained court orders requiring Air Canada and WestJet to hand over information for the watchdog's market study into airline competition. In the US, the Justice Department's Antitrust Division and the Department of Transportation jointly announced a broad public inquiry into the state of competition in air travel. <i>Collusion or tacit collusion</i> is also another anti-competitive device in the airline industry. The decision of WestJet and Air Canada to focus on	and Mexico; and c. remove impediments to competition if any exist; d. encourage the development of secondary airports; and e. cap increases in additional charges to not more than an increase in the rate of inflation. Road - a. renew discussions with the US on further removal of regulatory barriers on empty trailers. b. cap increase in additional charges in Canada to not more than an increase in the rate of inflation; and c. consider and retain gas tax cut as done in Ontario. In general, when the competition laws or transportation laws are going to be revised the abuse of dominance provision should specifically draw attention to networks and the merger provisions should impose stricter requirements or oppose mergers of the major network companies.
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destination is not substitutable for the other. In other words, a network with the same origin-destination services is a broader market definition but for antitrust purposes each origin-destination is the appropriate market after examining direct and indirect evidence. <i>Geographic market</i> Geographic market means determining whether geography limits consumers' willingness or ability to substitute service or a supplier's willingness or ability to serve consumers. For example, if an air traveller is in Toronto, is the traveller willing to go to the nearest town Hamilton or Buffalo to take his air trip if the airline raises its price in Toronto? Or if one network has connections to other network connections in other geographic markets that the other does not have or has different connections, is one network substitutable for another? The absence of connections or different connections of networks may be sufficient to delineate one geographic market from another. Further, if one network obtains loyalty points from the other connections, the networks may not be substitutable. Furthermore, loyalty points offered in one's carrier network in its geographic market may not be transferable to another carrier in its geographic market.	Cost advantageous: Cost advantages can create barriers to entry. There are various types of cost advantages: economies of scale, scope and networks, advantages arising from sunk costs (costs not recoverable if the firm exits), lower costs for firms with buying power, advantages arising from costs the entrant must incur to switch to another supplier. These cost advantages make it difficult for potential entrants as they may be unable to compete on price. Control over scarce resources: Control over scarce resources that the incumbent companies in the market enjoy can create barriers to entry. There are various types of scarce resources: natural resources such as land, essential facilities, innovation and R & D, intellectual property rights such as patents, trademarks, etc., essential raw material or other inputs, access to important technologies, control over distribution channels. Control over any of these scarce resources can pose a challenge for a company planning to enter the market. Capital requirements: Capital requirements can act as an entry barrier. There are various types of capital requirements: financial resources, human capital, buildings and facilities, access to capital, cost of borrowing, advertising budget capital requirements. The higher the capital requirements the greater the deterrent to new entrants. Established Reputation: Established reputation can create barriers to entry. There are various types of reputation arising from: quality of product or service, brand loyalty, experience of existing companies, ties between customers, history of companies and maturity of the markets. These factors which are built up over time can deter a new entrant into the market. <i>Characteristics of the market</i> differ among different products or services. The characteristics of transportation network markets are not all the same, these characteristics differ between transportation modes. Some have high fixed costs, and sunk costs, economies of scale and scope, others may just have low fixed costs and high variable costs, network effects, etc. In addition, the nature of regulations between each mode are not the same. Some may have entry regulation and others may have price regulation. <i>ii. Evaluating the strength of these barriers</i> The strength of these barriers by each of the five modes of transportation Canadian networks: Rail, Air, Water, Trucking and Pipeline transmission are evaluated based on a review of a few selective studies. It shall be evaluated as: low, medium and high. Rail: Regulations - <i>Regulatory and political barriers</i> exist. Not only have new entrants to obtain federal approval but also provincial approval because networks usually go through provinces. If they cross international boundaries approval is also needed from foreign regulatory agencies. Examples are: in rail, the recent merger of CP and KCS indicates the hurdle. ... These barriers to entry are considered medium to low. Cost advantageous - <i>Economies of scale and economies of scope</i> are present in rail transportation because of high fixed costs and multiple markets served. <i>Network economies</i> are also present. Networks are typically	different parts of the country raised concern about possible collusion and called for an investigation. The fixing of cargo fuel surcharges between 2000 and 2006 resulted in one of the largest fines on airlines in the world. Water: <i>Exclusionary conduct</i> such as fidelity rebates, exclusive dealing arrangements, tying, denying use of infrastructure facilities were found to exist in ocean transportation. Some of these activities still receive an exemption from the competition laws. Today new types of agreements – discussion agreements, co-operative agreements, co-consortia, joint ventures, alliances – between shipping lines have become more prominent. There are also agreements with ports, marine terminal operators and other inland carriers. These agreements make it difficult for a new shipping line to enter or for an existing shipping line to provide service on any new route. If these agreements are long term, it could act as a more effective strategic barrier to entry. Trucking: <i>Price collusion and bid-rigging</i> can be used as anti-competitive devices in this industry. In the past, rate bureaus provided the avenue through which covert or overt collusion occurred. Today some of these anti-competitive acts have occurred in some of segments of the trucking market (eg. household goods, waste collection, driving schools, etc). <i>Building barriers to entry</i> can also occur in this industry through anti-competitive clauses, mergers, etc. There have been a number of mergers in the last ten years, but given the fragmented state of the industry it has not raised too much concern in Canada. There are however exceptions, for example in the EU, UPS acquisition of TNT was not approved by the EC. Pipelines: <i>Building barriers to entry</i> can
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	vertically integrated providing the network a larger flow of traffic to the end destination. For example, in the CPKC merger, CP was able to carry large amounts of traffic to Mexico after the merger lowering its cost rather than having to switch the traffic to another carrier in the US for carriage to Mexico. These barriers to entry are considered high to medium. Control over scarce resources - <i>Essential facilities</i> creates a barrier to entry. The essential facility is the rail lines, if a new carrier wants to provide service. For example, Ferroequus Railway Co. was denied running rights on CN track. <i>Land</i> is also a scarce resource. Building new railway tracks is usually not possible. The price of land would certainly increase if there was any knowledge that a firm intended to build. Established firms have an absolute advantage. These barriers to entry are considered high to medium. Capital requirements - <i>Large capital investments</i> are needed making entry difficult. These barriers to entry are considered medium. Established Reputation - <i>Established reputations</i> and international standing by rail companies in Canada make potential entry unlikely. These companies (CN and CPKC) have long histories as <i>iconic companies</i> in Canada with a great deal of government intervention and patronage. They have product differentiation advantages arising from their favoured locational advantages such as being downtown or near the city with different routes and connections. Their company reputation arises largely from their experience and number of years of being in business and continued expenditures on advertising to building up their brand names and services. They are well-recognized companies in Canada, not just transportation companies. These barriers to entry are considered high to medium. In sum, rail transportation can be considered a transportation mode where entry barriers are high. As a consequence, some countries have separated operation from access to rail lines. Air: Regulations - <i>Regulatory and political barriers</i> exist. If airlines cross international boundaries approval is also needed from domestic and foreign regulatory agencies. Restrictions on the area of operation and number of carriers in bilateral agreements, cabotage protection, ownership limits, etc. highlights the presence of these barriers.^{ccdxv} These barriers to entry are considered low with the exception of cabotage which is medium to high. Cost advantageous - <i>Economies of scale and scope</i> may exist to some extent but are not considered a major barrier to entry. These industries are not natural monopolies. The observed growth in some companies (Air Canada and WestJet) suggest that there may be some economies of scale or if there are diseconomies of scale it is outweighed by economies of scope or / and network economies / or for some political decision.^{ccdxvi} <i>Network economies</i> are also present. A larger network permits a larger flow of traffic to the end destination. In air, the hub and spoke networks are common enabling a higher load factor on any route. <i>Sunk costs</i> are not a significant barrier to entry though they may be some sunk costs. For example: in air “entry costs involve setting up a reservation system, labour contracts, renting airport space and maintenance operations. Industry exit is easier, but these then become sunk costs.”^{ccdxvii} In air sunk costs are not a	also occur in the pipeline industry through anti-competitive clauses, mergers, vertical agreements, etc. For example, on July 27, 2022, the Competition Bureau registered a consent agreement with the Competition Tribunal regarding a joint venture between Pembina Pipeline Corporation and KKR’s Global Infrastructure Funds. Acquisitions (Veresen; Kinder Morgan Canada Ltd.; and Enbridge) also occurred but were cleared by the Competition Bureau.
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	significant barrier to entry though they may be some sunk costs. These barriers to entry are considered low to medium Control over scarce resources - <i>Essential facilities</i> such as air slots, gates, airport facilities including computer reservation systems are essential for a new carrier to provide service. In addition, land is also a barrier as building an airport with runways is usually not possible. An example is the Toronto Island Airport. These barriers to entry are considered low with the exception of new runways which is medium. Capital requirements – <i>Capital requirements</i> are not too great as witnessed by entry of carriers over the last two decades. Entry typically begins as a single origin-destination service which require lower capital requirements and gradually services are added. These barriers to entry are considered low. Established Reputation - <i>Established reputation</i> and international standing for flag carriers raise the barrier to entry. Airlines such as Air Canada have long histories as <i>iconic companies</i> in Canada largely as a result of government patronage and intervention. They have product differentiation advantages arising from serving major cities and international destinations. Their company reputation arises largely from their experience and number of years of being in business and continued expenditures on advertising to build up brand names and service. They are well-recognized companies in Canada, not just transportation companies. These barriers to entry are considered low to medium. In sum, air transportation can be considered a transportation mode where entry barriers are low. Water: Regulations – <i>Regulations</i> permit shipping conference agreements and other agreements to control entry. It is up to the carriers in an agreement, alliance or consortia to decide if it will accept another carrier to be part of the agreement. However, entry as an independent carrier would need a license to operate. These barriers to entry are considered low for independent entry but medium to high for entry into alliance and consortia agreements. Cost advantageous - <i>Economies of scale</i> are present in the ocean transportation because of high fixed costs. Economies of scale in liner shipping have been increasing in response to technology-driven productivity growth, regulatory changes, and higher world-wide trade flows. The pursuit of economies of scale also appears to be contributing (only one reason, but a major one) to the consolidation in the liner shipping industry and the formation of global strategic alliances. <i>Network economies</i> are also present to a small extent as there is no extensive hub and spoke network as in the air transportation. <i>Sunk costs</i> are not a significant barrier to entry as ships can be bought and sold to anyone in the world though they may be some sunk costs. For example building new terminals could become a sunk costs should the shipping line choose to leave that port. Control over scarce resources - <i>Essential facilities</i> restrictions creates barriers to entry. If the shipping line owns or controls a port provision of service by a potential entrant may be denied. In general, most ports are not owned by a shipping line. These barriers to entry are considered low. Capital requirements - <i>Large capital investments</i> are needed for ships and terminals making entry difficult.	
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	These barriers to entry are considered medium. Established Reputation - <i>Established reputation</i> and brand loyalty is not considered a barrier to entry in shipping. These barriers to entry are considered low. In sum, ocean water transportation can be considered a mode where entry barriers are medium to low. Trucking: Regulations - <i>Regulatory and political barriers</i> do not generally exist and in case of a few barriers (repositioning of trucks etc.) they apply to both established carriers and new entrants. Difference in standards and safety regulations between provinces can create some barriers. These barriers to entry are considered low. Cost advantageous - <i>Economies of scale</i> are constant or at best limited. Economies of scope are likely to exist in certain segments of the industry. The trucking industry continues to be fragmented. The continued growth of the large companies (e.g. TFI) suggest that any diseconomies are outweighed by economies of scope or network economies. An exception is the courier industry where large companies dominate. These companies have large ground and air networks both domestically and internationally that claim to enjoy economies of scale and network economies. These barriers to entry are considered low with the exception of courier industry where they are medium. Control over scarce resources – <i>Control over scarce resources</i> as barrier to entry only exists in the form of land required to build terminals and in the case of courier access to important technologies eg. tracking overnight deliveries. These barriers to entry are considered low with the exception of the courier industry where they are medium to low depending on whether one is considering all or just one segment. Capital requirements – <i>Capital requirement</i> to entry in this industry is not large, the exception being the courier business. A large capital investment is required to enter the courier industry where fast, global delivery is expected – at a low price. Establishing a network of planes, trucks, couriers, etc. would have astronomical costs where multiple entry is needed and having the ability to compete with the existing margins offered by the existing competitors would not be feasible as you tried to break even from your initial investment. If one is only considering the ground delivery by courier companies the capital cost requirement would be much less. These barriers to entry are considered low with the exception of courier industry where they are medium to low depending on whether one is considering all or just one segment. Established Reputation - <i>Established Reputation</i> is not a barrier to entry in trucking. Though the top trucking companies over time have built up domestic and cross-border reputation (for example TFI, Bison Transport, Groupe Robert, Trimac, and Day and Ross). Perhaps an exception are the international courier companies (for example UPS, Fedex, etc) with their worldwide networks. Entrants would have to compete against very well known, trusted companies. In this industry, the threat of entry of new competitors will remain low for the foreseeable future.^{ccxlviii} These barriers to entry are considered low with the exception of the courier industry where they are medium to low depending on whether one is considering all or just the ground segment. In sum, trucking can be considered a transportation		
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	mode where the entry barriers are low. <i>Pipeline transmission</i> Regulations - <i>Regulatory and political barriers</i> exist. Not only have new entrants to obtain federal approval but also provincial approval because networks usually go through provinces. If they cross international boundaries approval is also needed from foreign regulatory agencies. Examples are: in pipeline, cancellation of permits for the Keystone XL pipeline in the US, the criticism of Bill C-69 and the tug-of-war between the federal government and Alberta is indicative of the problems, etc. These barriers to entry are considered medium to high. Cost advantageous – <i>Economies of scale and economies of scope</i> exist making pipelines a natural monopoly. <i>Sunk costs</i> which are quite significant in pipeline transmission pose a formidable barrier to entry. <i>Network economies</i> are also present. On the supply side, networks bring benefits to owners or suppliers of these services (through increases in load factor or traffic density) as it lowers the cost of transportation. In pipelines, networks are typically vertically integrated providing the network a larger flow of traffic to the end destination. These barriers to entry are considered high. Control over scarce resources - <i>Essential facilities</i> creates a barrier to entry as pipelines are typically a monopoly. <i>Land</i> is also scarce resource and building a new competitive pipeline usually does not occur. These barriers to entry are considered medium. Capital requirements - <i>Large capital investments</i> are needed making entry difficult. These barriers to entry are considered medium to high. Established Reputation - <i>Established reputation</i> and international standing have grown over time with Canadian pipeline transportation companies. They have short to medium histories and their company reputation arises largely from their experience and number of years of being in business. These barriers to entry are considered low. In sum, pipeline transportation can be considered a transportation mode where entry barriers are high. As a consequence some countries regulate the prices that can be charged by pipeline transmission companies. <i>iii. Switching Cost Analysis</i> Switching costs analysis examines the factors that make it difficult for customers to switch from the product or services of one supplier to another. Examples of switching costs are: search costs, transaction, cancellation, penalty costs, etc; inertia costs due to habit formation; learning costs; access costs due to supply, distribution outlets, technologies, etc.; loss of rewards cost or deferred rebates; loss of network effects; etc. The importance of these costs differ in different modes of transportation. Rail: Switching costs associated with switching traffic within certain zones (30km or 160km) from one carrier to another is determined by the Canadian Transportation Agency. The use of competitive line rates now the long haul interswitching (LHI) has so far not been successful. There are also legal costs in making such applications. The switching cost barrier of obtaining a LHI is medium to high but the other switching costs as a barrier is considered low. Air: Switching costs associated with passenger traffic has centered around accumulated loyalty rewards that		
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	would be lost if a passenger shifted to another carrier. In one paper, on airline routes in Sweden, the switching cost was found to be substantial. The greater the network and network externalities effects the more the loyalty points that a passenger can accumulate and also the greater the opportunity for passengers to use these points, so the greater the switching costs. These effects arise more with hub and spoke carriers than with carriers providing point to point services. The former has been associated with mainline carriers and the latter with low cost carriers or new entrants that begin with point to point services. Similar arguments apply to network carriers forming alliances with other network carriers. This is often used as an argument for the lack of entry of new carriers. Most switching costs are difficult to quantify. These barriers to entry are considered medium. Water: Switching costs associated with ocean traffic that once received attention were deferred rebates. The rebate was given to the shipper on the next shipment or after a period. It is used as a form of tying device. Transaction cost, cancellation fees, penalty costs are considered as low barriers to entry. Trucking: Switching costs do exists when a decision is made to switch from the services of one trucking company to another. No specific type of switching cost has attracted special attention. These costs are considered low and are a low barrier to entry. Pipelines: Switching costs are not an issue in transmission for pipelines as they in general have a monopoly and tolls and tariffs are regulated. However, at the distribution level, since a consumer may have the choice of choosing supply from different distributors there could be switching costs. Switching costs are considered as low barriers to entry. In sum, switching costs and network effects in transportation have not received a great deal of attention though they both create barriers to entry and lock-in customers. High switching costs can strengthen the value of network effects by making it harder for users to leave a network even if they are dissatisfied. They are considered as medium to low barriers to entry, perhaps with the exception of air transportation where they are considered as medium..		
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VI. Conclusion

Networks have always been *important* in transportation in Canada. From a broader perspective, the transportation and warehousing sector “directly contributed 4.0% to GDP, amounting to \$88.5 billion in monetary terms. This underscores the sector’s substantial economic footprint and its importance in driving overall economic activity.” It also accounted for more than 1.75 million jobs. Perhaps, a better appreciation of the importance of transportation networks can be appreciated in the fact that of the largest eight companies in Canada four of these - Canadian Natural Resources Limited; Enbridge Inc.; Canadian National Railway Company; and Canadian Pacific Railway Company - are transportation companies or partly involved in transportation. But dollar values and bigness often do not convey the true importance that transportation is playing and has played in building the Canadian economy. Indicators such as enabling social connectivity, providing emergency response to accidents and distribution of emergency supplies, providing access to growth and services to inaccessible regions of the north, driving economic growth and development, facilitating globalization, tourism and travel not only in Canada but also to other continents cannot be easily quantified and are of tremendous importance. Transportation networks are also *widespread* in Canada providing everyday links from home to work, life lines to diverse regions together with corridors for our export and import trade. Their services are often deemed as ‘essential services’ and typically lead to back to work legislation or binding arbitration if labour union strikes are not quickly resolved. Our economic futures are more closely tied to the sustainability of our transportation networks than we might care to admit. They define the key to success in today’s dynamic marketplace. They are a strategic tool to gain competitive advantage. This is particularly true today in the context of globalization. *Gaps* exist in our transportation gateways and corridors that have created opportunities to optimize investment in the existing infrastructure. Some studies in the early 2000 called for a National Transportation Strategy and other studies for a National Transportation Investment Strategy. Then in 2105, the Pathways’ Report suggested recommendations and more recently the National Supply Chain Task Force and the WESTAC Compass report pointed to the gaps. We therefore suggest the government:

* continue to update its long term investment plan in conjunction with the provinces in light of ongoing demographic developments and reports from transport organizations in Canada and current developments in the US and the World

To get a better understanding about networks and their development we begin by briefly describing the mathematical tools required to understand transportation networks ranging from graph theory to linear programming. It enables one to logically formulate problems and solve problems related to routing - the one way street problem, the shortest route, the least cost route, etc. and problems related to network - the maximum flow, the minimum cost flow, the transportation problem, the hub and spoke network, and the more recent development of the use of graph neural networks in transportation and Bayesian networks in transportation. Then, network theory is also briefly reviewed to enable one to understand the formation, evolution and growth of networks in transportation. This improved understanding could reveal how decisions made at one point of time have affected future choice. It could help planners and decision-makers desiring to shape the future to improve planning and designing of transportation networks so as to exploit network economies and externalities. It could help create optimal networks that will not only improve the flow of traffic but also reduce time lost due to congestion. It could also give planners an insight when certain segments are reaching capacity, so that they may plan alternative routes to avoid bottlenecks that could arise from sudden increases in both its own network traffic and traffic from other transportation modes. We therefore suggest the government:

* increase attention to new research on developments in transportation networks – neural, Bayesian, etc.

The description in the above two paragraphs provides a background for the main motivation of this paper, do networks in transportation create barriers to entry and competition in the provision of transport services. So we begin by reviewing the *meaning* of barriers to entry, how barriers to entry are treated under competition laws in Canada, USA, EU, Australia and New Zealand and whether *networks* are treated as barriers to entry? We then review important studies on barriers to entry in transportation and whether there are barriers to entry in each transportation mode - air, rail, trucking, water, and pipelines – to learn of its existence. Our examination indicates that there are barriers to entry in these transportation network industries that range from high to medium to low depending on the mode and the specifics of each situation and whether sunk costs play an important role. As a result, network effects have resulted in a market structure dominated by a few firms where bigger is better, in some modes of transportation. Apart from structural barriers to entry, strategic entry barriers (ranging from all types of collusion to anti-competitive practices) have played an important role in erecting barriers to entry which anti-trust authorities have attempted to address from time to time. These two types of barriers can interact and should be considered together. We therefore suggest that competition policy:

*be concerned more with the strategic barriers to entry than with structural barriers as the Canadian transportation scene is dominated by few network transportation companies

We then begin by examining how networks are treated under the *Competition Act*. We find that until the 2022 amendments, networks were not specifically referred to in any provision of the *Competition Act* though anti-competitive practices that may arise in such industries raise greater concern in light of the structural characteristics of these industries. This is not surprising as Professor Economides concludes his research on competition policy in network industries by noting that ...the legal system does not yet have a framework for analysis of competition policy issues in network industries. ... economic theory of networks is so inadequate and unsettled that there is no commonly accepted body of knowledge on market structure with network externalities, based on which one could evaluate deviations toward anti-competitive behaviour. Since transportation in Canada is regulated under various transportation acts, the important acts being – *Canada Transportation Act*, *Motor Vehicle Transport Act*, *Shipping Conferences Exemption Act* and *the Canadian Energy Regulator Act*, we begin by reviewing the economic regulations in these acts that could act as barriers that limit competition such as entry/exist, access, pricing, etc. We therefore suggest that a framework:

*be introduced in the competition law for dealing with transportation *networks*

The above examination of the competition laws and sectoral transportation laws is repeated in the same format for each of five major jurisdictions – US, EU, Australia and New Zealand. Our findings indicate increasing interest in network industries in their respective competition law. For example, in the EU, the recent *Draghi Report*, stresses that the “economy has shifted towards more innovation-heavy sectors where competition is usually based on digital technologies ... where both scale and innovation are critical to compete rather than just low prices.” Its proposed reforms call for a realignment of competition policy with the realities of these markets, characterized by high fixed costs, network effects and “winner-take-all” dynamics, as well as the key objectives of the Clean Industrial Deal.^{cdi} Further, transportation often does not just involve one mode of network but networks in other modes – layer on layer. For example from water to rail/trucking, air to taxi/bus, etc. Furthermore, given that these networks exist not only within one country but have also spread and have also been linked to networks in other countries, it has become increasingly more complex to deal with matters of competition forcing five jurisdictions to enter into a “Multilateral Mutual Assistance and Cooperation Framework for Competition Authorities”.^{cdi} We therefore suggest the Competition Bureau:

*increase attention to developments on the treatment of networks in other major jurisdictions

In light of the above, we attempt to provide a framework for reviewing network industries in transportation in Canada in competition law. The key elements of the suggested framework are: 1. Market definition. 2. Market power analysis. 3. Competitive analysis. 4. Options to promote competition and consumer welfare. We also attempted to assess the height of the barriers in each transportation mode.

Finally, it should be emphasized that the above paper is only concerned with transportation network industries. Network industries have become ubiquitous and important today in all other key sectors of the economy, telecommunications, banking, grocery shopping, etc. especially because of the Internet - “network of networks” which connects virtually everything today. In light of the above, a *broader framework* is called for, to deal with networks in competition law, not just transportation. We therefore suggest the Competition Bureau:

*consider developing a framework for dealing with networks not only in transport but other networks in the economy

We live in the age of massive networks - Amazon, Google, Microsoft, Apple, Netflix, Facebook, etc. making entry and competition even more difficult. This was also recognized in the President Joe Biden’s Executive Order “Promoting Competition in the American Economy”. It called on the federal government’s two antitrust agencies, the Federal Trade Commission and the Department of Justice Antitrust Division, to adopt a number of changes to antitrust policy and enforcement. Everyone’s view on antitrust policy to network industries differs. One view, stresses that antitrust policy in network industries should be concerned with concentration and barriers to entry that could result in possible future foreclosure of entry. The other view, stresses that antitrust policy in network industries should be guided by considerations of dynamic efficiency where efficiency is the rule of reason. Regardless of one’s view, there should be a framework for dealing with network industries in the competition law or in other sector laws.

APPENDIX I-- Table 1

Competition or Antitrust Laws most applicable to Networks					
	Canada	USA	EU	Australia	New Zealand
AOD /Pred.P.	ss. 78-79 CA [^]	s. 2 SA ^{^^}	A. 102 TFEU ^{^^^^}	s. 46 MMP [#]	s. 36 CC ⁺
Collusion	s. 90(1) CA	s. 1 SA	A.101 TFEU	s. 45 CCA ^{##}	s. 27/30 CC
Mergers	ss. 91-83 CA	s.7 CLA and SRIM ^{^^}	EC 139/2004	s. 50 CCA	s. 47 CC
Misleading Ad	s. 74.1(1.1) CA			s. 131 CCA	

[^] Competition Act. ^{^^}Sherman Act. ^{^^^}Clayton Act and Scott-Rodino Improvement Act. ^{^^^^}Treaty on the Functioning of the European Union (TFEU). [#] Misuse of Market Power Act (MMP). ^{##} Competition and Consumer Act 2010 (Cth) (CCA). ⁺ Commerce Act (CC).

Transport Laws most applicable to Networks					
Rail	*				
Entry / Exit	s. 90 Certificate s.93.1 Liability Insurance	49 U.S.C. 11323	EU Directive 95/18; 2001/13; 2007/59; 2016/797		s. 21 Railway Act 2005
Competition	s. 127 Interswitching s.129 Long-haul Inter. s.138 Running Rights s. 159 Final Offer Arb.	49 U.S.C. § 10707(a) Market dominance s.1145.6 and 11102(c) Reciprocal Switching	EC 2004/49; 2004/50); 2004/51);881/2004).2007/58); 1370/2007); 2016/2238; 2016/3370); 2001/14/EC	s. 46 MMP s. 27 RA (NSW) RMA (Vic)	Railway Act 2005
Mergers	53.1(1) Mergers	49U.S.C.§11324(c)&(d)		s. 50 CCA s.88 TAA	s. 18
Transfers / Abandon.	s. 140 Transferring and Discontinuing	PL 104-88, 109 Stat. 803 (1995) (ICCTA),		RSNL	ss.14, 23 28- NZ Railway Corp. A
Air	*				
Entry / Exit	s. 61 Licence for Dom. Service s. 67 License for Schedule International. Service	49 U.S.C. 40101.	EEC 87/601; 87-602; 2342- 90; 2342-90); 2407/920 and 2408/92. EU 2019/712 EEC No. 95/93; 96/67EC; 2009/12/EC; EC No. 80/2009.	ss. 27-28 Civil Aviation Act ss. 12-13 Civil Aviation Act	s. 9 and s. 87 D Civil Aviation Act 1990
Competition	s. 67 Tariffs	49 U.S.C. 40101(a)(4) to (15); (e)(1) to (10) (e)(1) to (10)); 41712(a) and (f)		Independent Air Fares Committee Act 1981 s. 46 MMP	s. 29 Air Licensing Act s. 27/s.30 CC
Mergers	53.1(1) Mergers	49 U.S.C. § 41105(a)		s. 50 CCA	s. 47 CC
Transfers/Ab.		49 U.S.C. § 41105(a)			
Road	**				
Entry / Exit	s. 5 Licence Bus s. 7(1) Extra Prov. Road s.8(1) Safety Fitness Cert.	Public Law 96-296 (s. 53 MCA)		Heavy Vehicle National Law (HVNL)	s.30J-R Land Transport Act
Competition	s. 6 Tariffs	49 U.S.C. § 13710	(EC) No 1071/2009 Road International (EC) No 1072/2009 Cabotage (EC) No 1073/2009 Passenger Bus International	s. 45 MMP s. 70	s. 142-152 Licensing Act 1982
Mergers	53.1(1) Mergers	49 U.S.C. § 14303		s. 50 CCA	s. 47CC
Water	***				
Entry / Exit	4.1(g) Non-App. of CA				
Competition	4.1(a)-(f) Non-App. of CA 4.1(3)-(4) I.A. and Pred P s. 5.1 Limitation s. 21 Shippers Group	s. 1701-3(a).Exemptions s. 1706(b) Restrictions and s. 1709(a) – (d)		s. 46 MMP Part X of CCA	s. 36 ss. 44A and 44 B of the CC
Mergers				s. 50 CCA	s. 47CC
Transfers					
Pipelines	****				
Entry / Exit	s. 11(b) Mandate s.179 (1) Companies only 198(a) Approval 180(1)(a) Operation Cert	s. 7	A. 11 Directive 2009/73/EC	s. 217 Offshore Petroleum and Greenhouse Gas Storage Act - OPPGS	s. 50 Petroleum Amendment Act (PAA)
Competition	s. 11(c) Mandate ss. 225-240 Tolls and Tariff	s.1(4), s.1(5)(a), 6(1), s.16(1), s.13, s.15 FERC. s. 4(a)-(e), 5(g) NGA	Dir. 98/30/EC; 2003/55/EC As. 32, 37, 9, 11, 41(1)(a) Directive 2009/73/EC	ss.131/136, 16C National Gas Law (NGL)	s. 43F Gas Amendment Act
Mergers	s. 181 (1) (b) Limitation	ss. 201 and 203 FERC		s. 50 CCA	s. 80 PAA
Transfers / Abandonment	s. 181 (1) (a) and (c) Limitation			s. 228 OPPGS	s. 81 PAA

* Canada Transportation Act. **Motor Vehicle Transport Act. ***Shipping Conferences Shipping Act. ****Canadian Energy Regulator Act.

Appendix II – A Brief Background of Transportation Laws in Other Jurisdictions

US

Rail

The history of railways in the US goes back to the 1860s. It was not until 1887 that the *Interstate Commerce Act* was passed and the Interstate Commerce Commission (ICC) was created to regulate rail. On January 1, 1966, the ICC Termination Act of 1995 created the Surface Transportation Board (STB) formerly the ICC. It was administratively aligned with the U.S. Department of Transportation from 1996 to mid-December 2015. The STB Reauthorization Act of 2015 established the STB as a wholly independent federal agency on December 18, 2015.^{cdii} Economic regulation of various modes of surface transportation, primarily freight rail fall under the jurisdiction of the Surface Transportation Board. More specifically the agency has jurisdiction over railroad rate, practice, and service issues and rail restructuring transactions, including mergers, line sales, line construction, and line abandonments. The STB also has jurisdiction over certain passenger rail matters, the intercity bus industry, non-energy pipelines, household goods carriers' tariffs, and rate regulation of non-contiguous domestic water transportation (marine freight shipping involving the mainland United States, Hawaii, Alaska, Puerto Rico, and other U.S. territories and possessions). The Act as it pertains to barriers to entry and competition was described. In the Presidential Order of 2021, to further the competitive marketplace regulatory agencies should: (i) consider commencing or continuing rulemaking to strengthen regulations pertaining to reciprocal switching agreements pursuant to 49 U.S.C. 11102(c), if the Chair determines such rulemaking to be in the public interest or necessary to provide competitive rail service; (ii) consider rulemakings pertaining to any other relevant matter of competitive access, including bottleneck rates, interchange commitments, or other matters, consistent with the policies set forth in section 1 of this order.

Air

In the US, the policy framework for scheduled air transportation began with the *Contract Air Mail Act of 1925*. The law was amended and an integration of passenger service and airmail service led to the *Air Mail Act of 1930* under the authority of the postmaster general. Bid rigging and cartelization of 23 air mail carriers in the 1930s led to the *Air Mail Act of 1934*. Regulatory authority was then transferred to the Interstate Commerce Commission (ICC) and the Bureau of Air Commerce (to regulate routes and safety) together with the Federal Aviation Commission ((FAA) - to consider the future of aviation policy). The FAA released its report in 1935, it called for consolidated economic regulation of the aviation sector by a single federal regulator. This led to the *Civil Aeronautics Act of 1938* which created the independent Civil Aeronautics Authority (CAA) as the aviation industry's economic and safety regulator. The CAA grandfathered the 23 cartel air carriers into a new cartel of scheduled "trunk carriers." This "managed competition" framework severely limited competition on routes and pricing between trunk carriers, and prevented entry into the market by new carriers. 1940 saw a reorganization of federal agencies and the Civil Aeronautics Board (CAB). In 1958, the *Federal Aviation Act of 1958* was passed superseding the *Civil Aeronautics Act* and creating the independent Federal Aviation Agency (FAA). In 1966, Congress enacted the *Department of Transportation Act* and renamed the FAA the Federal Aviation Administration. The Civil Aeronautics Act did not regulate charter carrier fares which led to charging lower prices than the regulated CAB fares of trunk carriers. This led to a restriction on Charter carrier flights by the CAB. Attempts to circumvent this restriction because CAB's authority was restricted to interstate air travel led to intrastate carriers. Evidence mounted against the status quo regulatory environment. President Ford appointed John Robson to chair the CAB and entry restriction and some competition between charter and trunk carriers was permitted together with a Report calling for deregulatory reform. In 1975, Senator Edward Kennedy appointed a Committee to conduct an investigation of the CAB which led to a critical report. In 1976, President Jimmy Carter appointed Alfred Kahn as CAB chair which led to pro-competitive regulatory reform and comprehensive airline deregulation legislation and the enactment of the *Airline Deregulation Act of 1978*. "The key regulatory authorities that for four decades had allowed the CAB to fix prices, set routes, and prohibit entry by new competitors were phased out in favor of "maximum reliance on competitive market forces." The few remaining CAB powers, most notably those related to consumer protection, were transferred to the Office of the Secretary of Transportation upon termination of the CAB in 1985."^{cdiii} The initial years after deregulation saw many interstate carriers adopting the low cost model of intrastate carriers. Networks began to be redesigned by the legacy trunk carriers to hub and spoke networks. Intense competition led to bankruptcy and consolidation into three legacy network carriers—American Airlines, Delta Air Lines, and United Airlines—by 2023 from the 11 trunk carriers that existed in 1978.

Road

Interstate highway transport in the US fell under the *1887 Interstate Commerce Act* and was under the jurisdiction of the ICC. But it was not until 1935 that the ICC began to regulate it with the passage of the *Motor Carrier Act of 1935*. Though before this year many States had laws governing weight restrictions on trucks and there was also the Code of Fair Competition. The *Motor Carrier Act of 1935* required new truckers to seek a "certificate of public convenience and necessity". Tariffs had to be filed thirty days before they became effective. Proposed tariffs of carriers' rates had to be reasonable "as to both minimum and maximum." Objections led to an investigation. Economic regulation was extensive (origin and destination, routes, goods, etc.). To exempt carriers from the antitrust laws, in 1948 Congress authorized truckers to fix rates in concert with one another when it enacted, the *Reed-Bulwinkle Act*. This act allowed "rate bureaus" operating under ICC-approved agreements to set rates collectively. Almost all carriers belonged to a rate bureau. ICC regulation reduced competition and made trucking inefficient. The need to reduce regulation was sounded by Presidents John Kennedy, Gerald Ford and Jimmy Carter. In 1980, the Carter administration, enacted the *Motor Carrier Act of 1980* (MCA) limiting the ICC's authority over trucking. The MCA made it significantly easier for a trucker to secure a certificate of public convenience and necessity (fit, willing and able test). The MCA also required the Commission to eliminate most restrictions on commodities that could be carried, on the routes that motor carriers could use, and on the geographical region they could serve. The law authorized truckers to price freely within a "zone of reasonableness," meaning that truckers could increase or decrease rates from current levels by 15 percent without challenge, and encouraged them to make independent rate filings with even larger price changes. Rate bureaus were no longer immune from the antitrust laws. The Act did not completely remove federal oversight and rates had to be filed and applicants had to only show that the new service was "inconsistent with the public convenience and necessity." So, in 1994, the *Trucking Industry Regulatory Reform Act of 1994* ("TIRRA") was passed accelerating the process of promoting competition among interstate motor carriers. In 1995, the ICC was abolished and regulation was under the jurisdiction of the STB in the DOT. The Act abolishing the ICC eliminated various regulatory functions, transferred licensing and certain non-licensing motor carrier functions to the Federal Highway Administration within DOT. This act also effectively deregulated intra-state controls over motor carriers, which had been blocking a fully competitive trucking industry. On January 1, 2008, the STB determined not to renew rate bureau agreements immunity. The STB noted Congressional directives that the STB approve motor carrier collective agreements only if such agreements are in the public interest.

Water

In the early 1900s, US Congress became concerned about the practices of steamship lines. In 1912, a Committee was appointed to investigate the matter chaired by J.W. Alexander which led to the passage of the first shipping law, the US Shipping Act, 1916. It granted ocean carrier liners immunity from the antitrust laws. In 1961, amendments were made to the Act when the 'dual rate system' was challenged. Congress undertook a full scale investigation of the steamship industry legalizing the dual rate system, adding a new 'public interest' test to conference agreements and setting up a new agency the Federal Maritime Commission with the sole responsibility of regulating the maritime industry with increased regulatory powers. After 1961, two practices in the industry that were having an impact on U.S. shipping drew increasing attention: rates of state-controlled carrier; and rebating. To deal with these problems the 1978 Shipping Act and the 1979 Antirebating Act were passed. Domestic and international developments led to the Shipping Act of 1984. The Act now contained a declaration of policy and an extension of the scope of the exemption thereby recognizing international policy, together with the requirement to file tariffs and service contracts with essential terms. Filings went into effect after 45 days (there was no specific need for approval). The act was amended in 1998, 2018 and 2022. The Act as it pertains to barriers to entry and competition has been described earlier.

Pipelines

Pipeline transportation for crude oil was constructed as early as 1874. By the early 1900s Standard Oil controlled eighty percent of world's production and transportation of oil services. To prevent price gauging in the transportation of oil, the *Hepburn Act of 1906* brought oil pipeline regulation under the *Interstate Commerce Act 1887*. The *Hepburn Act of 1906* (34 Stat. 589) began the regulation of interstate oil pipelines, making them common carriers and subject to rate regulation. The Act was an amendment to the existing Interstate Commerce Act (ICA). The ICA does not regulate: construction and abandonment of oil pipelines (entry and exit); Sales and leases of oil pipeline assets; Securities transactions; Provision of non-transportation services; long-term storage and terminalling; and in-line transfer documentation. The responsibility for regulating oil pipeline rates remained with the ICC from 1906 until 1977 and then to the Department of Energy and then to the FERC when the Department of Energy Act was enacted. In May, 1986, the US DOJ issued its report of oil pipeline deregulation with a view to lessen regulatory control over those common carriers. The Report concluded that the majority of the crude oil and oil products pipelines could be safely deregulated, and that all new pipelines should be released from federal regulation.^{cciv} The 1988 Buckeye Pipeline application to use market-based rate alternative led to a final ruling by the FERC that it could obtain "lightheaded regulation" by showing "lack of significant market power in the relevant markets". This led to broadening the rule to all pipelines. In 1992, the *Energy Policy Act* was passed. It: "Grandfathered" existing rates as of October 24, 1992; ordered the FERC to develop "simplified and generally applicable" methodology; and required the FERC to "streamline" procedures for oil pipeline regulation. In 1994, FERC rulemaking adopted indexing methodology to rate making and retained three alternatives to indexing: cost of service rates; market-based rates (where no market power exists); and negotiated rates (if all shippers agree).

Pipeline transportation for natural gas began at a much later than that of oil. Natural gas pipelines are contract carriers unlike oil pipelines which are common carriers. In 1906, Congress specifically excluded interstate natural gas pipelines from the jurisdiction of the *Interstate Commerce Act*. In addition, prior to WW II, there was very little pipeline transportation of natural gas. So there was little regulation of it. The years thereafter saw mergers and the FTC Report of 1935 pointed to potential anti-competitive consequences and concentration. As pipeline construction expanded together with consumption, there was increased political support for regulation. This led to the *Natural Gas Act of 1938* (NGA). Under it, the Federal Power Commission (FPC) (created in 1920) was given jurisdiction over pipeline rates (i.e. the authority to set "just and reasonable rates" for the transmission or sale of natural gas in interstate commerce) and the certification (i.e. "certificate of public convenience and necessity" under Section 7) of new facilities and abandonment. It also permits pipeline companies to charge customers for some of the expenses incurred in pipeline construction and operation. The NGA specified that no new interstate pipeline could be built to deliver natural gas into a market already served by another pipeline. Under, section 3 of the NGA, Federal approval by the Department of Energy for the import and export of natural gas, including liquefied natural gas is required. In 1942, these certification powers were extended to cover any new interstate pipelines. This meant that, in order to build an interstate pipeline, companies must first receive the approval of the FPC. The years that followed saw regulation and the energy crisis. This led to the National Energy Plan which was sent to Congress in April 1977 by the Carter Administration and the subsequent passage of the *Natural Gas Policy Act of 1978*. The Act (containing six titles) is concerned with natural gas prices. In 1977, regulatory functions of the FPC were transferred to the *Federal Energy Regulatory Commission* and to the Department of Energy by the *Department of Energy Organization Act*. In the years thereafter, oversupply, bundling of gas prices with pipeline transportation costs and lack of customers' choice to transport unbundled gas led to the lobby for reduced natural gas prices. In 1985, FERC Order No. 636 began the process of decoupling the bundling and providing open access to the pipeline infrastructure (including information on available capacity on any pipeline and eliminating purchases of natural gas) and in 1989, the *Natural Gas Wellhead Decontrol Act* was passed. By 1992, FERC Order No. 636 completed the final steps towards unbundling by making pipeline unbundling a requirement and by 1993 all regulation over the wellhead prices were eliminated. The FERC reviews filed rates of pipeline companies to ensure that they are just and reasonable and where a pipeline has no competition, it may set rates (using a traditional public utility accounting regulatory format).

EU

Rail

Before regulatory reforms were introduced in the EEC, most railways in European countries were organized as single monopolistic companies controlling both infrastructure and railway services. Regulatory reforms were introduced in four packages in 1991, 2004, 2007 and 2016.^{cciv} The *first package of 1991* consisted of three major directives. It was to facilitate the adoption of the Community railways to the needs of the Single Market and to increase their efficiency by: 1. ensuring the management independence of railway undertakings; 2. separating the management of railway operation and infrastructure from the provision of railway transport services, separation of accounts being compulsory and organizational or institutional separation being optional; 3. improving the financial structure of undertakings; and 4. ensuring access to the networks of Member states for international groupings of railway undertakings and for railway undertakings engaged in the international combined transport of goods (EC 1991/440). In addition, directive 2001/13 sets out framework and guidelines for countries in issuing licenses and directive 2001/14 set guidelines for railway capacity allocation and track access charges. The *second package of 2004* consisted of four major EC Directives related to: safety (EC 2004/49); harmonized interoperability requirements (EC 2004/50); access for freight services (EC 2004/51); and European

Railway Agency to coordinate safety and interoperability (EC 881/2004). The *third package of 2007* consisted of four major EC Directives related to: international rail passenger services including cabotage (EC 2007/58); harmonized licences for train drivers (EC 2007/59); open access and subsidized public service (EC 1370/2007); and rail passenger rights (EC 1370/2007). The *fourth package of 2016* consisted of three major EC Directives related to: domestic rail passenger service to competitive tendering (EC 2016/2238); fairer access to operators to infrastructure (EC 2016/3370); and safety certification harmonization to improve interoperability and get innovative new rolling stock on the rails faster (EC 2016/797) which has been approved.

Air

Regulatory reforms were introduced in three packages in 1987, 1990 and 1993. In addition, measures have been adopted to apply the EC Competition Law to air transport services. The *first package of 1987* consisted of one directive on fares and one council decision on capacity and access. The major features were: economic fares were subject to double approval and two discount zones were established (EEC 87/601). In addition, constraints on capacity, multiple designation and entry were relaxed (EEC 87-602).

The *second package of 1990* consisted of one council regulation on fares and one council decision on access and capacity. The major features were: automatic approval in simpler zones (EEC 2342-90) and relaxation on access and capacity for example removal of constraints (EEC 2342-90). The *third package of 1993* consisted of a proposal to further liberalize access measures provided in the first and second packages and removed all remaining commercial restrictions on competition on airlines operating in the EU (EEC2407/920 and (EEC 2408/92).^{cdvi} The *third package* permits Community air carrier to freely set fares for passengers and cargo and to have access any intra-EU route without any permit or authorisation. An important element of the 1987 package was the adoption of two Council Regulations. The first pertained to the application of rules on competition to undertakings in the air transport sector. This regulation which came into force on January 1, 1988 lays down detailed rules for the application of Articles 85 and 86 of the Treaty of Rome to air transport. The regulation also provides for: exceptions for certain technical agreements; procedures on complaints and the conveyance of the results of such procedures; powers of the Commission and the way the powers of investigation and sanction are to be conferred; and the review of the Commission decision. The second regulation was intended to create greater legal clarity concerning EC competition policy treatment of certain types of agreements used in the air travel sector. It outlines a number of types of agreements that are not considered to be in violation of EC competition law.

Common rules have since been adopted to ensure the proper functioning of the single aviation market, namely: (1) a level playing field and (2) a high and uniform level of protection for passengers. To accomplish the first: the competition rules will be applied; the Commissioner is empowered to investigate and take action where non-EU carriers face discriminatory practices and subsidies: the allocation to airlines of access must be equitable, non-discriminatory and transparent to be made by an independent slot coordinator; the market for ground handling service is being gradually opened to competition; the basic principles for levying of airport charges paid by carriers for airport facilities and services has been laid down; and fair access to distribution networks and prevent them from influencing consumer choice is in force.^{cdvii} To accomplish the second: common safety rules now apply; security requirements at EU ports have been harmonized; and common rules to protect air passenger rights are in place.

Road

Historically, the freight transport market in the Europe was strictly regulated. Regulations consisted of fixing tariffs, restricting entry (licenses, safety, etc.), qualifying requirements (capital, reputation, insurance, etc.), working conditions (driving time, etc.) and operating requirements (weights, measures, speed, access, etc.). To create a single EU market, these strict regulations had to be removed. A 1985 Court of Justice decision on road haulage expedited the liberalization process. In March 1992, a regulation was passed for uniform arrangements for access to the market by elimination of restrictions on service providers and a carriage authorisation scheme.^{cdlviii} Thereafter, the process of liberalization that occurred is described under two headings: 1. Road haulage and cabotage; and 2. Road Passenger Service.^{cdlix}

1. Road haulage (international services for hire or reward): As of January 1, 1993, the need for bilateral agreements (subject to restrictions including quotas) between two Member States or through one or more Member States for carriage of goods by road was abolished with Community authorizations. The system applied to a Member State and non-EU country if an agreement existed (EEC No. 881/92). As part of the 2009 Road Package, this regulation was replaced (EEC No. 1071/2009). This regulation introduced stricter rules on admission to the road haulage business and sought to modernise the road transport industry's image. It established four qualitative criteria for becoming a road haulage operator: good repute, financial standing, professional competence, and having an effective and stable establishment in a Member State. To deal with non-EU national drivers, a driver attestation was established (EC No.484/2002) and replaced (EC No. 1072/2009) and then amended (EU No. 2020/1055) in 2020. In May 2017, the EC proposed 'Europe on the Move' legislative initiative ([COM\(2017\) 0281](#)) revising the previous regulations. It aimed at modernizing the rules and ensuring the proper function of a single market. It was adopted in July 2020 providing a legal framework for rules applicable to cabotage and international transport operations, excluding transit and bilateral operations (EU 2020/1055). On May 16, 2022, leasing of vehicles (without drivers) (Directive 2006/1/EC) was revised to ensure equal access to hired vehicles (COM (2017) 0282). On 31 July 2020, a regulation on electronic freight transport information was implemented for the electronic exchange of regulatory information and for an appropriate authority ((EU) 2020/1056). On 13 Dec. 2022, an EU-Ukraine agreement was enacted on the carriage of freight by road providing international driver permit exemptions ([Decision 2022/2435](#)).

Cabotage: On 25 October 1993, a regulation was adopted to cover 'cabotage' (EEC No. 3118/93). It allowed carriers with Community authorisation issued by a Member State to provide road haulage services within other Member States on the condition that they were provided on a temporary basis. In 2009, a more restrictive formula for cabotage was established (allowing up to three cabotage operations within the seven days following an international journey) (EC No. 1072/2009). These provisions on cabotage have applied since 14 May 2010 but, as mentioned above, are now amended by [Regulation \(EU\) 2020/1055](#). Regulation (EC) No 1072/2009 further consolidated and harmonised rules on cabotage.^{cdlx} In particular, it merged Council Regulations ([EEC No 881/92](#) and ([EEC\) No 3118/93](#) and repealed [Directive 2006/94/EC](#) (on the establishment of common rules for certain types of carriage of goods by road), which did away with the legal uncertainty surrounding carriers.

2. Road Passenger Service (international bus and coach passenger): Progress in opening up the market for passenger transport services has been slower than for road haulage. In March 1992, international bus and coach passenger services (9 passengers) were permitted by a EU transport company between Member States (EEC No. 684/92). In December 1992, a Community licence was introduced for for-hire or reward (EC No. 11/98). In December 1997, cabotage operations were permitted for: occasional or special regular services for specified categories of passengers covered by a contract (EC No. 12/98); and regular international service (not end of line) on a temporary basis only. In October 2009, international carriage of passengers rules by road (coach and bus services) within the territory of the EU and the conditions under which non-resident carriers may operate national transport services within a Member State were clarified and simplified (EC No. 1073/2009 – merging EEC

No. 684/92 and EC No. 12/98). It confirms the principle of the free provision of services, sets out the conditions for issuing and withdrawing Community licences (periods of validity, rules for their use and the layout licence and certified copies). Though cabotage services were permitted, it was not to be the main aim of the transport service i.e. it was subsequent to a regular international service). EC No. 1073/2009 was amended (EC No. 561/2006) and complemented as regards to documents needed for the international carriage of passengers by coach and bus (EU No. 361/2014). In 2017, minimum requirements on maximum daily and weekly driving times, minimum breaks and daily and weekly rest periods was amended (in EC No. 561/2006) together with positioning by means of tachographs' (in EC No. 165/2014). In May 2023, the Commission published a proposal slightly modifying the rules on breaks and daily rest periods laid down in Regulation (EC) 561/2006 for the 'occasional passenger services' sub-sector, normally associated with coach tourism ([COM\(2023\)0256](#)). All three major regulations (EC) No 1071/2009, (EC) No 1072/2009, and (EC) No 1073/2009 have been fully applied since December 2011.

Water

In 1986, the European Union recognizing the stabilizing influence of conferences while implicitly establishing the principle of block exemption passed its first regulation laying down detailed rules which granted shipping conferences exemption from the competition provisions of Articles 85 and 86 of the Treaty of Rome (Council Regulation No. 4056/86). The key elements contained in Section I of the Regulation were: 1. Exemptions to technical, price fixing and transport users and conferences from certain Articles of the Treaty of Rome; 2. Restrictions on the Agreements; 3. Monitoring of the Agreements; and 4. Conflicts with international law. An OECD workshop and Report led to a review of the regulation. Based on further studies and reports which called for a repeal of the regulation on December 14, 2005, the European Commission called for an abolition of the liner conference exemption. In 2006, it adopted a regulation which repealed the regulation. But the repeal was not total, it only applied to price agreements of shipping conferences. Non-rate agreements (eg. consortia agreements) continued to enjoy the exemption.^{cckxi}

In view of the above and in light of the emergence of consortia agreements, in 1995 the European Council granted exemption to consortia agreements (CR 870/95). The key elements of the Regulation were: 1. the exempted agreements cover: joint operation of shipping liner services; temporary capacity agreements; joint operation or use of port terminals and related services; participation in one or more of the following pools: tonnage, revenue or net revenue; joint voting regarding activities; joint market structure/joint bills of lading; and any other ancillary activities. The exemption does not apply to non utilization of capacity. 2. the conditions for exemptions are: a. evidence of effective price competition between consortia members (i.e. independent action, or individual service contracts, or competition from non-consortia); b. market share of less than 30% for members within a consortium or market share of up to 35% for carriers not members of a consortium; c. market share of consortium members between 30% or 35% and 50% must notify the Commission; d. the right of withdrawal without penalty on 6 months notice, after an initial period of 18/30 months; e. own service arrangements for individual service contract; and f. independent marketing by consortium members. g. no detriment to EC ports/users/carriers. 3. the exemption may be withdrawn if the Commission finds: a. absence of competition from outside; b. failure to comply with other obligations (consultation with users), incompatible with Article 86, that result from an arbitration award.

Before the expiry of the above regulation in 2000, the Council adopted Regulation 823/2000 to clarify the applicability of the regulation to more than one trade lane, substituting market share for trade share which narrowed the scope of the exemption and defined ancillary services. In 2005, it passed a regulation to extend the notice period for withdrawal, add a non withdrawal clause for new investments and also added a new requirement of individual confidential contracts as an indication of effective competition (CR 611/2005). In 2009, the regulation was revised pertaining: to calculation of market share to include all consortia vessels in and out of the consortia; to increase the notice period for withdrawal; and to include all vessels not just container vessels in the exemption (Regulation 906/2009). Before the regulation was to expire in 2015 and 2018 and after consultation, it extended the regulation to 2020 and then to April 25, 2024 (CR 697/2014 and CR 2020/436). In 2022, the Commission launched a public consultation and conducted an evaluation of the Consortia Block Exemption Regulation and published its Staff Working Document. It concluded "Overall, the CBER does not appear to be fit for its purpose any more, as it does not fulfil the criteria of effectiveness, efficiency and EU added value."^{cckxii} The Commission therefore decided not to extend the consortia legislation beyond April 24, 2024. Now Articles 101 and 102 of the Treaty on the Functioning of the European Union (TFEU) (formerly Articles 81 and 82 or Articles 85 and 86 of the Treaty of Rome) are now fully applicable to the ocean transport sector.

Pipelines

State owned monopolies dominate the gas subsector, these monopolies had exclusive rights in importing and exporting natural gas. Regulatory reforms were introduced in four packages in 1991, 2004, 2007 and 2016. The *first directive of 1989* adopted on October 29 1990, pertains to the liberalization of intra-community transfrontier trade in gas and electricity ((Com 89) 0334 and 0336). The *second Directive of 1989* adopted on 29 June 1990 pertains to price transparency to industrial end-users ((Com 89) 0332).

The Directive on gas transit was the first stage in facilitating entry into the natural gas market. This Directive would provide for the right of access to transmission through high pressure grids, and thus addresses the restrictions to the free flow of natural gas over national borders which may prevent normal commercial arrangements between interested parties. The Directive contains plans for enforcement of the right of transit and a representative body was to be set up for enforcing the plan. The gas market will be made accessible to third parties in two additional stages. The second stage beginning on January 1, 1993 will include the limited introduction of a system of third party access. Large industrial energy consumers will be granted access to the network. The third stage starting on January 1, 1996 will extend the system of third party access to the network based on the experience of the first stage. The measures would increase the potential for liberalization of trade and competition, introduce competition and open up the market to new distributors, permit fair and non-discriminatory competition through unbundling of accounts of production, transmission and distribution, and permit consumers to choose their suppliers and to benefit from competition.

The Directive on transparency of gas prices was the first stage, to improve transparency on prices charged to industrial end-users. It obliges gas distribution companies to send price information to the Commission every six months. Prices will be published by the Statistical Office and made available to actual and potential consumers without breaching the confidentiality of contracts. This would promote competition not only between suppliers of a particular type of gas but also between suppliers of various types of energy. When energy prices are not transparent, it can cover up the anti-competitive practices of undertakings in breach of the Community rules on competition. At the second stage, the Commission was to consider additional price transparency measures with regard to large gas consumers in the Community.

After the formation of the EU, five energy packages were passed.^{cckxiii} The *first energy package* of gas 1998 introduced a liberalization of national energy markets. Member States could elect to require the owners of gas pipelines to allow third parties to use their pipelines under regulated conditions or to require them to negotiate individual contracts with third parties. Accounting and unbundling of national transmission system operators (TSOs) were required (Directive 98/30/EC).

The *second* energy package adopted in 2003 allowed industrial and domestic consumers to choose their own gas suppliers from a wider range of competitors. It required the Member States to create national regulatory agencies (NRAs) that are independent of the electricity industry. The Directive also introduced a requirement that transmission functions should be legally unbundled from other functions (Directive 2003/55/EC).

The *third* energy package adopted in 2009 introduced rules on ownership separation of energy supply and generation from transmission networks (unbundling of sale and operation), new requirements for independent regulators, a European agency for the cooperation of national energy regulators (ACER), a national regulatory authority (NRA) for each member state, European networks for transmission system operators for gas (ENTSO-G) and enhanced consumers' rights in retail markets. It provides for a specific certification procedure for the ownership/control of European transmission system operators by a third-country person or persons. It also included conditions for access to the network for cross-border exchanges and Regulation on conditions for access to the natural gas transmission networks (Directive 2009/73/EC, (EC) No 713/2009, (EC) No 714/2009, and (EC) No 715/2009).

The *fourth* energy package adopted in 2019 introduced new rules for renewable energy, consumer incentives and limits on subsidies to power plants, such as capacity mechanisms. It required the preparation of risk-mitigation plans for electricity crises and increased ACER's competences for cross-border cooperation. In April 2019, non-EU members pipelines were allowed into the EU and they have to comply with rules applicable to EU members (accessibility, transparency, separation of infrastructure and supply). The Commission will be allowed to grant exemption to certain agreements on EU gas lines with non EU countries under certain conditions.

The *fifth* energy package adopted in 2024, 'Fit For 55', aligns the Union's energy targets with its new net-zero climate ambitions and extends the gas package to hydrogen.

Australia

Rail

The history of railways in Australia can be traced to the 1830s where horses were used on rails but it was not until 1854 that steam powered locomotives made its appearance. The railways developed independently in each of the major states and territories of Australia^{cclxxiv} and ownership shifted from private to state government control due to financial difficulties. To prevent abuse of monopoly, legislation was passed in the Australian states requiring railways to fulfil their common carrier obligations. Some of the State legislation also restricted price discrimination. Rates were regulated and fall into three categories: special rates (generally not published); by-law rates (maximum rates that are published); and contract rates (confidential). Intersystem rates are published in the Railways of Australia Goods Rate Book and may be negotiated by shipper groups. The freight rate legislation is covered extensively in the: *Victoria Transport Act 1983*^{cclxxv}; *Government Railways Act of Western Australia*^{cclxxvi}; *New South Wales Government Railways Act, 1912* and *New South Wales Transport Authorities Act 1980, No 103*^{cclxxvii}; *Queensland Railways Act 1914-1982*^{cclxxviii}, and *Australian National Railway Act of 1917*^{cclxxix} and *Australian National Railways Commission Act 1983*^{cclxxx}.

Even when the Commonwealth of Australia was formed in 1901, the regulation of Australian railways remained under the control of the state-owned operators and their respective state laws which are not only diverse but also complex. The Commonwealth constitution permitted the acquisition, construction and extension of state railways with the consent of the State.^{cclxxxi} In the 1950s and 1960s, railways were viewed as public services and operated on non-commercial grounds. Charges were set by government and revenue shortfalls developed and deficits grew. In the 1970s, the Australian National Railways Commission (ANRC) was established.

The National Competition Policy (NCP) of 1995 set the stage for three types of reforms from the mid-1990s: a. a program of vertical separation, commercialisation and privatisation; b. the establishment of a national access regime; and c. the National Rail Reform Agreement (reducing costs, standardising practices and conditions). As a result of the reforms, by 1997 ANRC operations were taken by the National Railways Commission (NRC). It sold its 'above rail operations' (i.e. running trains and hauling freight) to private operators and transferred its 'below rail operations' (i.e. funding and managing rail infrastructure) to the Australian government owned ARTC (Australian Rail Track Corporation).^{cclxxxii} State governments did the same with a few exceptions (i.e. above-rail freight operations were sold to private operators and below-rail freight networks leased long term to private track managers). The above NCP reforms; the replacement of the NRTC [National Road Transport Commission] with the NTC [National Transport Commission] to encompass rail and intermodal regulation; and the Intergovernmental Agreement on rail safety set the stage for a more nationally-consistent rail safety and operational regulation in the mid-1990s.

The stage for unification by all states was set when the five mainland state capitals were linked with a uniform width track (as there were previously three tracks – narrow, standard and broad) and the passage and national legislation in 2012 was passed and adopted to provide for rail safety and the rail safety regulator. However, a multiplicity of access regimes and overlapping regulatory bodies and standards exist for below rail operations which are considered natural monopolies.^{cclxxxiv} Access regimes in Australia, South Australia, Western Australia, New South Wales, Queensland and Victoria have been implemented pursuant to various laws.^{cclxxxv} Access charges or pricing is set or determined by commercial negotiations within floor and ceiling limits using certain guidelines (subject to review) and in the case of Victoria by revenue cap regulation.^{cclxxxvi}

Air

The history of commercial flying in Australia began in 1920 with the formation of Qantas, which became its flag carrier and the first legislation regulating air transport was the Air Navigation Act 1920.^{cclxxxvii} In 1936, Australian National Airways (ANA) a private company was established and became the predominant domestic carrier from the mid-1930. Thereafter, government policy and intervention became apparent.

In August 1945, after WWII, the Chifley Government viewed air transport as a public service and was of the view that if air transport was becoming a monopoly, then it should be one owned by the public and working in the public interest. The Australian parliament passed the Australian National Airways Bill, which set up the Australian National Airways Commission (ANAC) and charged it with the task of reconstructing the nation's air transport industry. The bill declared that licences of private operators would lapse for those routes that were adequately serviced by the national carrier. A legal challenge ended up with a High Court ruling that the Commonwealth did not have the power to prevent the issue of airline licences to private companies. The government could set up an airline if it wished, but it could not legislate a monopoly. The bill was amended to remove the monopoly provisions. ANAC formed Trans Australia Airlines (TAA) in 1946, and nationalised Qantas in 1947. Qantas's domestic operations, in Queensland, were transferred to TAA, while Qantas continued as an international airline. In 1952, a 'two airlines policy' was formally established by the Menzies Government to ensure the viability of both domestic airlines (ANA and

TAA) under the 1952 Civil Aviation Agreement. Under the policy, only two airlines were allowed to operate flights between state capital cities and major regional city airports. It was a legal barrier to new entrants restricting inter capital services to the two major domestic carriers. It ensured that they carried approximately the same number of passengers, charged the same fares and had similar fleet sizes and equipment. In 1957, ANA was acquired by Ansett Transport Industries which led to the 1957 Civil Aviation Agreement, which allowed only TAA and Ansett Airways, as parties to the agreement, to operate trunk route services and the duopoly continued for the next four decades. While stability in services was achieved, the policy was criticized as there was no competition and fares on the same routes were the same. It led to changes in the Agreement in 1972 but debate continued. A package of changes in 1981 and the 1981 Airlines Agreement was introduced to increase competition within the industry while maintaining the two airlines policy as it applied to trunk line networks. In May 1985, the economic regulation of interstate aviation was addressed by the Independent Review of Economic Regulation of Domestic Aviation, commissioned by the Hawke Government in 1985. It was critical of the existing arrangements and indicated its shortcomings which led to the October 1987 Government notice that it would terminate the Airlines Agreement in October 1990 and the industry would be subject to competitive rules applicable to industry generally. The objectives of the government were: to be responsive to consumer needs; to provide a wider range of fares and services; to increase competition and pricing flexibility; and to maintain its safety record. The end of domestic economic regulation meant the end of controls on: passenger capacity (previously equally divided between the two lines on competitive trunk routes); fares (previously all fares for scheduled passenger services were set by the Independent Air Fares Committee); market entry of domestic operators on trunk routes; and aircraft importation.

In 1986, TAA was renamed Australian Airlines (AA) and in September 1992, AA merged with Qantas and was later privatised (1993-7). In August 2001, Virgin Airlines entered the market as Virgin Blue and a month later Ansett collapsed. Both Qantas and Virgin launched low-cost subsidiaries: Jetstar by Qantas and Tigerair Australia by Virgin (which was acquired).

In 1988, the Australian Government formed the Federal Airports Corporation (FAC), placing 22 airports around the nation under its operational control. In April 1994, the Government announced that all airports operated by FAC would be privatised in several phases. In December 2003, the Government ceased to own and operate airports and the big airports are now owned and operated privately (strictly, under long term leases).

Road

The history of road regulation in Australia begins in their states. These states managed their own trucking and passenger regulations. The trucking regulations led to inconsistencies and complexities at border crossings and the passenger regulations led to fragmentation and limited enforcement. The Commonwealth Parliament does not possess powers to legislate with respect to “transport” under section 51 of the Australian Constitution as it is under the jurisdiction of the states.

The rise of trucking from 1920 onwards led to the road maintenance tax in 1950 which truckers deemed unfair and resorted to underpaying or avoiding it altogether. In addition to the tax, other suffocating restrictions were put into place such as low speed limits, axle-weight limits, and limited driving hours. Despite these restrictions, the number of trucks on the roads continued to grow from the 1950s to the 1970s. Then in 1979, truckers staged a major protest at Razorback Mountain in New South Wales referred to as the ‘Razorback Blockade’ against unfair road maintenance taxes which pressed the government to address industry concerns and implement reforms. It led to the abolition of the road maintenance taxes. In 1989, the Interstate Commission published its report recommending more stringent requirements for the trucking business which were opposed by the Australian Trucking Association.^{cclxxviii}

In 1992, the National Transport Commission was formed to develop and oversee national transport regulations including heavy vehicle standards aimed at creating a unified system across Australia. It developed nonbinding model laws but most states used their own laws. This fragmented regulatory system became more problematic as time passed. In 2011, National Transport Commission indicated that cross-border movements have become increasingly complex and operators are not only required to comply with multiple regulatory regimes, but to also bear the overlapping costs under each regime and become more inefficient. It discouraged expansion into interstate markets. So, in 2012, the Heavy Vehicle National Law (HVNL) was passed unifying heavy vehicle regulations across all states and territories, creating a single set of rules for truck operations. The HVNL covered aspects like vehicle design standards, driver hours, load limits and safety measures aimed at improving road safety, industry efficiency and set up the independent national regulator known as the National Heavy Vehicle Regulator (NHVR). The HVNL was adopted by most states except Western Australia and Northern Territories.

Regulatory reforms have concentrated on harmonization and regulation of heavy trucking vehicles. To operate a truck [heavy vehicles or Restricted Access Vehicles (RAVs) and Oversize Overmass (OSOM) vehicles] a permit is required and applications had to be made to three separate road managers (State, Territory and local) but under the HVNL an application had to be made only to the NHVR (who liaises with the road managers) which reduced time and costs.^{cclxxix} The key challenges with the NHVL^{cclxxx} are: RAV^{cclxxxi}; HML (Higher Mass Limits)^{cclxxxii} and IAP (Intelligent Access Program), and OSOM.^{cclxxxiii}

The road passenger regulations of taxi and bus services are regulated by various states. The taxis industry was highly deregulated before 1999. Licenses were required, their numbers controlled, fares regulated via a taximeter or maximum fares together with quality and safety.^{cclxxxiv} These barriers to entry limited competition, so the federal government and states entered into the Competition Principles Agreement of April 1995 requiring a review of legislation by 2000. The Productivity Commission released its paper in 1999, recommending a framework for review of issues by states and indicating that a removal of restrictions would bring benefits.^{cclxxxv} Thereafter, the process of deregulation of taxis in each state began but its scope in each state varied. Nonetheless, it generally involved removing restrictions on taxi-licensing and legalizing ride-sharing services with some states offering to buy-back taxi plates. Northern Territories was the first to adopt deregulation of taxi and minibuses and buy-backs in 1999 followed by New South Wales in 2015^{cclxxxvi} legalizing ride-sharing and modernizing taxi regulation aimed to improve competition, safety and opportunities for drivers^{cclxxxvii} and then by Victoria in 2016 legalizing ride-sharing with buy-backs. Maximum fare regulations occurs in all metropolitan areas.^{cclxxxviii}

In bus services, deregulation took the form of permitting private companies to operate on various routes to create a more competitive local market for bus operations in the late 1980s. Deregulation varies from state to state. In 1987-8, New South Wales deregulated the long distance bus industry removing price and route restrictions.

Water

In 1930, a specific exemption was granted to a conference from the provisions of the *Australian Industries Preservation Act*. It required parties to agreements to show that this agreement was not a detriment of the public and was not unreasonable. It was not until the Trade Practices Act (TPA) was introduced that a specific part XA was introduced providing exemptions from all of the competition rules in Part IV of the TPA for all registered conference agreements in return for undertakings to enter into negotiations and provide information to the designated shippers Group.

In 1972, an amendment to the TPA provided designation by the Minister of a single body to negotiate with ship owners in all outward liner trades. In 1974, Part X of the Act was extended to cover a wider range of anti-competitive practices (contracts, arrangements or understandings in restraint of trade or commerce; monopolization; exclusive dealing; resale price maintenance; price discrimination; and mergers) in Part IV. This meant that the exemption granted to conferences became more extensive. In 1989, the Act was amended with a new Part X. Recognizing the importance of overseas trade, the possibility of conflict with laws of other maritime countries and the need to protect Australian shipowner interests, the amendments introduced an object clause together with safeguards against abuse of conference power with a view to encouraging a more competitive environment. In 2000, Part X contained 180 amendments. The Minister for Transport and Regional Services, and the ACCC were given increased powers to deal with concerns that may arise from the operation of discussion agreements and closed conferences. The exemption was extended to include Australian importers in negotiating with conferences; and to a stevedoring operator and an ocean carrier. Collective agreement on freight rate charges were not permitted unless done under the Part X exemptions. In 2011, the Australian government amended the Trade Practices Act 1974 (Cth) (TPA) and renamed the Act as the Competition and Consumer Act 2010 (CCA). Part X of the TPA was carried over into the CCA. In 2013, the Liberal-National Party Coalition Government of Tony Abbott (Abbott Government) commissioned an independent 'root and branch' review of Australia's competition laws and policy in recognition of the fact that the Australian economy has changed markedly since the last major review of competition policy in 1993. In 2017, the Australian Parliament passed the *Competition and Consumer Amendment (Misuse of Market Power) Act 2017* and the *Competition and Consumer Amendment*. The revisions to the latter contained provision to issue class exemptions for conference agreements based on the recommendation of the Harper Review. On December 21, 2022, in accordance with section 11 of the Productivity Commission Act 1998, the Productivity Commission released its final report and made one recommendation: repeal Part X.

Pipelines

Pipeline transportation in energy in Australia made its footprint in the 1960s and is new compared to the more conventional forms of transportation. The first oil pipeline was the Moonie to Brisbane pipeline that was completed in 1964 (306 kilometres long). The first gas pipeline was the Roma to Brisbane pipeline that began operation in 1969 (440 kilometres long). The 1960s and 1970s witnessed a significant growth in the pipeline transportation. By 2006, Australia's five geographic areas were served by sixteen main gas pipelines.^{ccxxxix}

The Commonwealth, States and Northern Territory had their own legislation. "The Pipeline legislation provides that no one shall construct and operate a petroleum pipeline without a licence [with the exception of Queensland]. Each Act provides a comprehensive scheme regulating, inter alia, applications for licences, the rights and duties of licensees, the term of the licence, renewals, variations of terms and conditions, acquisition of land, fees, security, registration and dealings with pipeline licences. They also make specific provision for access to pipelines by third party producers."^{ccxc} Legislative and regulatory barriers restricted interconnection of pipeline systems across state borders and thereby restricted interstate trade in natural gas.

Before the early 1990s, natural gas services were operated under separate state-based systems. The governments owned the transmission and distribution businesses. To revitalize economies, a policy of privatisation and deregulation was adopted by many countries in the 1990s, including Australia. The introduction of competition into the competitive segments of the gas industry called for a restructuring of the industry. The governments first separated the vertical integrated transmission and distribution businesses (corporatisation). Then they privatized both segments while deciding to regulate transmission (i.e. a natural monopoly and non competitive market) while opening the distribution business (i.e. a competitive market) to price competition. The governments simultaneously introduced reforms in 1991 which were subsequently put into the National Competition Policy program in 1995. In 1997, the Gas Code was implemented and in November 1997, the State and Federal Governments signed the Natural Gas Pipelines Third Party Access Agreement which set out the terms and conditions under which deregulation was to occur. In 2004, the Gas Code and Gas Law were replaced by the National Gas Law (NGL) and National Gas Rules (NGR) as a result of reforms agreed to in the Australian Energy Market Agreement 2004-2006.^{ccxc} The two acts provide the framework for the regulation of gas pipeline services. From 1 July 2008, the Australian Energy Regulator (AER) took over responsibility for economic regulation of the gas distribution and transmission sectors.

Regulation of pipelines in Australia is split between two bodies: 1. The Economic Regulation Authority, the regulator in Western Australia. It's role in the regulation of gas supply transmission is to: a. Regulate third party access to three fully regulated gas pipelines i.e. prices and terms and conditions to transport and receive gas. b. Administer light regulation to the Kalgoorlie to Kambalda Pipeline. c. Enforce and monitor compliance with the non-scheme gas pipeline information disclosure and arbitration framework.^{ccxcii} 2. The Australian Energy Regulator (AER), the regulator in states and territories. It uses three types of regulation: a. Full regulation – i.e. the setting access (usage) prices.^{ccxciii} b. Light regulation – i.e. a commercial negotiation approach supported by mandatory information disclosure.^{ccxciv} c. Part 23 Regulation – i.e. a free approach to set own prices and terms and conditions with disclosure of certain financial, service and access information.^{ccxcv} The type of regulation to be applied and the classification of natural gas pipeline is determined by the National Competition Council (NCC).^{ccxcvi}

On March 2, 2023, the gas pipeline reforms to the National Gas Law and the National Gas Rules commenced making a number of changes to the way that gas pipelines are regulated in Australia. These reforms are intended to deliver a simpler regulatory framework which continues to support the safe, reliable and efficient use of, and investment in, gas pipelines, while also: 1. posing a more effective constraint on exercises of market power by pipeline service providers; 2. facilitating better access to pipelines that would not otherwise provide such access, while minimising the cost and risks associated with regulation where there are no third party users; 3. providing greater support for commercial negotiations between shippers and service providers; and 4. streamlining governance arrangements.

New Zealand

Rail

1863 marks the start of steam railways in New Zealand.^{ccxcvii} The provincial governments constructed the first public railway, Ferrymead Railway, running the short distance between Christchurch and the wharf at Ferrymead and built by the Canterbury Provincial Railways. The abolition of the provinces in 1876 led to the railways thereafter being controlled by the central government under the Public works Department. In 1869, Julius Vogel, the premier and colonial treasurer, focussed on building a nationwide network linking major centres. Thereafter the *Railway Act of 1870* was passed and construction of railways began. In 1880, the New Zealand Government Railways or New Zealand Railways Department under the Minister of Railways a member of the Cabinet was responsible for the railways.^{ccxcviii}

Light industrial railways sprang up connecting to the national network as it expanded. A few private railways were built in the 1880s, such as the New Zealand Midland Railway Company, Wellington and Manawatu Railway Company, Waimea Plains Railway, and Thames Valley and Rotorua Railway Company. In 1908, the Wellington and Manawatu Railway Company was nationalized and the rest were also purchased. In the South Island, the first major route – Christchurch - Dunedin – Invercargill – was completed in 1878-9 and in the North Island, the line – linking Wellington – Auckland by the North Island Main Trunk was completed in 1908. The networks of the North and South Islands were independent of one another. At the network's peak in 1952, about 100 branch lines were operating. Large-scale closures of branch railway lines began in the 1960s and 1970s.

Railway tariff for goods and passenger fares were prescribed in detail by various regulations for different types of goods, parcels and for passengers. In 1930, the Royal Commission on Rail and Road Competition released its report which had a profound effect on developments thereafter.^{ccxcix} It noted the decline in revenues of the railways and recommended an increase in fares of 1/2d per shilling on passenger fares and an increase in rates on concession tickets and an increase in rates or/and conditions of carriage on lower rated commodities. It paved the way for the *Transport Licensing Act 1931* which protected the railways from road transport competition, established price stability and bought a period of prosperity to the railways.^{ccc} The act was repealed in 1982 paving the way for land deregulation and competition in rail.

The 1970s to early 1980s witnessed an ongoing discussion on the merits of deregulation till the passage the Transport Amendment Act in 1983. Despite the fact that the 1977 abolition of the old 40-mile limit, allowing road transport to compete with rail over a new limit of 150 kilometres, created competition on key routes like Auckland-Hamilton, Hamilton-Tauranga, Wellington-Palmerston North and Christchurch-Ashburton, the railways proposed expanding commercial services on grounds that it provided a social benefit and cutting those services could not be justified. Eventually, the Railways objections were dismissed and the road transport distance restriction was abolished completely in 1983. The Act altered the licensing system for transportation, removed government fare-setting and allowed coach companies to operate without having to prove that a service was needed.^{ccci}

The deregulation of land transport saw the end of rail protection in 1983.^{ccci} The Railway department became the New Zealand Railways Corporation. It embarked on a major restructuring, laying off thousands of staff and cutting unprofitable services. “There was a substantial rationalisation of freight facilities; many stations and smaller yards were closed and freight train services were sped up, increased in length and made heavier, with the removal of guard's vans in 1987 and the gradual elimination of older rolling stock, particularly four-wheeled wagons.”

In 1987, the Railways Corporation became a state-owned enterprise and its board and management agreed that private sector ownership was the best way to make the business more successful. The 1990 decision to consolidate the land-holding function into a corporation and to create a Government-owned, limited liability company, New Zealand Rail Ltd., to run the business, was widely interpreted as a precursor to sale. In September 1993, the company was sold to Tranz Rail Holdings and became Tranz Rail Ltd in 1995. Faced with financial difficulties, Tranz Rail Ltd. begins negotiations with the government in 1992 on selling it.

By 2008, rail becomes a government activity once more, with both the tracks and rail services owned and managed by the New Zealand Rail Corporation through its business arms, ONTRACK and KiwiRail. After more than 25 years of policy shifts and U-turns, rail in New Zealand today is still far from ‘a profit-making concern’ and the need for significant government subsidies remains. There are conflicting views on rail’s potential to contribute to New Zealand’s economic development and environmental goals. Debate continues over how best to fund and run a railway ‘in the true interests’ of New Zealand.^{ccci}

Air

The 1920s saw the birth of commercial aviation in New Zealand. The start of a few operations were short-lived until the first major company Union Airways of New Zealand was formed from the amalgamation of Coast Airways and Cook Strait Airways in 1936. It began by serving Palmerston North and Dunedin via Blenheim and Christchurch and flying between Auckland, New Plymouth, Palmerston North, Wellington, Christchurch and Dunedin in 1939. In 1940, Tasman Empire Airways Limited (TEAL) was established, jointly owned by Union Airways, Imperial Airways, Qantas Empire Airways, and the New Zealand Government and began scheduled services. It marked the start of the government’s involvement in air service which was re-enforced in 1947 when Union Airways and a number of other smaller operators were nationalized by the New Zealand government forming the National Airways Corporation (NAC). The labour government believed it was the responsibility of the government to provide essential services. In 1953, the Australian and New Zealand governments each bought 50% of TEAL and in 1961 New Zealand bought the Australian government’s 50% and renamed it Air New Zealand in 1965. In 1978, NAC, New Zealand’s domestic airline, was merged with Air New Zealand.

Regulation of civil aviation was provided for by an Act of Parliament in 1919, which provided for registration of aircraft and licensing of pilots, flying schools, and personnel, as well as the registration of aircraft, and other matters. Aero clubs became active from the late 1920s, and the government provided some training aircraft and subsidies. In 1934, licensing of air services began to create a more rational commercial environment for the development of aviation. In 1945, the New Zealand National Airways Act 1945 determined that only one airline could profitably serve the main trunk route, and that the surpluses from this service should subsidise secondary routes to provincial towns and NAC was created in 1947.

Following many years of regulation,^{ccci} the New Zealand government legislated deregulation of domestic airline markets from 1 April 1984.^{cccv} It replaced quantitative air service licensing (i.e. there had to be a ‘need’ for a service before it could be provided, which led to higher prices and reduced services)^{cccv} with a qualitative one (i.e. the service had to be safe and the operator had to be able to afford continued compliance but could not be foreign).^{cccvii} Domestic air services were further liberalized when ownership requirements were removed in 1986 (i.e. domestic airlines could be fully owned by foreign operators). New Zealand’s air transport policy came into effect in 1985 and aimed to ensure the economy benefitted from international air services. The policy was updated and reaffirmed in 1998, then reviewed, consulted on and updated again in 2012. Under the Civil Aviation Act 1990 (now 2023), the Minister of Transport can authorise regulation of international air carriage competition — alliance and code-share agreements — that involve New Zealand destinations. Airlines must apply to the Minister, who must consult with the public before making a decision on the application. When agreements end, airlines can apply for the agreements to be reauthorised.^{cccviii}

Air New Zealand was privatised in 1989 but in 2001 the New Zealand Government took up 80% ownership in return for injecting \$885 million after the airline ran into financial difficulty. In November 2013, the National government partially sold its share in Air New Zealand from 73% to 53% as part of its controversial asset sales programme. There are restrictions on ownership of Air New Zealand.

Airports are regulated by the *Airport Authorities Act 1966* which has now been replaced by the *Civil Aviation Act 2023*. Section 230 empowers it to set charges subject to consultation with airport companies concerning charges (formerly sections 4A and 4B).

Road

Road transportation in New Zealand began in the 1800s to serve local markets. In 1869, Julius Vogel, premier and colonial treasurer set up the Public Works Department (PWD), to administer the construction of roads, railways and other infrastructure on a national level. The process of construction was expedited in 1891 when Richard Seddon became Minister of Public Works. Roads were gradually improved with the introduction of the motorcar to New Zealand in the early 1900s.

In 1908, the Motor Regulation^{ccix} was passed and the Motor-vehicles Act, 1924 came into force on January 1, 1925, and a year later the Motor-omnibus Traffic Act, 1926 was passed. The 1924 Act consisted of four parts on: 1. registration and annual licensing of motor-vehicles (i.e. annual licenses, cancellation of registration, change of ownership, and change of garage); 2. licensing of drivers of motor-vehicles; 3. apportionment of fees and fines; and 4. general (i.e. power to make by-laws restricting use of motor-vehicles on roads, bridges; regulations covering a wide variety of matters, etc.). The Motor-omnibus Traffic Act, 1926 dealt with: the requirement for motor-omnibus operators to have licenses, the conditions to the grant of licenses,^{ccx} the terms of the license, the transfer of licences, the fixing of routes, fares and time-tables,^{ccxi} etc. Since the grant of motor-omnibus licence was considered special, the operator was also required to have a medical certificate indicating fitness. The operator was also required to maintain insurance against liability in the case of accidents and a maximum fare was also set for a one way journey.

After World War I, the number of automobiles on the road doubled between 1925 and 1930 from 71,000 to 155,000. Increased competition between the roads and railways came into focus. There was increased criticism from the railways about unfair competition from the roads such as: motor carriers had free use of the road; trucks contributed only a small portion to the construction and maintenance of road costs; trucks put pressure on railways to inflate their costs; railways were required to extend service while maintaining a public service; etc. It set the grounds for a new commercial policy for the railways. The 1924 Act and 1926 Act were seen as a beginning to restricting road transportation. The controversy over the public sector (rail) and the private sector (road) increased. Good roads built with public money and duplication of services by rails and protection of public money spent on rails added to the controversy. As a 'solution', the government policy statements dwelt upon the concept of "cooperation and coordination" (to achieve three objectives: develop the country, prevent waste, and protect public money). Reports were made and two options were considered: 1. regulate the physical operation or characteristics of trucking firms; and 2. regulate the actual freight business. These alternatives were both subsequently implemented: a road limit imposed in 1936; and a quantitative licensing scheme introduced in 1931 which restricted entry into the road haulage business. This led to the Transport Law Amendment Bill (1929) which was not successful but a forerunner to the Transport Licensing Act (1931).

The Act's aim was controlling commercial road transport services.^{ccxii} In considering an application for a passenger-service license, the licensing authority shall have regard to: (a) the extent to which the proposed service is necessary or desirable in the public interest; and (b) the needs of the district or districts as a whole in relation to passenger-transport. In deciding the matter it would also consider (financial ability, frequency of proposed service and fares, alternative service, etc.). It also prescribed the routes, fares, timetables, etc.^{ccxiii} It restricted the operation of passenger services and made provision for the licensing of road goods services. This provision for licensing goods services was enacted in 1933 when regulations were made to apply to the commercial haulage of goods over at least five miles along a main or secondary highway.^{ccxiv}

In 1936, the Transport Licensing (Goods Service) Regulation of 1936 brought in the 30 mile distance limit that goods could be carried by truck thereby prohibiting direct competition with rail.^{ccv} An amendment to the Act extended licensing to include non-main highway services and to some previously exempted farm related services. The limit was progressively increased to 40 miles in 1961 and then 150 km in 1977, with an increasing range of commodities exempt from restrictions.^{ccvii} Road transport operators could carry goods further than the 150 kilometres, but only by being granted an exemption to do so by a network of Transport Licensing Authorities that held regular sittings around the country to hear applications.

Pressure to deregulate road transportation increased. In November 1983, the Transport Amendment Act began the deregulation of road transport. It made two significant changes. First, the restriction on the number of road transport operators was replaced with a system that required operators to prove that they were capable and qualified to run a trucking business. Second, the 150km restriction was gradually phased out and abolished in 1983 and the permitted size and weight of trucks were increased.^{ccviii} Until 1986, road transport operators were still required to pay for a permit from the Ministry of Transport on a per tonne-day basis. But after 1986, the road transport industry was freed from all restrictions.

Water

In 1987, the New Zealand passed its first regulation which granted shipping conferences exemption from the competition provisions of Part 2 and Part 4 of the *Commerce Act 1986*. In March 2011, the Government of New Zealand asked the Productivity Commission to look at whether the costs of exporters and importers could be lowered and services improved. Based on the recommendations of the Productivity Commission and a review of the options, the Government of New Zealand introduced the Commerce Amendment Bill on October 13, 2011 and in March 2013 announced that international ocean shipping would fall under the *Commerce Act 1986* indicating that the exemption provided under the Shipping Act 1987 would be repealed. In November 2016, the then Minister of Commerce and Consumer Affairs, Hon Jacqui Dean, tabled a supplementary order paper to the Commerce Amendment Bill (Cartels and Other Matters) to introduce a block exemption for specified international liner shipping activities. The amendments were accepted in August 2017 which would become effective after a two year transition period on 17 August 2019. After that time the generic antitrust rules will apply to all activities in the shipping sector, with the exception of operational and vessel sharing agreements, which will continue to be subject to a block exemption.

Pipelines

Pipeline transportation in New Zealand is new compared to the more conventional forms of transportation. Natural gas transmission began in the North Island in 1970 and there is no natural gas transmission in the South Island. The North Island has about 2,600 kilometres of high-pressure natural gas transmission pipelines. Most of these are owned and operated by First Gas, including the Maui pipeline, a 307 km pipeline that carries 78% of all natural gas produced in New Zealand. The low-pressure gas pipelines that distribute gas to end users are owned by First Gas (Northland, Waikato, Bay of Plenty, Gisborne, Kapiti Coast), Vector (Auckland), Powerco (Hawke's Bay, Taranaki, Manawatu, Wellington) and GasNet (Wanganui).^{ccxiii} First Gas has transmission and distribution pipelines, while Vector, Powerco, and GasNet are distributors only. These networks are limited to the North Island only. First Gas' transmission services transport gas to large users of natural gas such as big industrial plants, electricity generators and the gas distribution businesses. The gas distributors then transport gas to smaller users, including domestic consumers.^{ccxiv}

Gas pipelines businesses are natural monopolies and do not face direct competition for their services. They are therefore regulated under Part 4, Section 55 of the *Commerce Act 1986*. The intent of the Act is to ensure regulated gas businesses have incentives to invest and innovate in their

networks, while preventing them from making excessive profits. The Commerce Commission regulates gas transmission and distribution businesses through price-quality path regulation. It sets the maximum revenue First Gas can collect and the minimum quality standards they must maintain. Price paths are reset every 5 years. If more revenue is collected or if quality standard sets are not made, enforcement action can be taken – return of excess revenue or penalties. The Commission does not oversee the daily operations of the gas sector or set the exact prices regulated businesses charge their customers. They are responsible for their own decisions on the operation and maintenance of their networks within the boundaries set by the Commission. New Zealand had one oil refinery, the Marsden Point Oil Refinery, but its refining capability was closed in 2021 and is now an import only facility. The major industry body is the Petroleum Exploration and Production Association of New Zealand.

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- ^{iv} “The term network refers to the framework of routes within a system of locations, identified as nodes. A route is a single link between two nodes that are part of a larger network that can refer to tangible routes such as roads and rails, or less tangible routes such as air and sea corridors.” *The Geography of Transportation Networks*, Authors: Dr. Jean-Paul Rodrigue and Dr. Cesar Ducruet, www.transportgeography.org
- ^v 1950, “Bandwagon, Snob and Veblen Effects in the Theory of Consumer Demand”, *Quarterly Journal of Economics*, Vol.64 No.2 : Page 183–207.
- ^{vi} See Besen, S., M. Innovation, *Competition and the Theory of Network Externalities*, Charles River Associates.
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- ^{xi} Id.
- ^{xii} Employment in the Transportation Sector, 2012–2023, Table EC14, Addendum Tables 2023, Statistical Tables by Transport Canada, www.tc.canada.ca; Table RA8: Volume of Rail Traffic, by Commodity, 2014–2023; Table RA9: Value of Rail Exports and Imports by Commodity, 2014–2023; and Table RA12: Value of Rail Exports and Imports, by Port of Exit and Clearance, 2014–2023; Table RA16: and Passenger and Passenger-Kms for VIA Rail Canada and Other Carriers, 2014–2023.
- ^{xiii} Employment in the Transportation Sector, 2012–2023, Table EC14, Addendum Tables 2023, Statistical Tables by Transport Canada, www.tc.canada.ca
- ^{xiv} Annual civil aviation statistics: First look, 2023, Statistics Canada, June 21, 2024; Air Canada Annual Report 2023; Table A16: Volume of Traffic Carried by Canadian Air Carriers, 2014–2023; and Table A18: Air Exports and Imports, by World Region, 2022 and 2023.
- ^{xv} Table EC14: Employment in the Transportation Sector, 2012–2023, Transportation and Information Hub, Transport Canada.
- ^{xvi} Transportation in Canada 2023, p. 9.
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- ^{xxi} Table EC5: Modal Shares in Canada’s International Trade, 2014–2023.
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- ^{xxv} Oil Pipeline Financial Survey, 2022, 2024-01-04, www.statcan.gc.ca
- ^{xxvi} Canadian Exports of Crude Oil and Natural Gas, www.capp.ca
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^{ccxxiv}Given the distribution of income, an efficient allocation of resources requires net social benefits [i.e. total social benefits minus total social cost. Total social benefits are defined as the sum of all individual increments of satisfaction (benefits) enjoyed by members of a society. The total social cost of producing additional units of one commodity is equal to the amount of satisfaction that is foregone because less of another commodity is produced] from the consumption of goods and services be at a maximum. The maximization of net social benefits occurs when marginal social benefits (MSB) = marginal social costs (MSC) (marginal being defined as a change resulting from a change in an additional unit). From the standpoint of individual consumption, an optimal position is reached by maximizing net private benefits, i.e., when marginal private benefits (MPB) = marginal private cost (MPC). (MPB is defined as the benefit which accrues to the individual consuming the good or service, and MPC as the cost incurred by the consumer or producer in the production of the good or service). Private and social costs and private and social benefits are not necessarily equal. Under most conditions, MPB and MPC schedules are equivalent to demand and supply schedules. MPC is equivalent to the cost that the producer or consumer incurs in the production of goods, and thus in order to maximize private benefits, an individual will purchase units of the goods where MPC = MPB = price. An efficient allocation of resources requires that MSB = MSC. If MPB = MSB and MPC = MSC in every market, the market-determined allocation of resources will be an efficient allocation. Marginal social cost pricing is a necessary condition for obtaining an efficient allocation of resources. If all markets are perfectly competitive, the market mechanism will automatically generate prices such that price = MSC = MSB (a result referred to as a Pareto optimal allocation of resources).

^{ccxxv}In addition, the production and consumption of transportation services generate special types of problems such as joint and common costs, consumption at peak times, congestion, demand that depends on service, etc.

^{ccxxvi}This concept of externalities was first formulated by the renowned English economist, Alfred Marshall in the 1890s and led to a great deal of ambiguity in the early 1900s. See Ellis, Howard, S. and Fellner, William, External Economies and Diseconomies, *The American Economic Review*, Vol. XXXIII, 1949, pp. 493-511. Also see references therein.

^{ccxxvii}Buttazzo, G., Pratelli, A., & Stepanov, E. (2006). "Optimal pricing policies for public transportation networks." *SIAM Journal on Optimization*, 16(3), 826-853; and Candogan, O., Bimpikis, K., & Ozdaglar, A. "Optimal pricing in networks with externalities." (See also: https://web.stanford.edu/~bimpikis/papers/network_pricing.pdf)

^{ccxxviii}Barriers to Entry, OECD, March 2006, p. 25.

^{ccxxix}Merger Enforcement Guidelines, Competition Bureau of Canada, pp. 28-31, www.competition-bureau.canada.ca

^{cd}Merger Guidelines, US Department of Justice and Federal Trade Commission, p. 19. December 18, 2023, www.justice.com

^{cdi}(b) Expansion or entry

"16. Competition is a dynamic process and an assessment of the competitive constraints on an undertaking cannot be based solely on the existing market situation. The potential impact of expansion by actual competitors or entry by potential competitors, including the threat of such expansion or entry, is also relevant. An undertaking can be deterred from increasing prices if expansion or entry is likely, timely and sufficient. For the Commission to consider expansion or entry likely it must be sufficiently profitable for the competitor or entrant, taking into account factors such as the barriers to expansion or entry, the likely reactions of the allegedly dominant undertaking and other competitors, and the risks and costs of failure. For expansion or entry to be considered timely, it must be sufficiently swift to deter or defeat the exercise of substantial market power. For expansion or entry to be considered sufficient, it cannot be simply small-scale entry, for example into some market niche, but must be of such a magnitude as to be able to deter any attempt to increase prices by the putatively dominant undertaking in the relevant market."

^{cdlii}Id.

^{cdliii}Guidelines on the assessment of horizontal mergers under the Council Regulation on the control of concentrations between undertakings, Official Journal, C031, 05/02/2004, www.europa.eu

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^{cdlv}Barriers to entry into the Rail Industry, C. A. Nash and J. M. Preston, Working Paper 354, March 1992.

^{cdlvi}Competition in Transportation Policy and Legislation in Review, Volume I, NTARC, 1993, p. 98.

^{cdlvii}Vision and Balance, Report of the Canada Transportation Review Panel, June 2001, p. 46.

^{cdlviii}Competition in Transportation Policy and Legislation in Review, Volume I, NTARC, 1993, p. 94

^{cdlix}Vision and Balance, Report of the Canada Transportation Review Panel, June 2001, p.50.

^{cl}Id., p. 52.

^{cli}Id., pp. 95-97.

^{clii}Submission to the Canada Transportation Act Review Panel: Rail, air and marine transportation, February 25, 2015, by the Commissioner of Competition, www.competition-bureau.canada.ca

^{cliii}In Europe, there is a separation between rail infrastructure and railway operations: the owner of the rail infrastructure is either distinct from the railway companies that operate on the network or is required to provide full access to railway companies on its network. European governments contribute to rail infrastructure maintenance and investment. Submission to the Canada Transportation Act Review Panel: Rail, air and marine transportation, February 25, 2015, by the Commissioner of Competition, www.competition-bureau.canada.ca

^{cliv}Restructuring Canada's airline industry: fostering competition and Protecting the public interest, House of Commons Transport Committee Report, December 1999, www.ourcommons.ca

^{clv}Vision and Balance, Report of the Canada Transportation Review Panel, June 2001, p.120.

^{clvi}Although not discussed in the context of this submission, it should be noted that frequent flyer programs and incentives towards exclusivity in corporate contracts can create significant switching costs and impede entry or expansion by rival air carriers. Submission to the Canada Transportation Act Review Panel: Rail, air and marine transportation, February 25, 2015, by the Commissioner of Competition, www.competition-bureau.canada.ca

^{clvii}Under the CTA, air carriers offering domestic service in Canada must be "Canadian", meaning that the carrier is incorporated or formed under the laws of Canada or a province; at least 75% of the voting interests are owned and controlled by Canadians, and the carrier is controlled in fact by Canadians. Cabotage (i.e. the right of a foreign carrier to operate within the domestic borders of another country) is not permitted. Carriers providing international service must likewise either be Canadian, or have been designated in a bilateral air services agreement that Canada has with their home country. Id.

^{clviii}International alliances are attractive to travellers as members of international alliances have the ability to transport passengers to a larger number of foreign destinations by leveraging the domestic networks of its partners. Id.

^{clix}According to the International Air Transport Association ("IATA"), over 160 airports worldwide are formerly designated as Level 3 airports (most congested, requiring slots). As of February 9, 2015, two Canadian airports were designated as Level 3 airports; Toronto Pearson

International Airport (YYZ) and Vancouver International Airport (YVR). A list of Level 2 and Level 3 airports as officially declared to IATA is available; see "[Worldwide Slot Guidelines](#)", IATA. Id.

clx Id.

clxi Pathways: Connecting Canada's Transportation System to the World Report, June 2015, pp. 184-209, [www.publications.gc.ca](#)

clxii Competition Bureau makes recommendations to improve competition in Canada's airline industry, [www.canada.ca](#)

clxiii Why is the trucking industry so fragmented? Joe Acosta, April 2, 2023, [www.linkdekin.com](#)

clxiv Keaton (1978) reviewed the early literature on scale economies in trucking and found conflicting evidence as to their existence. Corsi, Grimm, and Jarrell (1989) also found conflicting evidence. In their study, they found that economies of scale do not exist in either the LTL or the TL segments both before and after deregulation. Harmatuck (1992) found that the LTL industry had increasing returns to scale since deregulation when controlling for service. Harmatuck's article contradicts the general belief that economies of scale do not exist in the LTL industry, however he did not find evidence of a direct negative relationship between size and costs. Allen and Liu (1994) found that, when service was accounted for, economies of scale were present in the LTL industry. Xu et al. (1994) also analyzed costs in the LTL industry. They found constant returns to scale if output characteristics were held constant. Adrangi et al. (1995) tested the issue of economies of scale from a profit function approach. They found that the industry can be characterized by constant returns to scale, and that no major costs benefit could be obtained through merger.

clxv Economics of Scale in the US Truckload Industry Economics of Scale in the US Truckload Industry, Adam Gray Bradford, The University of Arkansas Undergraduate Research Journal, Volume 6 Article 10, Fall 2005.

clxvi FedEx and Barriers to Entry, September 11, 2016, [www.lpavneemba.wordpress.com](#)

clxvii Five Forces analysis of United Parcel Services (UPS) covering *threat of new entrants & substitutes, bargaining power of buyers & suppliers and competitive rivalry*, August 02, 2023, [www.mbaskool.com](#)

clxviii Shipping Conference Arrangements and Practices, R.T.P.C., Department of Justice, Ottawa, 1965, p. 100.

clxix "The major prerequisites for competition to be destructive are fixed or sunk costs that bulk large as a percentage of total cost; and long-sustained and recurrent periods of excess capacity." Kahn, A., *The Economics of Regulation: Principles and Institutions*, vol. II., New York: Wiley, 1971, p. 173.

clxx The historic rationale for supporting antitrust exemption in the US was substantial economies of scale exist because of the cost structure of liner shipping and control over shipping rates to ensure survival of US carriers which serves national security.

clxxi Section 18 Report on the Shipping Act of 1984, Federal Maritime Commission, 1989, p. 413.

clxxii S. Gilman, R.P. Maggs, and S.C. Ryder, *The Competitive Dynamics of Container Shipping*, Grower Publishing Company, Aldershot, 1983, pp. 39-40.

clxxiii Report of the Federal Trade Commission – An Analysis of the Maritime Industry and the Effects of the 1984 Shipping Act, 1989, pp. 19-20.

clxxiv Id. p. 17.

clxxv Id.

clxxvi The study cites and supports the findings of Devanney et al. (1975). See "The Regulated Ocean Shipping Industry, A Report by the U.S. Department of Justice", (Washington, DC: U.S. Government Printing Office, January 1977. p. 228.

clxxvii The Department of Justice Report Analysis of the Impact of the Shipping Act of 1984, US DOJ, Antitrust Division, March 1990.

clxxviii Report of the Advisory Commission on Conferences in Ocean Shipping (April 10, 1992).

clxxix Booz-Allen & Hamilton, Inc., "The Need for Retention of Common Carriage in Ocean Shipping," (study prepared for the Ocean Common Carrier Coalition) September 12, 1991.

clxxx Economies of scale in international liner shipping and ongoing industry consolidation: an application of Stigler's Survivorship principle, by Karen v. Gregory, January 24, 2000, p. 55.

clxxxi See [www.oeb.ca](#). A natural monopoly is one which can supply the entire market at lower cost than two (or more) firms. This cost property has been called subadditivity. A cost function is globally subadditive if $C(Y) < \sum C(y_i)$ subject to: $Y = \sum y_i$ and if $C(Y) = \sum C(y_i)$ it disproves the existence of a natural monopoly.

clxxxii Natural Monopoly in Canadian Interprovincial Gas Pipelines, Clyde Vincent Pawluk, 1995, p. 127.

clxxxiii Economies of scope are said to be present if there are cost savings when several products are produced jointly instead of separately. In the two product case, this can be shown as: $C(y_1, y_2) < C(y_1, 0) + C(0, y_2)$ where y_1 and y_2 are different products. Mathematically, cost complementarities can be shown as: $C_{12} = \partial C_2 / \partial y_1 \partial y_2 > 0$ for all $y_1 \neq y_2$, for all $y_1, y_2 > 0$ and $C_{12} = \partial C_2 / \partial y_1 \partial y_2 > 0$ for all $y_1 \neq y_2$, for all $y_1, y_2 \geq 0$ where y_1 and y_2 are individual products. Notice that if $C_{12} < 0$, then joint production of a certain quantity of each product is strictly less expensive than separate production, that is, if cost complementarities exist then so do economies of scope. Baumol, Panzar and Willig hold that transray convexity exists if average incremental costs, defined as: $AIC_1 = (C(y_1, y_1) - C(0, y_1)) / y_1$ of each product are increasing and if there exists weak cost complementarities.

clxxxiv Id. pp. 127-8.

clxxxv Id. p. 130.

clxxxvi Pipeline problems persist in Canadian oil and Gas, [www.torvs.com](#)

clxxxvii The [previous] regime was substantially changed with the new *Impact Assessment Act* (IAA) replacing the *Canadian Environmental Assessment Act, 2012* (CEAA 2012). Key changes include: introducing a new Impact Assessment Agency; a new litmus test, based on a wide range of "public interest" factors; more emphasis on greater stakeholder and Indigenous participation; and an important new planning phase. The new regime's broader scope has a stronger focus on the assessment of a project's potential economic and social impacts, as well some entirely new considerations, like the positive—not just adverse—impacts of a project, sustainability, certain climate impacts and the intersection of sex and gender with other identity factors. Other changes were also introduced to make the regulatory process less burdensome.

clxxxviii Why critics fear Bill C-69 will be a 'pipeline killer', Josh K. Elliott, June 21, 2019, [www.globalnews.ca](#)

clxxxix Oil Pipeline Deregulation, Report of the U.S. Department of Justice (1986), pp. viii-ix.

cxc Id. p. 7.

cxi See Jeffrey Church and Roger Ware, *Industrial Organization*, p. 430 and used by Joe Bain, *Industrial Organization*, 1956.

cxcii Competition in the skies, B. Prentice, June 5, 2024, [www.winnipegfreepress.ca](#)

cxciii "Whether air service in Canada is as efficient as it could be is clouded by protectionism. Domestic competition is constrained by cabotage restrictions. (Cabotage involves transporting goods or passengers between two places within the same country.) Foreign airlines are prohibited from competing for passengers within the Canadian market. Protectionism also applies to the percentage of foreign ownership. Removing

restrictions on the access to international investment capital could enable smaller carriers to reach more efficient scale and to be more resilient.”
Id.

^{cxciiv} Restructuring Canada’s Airline Industry: Fostering Competition and protecting the Public Interest. House of Commons, Transport Committee Report, December 1999, www.ourcommons.ca

^{cxciiv} Gomez-Ibanez, J., Tye, W. B., and Winston, C., Essays in transportation economics and policy, the Brookings Institution, Washington, D.C., 1999.

^{cxciiv} “Large airlines experience economies of scale and size. The more origin-destination pairs in their network, the bigger their customer base. Size also enables airlines to form hub and spoke networks. Larger aircraft, which are more profitable, can be deployed from hub locations. Economies of size also apply to operations such as, hangars, maintenance, and overhead expenses.” Competition in the skies, B. Prentice, June 5, 2024, www.winnipegfreepress.ca

^{cxciiv} Ferroequeus appeals CTA running rights ruling, October 24, 2002, www.producer.com

^{cxciiv}“ On July 2, 2004 the Commissioner of Competition and BC Rail and CN committed to “specific, enforceable and transparent standards and covenants to prevent anti-competitive behaviour.” Feds probe alleged breach of CN agreement that allowed BC Rail privatization, July 15, 2029, www.thebreaker.news

^{cxciiv} Restructuring Canada’s Airline Industry: Fostering Competition and protecting the Public Interest. House of Commons, Transport Committee Report, December 1999, www.ourcommons.ca

^{cc} “The federal Competition Bureau is already investigating earlier CanJet allegations that Air Canada engaged in predatory pricing when CanJet started flying in eastern Canada. On October 12, 2000, the Competition Bureau order Air Canada to eliminate cut-rate fares on five routes. That was subsequently reduced to three routes. In mid-November, Air Canada challenged the order in front of the Competition Tribunal, but lost its argument.” Air Canada using predatory pricing: CanJet, February 15, 2001, www.cbc.ca

^{cci} “The idea that incumbent airlines try to undermine new competitors with deep discounts — until the upstarts go out of business or get taken over — is no conspiracy theory, either, said air industry expert and former Air Canada executive John Gradek, noting that Canada’s aviation history is filled with examples of new airlines who’ve vanished. Wardair, Canada 3000, Jetsgo, CanJet, and this year, Lynx Air.” “The two big incumbents are very entrenched,” said Jones [retiring Flair’s CEO], referring to Air Canada and WestJet. “They’re entrenched as brands, they’re entrenched in airport positions, they’re entrenched in dealing with government. So they’re a force that you have to be able to come in and make your way through. It’s tough doing that as well.” Retiring Flair Airlines CEO warns Ottawa must react to ‘predatory behaviour’ by Air Canada and WestJet, July 29, 2024, www.thestar.com

^{ccii} The matter was resolved by consent agreement which imposes, for a period of 7 years, certain restrictions and requirements on the method and terms of waste haulage and disposal contracts.

^{cciii} On January 24, 2011, the Commissioner of Competition (Canada) filed a notice of application with the Competition Tribunal for dissolution of a merger (or divestiture of assets or control) resulting from the completed merger of CCS Corporation and Complete Environmental Inc., the latter of which owns Babkirk Land Services Inc. The allegation is that CCS acquired Complete to thwart a pro-competitive entrant.

^{cciv} The Bureau concluded that the proposed merger would likely result in a substantial prevention of competition in the supply of pipeline transportation for NGLs between northwest Alberta and Fort Saskatchewan, Alberta. Market participants have indicated that the proposed merger would weaken a likely competitive alternative to Pembina’s Peace Pipeline system. Competition Bureau takes action to protect competition in pipeline transportation for natural gas liquids in Western Canada, July 28, 2022, www.energynow.ca

^{ccv} Krugman, P. R., The self-organizing economy, Blackwell, 1966.

^{ccvi} The evidence of further consolidation is occurring in 2025 with the proposed acquisition by Union Pacific of Norfolk Southern and agreements between BNSF and CSX.

^{ccvii} Promoting Competition in the American Economy: Analysis, Brownstein Hyatt, Farber Schrek, July 9, 2021.

^{ccviii} On June 23, 2022, amendments were made to the Competition Act. The amendments were made in areas of: fines and penalties, business collusion, drip pricing, abuse of dominance (definition of an anti-competitive acts and expanded list of factors when assessing impact), merger review, and evidence gathering during investigations. Guide to the 2022 amendments to the Competition Act, June 24, 2022, www.competition-bureau.canada.ca

^{ccix} The expanded list of factors to determine an impact on competition was expanded and the Abuse of dominance enforcement framework was clarified. The *Competition Act* contains lists of factors to be considered when assessing the competitive impact of anti-competitive business practices, competitor collaborations and mergers (subsections 79(4), 90.1(2) and section 93). These non-exhaustive lists have been expanded to include some that may arise in digital commerce, although they are applicable more broadly as well. For *abuse of dominance*, the factors have been updated to include: 1. effects on barriers to entry, such as network effects; 2. effects on both price competition and non-price competition, such as quality, choice or consumer privacy; 3. the nature and extent of change and innovation in the relevant market; and 4. any other factor that is relevant to competition in the market that is or would be affected by the practice. For *competitor collaborations and mergers*, the factors have been updated to include: 1. network effects as another example of a barrier to entry in a market; 2. the possible entrenchment of leading incumbents’ market position; and 3. effects on both price competition and non-price competition, such as quality, choice or consumer privacy.

^{ccx} Grimm C.M., Clifford Winston, and Carol A. Evans, Foreclosure of Railroad Markets: A Test of Chicago Leverage Theory, *Journal of Law and Economics*, Vol. XXXV, October 1992, pp. 295-311. Also see William B. Tye and James Horn, p. 16; Scherer & Ross (1990); Riordan & Salop (1995); and Riordan (1998).

^{ccxi} Certain characteristics are found in these network industries, however, they may not always be because of anti-competitive behaviour. First, these markets display somewhat large market share inequalities together with profit inequality. Therefore, there should be no presumption that anti-competitive actions are responsible for the creation of market share inequality or very high profitability of the top firm. Second, free entry in network industries does not lead to perfect competition and eliminating barriers to entry may not significantly affect the market structure. Third, monopoly may maximize social surplus and breakup of monopoly into two competing firms could *reduce* rather than increase it.

^{ccxii} This doctrine applies to situations where access to an asset is required for effective competition and this asset cannot be economically reproduced. According to this doctrine, under some circumstances, a firm may be required to provide access to such an asset to its competitors.

^{ccxiii} Robert D. Anderson, Abraham Hollander and Joseph Monteiro, *Regulatory Reform and the Expanding Role of Competition Policy in the Canadian Economy, 1986-96*, *RIO*, Vol. 13, Nos. 1-2, April 1998, p. 199.

^{ccxiv} Air France, KLM, Martinair, Qantas, British Airways, Cargolux, Korean Air, Cathay Pacific and LATAM Airlines Group.

^{ccxv} Competition Bureau completes extensive investigations into northern airlines, August 22, 2017, www.canada.ca

ccxvi Federal government approves Air Canada's \$190M purchase of Transat, with conditions, February 12, 2021, www.financialpost.ca; Government of Canada approves proposed purchase of Transat A.T. Inc. by Air Canada, February 11, 2021, www.tc.gc.ca; Canada closed to competition, February 11, 2021, www.westjet.ca; Government ignores advice of its own Competition Bureau in Air Canada takeover of Transat, February 12, 2021, www.westjet.ca; and Opinion: To survive, Canada's airlines need grants, not loans, February 16, 2021, www.nationalpost.ca

ccxvii WestJet gets government OK to take over Sunwing, with conditions, March 23, 2023, www.cbc.ca

ccxviii Economides, Nicholas, Competition Policy in Network Industries: An Introduction, AEI, October 2003.

ccxix See The important regulatory developments in Canadian transportation 2004 TO 2024, Joseph Monteiro, Grace Castelino and Barry E. Prentice, Research Paper No. 1, CTRF, www.ctrf.ca

ccxx The Transport System, The geography of transport systems, www.transportgeography.org

ccxxi This Act is divided into three parts: Part I allows each province to licence extra-provincial bus undertakings; Part II of the Act allows each province to licence extra-provincial operations of extra-provincial truck undertakings; and Part III allows each province to licence extra-provincial truck undertakings involved in intra-provincial operations.

ccxxii The term 'network' does not appear with regard to shipping services other than in section 22(3) with regard to 'electronic network'.

ccxxiii Oil and natural gas pipelines are similar since they are both coated steel pipe buried underground. The key difference is that oil transmission pipelines typically transport liquids at pressure between 600 to 1000 pounds per square inch (psi), while natural gas transmission pipelines transport gas at higher pressures of 1000 psi or greater. Frequently Asked Questions (FAQs) Concerning Federally-Regulated Petroleum Pipelines in Canada, www.natural-resources.canada.ca

ccxxiv Regulations made under NEB Act are: Gas Pipelines Uniform Accounting Regulations; NEB Act VI (Oil and Gas) Regulations; NEB Act Cost Recovery Regulations; NEB Act Export and Import Reporting Regulations; NEB Pipeline Crossing Regulations, Part I; NEB Pipeline Crossing Regulations, Part II; NEB Rules of Practice and Procedure, 1995; Onshore Pipeline Regulations; Pipeline Arbitration Committee Procedure Rules, 1986; Pipeline Overhead Crossing Order; and Toll Information Regulations.

ccxxv Applications for longer pipelines are assessed by the CER within 15 months, after which federal Cabinet decides, based on the CER recommendation, whether a Certificate of Public Convenience and Necessity should be issued. If the project is designated under the Impact Assessment Act, such as pipeline projects with more than 75 km of new right of way, it will go through an integrated review process, led by the [Impact Assessment Agency of Canada](http://www.impactassessment.gc.ca), with the support of the CER. Federal Cabinet makes the final decision on whether or not these projects should be approved. See *Regulation of Pipelines and Power Lines*, Canada Energy Regulator, www.cer-gec.gc.ca

ccxxvi Consultations on Air Services Price Advertising Regulations, February 13, 2012, www.cta-otc.gc.ca; Canadians Have an Opportunity to Comment on Proposed Regulatory Amendments for Air Services Price Advertising, July 3, 2012, www.cta-otc.gc.ca; Harper government enacts all-inclusive airfare advertising laws, December 18, 2012, www.tc.gc.ca; All-Inclusive Air Price Advertising, December 18, 2012, www.cta-otc.gc.ca; and Airlines now face \$25,000 fine if they fail to reveal total ticket price, Dec. 18, 2012, www.nationalpost.ca

ccxxvii Three types of agreements are negotiated or amended under the Blue Sky policy: 1. an Open Skies-type agreement allows any number of carriers to operate both direct and indirect services between Canada and another country. Airlines choose the routes to serve, the frequency of the service and the prices of flights, without any restrictions; ccxxviii 2. an expanded agreement modifies an existing bilateral agreement. It generally provides more flexible provisions to carriers. An agreement can be expanded many times; and 3. a first-time agreement puts in place a new formal framework to govern scheduled services between Canada and its new partner. In essence, an "Open Skies"-type agreement would cover the following elements for scheduled passenger and all-cargo services: 1. Open bilateral markets/access (third and fourth freedom rights); 2. No limit on the number of airlines permitted to operate; 3. No limits on the permitted frequency of service or aircraft type; 4. Market-based tariff/pricing regime for bilateral and third-country services; 5. Open and flexible regime for the operation of code-sharing services; 6. Unrestricted services to and from third-countries (fifth and sixth freedom rights); and 7. Rights for stand-alone all-cargo operations (seventh freedom rights). See, *Bilateral Air Relations Between Canada and Foreign Countries*, www.international.gc.ca; and The Blue Sky Policy: Made in Canada, for Canada, www.tc.gc.ca

ccxxviii On March 3, 2000, the Minister of Transport re-introduced amendments to the Motor Vehicle Transport Act, 1987 – Bill C28. The amendments: 1) promote motor carrier safety through implementation of a safety performance regime based on the National Safety Code; 2) provide a national framework for provinces and territories to continue to administer motor carrier regulation; 3) promote consistent regulation of motor carriers across Canada; and 4) ensure that Canada has the tools to harmonize motor carrier regulatory standards internationally. These amendments came into force on January 1, 2006, they were initially proposed in Bill C-77.

ccxxix Id. p. 19.

ccxxx Network effects: Antitrust authorities strengthen cooperation efforts, September 2020, www.nortonfulbright.com

ccxxxi Staggers Rail Act: Deregulation, Impact, and Case Studies, May 25, 2024, www.supermoney.com

ccxxxii The Commission introduced in 2000 a simplified procedure for categories of merger cases deemed from the outset not to raise competition concerns, and in 2013 adopted a "Simplification Package" comprising of an Implementing Regulation and Notice on Simplified Procedure aimed principally at extending the categories of simplified cases and at reducing the information requirements for merger notifications. Then, in 2016, the Commission launched an Evaluation of procedural and jurisdictional aspects of EU merger control, which resulted in March 2021 in a Commission Staff Working Document that indicated that the 2013 Simplification Package had been effective in reducing the administrative burden and yielding significant cost savings, though that there was some limited room for improvement. To address this, the Commission launched in March 2021 an Impact Assessment to explore the different options for revising the existing framework. During this Impact Assessment, the Commission gathered evidence *inter alia* through an open public consultation from 26 March 2021 to 18 June 2021, and two consultations of stakeholders, from 6 May 2022 to 3 June 2022 and from 5 October 2022 to 19 October 2022 respectively. The results of this Impact Assessment can be found in the Impact Assessment Report and more succinctly in the Executive Summary of the Impact Assessment Report.

ccxxxiii The Horizontal Merger Guidelines explain the approach taken by the Commission in assessment of mergers. The Guidelines consists of eight sections: 1. Introduction; II. Overview; III. Market Share and Concentration Levels; IV. Possible anti-competitive effects of horizontal Mergers; V. Countervailing buyer power; VI. Entry; and VII. Failing Firms. Guidelines on the assessment of horizontal mergers under the Council Regulation on the control of concentrations between undertakings, Official Journal of European Union, 5/2/2004, www.europa.eu

ccxxxiv The Future of EU Merger Review under EVP Ribera, December 3, 2024, www.kluwercompetitionlaw.com

ccxxxv For details see International and cabotage road transport, May, 2024 www.europarl.europa.eu

ccxxxvi A service provider must be a legal entity (s. 131); must not prevent or hinder access (s. 133); comply with queuing requirements (s. 135); comply with interconnection principles (s. 136); must not increase charges to subsidise particular development (136A); must not bundle services

(s.136B); and prescribe transparency information (s. 16C). It also prohibits false or misleading statements (s.83D). The National Gas Rules provide the basis for third party access to regulated transmission and distribution pipelines and an information and arbitration framework for non-regulated pipelines. The arrangements for access to and provision of gas pipeline services also apply in Western Australia.

^{ccxxxvii} See section 10 of Railway Act 2005 (1) A rail operator must not operate a rail vehicle or permit a rail vehicle to be operated on a railway line unless— (a) the rail operator holds a licence as a rail operator; and (b) the access provider for that railway line holds a licence as an access provider. (2) An access provider must not permit a rail vehicle to be operated on a railway line controlled by it unless— (a) the rail operator of the rail vehicle holds a licence as a rail operator; and (b) the access provider holds a licence as an access provider.

^{ccxxxviii} See Air Services Licensing 1983, No. 36. 29. Inquiry into pricing practice of dominant licensee- (2) For the purpose of this section, a licensee is in a dominant position in a market for air services if the licensee, either alone or together with one or more other licensees, substantially controls, or exercises a dominant influence over, that market because of the share of the market enjoyed by the licensee, either alone or together with one or more other licensees, or for any other reason. (3) If the Licensing Authority on stated grounds suspects that—(a) A licensee is in a dominant position in a market for air services; and (b) The licensee is engaging in a pricing practice that has the purpose of or is likely to have the effect of- (i) Eliminating or substantially damaging a competitor in that market; or (ii) Restricting the entry of any other person into that market; or (iii) Deterring or preventing a person from engaging in competitive pricing in that market; and (c) As a result, the interests of the users of air services in that market are being harmed or are likely to be harmed-the Licensing Authority may conduct a public inquiry under this section.

...

(I 1) Without limiting the generality of the Licensing Authority's powers under subsection (4) or subsection (9) (d) of this section, the Licensing Authority may, in imposing price control under either of those provisions,- (a) Prescribe prices for specified air services; (b) Prescribe formulae for the purpose of calculating prices for specified air services; (c) Include conditions relating to the quality of the air service concerned while it is subject to price control.

^{ccxxxix} See section. 142 of the Transport Amendment No. 2, 193 which states" "(3) If the proper Licensing Authority, on stated grounds, suspects that- "(a) A licensee is in a dominant position in a market for transport services; and "(b) The licensee is engaging in a pricing practice that has the purpose of or is likely to have the effect of- "(i) Eliminating or substantially damaging a competitor in that market; or "(ii) Restricting the entry of any other person into that market; or "(iii) Deterring or preventing a person from engaging in competitive pricing in that market; and "(c) As a result the interests of the users of transport services in that market are being harmed or are likely to be harmed the Licensing Authority may conduct a public inquiry under this section.

^{ccxl} See Section 80 of the Petroleum Amendment Act 1962 "80. Assignment of authorisation-No pipeline authorisation shall be transferred or assigned to any person without the consent in writing of the Minister.

^{ccxli} It focuses on demand substitution factors, i.e., on customers' ability and willingness to substitute away from one service to another in response to a price increase or a corresponding non-price change such as a reduction in product quality or service. The application of this test in differentiated service markets is difficult. One focuses on consumer substitution patterns - consumer surveys providing diversion ratios and econometric models providing price elasticity estimates (which are not readily available). In addition to price evidence or service similarity, it is useful to consider the demographic profile of consumers of differentiated services.

^{ccxlii} *Canada (Director of Investigation and Research) v. Southam Inc.*, November 25, 1997.

^{ccxliii} See Church, J and Ware, R., *Industrial Organization, A Strategic Approach*, 2000, p. 429.

^{ccxliv} Concentration and market share played a key role in the thinking of antitrust authorities and jurisprudence during the structural approach to enforcement. Since the 1970s, this approach has undergone substantial revision. The view on this matter by a few jurisdiction is described.

Canada: Concentration was not mentioned before 1986, in the *Combines Investigation Act* now the *Competition Act*. In 1986, it appeared in the *Competition Act* for the first time in section 92. Concentration by itself does not raise any specific issue under the *Competition Act*. It is only mentioned once in subsection 92(2) wherein it states that for purposes of this section "the tribunal shall not find that a merger or proposed merger prevents or lessens, or is likely to prevent or lessen, competition substantially solely on the basis of evidence of concentration or market share." According to the Canadian Merger Guidelines the Bureau will not challenge a merger on the basis that the merging parties will be able to unilaterally exercise greater market power than in the absence of the merger, where the post-merger market share of the merged entity would be less than 35 percent. Or in the case of interdependent exercise of market power by two or more firms where the post-merger share of the market accounted for by the four largest firms in the market would be less than 65 percent or the post-merger market share of the merged entity would be less than 10 percent. As market share and concentration increase above these thresholds, the likely effect of a merger on competition gives rise to concern. An assessment of market shares and concentration is a starting point in the Bureau's analysis.

US: Concentration and market share statistics played a key role in the US in the assessment of mergers in the 1960s. In *United States v. Philadelphia National Bank* (1963), the Supreme Court stated "a merger which produces a firm controlling an undue percentage share of the relevant market, and results in a significant increase in the concentration of firms [i.e., an increase in the percentage of the area's commercial banking business controlled by the two leading firms from 44 percent to 59 percent] in that market is so inherently likely to lessen competition substantially that it must be enjoined in the absence of evidence clearly showing that the merger is not likely to have such anti-competitive effects."^{ccxlv} This approach changed radically after the 1970s when the structuralists approach was challenged, in particular by Chicago economists. As a result, high concentration in a market ceased to be viewed as a reason for initiating antitrust action.

Nevertheless, it provides a starting point for merger analysis today. According to the 1992 Horizontal Merger Guidelines, the US antitrust authorities divide the spectrum of market concentration as measured by the HHI into three regions those below 1000 as unconcentrated those above 1000 or more as moderately concentrated and those above 1800 as highly concentrated. Whether mergers raise significant competitive concerns in the later two regions depends on factors such as lessening of competition through coordinated interaction, lessening of competition through unilateral effects, entry barriers, absence of efficiencies and absence of imminent failure. Since the above statistics may either understate or overstate the likely future competitive significance of a merger, the following conditions are considered: changing market; and degree of difference between the products and locations in the market and substitutes outside the market.

EU: Concentration has been more a matter of concern in the EU than other jurisdictions because of concerns about exploitation, fairness and distribution of wealth. Surprisingly, it did not have any law against mergers^{ccxlv} until 1989 when it passed its first EC regulation on the control of concentration (4064/89), though before that year it approached the problem of merger through Article 82. Since 2004, EC 139/2004 applies to all concentrations with a Community dimension.

According to the EC Commission Guidelines "the overall concentration level in a market may also provide useful information about the competitive situation. In order to measure concentration levels, the Commission often applies the Herfindahl-Hirschman Index (HHI)."^{ccxlv} The

Commission is unlikely to identify horizontal competition concerns in a market with a post-merger HHI below 1000. It is also unlikely to identify horizontal merger concerns in a merger with a post-merger HHI between 1000 and 2000 and a change in the HHI below 250 or a post-merger HHI above 2000 and a change in the HHI below 150, except where special circumstances are present.

^{ccxlv} “Whether air service in Canada is as efficient as it could be is clouded by protectionism. Domestic competition is constrained by cabotage restrictions. (Cabotage involves transporting goods or passengers between two places within the same country.) Foreign airlines are prohibited from competing for passengers within the Canadian market. Protectionism also applies to the percentage of foreign ownership. Removing restrictions on the access to international investment capital could enable smaller carriers to reach more efficient scale and to be more resilient.” Id.

^{ccxlvii} “Large airlines experience economies of scale and size. The more origin-destination pairs in their network, the bigger their customer base. Size also enables airlines to form hub and spoke networks. Larger aircraft, which are more profitable, can be deployed from hub locations. Economies of size also apply to operations such as, hangars, maintenance, and overhead expenses.” Competition in the skies, B. Prentice, June 5, 2024, www.winnipegfreepress.ca

^{ccxlviii} Competition in the skies, B. Prentice, June 5, 2024, www.winnipegfreepress.ca

^{ccxlix} FedEx and Barriers to Entry, September 11, 2016, www.lpaynemba.wordpress.com

^{cccl} “Since at least 2010, the Board has been considering various ideas to reform the current reciprocal switching regulations so that captive shippers, in particular, would have a practical and realistic opportunity to obtain a reciprocal switching order when warranted. Unfortunately, until now, the Board has not developed such a reform.” August 9, 2023, www.stb.com A new rule was finally adopted in 2024. It states “Under the final rule, customers within a terminal area that have access to only one Class I rail carrier may petition the Board to order a reciprocal switching agreement when the customer’s rail service falls below specified levels. Board-prescribed reciprocal switching agreements will allow shippers or receivers to gain access to an additional line haul carrier, while still allowing the incumbent carrier to compete for the customer’s traffic. Reciprocal switching orders by the Board will be for a minimum of three years and a maximum of five years. The Board considers the new reciprocal switching rule to be a significant step in incentivizing Class I railroads to achieve and maintain higher service levels on an ongoing basis by permitting a competing line haul carrier to offer better service to win the customer’s business.” See STB Adopts Final Rule For Reciprocal Switching, April 30, 2024, www.stb.com

^{cccl} The Future of EU Merger Review under EVP Ribera, December 3, 2024, www.kluwercompetitionlaw.com

^{cccli} Network effects: Antitrust authorities strengthen cooperation efforts, September 2020, www.nortonfulbright.com

^{ccclii} About STB, www.stb.gov

^{cccliii} Airline deregulation: past Experience and future reforms, by Marc Scribner, April 2023, www.reaason.org

^{cccliv} The Report also found that despite their natural monopoly characteristics, oil pipelines face significant competition in most markets except for those in highly concentrated markets. The Report recommended the continued regulation of five products pipelines and deregulation of all crude oil pipelines in the lower forty-eight states but in six other product pipeline it could not make a judgement.

^{ccclv} “Between 2001 and 2016, four legislative packages were adopted with the aim of gradually opening up rail transport service markets for competition, making national railway systems interoperable and defining appropriate framework conditions for the development of a single European railway area. These include charging and capacity allocation rules, common provisions on licensing of railway undertakings and train driver certification, safety requirements, the creation of the European Agency for railways and rail regulatory bodies in each Member State as well as rail passenger rights.” www.transport.ec.europa.eu.

^{ccclvi} For an in depth discussion see “Europe 1992: The regulated sectors; the scope for expansion of competition Policy; and the implications for Canadian businesses,” Discussion Paper, Bureau of Competition Policy, Consumer and Corporate Affairs Canada, March 1992, www.publications.gc.ca

^{ccclvii} “Fair access to airports and airport services is ensured through [Council Regulation \(EEC\) No 95/93](#), which provides that at congested airports, slots (i.e. permission to land or take off on a specific date and at a specific time) must be allocated to airlines in an equitable, non-discriminatory and transparent way by an independent slot coordinator. To further improve the efficiency of the slot allocation and to ensure the optimal use of airport capacity, in 2011 the Commission came up with the amending proposal. However, negotiations on this proposal were suspended in 2013.” Air transport: market rules, www.europarl.europa.eu

^{ccclviii} These arrangements applied to the international carriage of goods by road carried out on European Union (EU) territory on behalf of a third party. For journeys linking a Member State to a third country, the arrangements applied to the journey carried out on the territory of the Member State of loading or unloading. In the latter case, an agreement between the EU and the third country in question was needed for the arrangements to apply [Regulation \(EEC\) 881/92](#).

^{ccclix} For details see International and cabotage road transport, May, 2024 www.europarl.europa.eu

^{ccclx} This Regulation modernises, simplifies and streamlines rules in the road haulage transport sector in order to improve the efficiency of the EU by harmonising rules on cabotage and minimising the administrative burden to the industry. Article 17(3) of Regulation (EC) No 1072/2009 requires the Commission to draw up a report on the state of the EU road haulage market in order to assess whether market conditions such as the effectiveness of controls and employment conditions in the profession, road user charges, social and safety legislation have converged to the point where further opening of national road transport markets could be envisaged. A report – the [Report on the State of the Union Road Transport Market](#) – was prepared. It recommended in particular introducing two different kinds of cabotage: (1) limited to a short period of time and connected to an international trip; (2) not connected to an existing international trip and for which a registration procedure would be required to ensure that the driver abided by the host country’s labour law. It was of the opinion “...that the creation of a Single European Transport Area will bring substantial benefits to Member States in terms of market efficiency, thereby enhancing industrial growth. However, in the course of its work the High Level Group identified a number of key obstacles to the achievement of this aim and consequently our Recommendations are for a continuous and gradual opening of the road haulage market” (COM(2014)222). It was adopted in April 2014.

^{ccclxi} For further details see “The Evolution of Ocean Liner Shipping Regulation”, Joseph Monteiro, www.ctrf.ca

^{ccclxii} COMMISSION STAFF WORKING DOCUMENT EVALUATION of Commission Regulation (EC) N° 906/2009 of 28 September 2009 on the application of Article 81(3) of the Treaty to certain categories of agreements, decisions and concerted practices between liner shipping companies (consortia), pp. 57-59, EUROPEAN COMMISSION, Brussels, 10.10.2023, SWD(2023) 670 final, www.europa.eu

^{ccclxiii} For additional information see Internal energy market, 2024, www.europarl.europa.eu/factsheets/en

^{ccclxiv} The states are New South Wales, Queensland, South Australia, Victoria, Western Australia and Northern Territory and their main railways were: Main Western Railway; Queensland Rail; South Australian Railways; Victorian Railways, Western Australian Government Railways; and North Australia Railway.

Australia's rail system is made up of 18 rail networks with three gauges, 11 signalling systems, and countless different working rules and standards.

^{celxv} The State of *Victoria Transport Act 1983* is considered as a model which other states must follow. It sets out the structure for governance, borrowing, etc. The Governor in Council could make regulations prescribing fees to be charged for the supply of rail equipment as well as for any service by the railway authorities (section 256(1)(a)). "...the Victorian Transport Act 1983 does not contain any provisions regarding abandonment of railway lines, nor a minimum compensatory rate for freight charges, nor any shippers' appeal mechanism if they are dissatisfied with their rate, nor any rate ceiling beyond which railways could not charge their customers. ... not only do the railways in Victoria not have any common carrier's obligations, but the assessment of freight rates does not have any statutory checks and balances other than direct political intervention. In other words, this railway legislation is notable for the absence of any provision discussing the rights of the users of transport services as opposed to the rights of those providing the services."

^{celxvi} *Government Railways Act of Western Australia 1904-1982* of the Act states that the Commission may, with the approval of the Minister fix freight rates (s.22) and special charges for the conveyance of specific goods or merchandise (s.22(2)). It also gives the Commission the ability to fix special freight rates for 'special occasions or for such times and in respect, of such railways as it thinks fit' (s. 22) and permits it to enter into special contracts and empowers it to enter into intermodal contracts (s.26(a)). The Act restricts the Commission in using its own intermodal transport except if alternatives are not available (s.28(a)). The Railways Commission is not considered to have common carriers' obligations in respect to a service provided under the joint venture. The Act also enabled the Commission to enter into an agreement with persons wishing to construct a railways siding (s.59).

^{celxvii} *New South Wales Government Railways Act 1912* gives the Minister very significant powers with regard to the establishment and modifications to freight rates (s. 24 and s.71 of the Transport Authorities Act 1980). The Commissioners may charge freight rates which are lower than the existing ones and may give concessions in particular cases (s.24(3)). It allows special rates where modal competition exists including concessions and freight rate agreements with shippers outside New South Wales for interstate movements. The Commissioners could also formulate a special scale of freight rates for specific classes of merchandise, and could encompass rebates (section 32(2)). It provides for no discrimination (s.35). The Commissioners shall give equal facilities for the interchange of traffic (s. 36) and were also authorised to make by-laws for the circumstances and conditions under which they would offer special freight rates (s. 64). The Act states that it is the duty of the State Rail Authority to operate efficiently and economically (s. 67) and take all reasonable steps to ensure that its revenue is produced at such a level to minimise payments to assist the Authority (New South Wales Transport Authorities Act 1980, no. 103)

^{celxviii} *Queensland Railways Act 1914-1982* permits the Commissioner to make special contracts to carry freight from any place to or from Queensland and that these freight rates may be higher or lower than the general rates in force for the same description of traffic (s. 101 of the 1985 Act). Furthermore, in these contracts the Commissioner and the shipper may limit the railway's liability to any extent which they determine (this latter section had been amended by the Railways Act Amendment Act 1985). It provides for the connection of a private branch Railway or siding with the Queensland railway, in the event the Commissioner so agrees (s.105). The Railways Act Amendment Act 1985 also gives the Commissioner the authority to set freight rates other than the prescribed rates. The Act states that the Commission is not a common carrier (s.120).

^{celxix} *The Australian National Railway Act of 1917* (amended upto 1980) provided for the determination of tolls, fares and charges and conditions which shall be non-discriminatory for the carriage of goods and passengers (s. 29). It also provided for special tolls which shall be non-discriminatory and for special contracts (ss. 30 and 30A). It may also provide for joint service (s. 31). It also provided the power to connect with other state railways and run trains over it (s.32) and for the use of railways before open for traffic (s. 33). The Commissioner was to be deemed a common carrier (s.34). Plans for proposed railways have to be submitted by the Commission to the Minister (s.59), laid before Parliament and the construction of railways is not authorized except by Act of Parliament (s.61). The closing of railways may be authorized by governor-in-council (s.69B)

^{celxx} *The Australian National Railways Commission Act 1983 (repealed)* states that the main functions of the Commission are to provide railway services over its system, etc. to the Federal Government of Australia. It was authorised to make joint agreements with other Railways or trucking companies for the carriage of freight between 'prescribed places' (s. 9). It may additionally run its trains over the railway of another jurisdiction and permit the same to be done in the reverse. It may also permit its own railway line to be connected with another (s.12). It must determine the principles on which it proposes to charge freight rates and inform and get approval from the Minister (s.21). The principles given were commercial - attaining as a high a level of cost recovery as possible. The Minister has the authority in virtue of the legislation to authorise the Commission to close any railway operated by the latter (s. 68). The Commission was not a common carrier (s.72). The Australian National Railways Commission Act 1983 is subject to the two transfer agreements when the railways of South Australia* and Tasmania# had been acquired by Australian National. (*maintenance of freight rates and advantages to shipper and non-closure of rail lines without state agreement) (#maintenance of concessional rates).

^{celxxi} See *Railway Legislation and Rate Contracts in Canada and Australia*, Information Paper 28, Bureau of transport and communications economics, Canberra 1988 for an in depth discussion.

^{celxxii} Road and Rail Freight Infrastructure Pricing Productivity Commission Inquiry Report, No. 41, 22 December 2006, p. 41.

^{celxxiii} *Id.*

^{celxxiv} *Competition and Consumer Act 2010(Cth); Railways (Operations and Access) Act 1997; Railways (Access) Act 1998 (WA); Transport Administration Act 1988 (NSW); Queensland Competition Authority Act 1997; Rail Management Act 1996 (Vic)*. Issues Paper: The regulatory framework for ARTC's Interstate network, ACCC, 25 August 2021, p. 21.

^{celxxv} Issues Paper: The regulatory framework for ARTC's Interstate network, ACCC, 25 August 2021, p. 21.

^{celxxvi} *Id.* p. 22.

^{celxxvii} Section 4 of the Act gave power to the Governor-General to make regulation regarding: giving effect to the Paris Convention; and controlling navigation in the Commonwealth and Territories. It created confusion as to the role of State governments resulting in the *Air Navigation Act 1936*. The Commonwealth government was now authorised to control air navigation: in relation to trade and commerce with other countries and among the states; and within any territory of the Commonwealth. It was supposed to keep out of intra-state aviation but did not. In 1947, *Air Navigation Act 1947* was passed to provide for the ratification of the Chicago Convention,

^{celxxviii} This struggle was the last for the truckers and from then on, regulations have been more or less fair –uniform driving schedules for the eastern states, an increase in speed limit, revised registration fees, and increased tonnage.

^{celxxix} In deciding whether to give consent to a proposed permit road managers would consider whether the permit is likely: a) cause damage to road infrastructure; b) impose adverse effects on the community; c) pose significant risks to public safety arising from heavy vehicle use that is

incompatible with road infrastructure or traffic conditions; and d) the possibility of granting the permit subject to conditions that will minimise that damage or public risk.

^{celxxx} Economic benefits of improved regulation in the Australian trucking industry, Australian Trucking Association, March 2019.

^{celxxxi} It is not streamlined or inconsistent across jurisdictions; lacks transparency or timeliness; and is not easily obtained by performance-based standard vehicles.

^{celxxxii} Three difficulties noted with the use of the IAP as a condition for HML access is it inconsistent, and varies across HVNL jurisdictions; IAP is too costly; and IAP is also used for other purposes.

^{celxxxiii} Three difficulties noted with OSOM vehicles. Inconsistency in permit processes across HVNL jurisdictions; a lack of timelines and transparency in permit decisions; and differences in pilot and escort training and accreditation requirements across HVNL jurisdictions.

^{celxxxiv} See Regulation of the Taxi Industry, Productivity Commission, 1999, www.pc.gov.au

^{celxxxv} “The analysis in the paper demonstrates that the removal of restrictions on taxi numbers would clearly bring benefits to the community. However, the paper recognises that the characteristics of taxi markets differ among jurisdictions, which means that the appropriate level and form of regulation are also likely to differ. Similarly, different circumstances could require different approaches to adjustment and compensation. Partly for this reason, the paper canvasses policy options in these important areas, rather than endorsing any particular approach.” Id, p. iii.

^{celxxxvi} The Point to Point Transport (Taxis and Hire Vehicles) Regulation 2017 (the Regulation) is made under the Point to Point Transport (Taxis and Hire Vehicles) Act 2016 (the Act). It prescribes the requirements for safety standards, authorisation of providers, taxi licences, fares and other matters. Together the Act and the Regulation provide a regulatory framework for passenger services undertaken in any vehicle with 12 seats or less (including the driver). The Point to Point Transport Taskforce recommended that fares for rank and hail taxi services remain regulated while those for booked services (including booked taxi services, traditional hire car and ridesharing services) ‘be substantially deregulated.’

^{celxxxvii} From 1 November 2017 booked taxi trips are no longer subject to a maximum regulated fare. This means that all booking service providers, including providers that provide booking services for taxis, traditional hire car, rideshare and similar services will be able to set their own fares. This gives service providers the flexibility to differentiate prices in a number of ways that benefit them and their customers. For example, service providers might offer loyalty or ‘frequent rider’ discounts or set fixed fares for certain trips, such as from the CBD to the airport. This flexibility aims to create more competition and choice for customers. From 1 February 2018, the temporary \$1 Passenger Service Levy applies on all point to point transport trips in NSW, including on all booked trips. Service providers can absorb this cost or pass it on to passengers (with GST).

^{celxxxviii} KPMG in its review of regulated maximum fares recommended: “1. Adopt the deregulation of rank or hail fares as the preferred approach in the medium to long term and develop a ‘roadmap to deregulation’ to progress the preferred approach. 2. In the interim, until deregulation can be practically achieved, retain regulated maximum metered fares.” See Review of Regulated Maximum Fares, KPMG, June 8, 2022, www.transport.wa.au

^{celxxxix} Western Australia is served by three main pipelines - Dampier to Bunbury pipeline, Parmelia pipeline and Goldfields pipeline. Northern Territories is served by two main pipelines - Amadeus Basin to Darwin pipeline and Palm Valley to Alice Springs pipeline. Southern Australia is served by two main pipelines - Moomba-Sydney pipeline and Moomba to Adelaide pipeline. Queensland is served by five main pipelines - Carpentaria pipeline, South West Queensland pipeline, Queensland Gas pipeline, Roma to Brisbane pipeline, and Dawson Valley pipeline. Victoria is served by three main pipelines - Victorian transmission system, Eastern Gas Pipeline, SEA Gas Pipeline, and Tasmanian Gas Pipeline. See Gas Transmission, Chapter 9, p. 257, www.aer.gov.au

^{ccxc} Pipelines Act 1967 (Vic.); Petroleum Pipelines Act 1969 (W.A.); Energy Pipelines Act, 1982 (N.T.); Pipelines Act 1967 (N.S.W.), Petroleum Act 1940 (S.A.); and Petroleum Act 1923 (Qld.). See *The regulation of access to petroleum pipelines by third parties in Australia - A comparative and critical review*, by Heather J. King, p. 337.

^{ccxi} “The proposed reforms do not affect the coverage assessment process, but will amend criterion (a) to limit coverage to pipelines where regulated access is likely to generate a material increase in competition in a related market, provide for light-handed regulation and for binding up-front no coverage rulings for greenfield pipelines and price regulation exemptions for international pipelines. The gas pipeline access Acts were also amended in 2006 to give effect to the decision to alter coverage rulings for greenfield and proposed international gas pipelines that deliver gas to Australia. The providers of covered pipeline services must submit access arrangements to the nominated regulator for approval and comply with other Gas Code provisions, such as ring-fencing. Pipelines that are not covered are subject only to the general anti-competitive provisions of the Trade Practices Act 1974. Access to non-covered pipelines is a matter for commercial negotiation between the access provider and access seeker, without regulation.” See Gas Transmission, Chapter 9, www.aer.gov.au

^{ccxii} It also regulates: 1. Administer the gas licensing regime. This role involves issuing licences to entities that generate, transmit, distribute or retail gas in Western Australia, monitoring and enforcing compliance with licence conditions, and approving customer protection measures. 2. Oversee the Gas Retail Market Scheme to ensure the market is regulated and operated in a manner that is efficient, open, competitive, and fair to gas market participants and their customers. The ERA does not have a role in setting gas prices. These are set by the State Government. It’s retail gas market has been deregulated since 2004. In the wholesale gas market, participants enter into agreements with gas suppliers and pipeline operators to purchase and transport gas, which they then sell and supply to end-users. The retail gas market is administered by the Australian Energy Market Operator (AEMO). The ERA is responsible for the oversight of the Gas Retail Market Scheme. See www.erawa.com.au

^{ccxiii} The AER sets access prices for 3 transmission pipelines – the Roma to Brisbane Pipeline (Queensland), the Victorian Transmission System, and the Amadeus Gas Pipeline (Northern Territory). In gas distribution, the AER sets access prices for networks in New South Wales (NSW), Victoria, South Australia and the Australian Capital Territory (ACT).

^{ccxiv} It requires gas pipeline businesses to publish access prices and other terms and conditions on their website. They cannot engage in inefficient price discrimination or other conduct adversely affecting access or competition in other markets. If a party is unable to negotiate access to a pipeline, they may request the AER arbitrate a dispute. The Carpentaria Pipeline in Queensland, the Central West Pipeline in NSW and portions of the Moomba to Sydney are subject to light regulation.

^{cccv} Monopolistic practices by some pipeline operators led to the introduction of the Part 23 provisions in the National Gas Rules, which took effect in 2018. Part 23 aims to make it easier for gas customers to negotiate access to unregulated pipelines at a reasonable price. The rules require otherwise unregulated pipeline businesses to disclose certain financial, service and access information following guidelines published by the AER.

^{ccxvi} A case-by-case test is undertaken to assess the type of regulation that applies to each pipeline, considering whether: i. the pipeline is a natural monopoly; ii. the regulation would promote competition; and iii. the regulation would be cost-effective (that is, the benefits of regulation outweigh the costs).

^{cccvi} A horse-drawn tramway from Dun Mountain copper mine to Port Nelson opened in 1862 was the first.

^{cccviii} For a detailed account of the history see *Can't get there from here : New Zealand passenger rail since 1920*, Andre Brett, 2021.

^{cccix} Regarding passengers it noted the decline in revenue and fall in number of passengers journeys due to the inroads made by private motor carriers and indicated that the diversion would continue. Regarding goods "The classification and the scale of charges in respect of the New Zealand Railways were made some years ago. The motor competition as it now exists was then unknown. It was found that additional revenue could be obtained from the carriage of Classes A, B, C, and D goods, and the Department was therefore able to give low rates for goods in Classes E, F, K, N, P, Q, and !!. which include such articles as grain, timber, coal, metal, chaff, lime, and at the same time obtain the revenue required to meet working-expenses and the policy rate of interest, which in 1897 was fixed at 3 per cent. The policy then laid down provided that all revenue earned by the railways in excess of 3 per cent, should be returned to the users of the railways by means of reductions in passenger fares, goods rates, and by the provision of additional train services to assist in the development of the country and its industries. This policy was continued until 1914." See Railways Commission Report 1930 also known as the Royal Commission Report on Rail and Road Competition, 1930.

^{ccc} The railways made some profit and NZR eventually expanded into other transport modes, especially with the [Railways Road Services](#), [inter-island ferries](#) and [Rail Air](#) service. NZR also had an extensive network of workshops. By 1981, NZR employed 22,000 staff.

^{ccci} For a detailed discussion see. New Zealand Railways, the First 125 Years, David Leitch and Bob Stott, 1988; New Zealand History Online. New Zealand Railways Magazine, Electronic Text Collection.

^{ccci} Deregulation led to: market share collapse 1983 to 1993, led to; financial crisis in 1988, led to; decision in 1988/89 to privatise; and financial & organisational restructuring in 1989/90, led to; privatisation in 1993, concurrent with; improved qualitative and financial performance, the separation of infrastructure from rail operations, etc.

^{ccci} Rail Transport in New Zealand, www.apec.org, p. 230.

^{ccci} Domestic Air Services Policy of New Zealand Government Printer, Wellington, 1982.

^{ccci} Air Services Licensing Act, No.36 of 1983, Government Printer, Wellington.

^{ccci} See, Air Services Licensing 1951, Section 18 states: 18. (1) In considering any application for a licence the Licensing Authority shall generally have regard to- (a) The extent to which the proposed service is necessary or desirable in the public interest (b) The needs of New Zealand or the district or districts as a whole proposed to be served, in respect of transport, whether by air, land, or water; and (c) The value of the proposed service and the aircraft and ground organization there of for auxiliary defence or other purposes in case of national or local emergency, - and if it is then of opinion that the proposed service is unnecessary or undesirable it shall refuse to grant a licence.

^{ccci} See 14. Offence to carry on air service without licence, etc and s. 20. Grant of licence, etc.- (1) Subject to subsections (2) to (4) of this section, after considering the application under section 19 of this Act, the Licensing Authority shall grant to the applicant the licence sought if it is satisfied that- (a) The proposed air service is likely to be carried on in a safe and reliable manner; and (b) The proposed air service will not be directly or indirectly carried on, operated, or controlled by an overseas person as defined in section 2(1) of the Overseas Investment Act 1973; and (c) The applicant's liability for loss of or damage to property caused by events occurring in connection with the carrying on of the proposed air service is or will be covered by insurance- (i) In respect of such kinds of event; and (ii) Up to such amount in respect of each kind of event- as the Licensing Authority considers appropriate.

^{ccci} Under the current policy, New Zealand continues to pursue reciprocal open skies ASAs except where it is not in its best interests. This benefits the country by adding new or additional foreign airline services, while ensuring New Zealand airlines have a fair and equal opportunity to compete.

^{ccci} The purpose of the Act was the regulation of motors and the registration of motors. It also included regulating the use and control of motors so as to insure the safety of the public. No vehicle could be operated on the road unless it was registered. The regulation of motors included diverse matters such as need for a light, bells, inspection, etc. In the case of any motor is used for trade purposes, or of any motor plying for hire it shall have to have distinctive marks or registration marks. Regulations could be made to control the use of motors. The Act was repealed in 1924.

^{ccci} 2.) In determining whether or not any such application should be granted the licensing authority shall take into consideration any existing or proposed facilities for the transport of passengers within the area proposed to be served, the condition of the roads or streets proposed to be traversed and the normal traffic thereon, and all other relevant considerations.

^{ccci} 10. (1.) With respect to every motor-omnibus service authorized to be carried on pursuant to this Act the licensing authority shall prescribe the routes to be traversed, the time-tables to be observed, the fares to be charged, and such other conditions and matters as may be prescribed by regulations under this Act, or as the licensing authority thinks proper.

(2.) For the purpose of fixing the fares as aforesaid in respect of any route the licensing authority may divide the route into two or more sections, and in any case where a motor-omnibus service is provided for an area that may conveniently be served in whole or in part by an existing tramway or motor-omnibus service, carried on by any local or public authority, it shall be the duty of the licensing authority so to fix the fares that the fares charged in respect of the carriage of an adult passenger by the motor-omnibus over any route or section thereof (however such fares may be computed) shall be at least two pence more than the corresponding fare charged in respect of the existing service.

(3.) The obligation to fix an additional charge under this section shall not apply in respect of the fare to be fixed for passengers whose journey begins or ends at a point not less than a quarter of a mile beyond the terminus of any existing tramway or other service, or in respect of a motor-omnibus service carried on by any local or public authority.

^{ccci} "The principle purpose of the Transport Licensing Act could therefore be summarised as regulating wasteful competition, not only between road transport operators and the railways, but among the commercial operators themselves. So far as road-rail competition was concerned, one of the prime objectives was to ensure that the railways could continue to offer low rates for certain services that were regarded as essential to the stability of the national economy. By 1936, the necessity for transport regulation was generally accepted." (p. 81)

^{ccci} See sections 26 and 30 of Transport Licensing Act, 1931, No. 138.

^{ccci} A study of deregulation: New Zealand road-rail freight competition the roading limit and its demise, Dave Spence, 1985, p. 76.

^{ccci} The implementation of the "thirty mile restriction" supported the view that the railways should be the dominant form of long-distance freight haulage. General governmental statements argued that road and rail competition should be discouraged and both transport services should complement each other. Within this policy of 'coordination', road transport was seen as a 'feeder' and delivery agent for the railway services. Id. p. 85.

^{ccci} The-background and impact of the transport amendment act, (no.2) 1983, B. M. Leonard, www.nzlii.org

^{cccxvii} The impact gradually became apparent. Trucks had carried almost 50 percent of land transport freight in 1972. By 1993, this had risen to 81 percent.

^{cccxviii} Oil and gas industry in New Zealand, Wikipedia, www.wikipedia.org

^{cccxix} Our role in gas pipelines, Commerce Commission, New Zealand, May 31, 2022, www.comcom.govt.nz