The Manufacturing and Marketing of Steel in Canada: Dofasco Inc., 1912-1970[1]

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In light of the strategic and economic importance of steelmaking it is almost inevitable that governments will become involved in the industry's affairs. The task facing the historian of the industry is to explain the nature and consequences of this involvement. Steven Tolliday used the term "institutional impactedness" to describe government-business relations in interwar Britain [17]. After 1945 alternating policies of nationalization and denationalization created an uncertain business environment. Paul Tiffany suggested that in the United States "institutionalized divisiveness" was the main cause of endemic confrontation between steel firms and the government [16]. Both historians argue that the character of business-government relations affected the international performance of the British and American steel industries. In Canada the government has played a major role in facilitating the transformation of steelmaking from an infant industry into an internationally competitive force. The involvement of the Federal and Provincial governments since 1945 has assumed two forms. First, Nova Scotia and Quebec have purchased firms and provided financial support both to offset locational disadvantages and to encourage the pursuit of non-economic objectives.[2] Consequently, political considerations have influenced corporate planning and the public sector has become dependent on government support. Second, the Federal authorities have extended a variety of incentives to privately-owned firms, leaving management to determine the direction of growth in response to the market. This second approach has helped to create a technologically advanced and internationally competitive industry.

As Canada and the U.S. approach free trade, it is an appropriate time to examine how past relations between the government and Canadian steel

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[2]In 1967 Nova Scotia acquired the bankrupt Sydney firm in order to preserve jobs in Cape Breton, where alternative employment opportunities are limited. Quebec purchased Sydney's Contrecoeur plant as part of a policy of provincial "import substitution." Both provinces have assumed part of the firms' debts.

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firms have influenced the structure and performance of the industry. The following discussion consists of three parts. First, the industry's structure between 1945 and 1970 is analyzed. The second section examines the incentive programs introduced by different levels of government. Finally, the effect of government policy is assessed by examining a series of key manufacturing and marketing decisions made by Dofasco Inc., Canada's largest steel producer. Comparison is made with other major Canadian steel firms.

Structure

The Canadian steel industry today can be segmented into two technological sectors: 1) four integrated firms that carry out all phases of manufacturing from primary iron and steel making to the rolling of finished products; and 2) eight small unintegrated mills that melt scrap into steel which is then rolled into final goods. Integrated firms accounted for 77% of Canada's total output (15.6 million tons) in 1988. The integrated sector can be divided into privately-owned firms, Stelco and Dofasco (which acquired Algoma Steel in 1988), and Crown Corporations, Sidbec-Dosco and Sydney Steel (Sysco). Private companies (integrated and unintegrated) produced 96.5% of Canada's steel in 1988.

TABLE I
THE GROWTH OF THE MAJOR CANADIAN STEEL FIRMS 1944-88 (tons produced)

	1944	1964	1967	1988	% increase (1944-88)
Dofasco	307,000	1,550,000	2,100,000	4,050,000	+1219%
Algoma	736,000	2,200,000	2,600,000	3,500,000	+375%
Stelco	1,105,000	3,250,000	4,250,000	4,710,000	+326%
Sydney	750,000	1,000,000	1,100,000	250,000	-67%
Sidbec				300,000	-

Industrial structure and patterns of ownership coalesced after 1945. During the post-War period three of the large firms (Algoma, Dofasco, and Stelco) balanced their primary and finishing capacities to emerge as fully integrated producers. Sydney Steel encountered financial difficulties in 1967 which resulted in its being split into two companies. The province of Nova Scotia acquired Sydney's integrated plant in Cape Breton, while Quebec purchased Sydney's Contrecoeur finishing mill, converted it into an integrated facility by adding direct reduction plant, and renamed the undertaking

Sidbec-Dosco [1]. Table I shows the changes in the ranking of the major firms after 1944. Most of the unintegrated firms entered the market following World War II in order to fill product or locational interstices.

Government Incentives

The Federal government employed developmental instruments to promote the objectives of the National Policy before 1914. As formulated by the MacDonald government in 1879 and pursued by succeeding administrations, the National Policy had three components: the construction of a transcontinental railroad network, settlement of the prairies, and industrialization. Government initiatives were designed within this context to encourage the steel industry to enlarge its primary production and to supply the finished products required by the railroads, agricultural implement makers, and other capital goods industries. However, of the various policy instruments employed, the most important, the tariff, was imperfectly designed in that it divided the interests of the industry by giving finished products high rates of protection and allowing raw materials and intermediate products free or low duty status. Ottawa provided production bounties to compensate primary producers [13, p. 15]. As a result of this skewed incentive structure (along with other development programs, such as government directed purchasing, subsidized rail services, and locational inducements), the industry's secondary capacity exceeded its primary production, plants were not integrated, and every firm was dependent on demand from the railroads [1, 10, 11].

Despite wartime growth the structural and technical characteristics as well as the market orientation of the steel industry remained intact. The collapse of railroad construction during the early 1920s caused steel production to fall by almost 40% [18]. The government discontinued some of its pre-1914 incentives but retained the tariff, its most important development instrument.[3] Moreover, the character of the tariff was even less appropriate by this time: railroad steel received strong protection at a time when demand for new products (plate, structurals, and sheet) was growing. It was not until 1930, the same year in which the U.S. passed the Smoot-Hawley tariff, that Canada raised the rate of protection on the new consumer steels. Firms began diversifying their product ranges, but by 1939 the industry as a whole was still unbalanced and considerable unused capacity existed.

The objectives of government policy toward the steel industry changed markedly during World War II. C.D. Howe, Minister of Munitions and Supply, encouraged the industry to develop as one component operating within a continental context [13, pp. 179-81]. Even though Canada imported more than 30% of its steel, Howe advocated a policy of selective rather than comprehensive import substitution. Canadian firms would specialize only in products for which the level of demand permitted efficient production. Other

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[3]The cessation of bounty payments for ore mining in 1912 led to the virtual closure of the industry until 1939 [13, pp. 15, 165]. Subsidized rail transport from the Maritimes to central Canada was discontinued in 1917, then reinstated in 1927 [12].

goods would be imported from the U.S. Further, Howe wanted to balance the industry's primary and secondary capabilities and to promote plant integration.

The government reduced its reliance on National Policy instruments and made increasing use of new incentives in order to achieve these goals.[4] Ottawa, for example, provided capital grants to companies to finance new plant and it set up Crown corporations that were later sold to private firms [13, pp. 179-9; 11, p. 236]. The cornerstone of Canada's policy, however, during and especially after the War was the accelerated depreciation allowance. Ottawa relied on these allowances to encourage firms to expand in the uncertain post-war period: steel was in short supply and cold war tensions were mounting, labor relations were unsettled, raw material and plant costs escalated (the latter by 300% between 1939 and 1951), and profit margins remained low. Even though the steel industries of both Canada and the U.S. faced similar conditions and both governments employed the same policy tools Canadian authorities made more consistent use of accelerated depreciation to create a more stable investment environment within which firms could plan [13, pp. 232-3].

Howe, as Minister of Munitions during the War, was given wide discretion in setting depreciation rates for individual firms. These ranged from 50% p.a. to nil. It has been argued that Howe used special rates to reward or punish firms for their responses to his policies [1]. Apart from Howe's special wartime allowances, a more formal depreciation policy was used between 1944 and 1949 to facilitate plant expansion, modernization, and conversion to peace time-operation. Rates varied from one-half to twice the ordinary levels [19, p. 5]. The Income Tax Act of 1949 introduced major changes in depreciation policy: the Minister's discretion was limited, all firms were entitled to some depreciation, and special provisions were extended to mining firms [4]. The Act introduced the Capital Cost Allowance, which required firms to use the diminishing balance method under which rates were set at 25%, twice those permitted under the old straight line depreciation [6, p. 25]. Moreover, these provisions allowed firms in rapidly expanding industries like steelmaking to win ever increasing tax savings by acquiring assets at a geometric rate of growth since tax liabilities could, in effect, be deferred indefinitely [6, pp. 74 and 81].

Greater reliance on accelerated depreciation instead of the tariff marked an important shift in development policy. Depreciation allowances constituted supply side adjustment and thereby avoided the welfare loss and demand distortion inherent in the use of tariffs. Moreover, the allowance was a particularly suitable instrument for encouraging the growth of industries like steelmaking which have heavy fixed costs. Reducing fixed charges was especially important in the context of the Canadian market, characterized by demand for relatively small tonnages of a wide variety of products.

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[4]To promote regional development, Ottawa strengthened the Maritime freight assistance program [2]. Ore bounties were discontinued in 1943 [13, p. 207]. Less emphasis was placed on the tariff.

Howe reinforced the effect of the depreciation allowance by setting up voluntary associations through which open business-government dialogue would develop. In forming these organizations, the Minister drew upon his close war-time relations with steel leaders and the experience gained from the operation of similar informal bodies that met during the conflict [13, pp. 233-4]. The post-war associations provided forums for discussing common problems, formulating economic goals, and examining alternative responses to challenges and opportunities.

By combining the use of new incentives and direct business-government dialogue during the 1950s and 60s Howe achieved his development goals. All of the major Ontario firms built modern integrated plants and diversified their product ranges in line with comparative advantage and the level of domestic demand. American imports and small entrants served other market sectors. The industry balanced its primary and secondary production, while consortia of Canadian and American firms established a dynamic iron ore mining industry which made an important contribution to an emerging continental raw material supply network. By the mid 1960s the Canadian steel industry had become internationally competitive. This was the changing business environment, shaped to a significant degree by shifting government incentives, with which Dofasco interacted to devise and implement its manufacturing and marketing policies from 1912 to 1970.

Manufacturing and Marketing Strategies at Dofasco

The formation of Dofasco and the other major steel firms was encouraged by the National Policy environment. American foundryman Clifton Sherman established Dofasco in 1912 to manufacture steel castings for the railroads and agricultural machinery makers. Canada's tariff structure protected the firm from competition from U.S. foundries and ensured market prices for all inputs needed for open-hearth steelmaking except coal. With its extensive finishing capacity, Stelco benefitted in similar fashion from the tariff structure; for Algoma and Sydney, both of which possessed more primary than finishing capacity, bounty payments were more important. Like the American founders of Algoma and Sydney, Sherman relied on U.S. contacts to provide the capital and expertise needed to launch his business [1, 13].

In 1917 Sherman made his first attempt to broaden Dofasco's product range beyond castings. His acquisition of a plate mill was intended in part to provide an outlet for the firm's enlarged steel output, which has increased during the war. The extent to which the government provided financial help is unclear, but the firm probably received relief from Excess Profits Duty or special depreciation under The War Tax Act of 1917 [3; 8, Feb. 19, 1918].

During the post-war boom Sherman replaced the mill with a more modern and flexible facility. The new universal plate mill was well suited for Canadian market conditions. The mill could roll a diverse range of goods (plates, sheets, and bars), most of which were imported from the U.S. [10; 8, Nov. 24, 1919]. The mill's capacity represented 33% of Canadian demand for products within its rolling capabilities [10]. Yet in 1921 when the mill began working, demand slumped and the tariff structure, still biased toward

protecting railroad steel, did not provide adequate insulation for markets that the new facility served. The mill closed in 1921 and did not reopen until demand revived in 1928.

In 1930 the new Conservative government raised the tariff on structural steel and flat rolled products, thereby creating opportunities for product diversification. Dofasco decided to produce tinplate, not only because of the protection provided by the new tariff, but also because, with modifications, the universal mill could roll the product. Moreover, the market for light steels used by consumer industries was growing more rapidly and exhibited less violent cyclical fluctuation than that for heavy steels needed by capital goods makers. By 1933 light steel represented 43% of total domestic demand and Canada imported all of its tinplate [8, Aug. 4, 1933]. By adopting tinplate, Dofasco doubled the size of its potential market.

In order to produce a higher quality strip for tinplate, Dofasco built Canada's first cold reduction mill in 1935. The firm later added a second cold mill to raise its capacity and installed an improved hot strip mill. These extensions reflected the pursuit of a strategy appropriate for a small firm: specialization in highly finished goods that had the largest profit margin.

Other Canadian steel firms took advantage of the revised tariff to diversify their product ranges. The most successful was Stelco, which enlarged its sheet mill and entered galvanized wire making [12, p. 155]. Algoma took up structural and channel production, but these developments did not reduce significantly the firm's dependence on rail making [13, pp. 10, 172]. Suffering from locational disadvantages and financial problems, Sydney did not make any significant plant modifications [1].

Thus, under the influence of higher tariffs and shifts in demand during the 1930s, three firms enlarged their plant and diversified into product lines that would prove to be the basis of their future growth. However, the variegated nature of Canada's slowly growing demand for steel exposed few opportunities to introduce efficiently-scaled plant and optimal production runs. The industry still possessed too little iron making capacity and lacked sufficient domestic ore supplies. Because of these limitations, American firms could produce at lower cost and imports remained high despite the tariff revision of 1930.

During World War II Canada's annual steel production rose by 133% to 2.86 million tons [11, p. 209]. To support this growth the government allowed Howe wide discretion in providing financial incentives in the form of direct capital grants and accelerated depreciation allowances. Individual firms benefitted to varying degrees from Howe's actions. For example, Algoma received the lion's share (82%) of all direct government aid (capital grants) to the steel industry [13, p. 199]. With capital grants and accelerated depreciation, the firm enlarged its ironmaking facilities and diversified into flat rolled products. The Government gave financial help to Dofasco to build armor plate mills, but of more importance to the future peace-time growth of the firm, it was allowed to depreciate rapidly two cold rolling mills [8, Oct. 31, 1943, May 12, 1944]. By 1945 the cold mills had enabled Dofasco to meet 50% of Canada's growing demand for tinplate [9, 1945]. Stelco expanded its

primary iron and steel works and built new plate and continuous sheet mills. Sydney's plant in Nova Scotia changed little.

Discretionary aid in the form of capital grants and special depreciation granted under the program of 1944-47 clearly favored Ontario's steel firms. The distribution of government financial assistance followed the locational logic of Howe's policy of encouraging continental specialization and reflected his reservations concerning the abilities of Sydney's management [1, 13]. However, the Income Tax Act of 1949, which was enacted to restimulate Canadian industrial expansion after it had faltered in the uncertain conditions of the late 1940s, reduced the discretionary nature of government programs and made more generous aid available to all firms on an equal basis. By allowing managerial initiative freer reign and by reducing uncertainty arising from the business environment, Ottawa helped to lay a solid base for the rapid growth of the steel industry during the 1950s and 60s.

Between 1950 and 1972 Dofasco expanded in two directions: 1) backward into iron production and iron mining, and 2) product diversification. The first step in integrating the firm's facilities came in 1949 when construction of No. 1 blast furnace began. The project had been under consideration since 1947, but the high capital cost had delayed its initiation [15, p. 31]. Rising scrap prices and shortages of this vital input for open-hearth steel making had presented steadily mounting pressure for the firm to substitute hot iron for scrap: at 1950 prices, the saving on scrap alone would pay for the furnace in 12-13 years. Special depreciation provided the push needed to start the project.

Dofasco's decision to adopt the Basic Oxygen Steel process (BOF) in 1954 was based solely on the potential cost reduction.[5] BOF operation reduced scrap requirements to an amount equal to that generated within the plant, thus decisively relieving the firm's exposure to the volatile market for used steel. By using only liquid iron Dofasco generated sufficient savings to recoup the cost of the BOF plant in just over one year [8, June 19, 1953].

The next step in Dofasco's backward integration came in 1961 when it purchased an interest in the Wabush Mine in Labrador. The completion of blast furnaces 2 and 3 raised Dofasco's ore requirements to a level that made it imperative to control ore supplies. By providing immunity from taxes on profits derived from iron mining for the first three years of new operations, Ottawa reduced the great risk involved in making the large investment needed to open new ore deposits. The co-operation of American and Canadian firms in ore projects on both sides of the border and in coalmining ventures in the U.S. helped to achieve one component of Howe's vision of the Canadian steel industry developing within a continental rather than a national framework.

The second part of Dofasco's expansion program, the extension of its product range and expansion of its finishing mills was driven partly by internal pressure: the growth of primary capacity demanded the enlargement of rolling

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[5]Dofasco was the third firm in the world to employ the BOF. As a result, the firm had to solve a variety of problems such as reducing air pollution, preventing splashing of the liquid metal, and developing a suitable refractory lining for the vessel [14].

plant and intensified the firm's search for new products. Rapid growth in the demand of both consumer goods manufacturers and the construction industry for flat rolled steel created an increasing range of opportunities to replace imports with products made in optimally scaled plants located in Canada.

Rapidly rising tin prices during the late 1940s induced Dofasco to build Canada's first electrolytic tinning line. The new plant reduced the amount of tin used by 80% and the resultant savings encouraged new applications and greater demand for tinplate [15, p. 25]. In 1954 Dofasco entered the market for galvanized steel by purchasing Lysaught-Dominion Co. One year later it had become apparent that domestic demand was sufficient to support a continuous galvanizing line and the firm built the first such facility in Canada [8, August 27, 1954]. The same year Dofasco installed a 56" mill (the first of five) in order to roll the high quality wide strip previously imported by car and appliance makers [15, pp. 27-8]. In response to the boom in residential and commercial construction, Dofasco developed improved corrosion resistant steels and, in partnership with Stelco, built an efficiently scaled plant for making pre-painted steels [8, Oct. 29, 1964]. By 1964 demand for silicon steel, which manufacturers of electrical goods imported, had grown enough to support a domestic plant, and Dofasco built the facility.

Buoyant demand in the early 1970s in the western energy sector provided Dofasco with an opportunity to pursue greater geographic diversification of sales. The firm acquired a pipe plant in Alberta and subsequently doubled its sales in the west [8, Nov. 30, 1973]. Of more importance, manufacturing new products for the oil and gas industries helped the firm to offset the fall in sales of automotive steel following the energy crisis.

Innovations in sales activities and the development of a research and development group supported Dofasco's post-war plans for product diversification. Sales and research consulting activities by Dofasco personnel exposed the firm directly to customers' material and processing problems and led to a variety of improvements in quality, manufacturing, and metallurgy [5, 14]. These activities made it possible to identify opportunities to develop new steels and coatings and to devise new applications for existing products. The firm thus was able to differentiate its products and to prevent the substitution of other materials for steel in specific applications.

Dofasco's dual strategy of backward integration and product diversification was achieved in a period of declining tariffs.[6] This firm and other major producers were able to adopt cost reducing processes and to build the optimally scaled facilities that made it possible for them to compete with foreign companies. By the early 1970s the Canadian steel industry had realized much of Howe's vision: the country's dependence on imported steel,

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[6]G. Boyce and E. Stewart are analyzing changes in the rates of steel tariffs for the period 1920-1972. A sample of 38 steel products revealed that the actual rate of protection fell from 1944 to 1958 as a result of inflation. (The tariff took the form of a fixed dollar amount applied to each ton of imported steel.) In 1958 the tariff was changed to a percentage of value, causing a significant upward revision. The percentages fell after 1964. [Information from STATSCAN and the *Canada Yearbook*].

so pronounced in the 1940s, had been reduced to those products that could not be manufactured efficiently, while the pattern of domestic production reflected the dictates of comparative advantage. Moreover, by the 1970s the Canadian iron mining industry had become integrated within a continental supply flow. In 1967 Ottawa phased out the accelerated depreciation allowances that had assisted the transformation of the industry.

Conclusion

The industry's rise to internationally competitive status was supported by similar policy instruments used by the U.S.; indeed shifts in the types of incentives employed by the Canadian and American authorities occurred at the same times. In both countries the formidable challenges of the post-1945 era were met with accelerated depreciation, but the Canadian government used this incentive with more consistency, thereby providing firms with a more stable environment within which to plan.

After most of the discretionary features of earlier depreciation policies were removed in 1949, the allowance became an appropriate and equitable development instrument. It avoided the welfare loss, demand distortion, and political maneuvering that flow from the use of tariffs. In contrast to the production bounty, special depreciation has a more direct impact on the decision to add capacity. The timing of the depreciation program's introduction was also most appropriate. Escalating plant costs made steel firms hesitant to build. The rapid post-war growth of consumer industries created demand for new steels and steel products. By reducing fixed costs, accelerated depreciation enabled firms to attain optimal production costs on new products at a lower level of output than otherwise would have been possible. Given the extensive linkages of the steel industry, these lower costs had important spread effects.

Since the Act of 1949 did not disturb inter-firm competitive relations, but rather benefited all companies equally, it remains to explain why Dofasco grew so much faster than its rivals after 1944 (Table I). Three aspects of the firm's manufacturing and marketing policies stand out: 1) Dofasco's innovative sales and research activities generated close relations with customers and thereby exposed new market opportunities; 2) the firm's pioneering use of new technology lowered costs; and 3) specialization in flat rolled steels that had the highest value added focussed the firm's operations in product sectors which grew rapidly and facilitated the quick attainment of optimal scale. Moreover, demand for flat steel was cyclically stable with the result that fixed costs were not as great a burden in recessions. In contrast, capital goods steel made up a much larger proportion of Stelco's and Algoma's output. Finally, Dofasco's unique labor relations and management philosophy have underpinned its success in marketing and manufacturing.[7]

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[7]Since 1912, Dofasco's management philosophy has placed great emphasis on developing open lines of communication at all organizational levels, including the shop floor. The firm has employed an informal management structure that stresses functional rather than

Firm-specific factors as well as government policy must be examined when explaining the rapid growth of Canadian steelmaking. The government has supported growth in the private sector while allowing managerial initiative full reign. However, when government has used public ownership as a medium for addressing regional and political concerns, it has had a disruptive effect on managerial initiative and has introduced distortions that must be removed before the full benefit of continental specialization and exchange can be achieved through free trade.

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hierarchial relations. The company combines extensive benefits with what amounts to lifetime employment. Since 1938, Dofasco has operated a profit sharing plan to which employees make annual contributions that the firm doubles or triples as profits allow. The employee receives all amounts plus interest on retirement, and early withdrawals are permitted.