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An Economic Appraisal of the St. Lawrence Seaway

Marvin J. Barloon

IN 1959, for the first time in history, the Great Lakes have become a full-scale segment of the world's ocean systems. While the immediate consequences on lake-borne foreign trade have been unimpressive, it should be remembered that the opening season has been merely an initial shake-down period, indicating little as to the longer-run outlook.

Following a description of the physical features and a summary of construction costs of the St. Lawrence Seaway, this article undertakes an assessment of its competitive strengths and limitations as opposed to the ports of the

THE AUTHOR (B.S., 1931, State University of Iowa, M.B.A., 1935, Harvard) is Professor of Economics, Western Reserve University.

Atlantic and the Gulf coasts. On the basis of this assessment, the outlook for foreign trade moving through the Seaway would appear reasonably optimistic, although its scale will remain modest. The St. Lawrence Seaway will not generate any vast commercial or industrial growth in the Great Lakes area. But, it will doubtless contribute significantly in those communities where growth is already under way.

PHYSICAL FEATURES

The Seaway forges the last link in the chain of deep waters from Chicago to the Atlantic Ocean. Until 1959, of this entire distance of 2,250 miles, only the short passage of 114 miles from Lake Ontario to Montreal was subject to a normal depth limitation of less than 25 feet. This short reach of the St. Lawrence River, consisting of tumbling rapids, was circumvented by a series of 14-foot canals, entirely within Canada, cluttered by 22 locks, each only 250 feet long, too small for any but pocket-size ocean-going ships. The Seaway displaces this system with a new channel 27 feet deep served by only seven locks, each with a usable length of 768 feet, big enough for the largest lake carriers, and more than big enough for typical ocean freighters.

Two of the new locks were built by the United States government along the international boundary waters of New York State. The other five were constructed by the Canadian government, four of

them farther downstream in the approaches to Montreal where the river lies entirely within Canada. The St. Lawrence estuary has thus been fully integrated with the Great Lakes navigation system.

CONSTRUCTION COSTS

Because of the controversial nature of the Seaway, published statements as to its cost are wildly confusing. One hears it referred to as "the billion-dollar" Seaway. On the other hand, because Congress actually appropriated only \$140 million to its construction, this figure is sometimes called its "cost." Either figure can be reconciled with the truth.

The total cost of the Seaway and all related works, incurred by the Canadian and American governments combined, will round out to something exceeding \$1.2 billion. However, \$600 million of this is chargeable to hydroelectric power construction and is being absorbed, not by the two national governments, but by the Hydro-Electric Power Commission of Ontario and the Power Authority of the State of New York. The provision of Seaway channels establishes a normal 81-foot fall of water, ideal for power production as a joint facility of the navigation works. The energy output from the total installed capacity of 1,880,000 kilowatts is shared equally between Ontario and New York State, and will be entirely self-liquidating by a safe margin.

Of the remaining \$600 million for navigation works, approximately \$150 million represents improvement of channels and harbors in the Great Lakes. Whereas the new waterway is 27 feet deep, existing channels in the lakes range from 21 to 26 feet, and these are being deepened accordingly. This leaves \$450 million expended on the navigation features of the Seaway proper. Because most of the locks fall within Canadian territory, the Dominion has provided most of this money, leaving the United States Government burdened with a construction outlay on navigation of only some \$130 million. Thus, including both the Seaway proper and the Great Lakes improvements, the "billion-dollar Seaway" has actually cost the United States government just \$280 million. In addition, probably \$300 million is currently being spent by local governments and private enterprise on water terminals and cargo-handling facilities. These, however, may be classed as merely the first phase of a program of local and private investment, and thus as one of the economic benefits of the Seaway project.

TOLL RATES AND REVENUES

It is hoped that the St. Lawrence Seaway will be self-liquidating. The toll schedule on freight in 1959 has been as follows:

TOLL SCHEDULE

	<i>St. Lawrence† Seaway</i>	<i>Welland‡ Canal</i>	<i>Total Through Passage</i>
Per Gross Registered Ton of Vessel (Whether laden or in Ballast)	\$.04	\$.02	\$.06
Per Ton of Bulk Cargo -----	.40	.02	.42
Per Ton of General Cargo -----	.90	.05	.95

†The Seaway segment consists of the passage from the eastern end of Lake Ontario to Montreal.

‡The Welland Canal consists of the passage from Lake Erie to Lake Ontario, circumventing the Niagara River and falling entirely within Canada.

All of the tolls on the Welland passage are collected by the Dominion of Canada, reflecting an expenditure by that government of some \$30 million on improvement of the canal to accommodate Seaway traffic. Of the collections on the Seaway proper, 71 per cent go to Canada. In addition to these charges, appropriate tolls have been established for passenger traffic and for pleasure boats.

Nobody is happy about the level of tolls. The eastern railroads and New York port officials assert that tolls are too low. Collections are intended to reimburse the governments in full for annual costs of \$28 million, including capital charges amortized over a fifty-year period. Of this, \$25 million applies to the Seaway — the remainder to the Welland Canal. When the Seaway was originally authorized in 1954, it was expected that the annual charges would be only \$14 million. Rising interest rates and construction costs have nearly doubled the figure. Toll should be appropriately higher, argue the railroads, so as to compensate the government in full.

Actually, even conceding that toll collections may be inadequate to cover total charges, raising rates significantly could make collections even smaller. That is, higher tolls would drive traffic off the waterway, thereby decreasing the total amount collected. For most commodities, there are attractive alternatives to Seaway movement. Iron ore, for example, can be moved from Labrador on the Atlantic Ocean to Baltimore and sent overland by rail to the interior. Grain can be shipped from Duluth to Buffalo and then moved overland to New York. The loss of enough of such movements from the Seaway would make its outlook for self-liquidation even more dismal. In view of the possibility of decreased traffic, and thus decreased collections, which might result from an increased toll rate, present toll rates are probably high enough.

On the other hand, Seaway optimists contend that tolls should be reduced in order to attract more shipping and raise revenues. Their argument has theoretical merit. The cost of operating and paying for the Seaway is almost entirely a fixed cost, varying hardly at all with the volume of traffic. Thus, increased traffic adds almost noth-

ing to costs, and every added dollar collected is net revenue. If a 5 per cent cut in tolls would result in a 10 per cent increase in customers, the question of self-liquidation would be solved on the favorable side.

Such a solution would result in a more rapid achievement of maximum traffic loads, rather than an increase in total traffic in the long pull. The present toll schedule contemplates achievement of the waterway's capacity, estimated at 50 million tons a year, by 1968. If this level could be reached, instead, by 1964 or 1965, it could turn the scales of the self-liquidation question. Traffic development is a slow process, however. It grows somewhat independently of toll levels. On balance, it would appear that since the tolls are criticized for being both too low and too high, they are probably about right.

COMPETITIVE STATUS OF THE SEAWAY

The chief competition faced by the Seaway comes from the North Atlantic Coast, especially the Port of New York, with important secondary competition from the Gulf Coast. In evaluating this competition, it should be borne in mind that the Great Lakes shores are closer to the nation's major export industries and import markets than any of the other coasts. If the Seaway frontier could compete with the others on even terms, it would probably develop rapidly into the major import and export gateway of the country.

However, it cannot compete on even terms. The Seaway is handicapped by the limited capacity of the Welland Canal, by seasonality, and by preferential railroad treatment of Atlantic and Gulf traffic. In sum, therefore, the Seaway will have the greatest advantage with respect to shipments originating and terminating directly in the ports of the lakes, rather than at inland points, and in the western ports of the lakes, rather than the eastern ports.

Preeminence of the Seaway Hinterland

The Great Lakes shores are closer to the central productive region of the country than is any coastal frontier. Their tributary area comprises a broad band extending in length from the Appalachian Mountains on the east to the Rockies and, in width, from the Canadian border south to the Ohio and Missouri Rivers. This area accounts, in a typical year, for about 45 per cent of the nation's manufacturing and 48 per cent of its agriculture. The remainder of the nation's production is divided among the three coasts.

Furthermore, the industries of the area are competitively strong and expanding. The central coal mining regions of the country are located here. The Lake Superior District is still the leading source of iron ore and will continue in this role for many more years. On this foundation, most of the iron and steel of the country is produced

in the regions tributary to the lakes, centering in the Pittsburgh and Chicago districts. The region is rich in the production of aluminum, plastics, chemicals, and glass. The manufacture of automobiles, trucks, trailers, and other vehicles, centered in Detroit, is distributed throughout the area. A preponderance of the country's farm machinery is built here, as well as manufacturing equipment, and mining and electrical machinery. Finally, the region is the home of the wheat belt, the corn belt, the production of meats and other foods, and, in consequence, the continental center of vast food-processing industries such as meat packing and flour milling. If the terms of competition were even, the St. Lawrence Seaway would quickly develop into the dominant foreign trade route of the country.

The Handicap of Congestion

Of the various handicaps confronting the Seaway, probably the most serious is the limited capacity of the Welland Canal. Lying wholly within Canada, the Welland provides a total lift around Niagara Falls of 327 feet in only 25 miles, a magnificent stairway of seven modern locks, completed in 1932 at a cost to the Canadian government of \$130 million. Of the seven locks, three are twin installations, permitting traffic to move in both directions simultaneously, but the other four are single locks, constituting a one-way bottleneck, especially in bad weather.

The St. Lawrence Seaway toll schedule is based on an expected volume of 50 million tons by 1968. Against this may be set the circumstance that the Welland Canal has occasionally been badly congested even before the opening of the Seaway, while carrying only some 20 to 25 million tons. Of course, a substantial volume of Seaway traffic will originate on Lake Ontario, downstream from the Welland, especially at Hamilton and Toronto, and so will not be affected by this congestion.

Furthermore, the "capacity" of the Welland will be substantially increased by the circumstances of Seaway traffic. Much depends upon the size of the individual vessel traversing the canal. It takes no longer to lock a big ship through than it does a small one, and the Seaway ships are running much larger than those of the pre-Seaway era. As time passes, more and more of the obsolete small vessels will be retired from service. Furthermore, it takes just as long to lock an empty vessel as a loaded one, and it is hoped that the tonnage moving into the lakes may balance better with that moving out, reducing the number of lockages in ballast. Finally, the capacity of the canal depends very much on the regularity with which vessels approach it. If all the traffic of the week tries to get through on Monday, its "capacity" is only one-seventh of what it would be if transits were evenly distributed through the week. It may be hoped that,

with longer distances to traverse, ships can schedule arrival at the locks by radio to coincide with the light traffic.

There has, of course, been very serious congestion in the Welland Canal during the opening season of 1959. However, this should not be taken as an indication of future expectation. In 1959, crews and pilots have been unfamiliar with the passage, and Seaway operating personnel have likewise been undergoing a learning process. Neither ship nor lock construction have been as well adapted to this passage as future modifications will make them.

Yet, when all these favorable considerations are taken into account, a canal troubled by congestion at 25 million tons is not likely to carry close to 50 million without building up high delay costs. Ship companies estimate that a day's delay costs from \$750 to \$2,500, depending upon the size of the ship and the pay scale of the crew. Interest and insurance on the cargo and the urgency of delivery on schedule must be added to these costs. As congestion in the Welland mounts, the competitive strength of the Seaway route will become progressively impaired.

A potential of 50 million tons will still leave the Seaway far short of the comparative volumes of the Atlantic and Gulf coasts. By way of comparison, the Port of New York, alone, handled 148 million tons in a recent year. Far from being credited to any one port, the 50 million tons of the Seaway will be distributed among all the ports of the lakes, both Canadian and American. As a volume target, it is obviously not very high. Until the Welland Canal is provided with twin locks, no port on the Great Lakes will become a major seaport, excepting, possibly, Toronto.

The Winter Freezing

The second competitive handicap of the Seaway is its seasonality. Over a twenty-year period, the Welland Canal has been open to navigation an average of 241 days per year, just short of eight months. The St. Lawrence shipping season is of about the same duration. In other words, for about four months of the year, the entire Seaway will be covered with ice and completely closed to traffic.

Seasonality will not be a serious handicap for certain bulk materials such as iron ore and coal which can be stored cheaply in the open air, nor to grain which, being a seasonal product, has to be stored somewhere in any case. However, manufactured goods of high value must be moved promptly to the consignee, and the winter closing will compel a transfer of routing to salt water ports. Unless a shipper finds the Seaway much cheaper than conventional routings, he will often be reluctant to make this transfer. Foreign trade involves highly complex relationships with banks, insurance brokers, freight forwarders, railroads, and shipping companies, and the shipper will often find the annual shift from one port to another too com-

plex. Finally, the railroads serving the Atlantic and the Gulf ports will offer strong inducements every spring to hold the summer's traffic to its winter course.

Railroad Cooperation and Competition

To understand the attitude of the railroads towards the St. Lawrence Seaway, it is necessary to divide them into two groups. The first consists of the western railroads such as the Chicago and North Western, and the Milwaukee, terminating at Chicago. Because these railroads do not serve the Atlantic Coast nor, to any substantial degree, the Gulf Coast, they have everything to gain and little to lose from the St. Lawrence Seaway. These railroads are offering attractive export rates and improved services for shipments through the Seaway, notably by way of such ports as Chicago, Milwaukee, and Duluth.

The eastern railroads, however, have much more to lose than to gain from the growth of Seaway traffic. This group serves not only the lake ports, but also the ports of the Atlantic and the Gulf which represent longer and more lucrative hauls. Furthermore, this group of railroads has invested vast sums in waterfront terminal facilities on the Atlantic and the Gulf and needs to protect this investment.

The railroads falling within this category consist of almost all those serving the lake ports east of Chicago, including the Pennsylvania, the New York Central, the Baltimore and Ohio, the Chesapeake and Ohio, and numerous others. Still two other lines should be added to this opposition group, namely the Illinois Central, and the Gulf, Mobile and Ohio. These two serve the ports of New Orleans and Mobile through the Mississippi Valley and, especially with respect to traffic originating south of St. Louis, will probably be inclined to favor the Gulf ports over Chicago. This means that railroad competition will be very intense in its opposition to Seaway traffic moving through the ports of Detroit, Toledo, Cleveland, Erie, Buffalo, and Rochester.

For competitive purposes, the railroads are experimenting with the "agreed charge" rate system. Under this system, an attractive rate will be offered to an inland shipper on export and import movements through an Atlantic or Gulf port with the proviso that a stated percentage (such as 90 per cent) of all his shipments move by rail through that coastal area. This would leave only 10 per cent to go by truck or via the Seaway, and trucking would get most of this. Inasmuch as the shipper must ship through the Atlantic or Gulf port during the winter months, this system would seriously discourage the annual springtime shift to the St. Lawrence Seaway. Railroads can also offer attractive seaport services, such as the carfloat service in New York harbor. Under this arrangement, the railroad moves

loaded box cars on barges to any point in the harbor free of charge, saving sizeable handling and transfer costs. Because of these preferences of the eastern and the Gulf Coast rail lines, the St. Lawrence Seaway will sustain a severe handicap in competition with these coasts.

Competition with the Port of New York

Finally, the Seaway ports must share with most of our coastal ports the intense competition with the incomparable Port of New York. New York enjoys the tremendous advantage of "bigness." In 1957, for example, while the Port of Philadelphia handled 52 million tons of cargo, New York handled 147 million tons, almost three times as much. Furthermore, because so much of Philadelphia's trade consists of crude petroleum, coal, iron ore, and other low-value commodities, the preeminence of New York in dollar values is even greater. In 1957, the dollar value of foreign trade moving through New York amounted to \$9.5 billion, while that moving through Philadelphia was only \$1.4 billion. This comparison with Philadelphia would be just as striking with any other port on the continent.

A big port is very attractive to shippers because it can support so many highly specialized services. For example, the foreign exchange personnel of a large New York bank will have first-hand knowledge of complex currency restrictions and values in small and remote countries and will be able to clear drafts quickly with banks of these countries through numerous foreign branches. A large volume of business is required to support such an activity. The same principle applies to such services as marine insurance, ship repair and supply, fumigated and refrigerated warehousing, heavy-cargo handling facilities, protective packaging services, and a host of related services. New York is rich in the manifold appurtenances of foreign trade.

Furthermore, because of its size, the Port of New York offers more frequent sailings to obscure foreign destinations than any other American port. If a shipment misses the boat for Bangkok, for example, another will normally be leaving in two or three days, whereas from a lesser port, such as Baltimore or Boston, there might not be another for two weeks or more. Frequency of sailings means also that a shipper from the interior can combine a number of less-than-carload shipments, each going to a different foreign destination, into a single carload to New York, thus saving overland freight.

New York also provides direct sailings more than other ports. A usual itinerary for a ship in process of gathering cargo is to call at two or three other American ports, such as Mobile, Baltimore, and Philadelphia, before proceeding to New York for final loading and departure for overseas. A shipper, therefore, is not likely to direct an export consignment to Baltimore, for example, if he can pick up the same ship at New York several days later. This is especially

true of high value shipments on which interest charges and obsolescence are important. The competitive strength of New York, of course, makes itself felt in other ports of the Atlantic and the Gulf as well as in the lake ports. But, because of their status as relative newcomers in the foreign trade field, the lake ports will feel this competition more keenly.

COMPETITIVE EFFECT ON EASTERN LAKE PORTS AND INLAND ORIGINS

In view of its competitive handicaps, the St. Lawrence Seaway will have to continue to share the traffic of its vast natural hinterland with the coasts. This is particularly true of the ports of Lake Erie and Lake Ontario. As one moves east from Chicago, the rail freight differentials to the Atlantic Coast become progressively smaller, and the Seaway's handicaps weigh more heavily against it. The following comparison between shipments to Chicago and Cleveland is illuminating:

*Total Rail and Water Charges per Ton on Light Machinery
Liverpool to Chicago and Cleveland, 1959*

	TOTAL CHARGES			
	<i>Via</i> <i>New York</i>	<i>Via</i> <i>Seaway</i>	<i>Seaway</i> <i>Saving</i>	<i>Percent</i> <i>Saving</i>
Chicago -----	\$56.48	\$29.40	\$27.08	48%
Cleveland -----	47.29	28.70	18.59	39%

Obviously, a shipper will be less willing to sustain the delays and seasonal interruptions of the Seaway for a saving of \$18.59 than he will for a saving of \$27.08.

The greater competitive strength of the Lake Michigan ports has already been manifested in the overseas trade through the shallow St. Lawrence canals before the opening of the Seaway. In 1957, for example, 210,000 tons moved through Chicago, 56,000 through Milwaukee, and 42,000 through Green Bay, Wisconsin. Meanwhile, Buffalo handled only 8,000 tons and Rochester virtually nothing. For the latter cities, New York was too close.

Secondly, the Seaway will have to share its hinterland with the coasts with respect to those traffic origins inland from the lakes. This applies, for example, to such cities as Pittsburgh, Cincinnati, and St. Louis. A shipper in Cleveland may save \$18.59 by shipping through the Seaway instead of New York. But, for a shipper from Cincinnati, much of his \$18.59 saving would be eaten up by overland freight to get his cargo into Cleveland. In view of the Seaway's congestion and the winter freezing, the small residue of savings would hardly seem worth-while. The New Orleans Port Authority has recently opened an office in Cincinnati, obviously with little expectation of losing Cincinnati shipments to the St. Lawrence Seaway. Certain

Seaway enthusiasts have been counting on a large volume of traffic originating in Pittsburgh. Officials of the Port of New York Authority hear this with quiet amusement.

In general, therefore, traffic of the St. Lawrence Seaway will be that originating and terminating in the immediate lake port areas. The only notable exceptions will be grain, coal, and certain other bulk commodities.

TRAFFIC PROSPECTS

Taking into account the competitive disadvantages of the Seaway and weighing them against the wealth of its hinterland, the forecast of 50 million tons appears a reasonably modest expectation. If we assume that the Welland Canal can handle this much, it will carry traffic in the general range of one-third of that moving through New York harbor. At current toll rates, this promises to make the Seaway self-liquidating.

The success of the Seaway will probably not do serious damage to the eastern railroads nor to the Atlantic Coast ports. In the first place, the Seaway's role is relatively modest. Secondly, it serves an expanding economy. During the five years in which it was under construction, the Gross National Product, expressed in dollars of constant purchasing power, increased by about \$30 billion, and an additional \$80 billion growth may reasonably be projected to 1965. The Canadian economy is growing at an even more rapid rate. With its 50-year life ahead, the Seaway is destined to serve two nations vastly bigger than any this generation has known.

This prospect gives the communities of the Great Lakes a sound basis for quiet optimism. As a reasonable measure of a respectable seaport, the Port of Mobile handled 9.4 million tons of foreign commerce in 1957. Supposing that Cleveland should be so enterprising and fortunate as to capture one-fifth of the 50 million-ton total of the St. Lawrence Seaway, the Port of Cleveland would then challenge Mobile as to tonnage volume. But, the communities of the Great Lakes area should not delude themselves with visions of entering the big leagues of foreign trade along with San Francisco, New Orleans, or Philadelphia. Should it ever occur, this will be the accomplishment of a later generation.