

Rethinking Canadian Economic Development:
Technological Dependency in Historical Context

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Introduction Within the literature on the political economy of Canadian capitalism, there continues to be a debate over whether or not Canadian capitalism should be viewed as a dependent formation. In a reissue of Kari Levitt's *Silent Surrender*, an original member of the left-nationalist school, Mel Watkins, claimed that "the continuing resonance and relevance of this book, thirty years on and counting, is remarkable."¹ In a recent article, Paul Kellogg rejected this view and argued that any notion of an underdeveloped Canadian economy was invalid. He called for an end to,

...the long detour of Canadian political economy, which has had political economists for almost 40 years trying to square the circle: explain the actions of a G8/Quad member country as being in the same category as the world's underdeveloped neocolonies.²

In this paper, I want to critically examine both of these approaches to understanding Canadian capitalism. I will argue that dichotomous approaches – either a dependent economy leading to economic truncation or a fully developed economy with no significant differences from other advanced capitalist economies – do not provide a complete picture of the Canadian political economy. The pattern of development in the Canadian economy has been highly variable over its history with very different relative levels of productivity and income – ranging from the high levels experienced in the eras of the national policy and the postwar Golden Age to the more limited levels in the current era of neoliberal restructuring. This variation is not adequately explained in approaches that either posit one long process of truncation because of dependency on American capital and technology, or argue for a fully-developed capitalism with no distinguishing features from other advanced economies.

Underlying the variation of productivity and income is a key structural feature of the Canadian economy that has persisted from the intense period of industrialization in the national policy era to the current period of neoliberal restructuring, and that distinguishes the Canadian economy from other advanced capitalist economies: a systematic reliance on imported technologies in key manufacturing sectors. Canadian

business, both domestic and foreign-controlled, has consistently followed a non-original approach to innovation that relies on transferred technologies in key areas of technological activity.

I will focus on three main periods of economic development, the national policy era, the postwar Golden Age, and the period of neoliberal restructuring, to show the differential effects of imported technologies on the Canadian economy. In the first two periods, a strategy of non-original innovation was followed in which foreign (primarily American) technologies were applied extensively that led to levels of productivity and income that were among the highest in the capitalist world. In the third period after 1973, the shift in orientation on the part of Canadian manufacturers toward producing for the American market introduced a new element into the strategy of non-original innovation. Canadian firms emphasized non-high tech areas of manufacturing using more mature forms of technology where original innovative capabilities were not as important. This different emphasis meant that, particularly in the last half of the 1990s, there was declining relative productivity not only in relation to the American economy but other advanced economies as well.

Different Interpretations Before reviewing the different periods of economic development, it is first necessary to briefly review the terms of the debate over the character of Canadian capitalism. The left-nationalist interpretation of the Canadian political economy reached its apex in the early 1970s and argued that Canadian economic development had been truncated by reliance on American direct investment, branch plant manufacturing and technological imports. It was further argued that Canadian indigenous capital occupied a subordinate position in the Canadian economy to that of American transnational capital in key economic sectors, particularly the manufacturing sector.³ While later work, such as that of Gordon Laxer and Glen Williams, did not share a number of the left-nationalist assumptions, particularly the arguments concerning the separation between a commercial/financial and an industrial business class, the view remained that Canadian economic development had been truncated by an insufficiently developed manufacturing sector.⁴

The second view, which rejected key aspects of the left-nationalist interpretation of Canadian economic history, began to develop in the latter part of the 1970s and by the middle part of the 1980s represented a significant volume of work. These writers disputed the notion of economic truncation and the claim that indigenous Canadian capital was in a weaker or subordinate position to American capital. The work in this area placed emphasis on a number of patterns: 1) the emergence of Canadian transnational corporations which generated outflows of foreign direct investment that were larger than investment inflows from foreign-based (particularly U.S.-based) corporations; 2) the existence of tight networks of connections between domestically-controlled financial institutions and industrial companies which provided the basis for an autonomous indigenous business class; 3) the rise of domestic control over the 1970s in various sectors of Canadian industry; 4) the rise of provincial industrial strategies linked to regional bourgeoisies; and 5) the role of the Canadian state in encouraging and supporting these developments.⁵

The underlying differences of political economists over the status of Canadian capitalism surfaced again in debates over the free trade agreement. On one side, it was argued that the agreement grew out of a strengthened indigenous Canadian business class which saw the agreement as a means of furthering its growing transnational interests in real estate, resource production, financial services and industrial manufacturing.⁶ On the other side, it was argued that the agreement led to a further strengthening of the limitations of dependent development, with Canadian business and political elites engaging in a “leap of faith” and attaching themselves even more closely to the U.S. economy.⁷

The debate has continued over the consequences of free trade. Watkins argues that with the movement to free trade and the removal of tariffs as well as controls on foreign investment, the same problems of low relative productivity and income have remained. He notes that,

...we'd long been told by mainstream economists that Canadian industrial productivity, and the associated standard of living, lagged the American because of a tariff that facilitated and protected the inefficient...Well, we did the experiment. We got rid of the tariff, we let foreign ownership rise, and now we live with the answer: the productivity and income gap did not disappear. Levitt and the political economists are right: foreign ownership is the problem.⁸

Kellogg, in response, asserts that the evidence does not support the view that the Canadian economy is underdeveloped or that foreign ownership is a problem: the pattern of manufacturing exports, net flows of foreign investment, and domestic control of the economy do not support the claims or predictions made by the left-nationalists, although he does not provide any evidence concerning relative productivity or income in the Canadian economy.⁹

There is thus a significant period of debate, stretching out over almost three decades, concerning the character of Canadian capitalism. However, neither side of the debate has been capable of capturing the diversity of Canadian economic experience which has been highly variable and has combined an underlying structure of technological dependency with both relatively high and low levels of development in different periods. Those arguing for a long-term process of truncation as a result of dependent development miss the intense periods of growth that have moved the Canadian economy at different points in time to the forefront of the advanced economies. On the other hand, the theorists who argue that Canada is simply a member of the G8 group of advanced economies miss the impact of technological dependency in shaping economic outcomes over time.

The National Policy Era The period which was crucial in establishing the pattern of innovation followed by Canadian industry was the national policy era from 1870 to 1914. It was during this era that a unified Canadian economic space was created and important dimensions of the organization of the Canadian economy were established. Smiley noted

in his discussion of the role of national policies in Canadian political development that the term “National Policy” with capital letters is commonly used to refer to the protectionist measures initiated by the Conservative Party under the leadership of John A. Macdonald after it was returned to power in 1878, while the term “national policy” without capital letters refers to the trilogy of policies pursued by both the Macdonald and Laurier Liberal governments to establish an east-west economy stretched out along the border between Canada and the United States.¹⁰ This is the distinction that will be followed in this paper with the second form of national policy covering the three central development measures – completion of a transcontinental railway, removal of indigenous peoples and settlement of the West, and passage of the National Policy tariffs in 1879 - that were implemented by the federal state to construct an east-west economy.¹¹

The architecture of the national policy was supported by an alliance of central Canadian capital uniting financial, commercial and manufacturing business interests behind the broad development strategy. Within this coalition, Canadian manufacturers were enthusiastic supporters of the new tariffs as they were focused on a strategy of import substitution industrialization.¹² Their main concern, echoing sentiments that had been expressed by Canadian manufacturers in previous periods, was in gaining a greater share of the home market and displacing the level of imports into the Canadian economy – a sentiment that was shared by key political elites when the tariffs were introduced in 1879.¹³

The response of other classes in Canadian society was more mixed. Initial forms of support by labour and farmer organizations for the tariffs in the 1870s gave way to opposition in later decades. However, these groups were divided both among themselves, depending on the extent to which one segment was harmed or benefited from the tariffs, and between each other over issues such as state-assisted immigration.¹⁴ As a result, they were not able to form meaningful alliances in opposition to the tariffs or the related strategy of import-substitution industrialization.

Industries were protected by a 10-20% duty in the case of semi-finished goods and industrial materials, a 25% duty in the case of manufacturing equipment and a 30% duty in the case of finished goods.¹⁵ A boom in investment occurred in these industries in the early 1880s.¹⁶ Further growth came from industries, such as those in agricultural products, food processing, railway building and housing construction, which were responding to the broader context of demand conditions in the latter part of the nineteenth century – a major part of which was the substantial increase in real earnings for Canadian workers.¹⁷ A final period of growth occurred during the Wheat Boom in the West between 1900 and 1914 when demand by Western farmers expanded the manufacturing base for farm machinery and other manufactured goods. Drummond observes that,

The period 1870-1914, especially the years after 1900, produced a remarkable structural change in the province’s industrial economy, a change so great that it justifies the application of that traditional label, ‘industrial revolution’.¹⁸

As a result of this industrial transformation, Ontario became the main location for the growth industries of the twentieth century in the areas of electrical apparatus, machinery and tools. Further growth occurred in the regional economy of Quebec which emphasized more labour-intensive forms of textile and leather production.¹⁹ Other regions of the country, in the West and the Maritimes, did not experience the same growth of manufacturing production as they were constructed as hinterlands supporting manufacturing in Central Canada.²⁰ The construction of Canada as a “white settler colony” also meant that certain groups, such as male Chinese and Asian labourers, were exploited as cheap labour and did not share in the growth of income. Women from these communities were also excluded as they were not allowed to immigrate to Canada out of fears that they would lead to a “distortion” of the ethnic and racial composition of Canadian society.²¹

But the existence of gender, racial and regional divisions did not alter the fact that Canadian economic development was more rapid than in any of the other leading economies, including the United States. In the period between 1870 and 1913, Gross Domestic Product (GDP) per capita in Canada grew at an average rate of 2.27 – substantially higher than the U.S. rate of 1.82 and the rates in all of the European economies and the Japanese economy.²² The rate of growth of GDP per hour worked was also greater than in the U.S. (2.25 versus 1.92) and in all of the European economies as well as in Japan.²³ The result was that, by 1913, the level of productivity in the Canadian economy was 87% of the U.S. level – surpassing the level of 84% in Britain which had been the economic and technological leader earlier in the nineteenth century.²⁴ The growth experienced in this period does not support notions of economic truncation because of an underdeveloped industrial structure. Rather, on the basis of a rapidly growing home market which was boosted substantially by east-west trade linkages, there was a broad industrial transformation of the Canadian economy.

Innovation in the National Policy Era Central to the transformations of the Canadian economy in the national policy era was the ability to integrate into production new technologies that had been developed elsewhere. This pattern was particularly evident in relation to firms in the United States. Canadian manufacturers took maximum advantage of the intensive technological development that was occurring in the United States in the period after the American Civil War. In this period, the American capital goods sector rapidly expanded with the production of new machines using a combination of interchangeable and craft-shaped parts that could be applied in a variety of manufacturing processes.²⁵

The ability of Canadian industry to rely on transferred technologies was premised on the political economic context of development which allowed American technologies to be incorporated into Canadian production processes in an extensive way. Contrary to the usual presentation of technological change in neoclassical economic models, technology is not a product that can be easily bought and sold in a market situation. Rather, technology is transferable only if appropriate social and organizational conditions are present. This was certainly the case with the American technologies that were developed in the national policy era which could not easily be applied in other economies. As is noted by Abramovitz,

The United States rose to productivity leadership and then extended its lead between 1870 and 1913 by its vigorous exploitation of advantages that other countries could not immediately match. One was its development of a rich resource base. In a time of high transportation costs and spotty resource exploitation elsewhere, this enabled the country to gain a lead in the development of resource-intensive industries. A second advantage was the emergence of a large national market that enabled the country to profit from the possibilities of an evolving power-driven, capital-intensive and scale-intensive technology and organization.²⁶

Abramovitz is focusing his attention on the other leading economies in Japan and Europe and thus is not considering the case of Canada. But Canada, more specifically the region of Ontario, represented an area that was closest to the U.S. in its ability to utilize American technologies. It had a resource base that could easily match that of the U.S. and it had a social organization of production in the form of developed labour markets, a growing home market, established transportation links and sufficient access to credit through capital markets.²⁷ Even though the home market in Canada was smaller than in the U.S., the rapid and concentrated growth of production, particularly during the Wheat Boom between 1896 and 1913, provided a basis for applying scale-intensive technologies.

Canadian industry also went through a period of consolidation in which between 1870 and 1890 there was an upward trend in the proportion of large firms in manufacturing. This trend continued until the first great wave of mergers between 1909 and 1913 created a number of very large firms, “such as the Steel Company of Canada, Dominion Cannery, Canada Cement, Canadian Cottons and Dominion Glass Company”.²⁸ The more concentrated character of Canadian manufacturing firms meant that they had the capital resources and the production scales that would allow them to effectively use American technologies.

All of these conditions put Canadian industry in an advantageous position vis-à-vis other leading economies in Europe and Japan. In contrast to these other economies, it had a greater ability to use American technologies which were developed on the basis of a “power-driven, capital-intensive and scale-intensive technology and organization”. Furthermore, the existence of tariff-protected domestic markets reduced the likelihood that Canadian firms would lose their markets to foreign-based competitors with greater innovation capabilities. This was in addition to the fact that, through licensing agreements, Canadian firms could gain “relatively cheap access to an already proven industrial process”, head off any other competitors from applying these technologies in the short-term and gain patent protection in the Canadian market against foreign and domestic competition.²⁹ The attractions of licensing agreements were such that they were used extensively throughout Canadian manufacturing industry.

Licensing agreements, however, did not represent the only major source of new technologies and products. Extensive imports of machinery and equipment, which did not receive the same levels of tariff protection because of the absence of Canadian producers agitating for them, came mainly from U.S. sources and provided another way of gaining

access to imported technologies. During the boom years between 1900 and 1914, on average approximately 60% of industrial, electrical, and mining machinery and equipment was imported.³⁰

Comparison with Other Economies The reliance on outside sources of new technologies through both licensing agreements and machinery and equipment imports was so extensive that almost all of the new technologies used in Canadian industry came either from the U.S. or from overseas sources.³¹ As a result, the substantial growth that occurred in the key manufacturing area of the province of Ontario between 1870 and the First World War did not give rise to a domestic technological capability focused on developing new technologies. Even though there was growth of capital goods industries and of manufacturing more generally, there was little development of indigenous original innovation.

In this respect, there was an unusual quality to Canadian industrialization which was not shared by other leading economies, such as the United States and Germany that industrialized at earlier points in the nineteenth century, or countries such as Sweden and Japan that industrialized at the same time as Canada. In these other countries, the development of capital goods industries and of manufacturing was premised on varying degrees of R&D and original innovation, ranging from a substantive capacity in the case of Germany, Sweden and the U.S. to a much more limited capacity in the case of Japan.³²

The reliance on foreign sources of new products and production technologies in the national policy era was reinforced by the status of Canada as a Dominion of the British Empire. The onset of Confederation in 1867 did not usher in a new era of independence from Britain in military terms. Canada remained within the orbit of the British Empire for its defence needs. As a result, there was no need in Canada to build up an autonomous military capability to defend itself from other countries and, given the strength of internal growth in the latter part of the nineteenth century, no need to embark on imperialist ventures of its own, aside from the need to colonize the territories of the West. The federal state only developed the military capabilities necessary to move indigenous peoples from the territories in the West that were to be settled by farmers.

This represented another important Canadian departure from other 'late-follower' countries, such as Sweden and Japan, which were industrializing at the same time as Canada. For reasons related to the need to defend against potential aggressors, such as Sweden's concern about Russian intentions in the Baltic area, or Japan's concern to resist Western domination, these countries pursued policies which supported an autonomous military capability.³³ In turn, the emphasis on developing military forces led to state policies encouraging R&D and original innovation in various key areas of production, including capital goods production.

There were thus several political and economic conditions which supported the reliance of Canadian industry on non-original innovation to a degree not shared by other advanced economies. Even though writers later lamented the lack of technological autonomy in Canadian industry, and faulted the Canadian state for failing to promote this autonomy, the fact remains that strategies of technological autarky were inconsistent with the economic and political conditions of the time.³⁴ A rapid process of industrialization

was achieved that satisfied both economic and political objectives without a commitment to R&D and original innovation.

Contrary to the arguments of the theorists stressing truncated development, the emphasis on non-original innovation did not arise from an incomplete industrialization process.³⁵ The key reason for the lack of original innovation was not the low priority placed on this type of innovation in a staples-based economy that was exporting resources in exchange for imports of finished manufactured goods.³⁶ Neither did it result from an excessive fixation by Canadian domestic capital on commercial/financial activities, leaving the manufacturing sector open to domination by American capital.³⁷ Rather, it resulted from the various political economic conditions in Canada that allowed transferred technologies to be used by both Canadian-controlled and foreign-controlled companies in a rapid process of growth and development – a situation that was only reinforced by the limited military role of the Canadian federal state.

However, contrary to the theorists arguing for a non-dependent Canadian capitalism, the pattern of development in the national policy era also laid the foundation for a distinctive approach to original innovation that would remain as an underlying vulnerability in the Canadian economy. As will be seen in the next section, the rapid growth in the postwar Golden Age period allowed the Canadian economy to remain at the forefront of the advanced economies. But this period was also one in which the other advanced economies not only were able to use American technologies in a more effective manner, but were able to combine transferred technologies with substantial forms of original innovation. There was thus a process of differentiation between the Canadian economy and the other advanced economies that had major implications for the lower relative levels of productivity experienced in the later period of neoliberal restructuring.

The Postwar Golden Age The next intensive period of accumulation in the Canadian economy, the “Golden Age” period from 1945 to the first oil shock in 1973, provided another example of the pattern established in the national policy era.³⁸ Once again, Canadian industry was able to combine a heavy reliance on technologies primarily imported from the U.S. with levels of productivity and income that were second only to the U.S. in the world economy.

The U.S emerged from the Second World War as the dominant technological leader in a number of research-intensive industries and this leadership expanded in the immediate postwar period of the 1950s.³⁹ As is well documented by the writers arguing for truncated development, a central way in which these technologies were transferred to Canadian industry was through foreign direct investment. The rise of FDI over the 1950s and into the early 1960s reinforced previous patterns established after the First World War when American capital entered in a major way into the key growth areas of manufacturing – automobiles, chemicals and electrical products. Canadian subsidiaries were given limited responsibilities for research and product development, and relied on technology transfers from their parent corporations.⁴⁰ Because Canadian branch plants also tended to be the largest companies in the Canadian economy, they could effectively receive scale-intensive and capital-intensive American technologies.⁴¹ The technology transfers from parent corporations were in addition to continuing high levels of imports

of machinery and equipment. At the end of the Golden Age period in the early 1970s, 60% of machinery requirements were imported.⁴² This was comparable to import levels during the boom years of the national policy era.

However, the extensive reliance on imported technology did not reflect acceptance by Canadian political and economic elites of a less robust form of capitalism in which the postwar reliance on American capital led to a continuing truncation of the Canadian economy – a notion that is common among those political economists emphasizing the limitations arising from dependent development.⁴³ Instead, in the same manner as the national policy era, the reliance on imported technology was incorporated into a context of growth in the home market that allowed non-original innovation to be combined with high relative levels of productivity and income.⁴⁴

The expansion of the home market in this era came from several sources. A central source of expanded demand was the intensification of American direct investment in the manufacturing and resource sectors of the economy. The highest growth rates of American direct investment were in the period 1948 to 1957, when the annual rate of expansion ranged between 10.2% and 16.3%. While the rate of growth slowed somewhat in the period 1958 to 1963, it still ranged between 6.4% and 9.6%.⁴⁵ The postwar growth of American investment provided a wave of spending and led to more investment in the financial, transportation and utilities industries which expanded to serve the growing sectors of the economy fuelled by the influx of American capital.

Domestic demand was further supported by the growth of Canadian resource exports over the 1950s and 1960s, the expansionary Keynesian policies pursued by the Pearson Liberals in the 1960s which ended the restrictive monetary measures followed by the Bank of Canada under the Diefenbaker Conservatives, and the growth of auto production after the Auto Pact was signed in 1965.⁴⁶ These buoyant conditions were further increased by the new collective bargaining regime established by the federal state both during and after the war which provided rising levels of real wages for the male workers that were employed in the “resource, mass-production and transportation industries”.⁴⁷ The increased incomes of workers not only raised their demand for consumer goods but also stabilized the relationship between capital and labour after the widespread strike activity in the war years and the immediate postwar period.⁴⁸

Once again, as in the national policy era, the growth of income was highly uneven in its distribution. Manufacturing production remained concentrated regionally in central Canada.⁴⁹ Keynesian policies that were directed toward maintaining high levels of employment and that supported an expanded welfare state were concentrated on male workers and premised on notions of the “family wage”. The Golden Age economy was also characterized by deep divisions in the distribution of employment along both gender and racial lines.⁵⁰

But these divisions did not change the fact that there was a rapid overall development of the Canadian economy – particularly over the 1960s and early 1970s. One review of Canadian economic performance notes that, “During the 1960s and early 1970s, real income per capita (measured as gross domestic product per capita) grew very rapidly in Canada – at about 4 per cent per annum.”⁵¹ As was the case in the earlier

national policy period, the growth was particularly strong in Ontario where there was expansion in the mass production industries, in resource industries and in services.⁵²

Postwar economic growth led to a rise in Canadian GDP per capita as a percentage of the U.S. level from 77.8% in 1950 to 82.9% in 1973. This was a level comparable to the peak achieved in 1913 of 83.9%.⁵³ The only other countries which exceeded this level were Denmark and Switzerland. It also allowed the Canadian economy to sustain its high level of productivity in relation to the U.S. economy which increased from 82% of the U.S. level in 1950 to 83% in 1973.⁵⁴ This level was higher than in any other economy in Europe or Japan despite the rapid growth of these economies in the Golden Age period. The rapid development in this period only confirmed the views of both political and business elites that foreign investment and its associated reliance on American capital posed no problem for the Canadian economy. As was stated by Charles Drury, a senior Liberal cabinet minister in the 1960s, when it was proposed that federal incentives to promote indigenous R&D and innovation should be restricted to Canadian-owned companies,

What *is* a Canadian company anyway? We want *jobs* in Canada – never mind where the company is owned. Why discriminate against 'non-Canadian' companies by not giving them incentives? I do not believe that a Canadian-owned company is more likely to develop plant capacity in Canada.⁵⁵

Cold War Context Another important source of technological dependency in the Canadian economy was the impact of the Cold War on the approach of the Canadian military to supporting indigenous technological capabilities. At the end of the Second World War, Canadian military officials had supported the development of Canadian-designed aircraft. However, the support of the Canadian military for this type of development eroded over the 1950s, particularly after the Korean War.⁵⁶ Military officials became increasingly influenced by American-defined Cold War strategies and were drawn into approaches which were premised on defending American soil from Soviet attack. This thinking was a key reason for the decision by the Diefenbaker Conservatives to end production of the Arrow fighter jet. Canadian military strategy was informed by the need to counter intercontinental missiles from the Soviet Union, through the Bomarc-SAGE weapon system, and to support a nuclear-strike role in Europe. Both of these American-inspired strategies placed very little importance on a Canadian-based interceptor jet like the Arrow.

The decision to end production of the Arrow precipitated a major movement on the part of the federal state toward greater integration with the U.S. in terms of defence production. Continental defence production arrangements had always existed from the Second World War onwards, but they reached a new stage of development at the end of the 1950s. As the federal state was drawn ever more closely into Cold War definitions of defence strategy, and became a "junior partner" in a series of defence alliances with the United States, the degree of continental integration of defence production also reached new heights.⁵⁷ The Canadian defence industry was increasingly viewed as one part of a continental defence system. This view was formalized in 1959 with the Defence

Production Sharing Agreement. Under the new arrangement, the Canadian defence industry was able to bid on American military contracts without being subject to tariff barriers or the Buy America Act. The full extent of continentalization under the Defence Sharing Agreement was made clear when, within a short period of time, Canadian defence contractors decided to orient themselves solely to the American market "without regard to Canadian defence requirements".⁵⁸

At the same time, it was decided that the Canadian military would purchase most of its equipment from suppliers in other countries through an "off-the-shelf equipment acquisition policy".⁵⁹ This removed the Canadian military as a major source of development of domestic technological networks. The ending of the Arrow thus represented a key point of departure in terms of the role of the Canadian and American states in promoting original innovation within their domestic economies. The Arrow represented the last major project in which the Canadian military attempted to acquire its equipment through supporting domestic sources of technology. Henceforth, not only would the Canadian defence industry be oriented toward serving American defence markets, but the Canadian military would no longer use its procurement needs as a systematic means of creating domestic R&D capabilities.

This was an important difference between the two economies as American military support for research in a number of areas, such as semiconductors and computers, was a central part of the initial development process of these industries in the U.S.⁶⁰ While American state funding was increasing for original research in this area, the Canadian state was cutting back. C. D. Howe, the "Minister of Everything" in various Liberal governments between 1945 and 1957, decided to end funding for the DATAR computer project. The decision in 1954-55 ended a project that was in the forefront of interactive computer systems and modular solid state technology.⁶¹ As was the case in the national policy era, the subordinate role of the Canadian state within wider defence arrangements removed an important source of support for original technological capabilities in Canadian industry.

The Golden Age period thus led to a renewal of the pattern of technological dependency in Canadian industry. The strength of technological dependency in the Canadian economy in comparison with other advanced economies was apparent in a number of indicators in the mid-1960s. Ninety-five per cent of patents were owned outside of Canada and two-thirds of those patents were registered to U.S. residents. Among twenty-five countries, Canada had the highest percentage of patents owned outside the country and the lowest percentage of patents owned by Canadian residents.⁶² Canada also ranked last among 10 leading economies in a composite index of four performance indicators covering: 1) the location of 100 significant innovations since 1945, 2) monetary receipts for patents, 1963-64, 3) number of patents taken out in foreign countries, 1963 and 4) export performance in research-intensive product groups, 1963-65.⁶³ While there was a brief increase in R&D expenditures in Canadian industry in the early 1960s in response to federal measures that were designed to expand domestic R&D and original innovation, by the end of the decade the level of expenditure had leveled off and in the early 1970s was starting to decline.⁶⁴

Innovation in Europe and Japan In the other advanced economies in Europe and Japan, a different pattern emerged. While in Canada the previous pattern of reliance on imported technologies was reinforced, the other advanced economies combined American technologies with greater original technological capabilities. This meant that these economies emerged from the Golden Age period with different levels of technological capabilities in key manufacturing sectors.

After the Second World War, there was an intensive period of catching-up by the other advanced economies as new economic conditions allowed them to apply American technologies more effectively. There was greater access to resources as oil from the Middle East became readily available at low cost and other technological changes made industrial materials more accessible. This change, along with the larger size of domestic markets in Europe with the creation of the European Economic Community and the growth of trade among the advanced economies in the Golden Age period, allowed scale-intensive and resource-intensive American technologies to be used more extensively.⁶⁵

New institutions and arrangements were also created that facilitated the adoption of American technologies. In Europe, there were major transfers of American technologies and forms of organization in the immediate postwar period under “the Marshall Plan, the European Recovery Agency, and its successor the OECC (later OECD).”⁶⁶ In Japan, as is discussed below, new forms of organization of production allowed Japanese firms to adapt American technologies to the smaller domestic market. The transfers that occurred, in turn, were a central part of the process through which other countries were able to move to GDP and productivity levels that were closer to the U.S. This was a significant development in the construction of a liberal capitalist postwar order in which the U.S. as the technological leader systematically disseminated new methods of production, products and forms of organization to other parts of the capitalist world.

However, the transfer process did not occur in the same way in the various leading economies. In contrast to the Canadian economy, American technologies were not simply transferred to Europe. They were also combined with a substantial degree of R&D and original innovation. In countries such as West Germany, Britain, France, and Sweden, there were areas of R&D and original innovation that either remained from the past or were developed through public and private investment in the 1950s and 1960s.⁶⁷ While European companies were not as strong in the computer industry, they did have a research presence in semiconductors, machine tools, aircraft and car manufacturing, chemicals, pharmaceuticals and diagnostic devices.⁶⁸

The auto industry, which was a core sector in postwar European expansion, illustrates this point. In response to labour militancy in the U.S. in the 1930s and 1940s and the postwar boom in demand for cars in the European market, there was a surge of American direct investment in car manufacturing over the 1950s and 1960s.⁶⁹ The expansion of European auto manufacturing was furthered through joint efforts by European states and European car manufacturers to reorganize auto production. Reflecting a history of manufacturing dating back to the beginning of the twentieth century, auto producers in Europe emphasized smaller cars using different types of technology such as front-wheel drive, fuel injection and five-speed transmissions.⁷⁰ They were in a competitive situation involving a number of companies in France, Germany,

Britain, Italy and Sweden. The competition among auto producers was increased as tariffs were gradually reduced to zero by 1968 for countries in the European Community.

In this different context, it was not possible to simply rely on technologies and products developed in the United States. Both European-controlled and American-controlled companies had autonomous design and engineering capabilities that allowed them to introduce new models into the European market and generate exports to other countries. This contrasted sharply with the situation in the Canadian auto industry. The negotiation of the Auto Pact in 1965 reinforced the role of Canadian subsidiaries in the auto sector as assembly operations using technologies and products developed in the U.S.⁷¹ There were thus important differences in the organization of innovation when the Canadian and European auto industries are compared. Canadian industry operated as a fully integrated user of technologies and products created in the U.S. while European industry developed as an autonomous sphere of design, production and marketing. This in turn affected wider sectors of industry as parts suppliers in Canada did not have to develop original innovative capabilities in order to serve the needs of the car manufacturers, while in Europe demands were placed on suppliers to support the innovation needs of the car producers.

The same differences are apparent with the Japanese economy which also followed a different path of development in the postwar Golden Age period. There were extensive technology imports in Japan between 1950 and the early 1970s, primarily through licensing agreements with foreign firms, but these technology imports were articulated with long term processes in which Japanese industry moved further and further away from relying on technology transfers. R&D in Japanese industry was associated less and less with absorbing imported technologies and became more connected to domestic forms of original innovation.⁷² The ratio of payments for licenses and technological know-how to R&D fell gradually over the 1960s and then rapidly in the 1970s from its peak level of 18.5% in 1960 reaching a low of 7.2% in 1990.⁷³

Again, a key sector in this regard was the auto industry. The auto producers in Japan took American Fordist methods of production and, from the 1950s to the 1970s, developed a new “lean production” system which emphasized production in small batches, just-in-time delivery systems, work teams, flexible manufacturing, production networks based on subcontracting and labour-displacing automation.⁷⁴ Along with a labour relations framework in which management was given untrammelled authority, a key source of the Japanese system was the need to produce a range of products for a smaller domestic market. This led to a focus on “small-batch production and quick changeover of product lines” through long-term networks of suppliers that developed multi-purpose equipment.⁷⁵

The demands placed by the auto industry on suppliers for different types of machinery were a key reason for the development of computerized numeric controller (CNC) machine tools. This industry grew gradually over the 1960s and then rapidly over the 1970s to become the leading producer of machine tools in the world.⁷⁶ The innovative performance of the machine tool industry was repeated in other areas such as electrical machinery, semiconductors and steel.⁷⁷ The development of the Japanese economy was thus heavily based on forms of production involving R&D and original innovation. In contrast to the situation in Canada, this type of innovation lay at the core of the process

through which economic growth was generated. The different approaches to innovation in the Japanese and Canadian economies were reflected in the extent of reliance on licensing agreements. Payments under these agreements in Canada remained at a high level in relation to R&D spending. The ratio of payments for licensing agreements to R&D in Canadian industry amounted to 25.7% in 1972.⁷⁸ This ratio was substantially greater than Japan's figure of 18.5% at the height of its reliance on imports in 1960.

Innovation and Adjustment after the Golden Age In turn, the different paths followed in the leading economies had implications for how they reacted to the economic problems after 1973 when several developments came together to end the era of rapid growth in the advanced capitalist economies. The conditions which supported the rapid growth rates of GDP and productivity in the Golden Age years came apart in the early 1970s when the fixed exchange rate system was abandoned under pressure from the United States and there was rising inflation from several sources, particularly increased oil prices after 1973-74.⁷⁹ The problems were compounded by the overhang from the Golden Age era in which states were reluctant to allow a realignment of the economy through bankruptcies, rising unemployment and a restructuring of capital into more productive areas.⁸⁰

In this situation of stagnation and inflation, characterized by falling rates of GDP and productivity growth, both business and the state in various capitalist economies struggled toward a solution over the 1970s. By the early 1980s, a clear direction in terms of how to control inflation and restore growth rates was established. After the "Volcker shock" in 1980, a process of U.S.-led neoliberal restructuring was set in motion in which the role of markets in politics and social relations was reasserted through forms of both domestic and global change.⁸¹ The role of the state in owning productive assets, regulating international capital flows, providing welfare state programs and managing demand through Keynesian forms of intervention was systematically reduced in the leading capitalist economies. Market logic was also extended deeper into the organization of public programs and the form of community life.⁸²

However, there was an additional dimension to this adjustment process that needs to be given more attention. The advanced economies differed considerably in the extent to which they were based on the new research intensive industries, particularly the industries producing information and communications technologies (ICTs). This was important because these industries were the prime location of the growth of productivity in the neoliberal era. Because Canadian industry emerged from the Golden Age era with a minimal foundation in these new industries, it was not well-placed to engage in export-oriented competition with manufacturers in other advanced economies – particularly the United States which was a technological leader in a variety of areas.

Shifting to an Export-Driven Strategy The problems posed by this situation became increasingly relevant when, over the 1970s and early to mid-1980s, export-driven strategies became more important to Canadian manufacturers. The ability of Canadian manufacturing industry to focus on the home market as it did in earlier periods was undermined by both the removal of tariffs that previously protected the domestic market

for manufactured goods, and by processes of neoliberal restructuring that restricted the rate of growth of domestic demand.

Tariffs were removed through successive rounds of GATT negotiations, culminating in the Tokyo Round in 1979. This round of negotiations essentially eliminated the National Policy tariffs. The reason for the dismantling of tariffs was that it was believed that greater specialization of production would lead to greater economies of scale in the manufacturing sector and promote greater exports and productivity – a logic that later played a major role in leading to the Canada-U.S. trade agreement.⁸³

The rate of growth of domestic demand was restricted by several sources. First, starting in the 1970s, for reasons that were discussed earlier, the Canadian economy, along with other leading capitalist economies, no longer experienced the same growth rates as in the postwar Golden Age. Demand conditions in the Canadian economy were lowered even further by restructuring in the labour market as Canadian business over the latter part of the 1970s and early 1980s downsized its operations in a number of areas and rejected the more accommodating stance toward unions that existed in the Golden Age era.⁸⁴ A final source of lower demand came from the restrictive monetary and fiscal policies pursued by the federal state in Canada as part of an agenda to control inflation and improve the international competitiveness of Canadian industry by restraining the rate of growth of wages and unit labour costs.⁸⁵

The more limited growth opportunities in the Canadian domestic market strengthened the resolve of Canadian business in various sectors, including manufacturers, to expand into the U.S. market. Canadian manufacturers moved from a stance at the end of the 1960s which emphasized the role of the home market, to a position at the end of the 1970s and early 1980s which focused on trade liberalization within a continental free trade zone.⁸⁶ With the implementation of the free trade agreement in 1989, there indeed was a shift in the orientation of Canadian manufacturing – particularly once the American economy recovered from a recession in the early 1990s. From 1992 to 1996, exports rose rapidly as a source of growth while domestic demand remained essentially flat.⁸⁷ This part of the story supports the arguments of those claiming that the shift to supporting free trade came out of “a strong indigenous capitalist class that defines its interests in terms of a continental economy”.⁸⁸

However, another part of the story does not fit with this interpretation. Because of its weaknesses in original technological development, Canadian industry was in no position to embark on innovation-based export growth. Even though, under the stimulus of federal subsidies and incentives, there were areas of indigenous technological development from the 1960s onwards, original innovation in key areas of economic activity remained highly limited.⁸⁹ A study of technological clusters was done by Britton from 1991 data which examined the linkages of firms in the Canadian economy around new technology-based products or related services. He found that the largest technological cluster, the Information Technology cluster, was centred on Nortel, a producer of telecommunications equipment, which on its own did 21% of all Canadian industrial R&D.⁹⁰ Other smaller clusters existed in the areas of energy-environmental technologies and aircraft and parts. But there was very low development in the crucial Machinery industry and in the Automation cluster more generally.⁹¹ There were also continued weaknesses in the computer side of the information technology sector. In a

study of patenting by Canadian inventors in the U.S. in the period 1980-94, Trajtenberg concluded that,

...Canada seems to be “missing the boat” in terms of the prevailing general purpose technology, Computers and Communications, continuing instead to innovate in traditional fields. Thus, the share of C&C patents in Canada barely changed during this period (from 7 to 9 percent), as opposed to a *doubling* of the C&C share for all patents (from the same initial base of 7 percent to 14 percent).⁹²

A recent review of the pattern of industrial innovation in the Canadian economy at the end of the 1990s pointed to lower levels of business R&D as a proportion of Gross Domestic Product (GDP), lower sales from innovative products, and lower patenting of new technologies and products in relation to other advanced economies.⁹³

In this fundamental sense, Canadian industry had not “matured” and was constrained in its export capabilities in the new areas of research-intensive industry. Canadian manufacturing industry focused on non-high tech areas of manufacturing where original innovative capacity was less of an issue. When the high tech sector in the U.S. rapidly grew in the latter part of the 1990s, and led to a major increase in productivity, Canadian industry largely missed out on the expansion.⁹⁴ U.S. industries by far accounted for the largest share of the growth. The percentage of U.S. output in high tech manufacturing almost doubled increasing from 17.4% in 1994 to 35.4% in 2000. The Canadian proportion showed much less change increasing from 12.2% in 1994 to 17% in 2000.⁹⁵ During this period, manufacturing output growth in both economies was similar but the composition of output was quite different.

The concentration of Canadian manufacturing growth in lower productivity industries led to major differences in the level of productivity and output both in relation to the U.S. and other advanced economies. Between 1994 and 2000, there was a significant divergence in manufacturing productivity growth rates in relation to the U.S., with Canada experiencing the largest relative decline among twelve OECD countries.⁹⁶ Central to the different productivity growth rates in Canada was the smaller size and lower rate of productivity growth of high-tech manufacturing industries, particularly the sector producing ICTs.⁹⁷ The trend toward lower relative productivity continued into the first half of the next decade as productivity growth in Canada declined even further. Productivity growth averaged 0.9% in the period 2000-2004, while the U.S. had productivity growth of 3.8%.⁹⁸

Contrast with Previous Eras In contrast to previous eras of economic development, technological dependency in the Canadian economy is leading to lower relative levels of productivity growth. A major difference with the earlier eras is that there is greater specialization in manufacturing production. Contrary to the arguments of mainstream economists around the benefits of greater specialization with free trade, the Canadian economy has experienced a decline in relative productivity with the movement away from a protected home market. In the national policy and Golden Age periods, the key

areas of expansion in consumer mass production goods were located in Canada as tariffs provided an incentive for manufacturers to establish plants there. The latest technologies were transferred to Canada primarily through the vehicle of licensing agreements and imports of machinery and equipment. With the removal of tariffs and the movement to free trade, the situation changed. Canadian industry specialized in non-high tech areas and key growth industries, particularly the production of ICTs, were either no longer located in the country or had a much smaller presence in the economy.

This effect was compounded by the premium placed in the new forms of technology on networks between users and suppliers. When productivity growth was located in specific consumer mass production industries, the importance of these networks was not as great. But as growth came to be generated in the sectors producing the means of production, and productivity growth was reliant to a greater extent on specific forms of relations between users and suppliers, Canadian industry was at a major disadvantage because it did not have the same networks of relations with the producers of the new technologies.

This situation was exemplified by the difficulties experienced by Canadian manufacturers in integrating advanced manufacturing technologies (AMTs) into production. This was a sector of machinery production developed in other advanced economies over the 1970s and 1980s that integrated new developments in computer technology and advanced materials into new production processes. Canadian manufacturers followed their traditional pattern and imported these processes from elsewhere. A survey of manufacturers which examined the process of applying AMTs in the province of Ontario found that firms had significant difficulties integrating them into their production operations, and that the greatest difficulty was faced when smaller, single plant firms attempted to use foreign technology that had been developed in overseas networks using different labour relations frameworks.⁹⁹ Similar problems were pointed to in a review of AMTs in Canadian industry at the end of the 1990s. The review pointed out that “to pass the technological advances of the R&D providers to the AMT users, the Canadian supplier industry needs to include more firms with an innovation culture”.¹⁰⁰

Conclusion The Canadian economy has gone through several different eras of economic development. Underlying all of them has been a reliance on non-original innovation by Canadian industry. The consequences of this reliance have differed considerably. In contrast to earlier periods during the national Policy era and the postwar Golden Age, the ability of Canadian industry to combine non-original innovation with high relative levels of productivity has eroded in the era of neoliberal restructuring.

But it is important to recognize that this erosion does not represent the culmination of a long pattern of economic truncation stretching back to the beginnings of industrialization in the Canadian economy. It is not the latest manifestation of a distorted and incomplete economy. Rather, it results from the greater difficulty of relying on non-original innovation in a context of neoliberal restructuring, changed production and innovation conditions, and the export strategies of Canadian manufacturers in a context of free trade.

At the same time, the relative decline experienced in the Canadian economy undercuts the approach of those arguing for a non-dependent Canadian capitalism. In the movement to free trade, Canadian manufacturers were not able to effectively compete in core areas of productivity growth. The focus by these theorists on rising levels of foreign direct investment by Canadian transnationals, growing levels of exports of manufactured end products, higher levels of domestic control in the Canadian economy and autonomous interlocks of directors among companies does not address this dimension of Canadian capitalism. As a result, there is insufficient recognition of how the pattern of technological dependency constrained the strategies of Canadian industry in the movement to free trade and continues to have an impact in shaping the position of the Canadian economy vis-a-vis other advanced economies.

Canadian manufacturing capital is caught in a situation where the legacy of technological dependency has restricted its ability to enter the industries with the highest growth rates of productivity or has restricted its ability to make effective use of technologies transferred from elsewhere. This in turn creates a competitive pressure to find other ways of lowering costs. In order to compensate for lower levels of productivity, Canadian industry has relied on a lower exchange rate of the Canadian dollar and, since the mid-1990s, a lower level of real wages. From 1994 to 2000, real wages in Canadian manufacturing fell 0.2%, while they rose 1.8% in the U.S.¹⁰¹ The need for lower wages in the manufacturing sector contributed to the rise in the number of low wage and precarious forms of employment – with women and racialized minorities concentrated the most in these types of jobs.¹⁰²

The trend of lower productivity and lower wages thus has negative implications for the standard of living of Canadian workers. But it cannot be understood simply as the result of a linear trajectory of truncation or of processes of economic restructuring common to all the advanced economies. The variability of economic development in Canada arising from the reliance on non-original innovation cannot be fitted into either of these two conceptual boxes.

Notes

¹ Mel Watkins, “Forward to the Carleton Library Series Edition” of Levitt, *Silent Surrender*, (Kingston: McGill-Queen’s University Press, 2002), p. xi.

² Paul Kellogg, “Kari Levitt and the Long Detour of Canadian Political Economy”, *Studies in Political Economy* 76 (2005), p. 32.

³ Key texts in this literature were: Kari Levitt, *Silent Surrender*, (Toronto: Macmillan, 1970); Ian Lumsden (ed.), *Close the 49th Parallel etc: The Americanization of Canada*, (Toronto: University of Toronto Press, 1970); R. T. Naylor, “The Rise and Fall of the Third Commercial Empire of the St. Lawrence”, *Capitalism and the National Question in Canada*, G. Teeple (ed.) (Toronto: University of Toronto Press, 1972), pp. 1-41; and Robert Laxer (ed.), (*Canada Ltd.*): *The Political Economy of Dependency*, (Toronto: McClelland and Stewart, 1973).

⁴ Gordon Laxer, *Open for Business: The Roots of Foreign Ownership in Canada*, (Toronto: Oxford University Press, 1989); Glen Williams, *Not For Export: The International Competitiveness of Canadian Manufacturing*, (Toronto: McClelland & Stewart, 1994).

⁵ Wallace Clement, “The Canadian Bourgeoisie: Merely Comprador?,” *Imperialism, Nationalism, and Canada*, C. Heron (ed.) (Toronto: New Hogtown Press, 1977), pp. 71-83; John Richards and Larry Pratt, *Prairie Capitalism*, (Toronto: McClelland and Stewart, 1979), pp. viii-ix; Jorge Niosi, *Canadian*

Capitalism, (Toronto: James Lorimer, 1981); William Carroll, "The Canadian Corporate Elite: Financiers or Finance Capitalists?," *Studies in Political Economy* 8 (1982), pp. 89-109; Philip Resnick, "The Maturing of Canadian Capitalism", *Our Generation* 15/3 (1982), pp. 11-23; John Niosi, "Continental Nationalism: The Strategy of the Canadian Bourgeoisie", *The Structure of the Canadian Capitalist Class*, R. Brym (ed.) (Toronto: Garamond, 1985), pp. 53-64; John Niosi, *Canadian Multinationals*, (Toronto: Garamond, 1985); and William Carroll, *Corporate Power and Canadian Capitalism*, (Toronto: University of British Columbia Press, 1986). There were differences within this literature concerning when a more autonomous indigenous business class was created. Carroll argued that by the second decade of the twentieth century "an advanced form of capitalist production, circulation, and finance was in place in Canada. At the apex of this bloc of finance capital was a small elite of Canadian capitalists..." (Carroll, *Corporate Power*, pp. 52-53). Other writers, such as Resnick and Niosi, emphasized changes that began to occur only in the 1970s. (Resnick, "The Maturing of Canadian Capitalism", pp. 12-13 and J. Niosi, "Two Responses", *Our Generation* 15/4 (1983), pp. 51-52).

⁶ William Carroll, "Neoliberalism and the Recomposition of Finance Capital in Canada", *Capital and Class* 38 (1989), p. 101; James Richardson, "Free Trade: Why did it Happen?," *Canadian Review of Sociology and Anthropology* 29/3 (1992), pp. 307-324; and Stephen McBride, *Paradigm Shift: Globalization and the Canadian State*, (Halifax: Fernwood, 2005), pp. 43-69.

⁷ James Laxer, *Leap of Faith: Free Trade and the Future of Canada*, (Edmonton: Hurtig Publishers, 1986), pp. 81-84; and John Warnock, *Free Trade and the New Right Agenda*, (Vancouver: New Star Books, 1988), pp. 86-133.

⁸ Watkins, Forward to *Silent Surrender*, p. xiii.

⁹ Kellogg, "Kari Levitt and the Long Detour...", pp. 32-44

¹⁰ Donald Smiley, "Canada and the Quest for a National Policy", *Canadian Journal of Political Science*, 8/1 (1975), p. 41. Smiley also refers to a third notion of national policy which covers the policies that were developed prior to Confederation for the purpose of creating a more unified political and economic space.

¹¹ For a detailed discussion of the effects of these policies, see: Kenneth Norrie, Douglas Owram and J. Emery, *A History of the Canadian Economy*, (Toronto: Nelson, 2002), pp. 196-221.

¹² Glen Williams, "The National Policy Tariffs: Industrial Underdevelopment through Import Substitution", *Perspectives on Canadian Economic Development*, G. Laxer (ed.) (Toronto: Oxford University Press, 1991), pp. 161-168.

¹³ Concerning the previous support for tariffs and protectionism, see: H. Clare Pentland, *Labour and Capital in Canada, 1650-1860*, (Toronto: James Lorimer, 1981), pp. 170-171.

¹⁴ Paul Craven and Tom Traves, "The Class Politics of the National Policy, 1872-1933", *Journal of Canadian Studies*, 14/3 (Fall 1979), pp. 14-31.

¹⁵ Janine Brodie, *The Political Economy of Canadian Regionalism*, (Toronto: Harcourt Brace, 1990), p. 103. It should be noted that a number of industries in Ontario, such as the butter and cheese and slaughtering and meat-packing industries, were not subject to tariff protection, but did not require it for reasons such as transportation costs or perishability. (Ian Drummond, *Progress without Planning: The Economic History of Ontario from Confederation to the Second World War*, (Toronto: University of Toronto Press, 1987), p. 112).

¹⁶ Richard Pomfret, *The Economic Development of Canada*, (Toronto: Nelson, 1993), p. 168.

¹⁷ Drummond, *Progress without Planning*, p. 227.

¹⁸ *Ibid.*, p. 104.

¹⁹ Brodie, *The Political Economy of Regionalism*, 106-107.

²⁰ *Ibid.*, pp. 107-117. See also: Norrie, Owram and Emery, *A History of the Canadian Economy*, pp. 232-234.

²¹ Yasmeen Abu-Laban and Christina Gabriel, *Selling Diversity: Immigration, Multiculturalism, Employment Equity, and Globalization*, (Peterborough: Broadview Press, 2002), p. 38.

²² Angus Maddison, *The World Economy: A Millennial Perspective*, (Paris: OECD, 2001), Table A1-d, p. 186. The figure for Japan is in Table 3-1a, p. 126.

²³ *Ibid.*, Table E-8, p. 352. Sharpe has argued that some caution should be exercised with Maddison's figures because of changes in how the U.S. calculates its GDP figures which have resulted in lower productivity levels in the period before 1929-1950. (A. Sharpe, "Review Article on *The World Economy: A Millennial Perspective* by Angus Maddison", *International Productivity Monitor*, 3, (Fall 2001), 76)

However, even if this is the case, it does not remove the high rates of growth shown in the Canadian figures both in relation to previous patterns of growth and in relation to other countries that did not follow the U.S. in changing their method of calculation. Furthermore, it is highly unlikely that the U.S. figures are so understated that the trend of higher Canadian levels in relation to the U.S. levels is entirely removed.

²⁴ Maddison, Table E-9, p. 353.

²⁵ John Oliver, *History of American Technology*, (New York: The Ronald Press Company, 1956), pp. 314-448; Robert Brenner and Mark Glick, "The Regulation Approach: Theory and History", *New Left Review*, 188 (July/August 1991), p. 72, and Christopher Freeman and Francisco Louca, *As Time Goes By: From the Industrial Revolutions to the Information Revolution*, (Oxford, U.K: Oxford University Press, 2001), p. 273.

²⁶ Moses Abramovitz, "Catch-up and Convergence in the Postwar Growth Boom and After", *Convergence of Productivity*, W. Baumol, R. Nelson and E. Wolff (eds.) (New York: Oxford University Press, 1994), p. 107. This point is also made by Nelson and Wright who note that American technological development was distinguished from that in other leading economies by its reliance on capital-intensive mass production industries using high levels of resources and materials and large-scale forms of organization. (Richard Nelson and Gavin Wright, "The Erosion of U.S. Technological Leadership as a Factor in Postwar Economic Convergence", *Convergence of Productivity*, pp. 134-139).

²⁷ Concerning these areas of development, see: Drummond, *Progress without Planning*, Chs. 4, 7, 8, 11, 15, and 18.

²⁸ Tom Traves, *The State and Enterprise: Canadian Manufacturers and the Federal Government, 1917-1931*, (Toronto: University of Toronto Press, 1979), pp. 4-5. See also: Carroll, *Corporate Power and Canadian Capitalism*, pp. 51-53.

²⁹ Williams, "The National Policy Tariffs", pp. 167-168. See also: Williams, *Not for Export*, pp. 34-35.

³⁰ Kenneth Buckley, *Capital Formation in Canada, 1896-1930*, (Toronto: McClelland and Stewart, 1974), Table C, p. 204 and p. 206.

³¹ Drummond, *Progress without Planning*, p. 132.

³² Concerning the innovative capabilities in Germany in the period leading up to the First World War, see: Otto Keck, "The National System for Innovation in Germany", in *National Innovation Systems*, R. Nelson (ed.) (New York: Oxford University Press, 1993), pp. 116-130. Concerning the situation in Sweden, see: Charles Edquist and Bengt-Ake Lundvall, "Comparing the Danish and Swedish Systems of Innovation", in *National Innovation Systems*, pp. 271-272. Concerning the U.S. situation, see: David Mowery and Nathan Rosenberg, "The U.S. National Innovation System", in *National Innovation Systems*, pp. 31-32; Brenner and Glick, "The Regulation Approach", pp. 70-72 and Freeman and Louca, *As Time Goes By*, pp. 208-212. The Japanese situation is covered in: Hiroyuki Odagiri and Akira Goto, "The Japanese System of Innovation: Past, Present and Future", in *National Systems of Innovation*, p. 81 and Christopher Freeman, *Technology Policy and Economic Performance*, (London: Pinter, 1987), pp. 32-33. Even though Japan used imported technology extensively in the three decades between 1885 and 1914, it still had original innovative capabilities in the important textile and iron and steel industries.

³³ Laxer, *Open for Business*, pp. 66-71

³⁴ Melville Watkins, "The 'American System' and Canada's National Policy", *Perspectives on Canadian Economic Development*, pp. 155-157; and Ralph Heintzman, "Efficiency and Community: the National Policy and National Unity", *Journal of Canadian Studies*, 14/3 (Fall 1979), p. 145.

³⁵ According to Laxer, "The National Policy, an import-substitution strategy, was not compatible in the long run with full industrialization". (Laxer, *Open for Business*, p. 15)

³⁶ Williams argues that building a competitive economy that was capable of exporting manufactured goods through developing original technological capabilities was not given priority because "maximum energy and investment" was placed on "building a staples economy based on the production of western wheat". "An extreme and unchallenged dependency on foreign technology" was allowed because manufacturing was only "a supplement to the resource export economy". (Williams, *Not for Export*, p. 50)

³⁷ For a more recent statement of this position, see: Joseph Robert, *In the Shadow of Empire: Canada for Americans*, (New York: Monthly Review Press, 1998), p. 31.

³⁸ The term "Golden Age" is used to refer to the higher growth rates achieved during the postwar boom years in comparison with both earlier and later periods of capitalist development. Concerning these different growth rates, see: Maddison, *The World Economy*, pp. 125-130.

³⁹ Concerning the leadership position of the U.S. in seven key industries both in the Golden Age period and later, see: David Mowery and Richard Nelson (eds.) *Sources of Industrial Leadership: Studies of Seven Industries*, (Cambridge: Cambridge University Press, 1999).

⁴⁰ There were a number of studies which pointed to the limited innovation role of Canadian subsidiaries in the postwar Golden Age period, see: Stephen Hymer, "Direct Foreign Investment and the National Economic Interest", *Nationalism in Canada*, P. Russell (ed.), (Toronto: McGraw-Hill, 1966), pp. 191-202; Arthur Cordell, *The Multinational Firm, Foreign Direct Investment, and Canadian science Policy*, (Ottawa: Information Canada, 1972), p. 29; Arthur Cordell and James Gilmour, *The Role and Function of Government Laboratories and the Transfer of Technology to the Manufacturing Sector*, (Ottawa: Information Canada, 1976), pp. 36-48; and the Gray Report, *Foreign Direct Investment in Canada*, (Ottawa: Information Canada, 1972), pp. 121-123. See also: Patricia Marchak, *In Whose Interest? An Essay on Multinational Corporations in a Canadian Context*, (Toronto: McClelland and Stewart, 1979), pp. 84-89; and Williams, *Not for Export*, pp. 117-118.

⁴¹ A survey of non-resident ownership and company size in 1964 found that, "Non-resident ownership of the Canadian economy is concentrated in larger corporations. Over 77 per cent of the assets of non-resident owned corporations are concentrated in corporations with over \$10 million in assets. These 450 non-resident owned corporations with over \$10 million in assets also account for 66 per cent of the total sales made by non-resident owned corporations. Generally speaking as corporations decrease in size, the degree of non-resident ownership also decreases." (Dominion Bureau of Statistics, *CALURA*, Part 1, (Ottawa: Minister of Trade and Commerce, 1968), p. 15.)

⁴² Williams, *Not for Export*, p. 117.

⁴³ Ralph Heintzman, "Efficiency and Community", p. 145; Tom Kent, *A Public Purpose*, (Montreal and Kingston: McGill-Queen's University Press, 1988), 22-23; and Paul Phillips, "The National Policy Revisited", *Journal of Canadian Studies*, 14/3 (Fall 1979), p. 12. According to Phillips, the reliance on American capital for development was part of a long term failure to develop a national economic strategy after the previous National Policy framework ceased to have much effect by the 1920s.

⁴⁴ With the Auto Pact in 1965, the pattern of relying on the home market began to change. The Canadian subsidiaries of the U.S. auto producers were now producing for export markets in the U.S. The changes made with the Auto Pact foreshadowed what was to come later with the movement to free trade with the U.S. when, as is discussed later in the paper, Canadian industry abandoned its focus on the home market.

⁴⁵ Statistics Canada, *Canada's International Investment Position, 1926-1967*, (Ottawa: Information Canada, 1971), Statement 10, p. 27.

⁴⁶ David Wolfe, "The Rise and Demise of the Keynesian Era in Canada: Economic Policy, 1930-1982", in Cross and Kealey (eds.) *Modern Canada 1930-1980's*, pp. 60-62.

⁴⁷ Judy Fudge and Eric Tucker, *Labour Before the Law*, (Toronto: Oxford University Press, 2001), p. 308.

⁴⁸ *Ibid.*, pp. 263-310.

⁴⁹ Brodie, *The Political Economy of Canadian Regionalism*, pp. 155-159.

⁵⁰ Pat Armstrong and Hugh Armstrong, "Taking Women into Account: Redefining and Intensifying Employment in Canada", *Feminization of the Labour Force: Paradoxes and Promises*, J. Jenson (ed.) (New York: Oxford University Press, 1988), pp. 67-73; Ann Porter, *Gendered States: Women, Unemployment Insurance, and the Political Economy of the Welfare State in Canada, 1945-1997*, (Toronto: University of Toronto Press, 2003), pp. 38-42.

⁵¹ Economic Council of Canada, *Pulling Together: Productivity, Innovation and Trade*, (Ottawa: Minister of Supply and Services, 1992), p. 2.

⁵² Robert Macdermid and Greg Albo, "Divided Province, Growing Protest: Ontario Moves Right", *The Provincial State in Canada*, (Peterborough, Ont: Broadview, 2001) K. Brownsey and M. Howlett, (eds.), pp. 166-167. The growth experienced in Ontario meant that scale-intensive American technologies could still be applied, although not at the same volumes as in the larger American market.

⁵³ Maddison, *The World Economy*, Table A1-c, p. 185.

⁵⁴ *Ibid.*, Table E-9, p. 353.

⁵⁵ Letter from L.G. Cook, National Research Council to A.G. Kniewasser, Chairman, ITC Task Force, March 6, 1969 (National Archives, RG 20, 85-86/665, Box 44, file IRA 9100-25-2 pt. 3)

⁵⁶ James Dow, *The Arrow*, (Toronto: James Lorimer, 1997), p. 116.

- ⁵⁷ The various defence alliances entered into with the U.S. are covered in: Philip Resnick, "Canadian Defence Policy and the American Empire", *Close the 49th Parallel etc.*, pp. 97-110.
- ⁵⁸ J.C.E. Mitchell, "Defence Industry Productivity Program, Objectives and Methods", memo from J.C.E. Mitchell, Program Office (External Services) to A. Vanterpool, Office of Science and Technology, Department of Industry, Trade and Commerce, April 24, 1972, p. 1. (National Archives, RG 102, Acc. 85-86/247, Box 6, file 1423-2-2.)
- ⁵⁹ William Yost, "Sustaining the Force: Industrial Mobilization in Canada", B. MacDonald (ed.), *Guns and Butter: Defence and the Canadian Economy*, B. MacDonald (ed.) (Toronto: Canadian Institute of Strategic Studies, 1984), p. 78.
- ⁶⁰ Timothy Bresnahan and Franco Malerba, "Industrial Dynamics and International Competition in Computers", *Sources of Industrial Leadership*, pp. 89-90; Richard Langlois and W. Edward Steinmuller, "The Worldwide Semiconductor Industry", *Sources of Industrial Leadership*, pp. 26-27.
- ⁶¹ Canada. Senate Special Committee on Science Policy, *A Science Policy for Canada*, Volume 1, (Ottawa: Queen's Printer, 1970), p. 83.
- ⁶² Gray Report, *Foreign Direct Investment in Canada*, p. 118.
- ⁶³ *Ibid.*, Table 18, p. 119. The ten economies were: Belgium, Canada, France, Germany, Italy, Japan, Netherlands, Sweden, U.K., and U.S.A.
- ⁶⁴ Pierre Bourgault, *Innovation and the Structure of Canadian Industry*, (Ottawa: Information Canada, 1972), p. 62.
- ⁶⁵ Nelson and Wright, "Erosion of U.S. Technological Leadership", *Convergence of Productivity*, p. 156.
- ⁶⁶ Freeman and Louca, *As Time Goes By*, p. 279.
- ⁶⁷ Concerning the development of innovation in various European countries, see: Nelson (ed.) *National Innovation Systems*. In West Germany, the previous innovation system was reconstructed after the war and had areas of research concentration in engineering and chemicals industries. (Keck, "Technical Innovation in Germany", p. 133) In France, there was intensive investment in new institutions promoting original innovation in the two and a half decades after the war. (Francois Chesnais, "The French National System of Innovation", pp. 200-204) In Sweden, the initial areas of original innovation established at the turn of the twentieth century continued to be at the core of industrial development. (Edquist and Lundvall, "Danish and Swedish Systems of Innovation", pp. 271-272) In Britain, while a process of long term decline was underway in the postwar period, there still remained areas of original innovation as is shown by the level of patenting (24.8% of European patents in the United States) by British firms in the 1960s. In the period 1963-68, the top five European countries in terms of shares of patenting in the United States were: West Germany (33.74), United Kingdom (24.80), France (13.42), Netherlands (4.67), and Italy (4.27). (Pari Patel and Keith Pavitt, "Europe's Technological Performance", *Technology and the Future of Europe*, C. Freeman, M. Sharp and W. Walker (eds.) (London: Pinter, 1991), Table 3.4, p. 41).
- ⁶⁸ See the various articles in D. Mowery and R. Nelson, (eds.) *Sources of Industrial Leadership*.
- ⁶⁹ Beverly Silver, *Forces of Labor*, (Cambridge: Cambridge University Press, 2003), pp. 50-51.
- ⁷⁰ Concerning the history of auto production in Europe up to the postwar period, see: James Laux, *The European Automobile Industry*, (New York: Twayne, 1992), Chs. 1-13.
- ⁷¹ Concerning the reliance on imported technologies in the auto industry, see: John Holmes, "Restructuring in a Continental Production System", *Canada and the Global Economy*, J. Britton (ed.) (Montreal & Kingston: McGill-Queen's University Press, 1996) p. 249.
- ⁷² Fumio Kodama, *Emerging Patterns of Innovation*, (Boston, Mass: Harvard Business School, 1995), pp. 29-37.
- ⁷³ Ryoshin Minami, Kwan Ki, Fumio Makino and Joung-hae Seo, "Japanese Experience in Technology: A Survey", in R. Minami, K. Kim, F. Makino and J. Seo, (eds.) *Acquiring, Adapting and Developing Technologies*, (London: Macmillan, 1995), pp. 8-9.
- ⁷⁴ Holmes, "Restructuring in a Continental Production System", pp. 239-240.
- ⁷⁵ Mitchell Bernard, "Post-Fordism and Global Restructuring", in R. Stubbs and G. Underhill, (eds.) *Political Economy and the Changing Global Order*, (Toronto: Oxford University Press, 2000), pp. 154-155.
- ⁷⁶ Kong-Rae Lee, *The Sources of Capital Goods Innovation: The Role of User Firms in Japan and Korea*, (Amsterdam: Harwood, 1998), pp. 77-79.
- ⁷⁷ Concerning these sectors, see: Kazuyuki Suzuki, "Production Technology and Productivity Growth in the Japanese Electrical Machinery Industry", pp. 100-117, Yui Kimura, "Technological Innovation and

Competition in the Japanese Semiconductor Industry”, pp. 121-132, and Siichiro Yonekura, “The Innovation Process in the Japanese Steel Industry”, pp. 159-171, in *Innovation in Japan*, A. Goto and H. Odagiri (eds.) (Oxford: Clarendon, 1997).

⁷⁸ The figure for licensing agreements is taken from: Statistics Canada, *Quarterly Estimates of the Canadian Balance of International Payments*, Third Quarter, 1973, p. 17. The figure for R&D is taken from: Statistics Canada, *Science Statistics*, 15/3, (July 1991), Table 4, p. 4.

⁷⁹ Angus Maddison, *Dynamic Forces in Capitalist Development*, (Oxford: Oxford University, 1991), pp. 173-185 and Abramovitz, “Catch-Up and Convergence”, pp. 108-119.

⁸⁰ Leo Panitch and Sam Gindin, “American Imperialism and EuroCapitalism: The Making of Neoliberal Globalization”, *Studies in Political Economy*, 71/72, (Autumn 2003/Winter 2004), pp. 20-21.

⁸¹ Concerning the importance of the “Volcker shock”, see: Panitch and Gindin, “American Imperialism and EuroCapitalism”, pp. 21-24.

⁸² Concerning the connection between neoliberalism and the extension of market logic, see: Colin Leys, *Market-Driven Politics: Neoliberal Democracy and the Public Interest*, (London: Verso, 2001).

⁸³ Williams, *Not for Export*, p. 144.

⁸⁴ Bryan Palmer, *Working Class Experience*, Second Edition, (Toronto: McClelland and Stewart, 1992), p. 347.

⁸⁵ Wolfe, “The Rise and Demise of the Keynesian Era”, pp. 65-75.

⁸⁶ Williams, *Not for Export*, pp. 145-147.

⁸⁷ Meric Gertler, “Negotiated Path or ‘Business as Usual’? Ontario’s Transition to a Continental Production Regime”, *Space & Polity*, 3/2 (1999), Figure 5, p. 193.

⁸⁸ McBride, *Paradigm Shift*, p. 49.

⁸⁹ Concerning the growth of indigenous original technological activity, see: Jorge Niosi, *Canada’s National System of Innovation*, (Montreal & Kingston: McGill-Queen’s University Press, 2000), p. 193.

⁹⁰ John Britton, “High-Tech Canada”, *Canada and the Global Economy*, p. 264.

⁹¹ *Ibid.*, p. 268.

⁹² Manuel Trajtenberg, “Is Canada Missing the “Technology Boat”? Evidence from Patent Data”, *Productivity Issues in Canada*, S. Rao and A. Sharpe (eds.) (Calgary: University of Calgary Press, 2002), p. 261.

⁹³ Conference Board of Canada, *Exploring Canada’s Innovation Character*, (Ottawa: Conference Board of Canada, 2004), pp. 8-13.

⁹⁴ A major part of the productivity gain was registered in the Information and Communications Technology (ICT) sector. Concerning the dominant role of the ICT sector in U.S. productivity gains in the last half of the 1990s, see: Dale Jorgenson and Kevin Stiroh, “Raising the Speed Limit: U.S. Economic Growth in the Information Age”, *Brookings Papers on Economic Activity*, 1 (2000), 125-129; and Stephen Oliner and Daniel Sichel, “The Resurgence of Growth in the Late 1990s: Is Information Technology the Story?”, *The Journal of Economic Perspectives*, 14/4 (Autumn, 2000), p. 4.

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⁹⁶ *Ibid.*, pp. 4-6.

⁹⁷ One study found that the entire difference in productivity growth rates between Canada and the U.S. in the last half of the 1990s resulted from this sector. Someshwar Rao and Jianmin Tang, “The Contribution of ICTs to Productivity Growth in Canada and the United States in the 1990s”, *International Productivity Monitor*, 3 (Fall 2001), pp. 3-4.

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⁹⁹ Meric Gertler, “Capital, Technological Change and Regional Growth”, in Britton, *Canada in the Global Economy*, p. 285; and Meric Gertler, “Being There”: Proximity, Organization and Culture in the Development and Adoption of Advanced Manufacturing Technologies”, *Economic Geography*, 71/1 (Jan 1995), pp. 12-20.

¹⁰⁰ Industry Canada, *Advanced Manufacturing Technologies*, Sector Competitiveness Framework Series, available at <http://strategis.ic.gc.ca/SSG/at01161e.html>, 4, access date 17/09/00.

¹⁰¹ Bernstein, Harris and Sharpe, “The Widening Canada-US Manufacturing Productivity Gap”, p. 8.

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