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The Tariff-Foreign Ownership-Technology Nexus: Towards a Less Truncated Theory of Canadian Industrial Truncation

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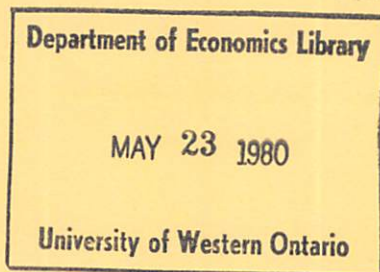
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THE TARIFF-FOREIGN OWNERSHIP-TECHNOLOGY NEXUS:
TOWARDS A LESS TRUNCATED THEORY OF CANADIAN
INDUSTRIAL TRUNCATION

Paul Wonnacott
and
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This paper contains preliminary findings from research work still in progress and should not be quoted without prior approval of the author.

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THE TARIFF-FOREIGN OWNERSHIP-TECHNOLOGY NEXUS:
TOWARDS A LESS TRUNCATED THEORY OF CANADIAN
INDUSTRIAL TRUNCATION*

by

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* We wish to thank, without implication, Richard Caves and Don McFetridge for their comments.

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Much concern has recently been expressed about the disappointing performance of Canadian industry in competing in both international and Canadian markets. While there is general agreement on the symptoms of this malaise (e.g., Canadian industry operates at insufficient output levels to achieve economies of scale), there is heated dispute about the causes and possible cure. One view has been expressed in a number of publications of the Science Council of Canada (e.g., Britton and Gilmour, 1978), and in speeches by a previous Vice-Chairman of that Council (Shepherd, 1978). They contend that foreign ownership is the major source of our problems and recommend novel new ways of protecting Canadian industry and especially Canadian R & D. In their analysis and recommended cures, they have often come into conflict with what they term orthodox economists or traditional theory, and in particular with studies by the Economic Council of Canada (1975) and the Senate Standing Committee on Foreign Affairs (1978). These studies have pointed to inadequate access to foreign markets as a major cause of our problem, and have recommended that, in designing any cure for Canada's industrial problems, we should consider expanding Canadian trade through reduction in trade barriers--in particular, reductions in the U.S. tariff.

In this paper, we compare these two views. We refer to the first as the "Weakest Link" view, named after the title of the most ambitious background study published on the subject of ownership and trade by the Science Council (Britton and Gilmour, 1978). (Although the Council is careful to note that the Weakest Link, like any of its background studies, does not necessarily represent the official Council position, it seems to have played an important role in the development of Science Council policy.) We refer to the second as the traditional or orthodox view,

because it is based on standard economic and statistical research techniques.¹ While many developments in the past have been the result of attacks by economists on economic orthodoxy, the Weakest Link attack is interesting because it has come from non-economists. (Britton and Gilmour are geographers.) It is important, however that economists resist the natural temptation to simply pass off these arguments; they should be carefully considered because of the influence they have apparently had over recent Canadian industrial policy.

Moreover, the Weakest Link attack has forced a more careful consideration and statement of the orthodox economic position. This then is the major objective of this paper: to set out the traditional view. What does the analysis and statistical research undertaken so far by economists tell us about the comparative role of trade barriers and foreign investment in explaining Canada's manufacturing handicaps?

Before embarking on this task, it is important to sketch out the issues on which the proponents of these two conflicting views do agree. Their is agreement not only that Canadian industry operates at too small a scale, but also that free trade and open foreign markets are a desirable long-run goal, although in the Weakest Link there is considerable ambivalence on this issue; any further major initiative towards trade liberalization in the foreseeable future is strongly opposed. Both agree that there is a higher-than-desirable degree of foreign branch plant investment in Canada; but whereas in the Weakest Link this is viewed as a primary cause of our trouble,

¹Such oversimplified terminology is, of course, easy to criticize: For example, the traditional view does not, in some respects, have a long tradition, and some Canadians who view themselves as "traditionalists" would oppose it. Nonetheless some such abbreviations must be used, and we can find none better.

in the traditional view it is viewed as a symptom as well as a cause of Canada's problems. This fundamentally different viewpoint is illustrated in the two diagrams below.

A. THE TRADITIONAL VIEW

The relationships (arrows) in the traditional view are set out in Figure 1. (Since this diagram is meant only to highlight differences between the two views and to isolate a particular set of Canada's structural problems, it is an oversimplification. Obviously, it would be easy to complicate this diagram by adding other relationships.)¹

1. The Effects of Trade Barriers

Arrow (a) shows the transfer in income from Canada to foreign treasuries that results from foreign tariffs.² Arrow (b) shows the effect of the Canadian tariff in raising Canadian prices and thereby distorting consumer expenditures. Arrow (c) shows the effects of foreign tariffs³ in reducing exports (especially of manufactured goods). The consequent reduction in the volume of Canadian output results via (e) in high-cost production and low productivity in Canada. Arrow (d) shows how the Canadian tariff also induces inefficiency, by insulating Canadian producers from foreign competition and thus allowing this small-scale, low-productivity production to continue in Canada.⁴

¹For example, since any analysis must start somewhere, we do not consider the many influences (h) that determine tariff levels [for detail on this, see for example Caves (1976)].

²This income transfer has been estimated, along with other Canadian losses from tariffs, by Williams (1973). For more detail, see Wonnacott (1975, pp. 47-53).

³We use "tariffs" as a shorthand for both tariffs and NTB's, which are becoming increasingly important.

⁴Caves *et al* (1980, pp. 10-27) conclude that tariff protection (combined with certain types of scale configuration) results in a statistically significant reduction in Canadian plant scale, and that this in turn is an important reason why Canadian technical efficiency is below the U.S. level (an estimated 25% below in a sample of 84 manufacturing industries). For further similar evidence, see Daly *et al* (1968, especially pp. 20-24 and 31-32). Wilkinson (1968, p. 145) provides statistical support for the hypothesis that Canadian protection and productivity are inversely related. See also Saunders, 1978, p. 153.

THE CANADIAN TRADE-OWNERSHIP-TECHNOLOGY NEXUS

FIGURE 1 THE TRADITIONAL VIEW

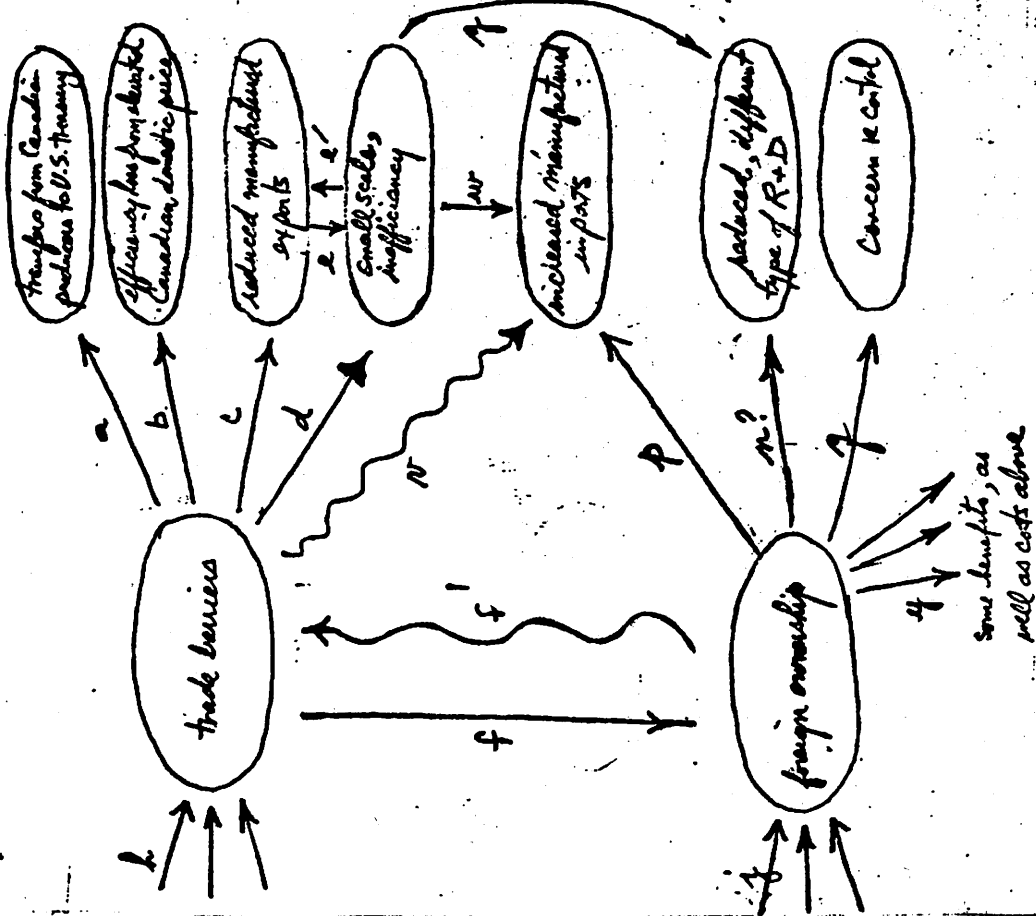
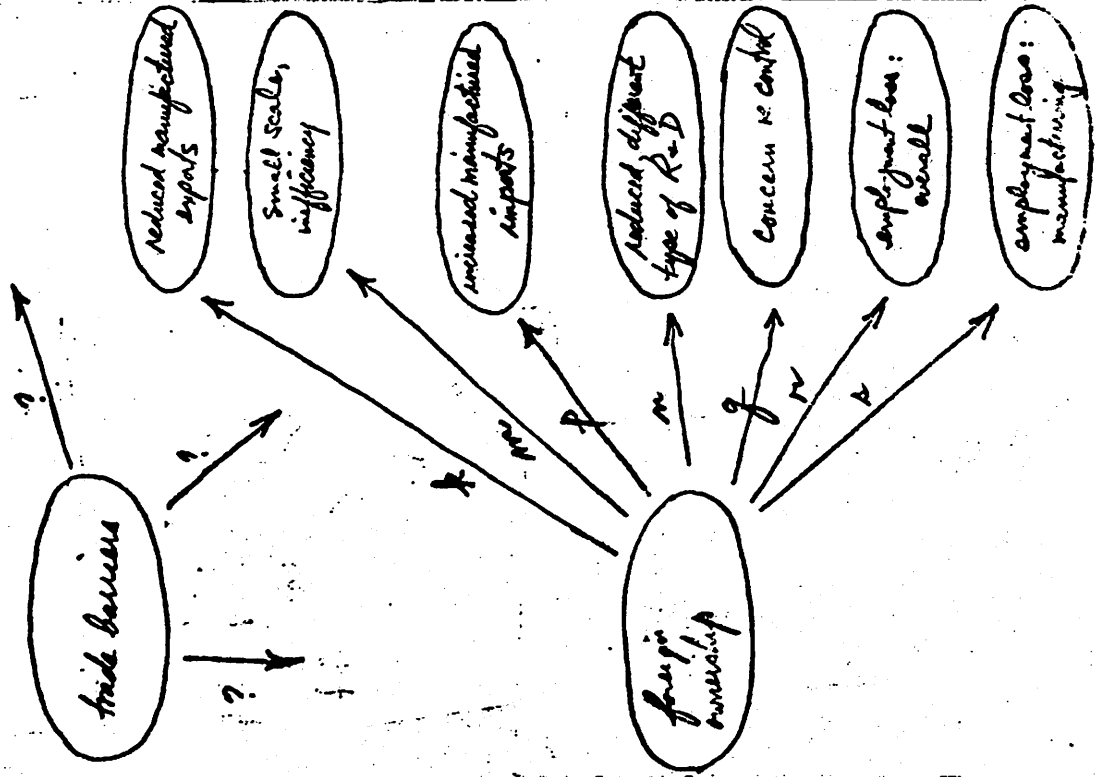


FIGURE 2 THE WEAKEST LINK VIEW



In turn, this has led not only via (e) to reduced exports,¹ but also via (g) disappointing Canadian R & D performance: R & D is a costly overhead that is difficult to justify unless it can be spread over a large volume of sales.² Notice that this effect of small scale on R & D describes a problem common to any Canadian enterprise that is small by international standards, regardless of whom its owners may be.

The question of ownership, however, is important, because it is the key to a number of other important relationships to which we now turn. Arrow (f) indicates how Canadian protection has provided an incentive for foreign firms to decide not to export to Canada, but instead jump the

¹ Thus the Canadian, as well as the U.S. tariff, deters Canadian manufacturing exports. For evidence of this (d) / (e) link, see Saunders (1978, pp. 111, 112, 118).

[There is, of course, another respect in which the Canadian tariff deters exports: Its deterrent effect on imports tends, via the international adjustment mechanism (i.e., a rise in the Canadian dollar) to also deter exports.

² This does not mean that only large firms innovate. (Often small firms may innovate with little or no R & D expenditure.) For evidence on (g), i.e., that low R & D tends to be associated with small sales volume, see Scherer (1975, pp. 325-342). And for statistical support for the conclusion that low R & D and low exports are associated, see Caves et al (1980, Ch. 4).

Should there be another arrow (g), running in the opposite direction to (g)? Saunders (1978, pp. 149, 163) provides weak evidence that the answer may be yes: Low R & D does lead to low productivity. [The terms "weak" and "strong" evidence must remain imprecise. But when we cite a single statistical study, we use the term "strong evidence" to (roughly) mean evidence that would survive, say, a one-tailed test at less than a 10% level; by weak evidence, we mean a correctly-signed t value of roughly .5 or more, depending on degrees of freedom.] (Of course, when we cite several studies, the terms weak evidence may mean that these studies may involve some partially conflicting evidence.

Canadian tariff by setting up production facilities in Canada. This effect of the Canadian tariff in encouraging foreign ownership is, of all the arrows shown in this diagram, the one over which there is least theoretical dispute; it has now become an accepted premise in discussions of tariffs and foreign investment. [See, for example, the Royal Commission on Corporate Concentration (1978, pp. 3-4).] Empirical support for this has been provided by Eastman and Stykolt (1967). Caves (1971, p. 4 fn) cites further studies based on countries other than Canada that document this same relationship.¹

However, in explaining foreign investment in Canada, arrow (f) includes not only the positive effect of the Canadian tariff, but also a possible negative effect of the U.S. tariff (i.e., the U.S. tariff may have discouraged U.S. firms from investing in Canada to service the U.S. market).² The effect of both together may thus not be as strong as the proponents of trade liberalization may have sometimes implied in their argument that reduced protection would bring a substantial long-run reduction in U.S. investment

¹In recent statistical studies, it has become difficult to discern this relationship. Thus Caves (1974b, p. 286) does not uncover statistically significant evidence of an effect of the Canadian tariff on foreign investment in Canada (indeed his estimates frequently have the wrong sign). Saunders (1978, p. 132) finds evidence of this relationship only in his simple ordinary least squares estimation, but not, somewhat mysteriously, in his more appropriate 2SLS estimation. Both authors attribute this statistical obscurity to the fact that such studies use very recent tariff figures, whereas foreign firms' decisions to invest in Canada have been influenced by tariff levels applying at various times during the past. (For a further reason, see Caves, 1974b, p. 286.)

²This negative effect of the U.S. tariff may have further complicated Caves' and Saunders' attempts (see previous footnote) to uncover the positive effect of the Canadian tariff. (Both authors include the Canadian, but not the U.S. tariff, as a regressor.)

in Canada.¹ There is still a net expectation that trade liberalization would bring reduced (and more scale-efficient) foreign investment in Canada-- as described by arrow (f) --because it would allow a reduction in the Canadian capital/output ratio, and thus a reduced net requirement in Canada for investment funds from all outside sources.² But what is not so clear is how,

¹ But not necessarily a reduction in the short run--a point made by the Task Force on the Structure of Canadian Industry (1968, p. 118) and implied by the Economic Council (1975, p. 183). A number of authors have noted that there may be a substantial lag before lowered protection reduces foreign investment. Indeed we ourselves have noted (1975, p. 101) that in the short run, Canadian tariff elimination might even increase foreign investment:

The rationalization of Canadian production implied by free trade may involve financial reorganization as well, with presently small Canadian producers in many cases being amalgamated into larger firms. This may in some cases be accomplished with Canadian, but in others with foreign, capital. In other words, in the short run there is a real prospect that in the absence of controls, the major reorganization of the economy implied by trade liberalization would provide an opportunity for multinational corporations with the largest financial resources to increase their ownership of Canadian industry. Although a few of these multinationals are Canadian, most are European, Japanese, and, in particular, American. Moreover, increased U.S. purchase of Canadian industry is a problem that may arise if Canada liberalizes its trade with any other country or group of countries, because U.S. capital may finance increased Canadian trade with any country. The degree to which foreign ownership should be controlled (or domestic ownership subsidized) is a highly controversial issue that is not dealt with here; however, these observations support the position that if such controversial controls are to be imposed, then the best time to do so would be during the rationalization period immediately following any substantial tariff reform.

Thus the reduction or elimination of tariffs may reduce foreign ownership only in the longer run, by making Canada a more conducive headquarters setting for home-grown firms in new industries, and possibly by substantially reducing the incentive for U.S. firms to set up new plants in Canada.

² For detail on how trade restrictions have raised the Canadian capital/output ratio, see Wonnacott (1967, pp. 182-188).

above and beyond this, the pull and push of the two tariffs¹ on foreign investment would trade off.

Arrow (f) of course describes only one of the influences determining foreign investment in Canada. Other arrows like (j) indicate additional influences. For example, foreign investment provides an effective vehicle for a firm to use its intangible capital.²

2. Effects on Foreign Ownership

Both Caves and Saunders have noted that any attempt to statistically define arrow (f) is complicated by a simultaneity problem: The influence runs out only via (f) from tariffs to foreign ownership, but also in the opposite direction; foreign ownership affects the level of Canadian protection (arrow (f')). The reason, as suggested by Caves (1974) and statistically confirmed by Saunders (1978, p. 68), is that, ceteris paribus, the Canadian government seems, on average, to provide lower tariff protection to foreign subsidiaries than to domestically-owned enterprise. [Arrow (f') is a squiggly arrow to indicate that it carries a negative sign; i.e., foreign ownership tends to reduce (rather than increase) Canadian tariffs.]

Does foreign ownership result in less R & D in Canada (arrow (n))?³ Low R & D expenditure in Canada is not a matter of dispute. R & D accounts for only about half as large a proportion of GNP in Canada as it does in other industrialized countries; moreover, this Canadian proportion fell from 1.29 in 1967 to .92 in 1977

¹More precisely, the two sets of trade barriers. The most important results of U.S. trade liberalization may well not come from a reduction in the U.S. tariff (which by the mid 80's will be quite low in any case) but rather from a reduction in U.S. NTB's.

²For a discussion of such influences, see Johnson (1970), Caves (1971 and 1974, pp. 284-285) and Saunders (1978, Ch. 7).

³The Weakest Link contends that there should be two other arrows in this diagram, indicating that foreign ownership results in poor export performance and in inefficiency (arrows (k) and (m) in Figure 2). However, as we shall see in Section B below, statistical studies do not confirm either contention; indeed, if anything, these studies provide weak support for believing that the reverse may be true.

(Senate, 1978, p. 54). But is this because of foreign ownership? In other words, does arrow (n) exist, or is low R & D in Canada a problem shared equally by foreign and domestic firms and therefore explained fully by causal links (d)/(g) and (c)/(e)/(g)?

Before examining the evidence, what is the theoretical expectation about (n)? This relationship, like many others, seems to be the result of conflicting pressures. On the one hand, subsidiaries may do less research than domestic firms because there are economies of scale and agglomeration pressures in research (scientists like to talk to each other); therefore parents may keep research "at home". (This will obviously mean that subsidiaries will do less research than parents [as Safarian (1969, p. 187) confirmed]; but the question here is whether this pressure is strong enough to induce subsidiaries to do less, not than their parents, but than their Canadian domestically-owned counterparts.) On the other hand, subsidiaries might tend to do more research than Canadian-owned firms, because, as multinationals, they can afford R & D that small domestic Canadian firms cannot. (This possibility may have been strengthened recently by the allocation by some parents of world product mandates to subsidiaries.¹)

What is the evidence? In the first direct attack on this question, Safarian (1966; 1968, Ch. 9) could find no statistically significant evidence that foreign ownership reduced R & D in Canada. In a more recent

¹It has been suggested that parents may tend to allocate world product mandates--with the R & D these bring--to subsidiaries in industries where foreign tariffs are low. (This is simply the (c)/(e)/(g) link, illustrated from another point of view.)

Although world product mandates are a promising development for Canadian industry, a crucial question is: "How mature is the mandated product?" If it is old technology--as is often the case--it may not be a very exciting mandate. But the possibility of a mandate puts a considerable challenge to Canadian scientists: they will be far more likely to get a world mandate if the product has been developed in Canada than if it has been developed elsewhere.

Frankl (1979, p. iii) suggests that world product mandates may be one of the explanations for the relatively high R & D expenditure in the Canadian aircraft industry.

study, Porter has examined this same question (see Caves et al., 1980). In his first preliminary passes he found a highly significant positive relationship in his regressions of R & D on foreign ownership (all t values were 5 or more; see p. 19), results that seemed to provide extraordinarily strong confirmation of Safarian's earlier conclusion. But there are two possible cause-and-effect explanations: Foreign ownership may encourage R&D, or heavy R&D industries may attract foreign ownership. [Firms in high R&D industries are more likely than firms in low R&D industries to engage in foreign investment, because it provides them with a way to reap further payoff from their intangible R & D assets. This latter explanation has indeed since received strong support from Saunders (1978, p. 132).] In subsequent passes, therefore, Porter took account of the R & D intensity of each industry, using the U.S. inter-industry R & D pattern as his benchmark. In these passes he uncovered fairly strong evidence that his earlier conclusion should be reversed (p. 31): Foreign ownership tends to reduce an industry's R & D below the level its R & D intensity would predict.

In summary, Porter's study suggests that if no interindustry adjustment is taken into account, we observe heaviest R&D expenditures in Canada in those industries with a heavy concentration of foreign ownership. But this is not because foreign ownership increases R&D expenditure. Instead it is because R&D intensive industries tend to attract foreign investment. This is the dominant influence; once it is taken into account, there is then a further-- but weaker -- tendency for foreign ownership to discourage Canadian R&D. The apparent reason: Most foreign subsidiaries have full access to the

parent's R & D, often at little cost.¹ [Whereas the Science Council view is that this "crowding out" of Canadian R & D by inexpensive foreign R & D is highly undesirable because it displaces R & D activity in Canada, traditional authors tend to view R & D like any other good: If it's worth a lot and you can get it inexpensively, it's in your interest to take it (unless there is evidence of more-than-compensating external costs from reduced Canadian R & D activity--the issue that now has become the focus of attention).

In his examination of this same issue, McFetridge (1977, pp. 29-36, especially p. 34) uncovered mixed evidence that, on balance, tended to support Porter's conclusion. Like Porter, he took account of inter-industry variations in R & D, and a number of other factors that influence R & D. Although he found a moderately strong positive effect of foreign ownership on R & D in the machinery industry, in the other two industries he studied (chemicals and electrical equipment) he found a much stronger negative influence. Frankl (1979, p. 40) also found that foreign-controlled firms do less R & D than Canadian-controlled firms in the same industry--with the important exception of the aircraft industry, in which foreign-controlled firms do more R & D.

Why then does arrow (n) carry a question mark in Figure 1? The reason is not only the exceptions noted in the McFetridge and Frankl evidence; in addition there have been two other studies that do not support Porter's view. In a study that did take account of inter-industry differences, but not other influences on R & D, Lithwick (1969, pp. 80-83) found strong evidence that foreign ownership increases R & D. In a 1973 study, Globerman took account of inter-industry differences in R & D only in a relatively limited way (he used only a 2 "industry" classification: high technology and low technology activities). Although, in support of

¹Safarian (1966, p. 189, 191) found that "fully 187 of the 215 (reporting subsidiary) firms...indicated that the knowledge of the parent firm was fully available to them." (82 of these firms paid no charge whatsoever, and 25 made only a nominal payment.)

Porter's position, he found weak evidence (p. 63) that foreign investment discouraged R&D in technology-poor industries, he found strong evidence that it encouraged R&D in technology-rich industries. (This latter result of Globerman's seems to be most interesting because of its failure to support the oft-heard contention that foreign investment poses a special R&D problem in high-technology industries.)

Although Porter's conclusion seems to us to be more likely to be correct, we still judge it quite reasonable to argue that a negative effect of foreign ownership on R & D expenditure in Canada has not yet been proved; indeed, in some industries the effect may well be positive. Therefore arrow (n) is left with a question mark. The mists surrounding this issue have not yet been dissipated.¹

There are two other implications of foreign ownership to add: (q), a political-economic concern about control of Canadian industry; and (p) the greater propensity to import because of tied inter-corporate purchases by subsidiaries from parents.² This latter may involve a welfare gain or loss for Canada, depending, among other things, on whether the parent is undercharging or overcharging³ the subsidiary.

¹ Another issue emphasized in the weakest link is the type of R & D done in Canada. Safarian (1966, p. 186) concluded that subsidiaries were more likely than their parents to do "adaptive research" as opposed to basic research or research designed to develop new products.

² Safarian (1966, pp. 274-277) provides evidence of the greater import propensity of foreign-owned firms--an observation confirmed by Spence (in Caves, et al, 1977, p. 267) and, weakly, by Saunders (1978, p. 118). Wilkinson (1968, p. 149) provides further strong evidence of this relationship in secondary manufacturing. (But in primary manufacturing, he found the relationship is reversed: foreign ownership results in less imports.)

³ The appropriate price for the parent to charge the subsidiary is not easy to define, since it depends on questions such as: "How should the parent's joint R & D expenses be allocated between the product(s) sold to the subsidiary, and its other products?"

(Of course, one reason for a parent to overcharge a subsidiary is to transfer profits from the host to the home country.)

3. Overview of the Problems Created by Trade Barriers and Foreign Ownership

Before summarizing the effects of trade barriers and foreign ownership, observe how Figure 1 provides an interesting answer to the question: How does protection affect imports? The standard answer: It reduces them, as shown by squiggly ("reverse-the-sign") arrow \textcircled{v} . But this diagram now illustrates that the issue is more complicated than this. The real question is how the direct effect \textcircled{v} balances off against two conflicting indirect effects: $\textcircled{f}/\textcircled{p}$ which indicates how protection induces foreign ownership, which in turn increases imports; and $\textcircled{d}/\textcircled{w}$ which indicates how protection, by inducing inefficiency also tends to increase imports.¹

Let's now consider the key question: Are trade barriers or foreign ownership more damaging overall to Canada? There are three reasons for citing trade barriers.

First, as already noted, the economic problems associated with foreign ownership--namely the higher imports of manufactured goods (arrow \textcircled{p}) and technology \textcircled{n} --may or may not involve a welfare loss for Canada. This depends on the price at which these imports are acquired by Canada, and the externalities involved--especially those associated with importing R & D rather than producing it in Canada. On the other hand, it is much more likely--indeed, in some cases virtually certain--that the problems associated with trade barriers (arrows \textcircled{a} to \textcircled{d})

¹ \textcircled{w} is more complex than this: True, competitive pressure do mean that lower Canadian productivity leads to increased imports; but lower Canadian productivity means lower real income, hence reduced imports.

do involve a welfare loss to Canada.¹

The second reason that trade barriers may be viewed as the more serious problem is that they not only contribute directly to problems (a) to (d) in Figure 1, and indirectly to low R & D expenditures via arrow (g), but in addition, by encouraging foreign investment (arrow (f)), they contribute indirectly to the problems attributable to foreign ownership. In other words, trade barriers not only generate their own set of problems, but also contribute to the set associated with foreign ownership.²

¹Each of these problems involves an efficiency (or Pareto) loss. The only reason one cannot argue that such efficiency losses result in welfare losses is because a conclusion of this kind can, strictly speaking, not be made so long as domestic transfers are involved--unless one can assume that such domestic transfers "wash out", with the winners benefiting as much from a dollar of gain as the losers are hurt by a dollar of loss; or at least wash out enough to allow one to argue that an efficiency loss translates into a welfare loss. In the case of each of the problems (a) to (d) (and especially (a) and (d)) the argument that the efficiency loss almost surely results in a welfare loss is an easy one to make; it would take a relatively extreme assumption about the welfare-changing effects of redistribution to upset it.

²Is this indictment of trade barriers too strong? Does not the Canadian tariff, through its classical effect of restricting imports (v), have a "favorable" impact? The answer is yes, in terms of its balance-of-payments effect. But it does not necessarily follow that the Canadian tariff therefore has a favorable overall effect on Canadian welfare. Indeed, accepted tariff theory would lead us to expect, other things equal, that its restrictive effect on imports is likely to have an unfavorable welfare effect, since the losses to consumers are likely to exceed the gains to producers. (Canada is a small enough country that any terms of trade effect of a tariff on manufactures can be ignored.)

The other possible reservation about our strong indictment of trade barriers is this: We have already seen how trade barriers, by reducing Canadian manufacturing volume and efficiency, tend to deter Canadian R & D expenditure via arrow (n). But there is now some moderate to weak evidence (Porter, in Caves *et al.*, 1980, Ch. 7) that the Canadian tariff encourages (rather than discourages) Canadian R & D by allowing Canadian firms the economic "elbow room" to undertake adaptive research; or by allowing more favorably placed firms to replace adaptive research with more original research aimed at the Canadian market. But we emphasize: This is an effect only of the Canadian--but not the U.S. tariff. (In explaining Canadian R & D, Porter did not include the U.S. tariff.) The question of how both tariffs affect Canadian R & D reduces to the issue of how this possible encouraging effect of the Canadian tariff balances off against the deterrent effects of trade barriers--especially of foreign barriers--in restricting Canadian scale and efficiency and hence Canadian R & D opportunities.

The third reason for viewing trade barriers as the more serious problem is that there is a point in Figure 1 that we have so far not recognized that makes foreign ownership less damaging. True, foreign ownership is a contributing influence to problems (p), (n) and (q), as already described; but at the same time it tends to reduce problems (a) to (d). This is because foreign ownership tends to reduce trade barriers (arrow (f')), and thus tends indirectly to reduce the problems ((a) through (d)) attributable to trade barriers. In short, both trade barriers and foreign ownership have created their own set of problems; but while trade barriers have indirectly made 'foreign ownership' problems worse, foreign ownership has indirectly reduced 'trade barrier' problems. The reason is that (b) and (c) carry different signs.

Before now turning in detail to the Weakest Link, we emphasize that, in order to keep this paper simply focused on Canadian structural problems, we have not included any of the favorable effects (y) of foreign investment--such as, for example, the Canadian taxes paid by foreign owners.¹ Our interest has been limited to real or perceived "Problems Only".

¹For further benefits of foreign investment in Canada, see, for example, Caves (1971), pp. 22-27; and Globerman (1979).

²As noted above, we have also not considered all the possible arrows that show how variables from "outside" this diagram influence the variables inside. For example, we do not pretend to be fully explaining all the determinants of Canadian R & D expenditure. [For detail on this issue, see Porter (1979).]

B. THE WEAKEST LINK

1. The Relationship Emphasized

Before plunging into detail, consider the broad picture painted by the Weakest Link in Figure 2. Many of the problems recognized in traditional Figure 1 again appear. But, as we shall see, the question of the role tariffs play in causing these problems is lost in a sea of ambiguity and contradiction. Moreover, effect (a) of tariffs in Figure 1 is, to our knowledge, not recognized as a problem. On the other hand, there is no ambiguity or contradiction about foreign ownership: It is cited as the major cause of all the problems (except (a) and (b)) that appear on the right hand side of Figure 1, plus an additional problem (s) at the bottom of Figure 2.¹ Finally, benefits (y) of foreign ownership get short shrift in the rare instances in which they are mentioned at all. In short, foreign ownership now becomes the keystone explanation of Canada's structural problems.

2. The Weakest Link on Tariffs

Britton and Gilmour's discussion of the role tariffs play in causing Canada's structural problems is particularly unsatisfactory. So substantial are the contradictions that readers can go away with almost any view of tariffs they like. On the one hand, tariffs are repeatedly referred to as a major explanation of Canada's problems: Specifically on p. 93 they write that "tariffs have prevented Canadian firms from attaining greater size, specialization, long production runs, and thus scale economies and export-competitive production"

¹For the attribution of all these problems to foreign investment, see Britton and Gilmour (1978, pp. 92-96).

(relationships (c) and (d)). And on p. 58 the Canadian tariff is recognized to have encouraged foreign ownership (relationship (f)). Indeed, on p. 101 they seem to suggest that protection is the second most important cause of Canada's structural problems.

However, on pp. 50-51, Britton and Gilmour take a completely different view, and argue that tariffs are unimportant; their protective effect is a "mirage". This not only contradicts their argument elsewhere that tariffs are important, but also is inconsistent with their policy conclusion that removing tariffs would be a disaster.¹ (Specifically, they seem to be simultaneously arguing the following two contradictory propositions: (1) Canadian tariffs provide trivial protection; but (2) the removal of tariffs would provide a devastating shock to Canadian industry.) But their argument that tariffs don't protect is not only inconsistent; it is also wrong: In quoting tariff averages (e.g.,

¹A contradiction noted by Daly (1979, p. 313).

on p. 50) they fail to recognize the well-known bias in such estimates.¹ It is also attempt to dismiss tariffs as unimportant² and hence to discard the relationships in the upper half of Figure 1 that Britton and Gilmour are most open to the charge that their theory is truncated.

Moreover there is a third position they take on tariffs (e.g., on p.153): In the long run tariffs should not necessarily be retained; instead they argue that removing tariffs some day is a policy that "might have some appeal if the economy had developed an advanced technological capacity" and world market conditions were improved. The overall tone of the book suggests that they have no great enthusiasm for this argument. Moreover, if they really want free trade eventually, painting the "devastating scenario" of its effect (e.g., on pp. 93-94, 153, 195) will surely make it more difficult to sell the idea in the future.

¹ To illustrate, consider a country in an initial free trade position which places a prohibitive tariff on 50% of its imports. Its imports are reduced, but 100% of them still enter duty free. This 100% figure suggests it is still trading freely when it is not.

This bias is very important in the Canadian case, where exports tend to be heavily concentrated where "gaps exist in the U.S. trade barrier wall". (Autos are the most dramatic example.)

² See, for example, their statement on p. 50: "So much for protection!" (exclamation mark theirs).

Finally, it's not just that they are pessimistic about free trade prospects; in addition, their description of current free trade proposals is little more than a caricature; they implicitly assume that tariffs are to be removed with little warning or short-run buffering of the impact. Actual trade liberalization proposals are typically based on the assumption that adjustment costs should be minimized by a staged reduction over a period of (e.g.) ten years,¹ with each tariff cut thereby being almost indiscernible in a world of fluctuating exchange rates.² Moreover, the adjustments would not necessarily be severe compared with the continuous adjustments that businesses must make in any case in the face of changing market conditions. Finally, any broad additional move toward freer trade would be unlikely to begin before the late 80's. (It will take most of the 1980's to digest the present Tokyo cuts and to negotiate any further liberalization--even if we start now.) Consequently the adjustment to free trade would not be so much a question of sunk capital losses, as getting the next generation of Canadian capital investment aimed in the right direction.

So strong is Britton and Gilmour's caricature of both free trade proposals and its effects that in our judgment, a more likely interpretation of their limited sympathy for free trade in the long run is that it is a new variation on the standard protectionist theme: Free trade is fine some day, but the worst possible time is now--whenever now happens to be.

¹To our knowledge, Britton and Gilmour don't even address the issue of how a move to free trade would be buffered.

²These and other issues raised by trade liberalization are detailed in Wonnacott and Wonnacott (1980). One suggestion is that each small timetabled tariff cut might be moved ahead to coincide with one of the (now frequent) small reductions in the value of the Canadian dollar--in which case each specific tariff cut could scarcely be identified, and would only manifest itself as part of a general pressure when the dollar fluctuates up again.

In this paper we also show that an earlier Britton criticism that our analysis of free trade is out of date, is itself out of date.

There are two additional problems with the view in the Weakest Link that free trade should be considered only after we have developed competitive, world-scale enterprises. First, it may not be possible to do so. [For a criticism of certain proposals for establishing world scale enterprises, see Wonnacott (1975).] Second, even if it were to be possible, it is not clear that the activity we may have so carefully fostered (at considerable expense to the taxpayer) will turn out to be a high payoff enterprise once we then move towards freer trade. For example, we might erroneously subsidize an industry in which present foreign tariffs are low, rather than an industry of greater free trade payoff (which we might not be able to establish now--even with substantial subsidies--because of high present foreign tariffs). Nor can we be sure, if we subsidize R & D and develop world-scale plants, that free trade will then be negotiable: Canadian industry may be "all dressed up with no place to go". (It has been suggested that the Canadian chemical industry anticipated a greater reduction in foreign trade barriers than has actually occurred in recent GATT negotiations.)

In short, it makes little sense to sweep away trade barriers suddenly without giving business time to adjust. It is equally dubious to try to get our industry fully prepared for free trade before multilateral or bilateral commitments to future cuts in tariff barriers have been made. The best strategy is for industrial reorganization and prespecified tariff cuts to occur together, in a gradual process extended over a number of years.

3. The Weakest Link on Foreign Investment

If the concern is only with the R & D problem, then, as already noted, the Council claim that foreign ownership reduces R & D expenditures and employment may be viewed as weakly supported by the statistical evidence.

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(Recall that arrow (n) appears in Figure 1--but it carries a question mark: it is the least well established of all the relationships in this diagram, and as we have conceded earlier, it is even reasonable to view it as so far 'not proved'.)

Council authors also contend that relationship (k) exists--i.e., that foreign ownership reduces exports. Before examining the evidence, we might ask: "What is our theoretical expectation?" Specifically, does foreign ownership result, as sometimes alleged, in less exports, because subsidiaries are discouraged or prevented from entering the export markets already serviced by the parents? Specific concrete instances of this have been cited. Moreover, there have also been a very few well-publicized instances of Canadian subsidiaries that have been prohibited from exporting because it would put the U.S. parent in violation of the American "Trading-with-the-Enemy Act". Yet in examining the broad aggregates, Wilkinson (1968, p. 146) could find no significant effect of foreign ownership on export performance, while Safarian (1966, pp. 136-137) and Saunders (1978, p. 118) found weak evidence that foreign ownership has, overall, improved rather than damaged Canadian export performance.¹ This suggests that the instances in which subsidiary exports have been reduced by parental pressure have been offset, or more than offset, by the greater export opportunities subsidiaries have been able to realize by drawing on the marketing capabilities or accumulated advertising and goodwill of the parent multinational. (One might speculate that subsidiaries may be able to exploit this advantage even more in the future, insofar as they are able to develop world product mandates.) In short, available evidence does not support the inclusion of arrow (k); hence it was not included in Figure 1.

¹McFetridge and Weatherby (1977) provide very strong evidence that foreign ownership improves export performance overall (see their coefficient b_{32} , p. 83) and specifically in the resource sector (b_{31} , p. 93). However, when they examined only the manufacturing sector they found no such strong evidence. (In this instance, they did not report whether or not there was weak evidence.)

Nor, because of lack of evidence, does arrow (m) appear in Figure 1. Before turning to this evidence, what is our prior expectation about (m)? On the one hand, it has been argued that access to the parent's technology should make subsidiaries in Canada more efficient than Canadian-owned firms; further, it has been argued that the existence of foreign firms increases competitive pressures that tend to increase the efficiency of Canadian firms both in the same industry and in other industries.¹ On the other hand, several possible reasons have been suggested for expecting that subsidiaries may be less productive. Foreign ownership leads to greater product differentiation (which by carving up the relatively small Canadian market leads in turn to scale inefficiency and low productivity). This has been attributed to a "follow-the-leader" attitude by American parents in setting up Canadian subsidiaries (Royal Commission on Corporate Concentration, 1978, p. 194). And once established, oligopolistic U.S. subsidiaries may not engage in the sort of competition that might result in fewer, less costly products because American parents don't want to disturb the market for two reasons. First, they may be willing to sacrifice an expected profit in order to avoid the risk of being forced to withdraw and being no longer able to "fly the flag" in Canada (Fullerton and Hampson, 1957, p. 71); moreover, each U.S. subsidiary may be reluctant to initiate price competition with the others, because the deep pocket of each parent makes it unlikely that competitors actually can be driven out (English, 1964, p. 42). A final reason suggested for the fragmenting of the Canadian market into many small firms is that the past spillover of U.S. advertising into Canada may have fragmented Canadian demand. In other words, it may have created strong Canadian preferences for specific brand name products which in turn may provide each U.S. subsidiary with insulation in its own corner of the Canadian

¹See Caves (1974a), and Globerman (1979).

market (Fullerton and Hampson, 1957, p. 74; Caves, 1975, p. 3).¹

Studies of how these conflicting pressures trade off have tended to turn up contradictory evidence. Fowler (1976) uncovered a strong negative correlation between foreign ownership and productivity. On the other hand, Safarian (1969, p. 91) found that foreign firms are at least as productive as domestic firms. In a later study, Daly (1979b, p. 48) found that U.S.-controlled establishments were generally more productive than Canadian-controlled. And in a sample of 2,000 manufacturing establishments in Quebec, Raynauld (1972, pp. 97-99) found strong evidence that foreign subsidiaries were more productive than domestically-owned firms. (His best estimate of this difference was 33%.)² Since then there have been three broader statistical enquiries that have not only included more regressors, but have also allowed for simultaneity. Caves et al (1980, Ch. 10) provide strong evidence that in some activities, foreign ownership is associated with reduced scale (and productivity), while in others it tends to be associated with increased scale. Saunders (1978, p. 151) uncovered a statistically significant negative effect of foreign ownership on productivity; on the other hand, he argued later (p. 174) that there was some weak statistical support for the view that access to parents' technology contributes to productivity. Moreover Globerman (1979) found fairly strong statistical support³ for an hypothesis that Caves had postulated (1974a) but

¹A further more complicated reason for expecting that foreign ownership may have led to reduced efficiency is this: Post-war tariff reductions have increased efficiency (at least in domestically-owned enterprise) as increased import competition has forced less efficient Canadian firms out of business. But this may not have occurred to the same degree in industries with a heavy concentration of foreign ownership: U.S. parents who wish to prevent the loss of sunk capital in Canada may have been able to moderate import competition, since they are, in many cases, the source of imports (Royal Commission on Corporate Concentration, 1978, p. 54).

²An estimate, he notes, that is similar to the "one third" estimates of the productivity advantage of U.S. subsidiaries discovered in Australia by Brash (1966), and in the U.K. by Dunning (1958).

³At one point Globerman refers to his support as "ambivalent", but later suggests it is substantial. In our view, this latter judgement is justified by his statistical results.

had been unable to convincingly confirm in any of his tests: There seems to be spillover benefits of foreign ownership in terms of increasing the productivity of competing Canadian firms. Thus, we conclude that the contention that foreign ownership reduces Canadian productivity is not proved; indeed, if anything, the balance of evidence seems to point in the other direction.¹

To sum up our discussion of (k) and (m): It is difficult to argue, as in the Weakest Link, that our problems of weak export performance and inadequate scale and productivity can be attributed to foreign ownership. Indeed, available evidence is that foreign ownership seems as likely to raise exports and productivity as to lower them. Thus these problems indeed seem [as Safarian earlier discovered (1966, p. 217) and as reiterated by the Royal Commission on Corporate Concentration (1978)] to be common to foreign and domestic firms, with Canada's truncated market due to foreign and Canadian tariffs being the most likely explanation.

¹Thus the only effect of foreign ownership on productivity that is detectable in this diagram is a very indirect one: Foreign ownership tends to improve productivity via the (f) / (a) link.

4. Evidence in the Weakest Link

The empirical studies cited above are not taken from the Weakest Link. The reason is that both the logical argument and the evidence provided in the Weakest Link is so extraordinarily weak. At one point, Britton and Gilmour (1978, p. 125) state that their most extreme critics may find their line of reasoning "particularly exasperating". The problem is that almost anyone will. Not only does the Weakest Link involve contradictions (of the sort already noted in our discussion of tariffs in Section B2 above). In addition, it also includes a lot of bad logic, sometimes even advertised as good--for example (p. 132): "Logically, if the U.S. economy is managed optimally, it should be able to retain its standard of living lead in comparison with economies such as Japan." (This isn't necessarily true even if investment rates are the same, and, of course, optimal investment rates will not be the same so long as national time preferences differ.) The book is replete with totally unsupported statements: "The only discernible, unequivocal national economic objective is growth" (p. 186) and "...electronics is the most important industrial growth area" (p. 99); "at the least, if one is to acquire foreign technology, one must have technology with which to bargain and trade" (p. 147).

(Oil won't do?) In support of extremely controversial positions, evidence is sometimes claimed, but not provided: "...evidence indicates that over the short term more jobs have been created through (FIRA) intervention than would otherwise have been the case." One looks in vain for support. In other cases, evidence is provided in tables, which may give the lay reader the impression that the argument has statistical foundation. But in some cases the data in these tables don't seem to support the contention at all; worse yet, Table III.5A contradicts the conclusion it is alleged to support--that is, the contention (p. 77) that "engineers and scientists both grew poorly in Canada (1961-1971)." It's one thing for Science Council authors to make a political case for more R & D subsidy in Canada. But it's quite another for them to suggest that their study is serious economic analysis, when it is not.

We now turn to an argument that Science Council authors have made that escapes the above strong criticisms. Cordell (1971) and Bourgealt (1972) attempt to support their critical view of foreign ownership with illustrations of the experience of individual foreign-owned firms:¹ But the problem is that they do not make the essential comparison of foreign firms with similarly

¹For a more detailed discussion of the studies of Cordell (1971) and Bourgealt (1972), see Safarian (1979).

situated domestic firms. Instead, they observe a foreign firm, and observe that it is truncated. They then imply that foreign ownership is the cause of truncation, without testing the alternative hypothesis that ownership has nothing to do with it at all--both foreign and domestic firms are truncated because they operate in a small market.

There are other problems with using illustrations of specific firms, rather than economy-wide aggregates. A debate based on illustrative examples tends to reduce to swapping anecdotes. ("Your firm can do such-and-such, but my firm can do so-and-so.") Moreover, such examples typically comprise a relatively small sample. (This raises the question of reliability even if the authors who have been drawing on these examples have been scrupulously careful to avoid bias by selecting their firms at random--rather than selecting them because they have special characteristics that illustrate their point.)

The second problem encountered in the discussion of R & D by Science Council authors can be best illustrated with an example. California is one of the highest R & D states in the United States--the last state that could reasonably claim that it suffers from R & D truncation. (Palo Alto is one of the two or three major U.S. centers for R & D.) But if a few firms can be used--Science Council style--to illustrate the total California picture, it is easy to show that even California suffers from truncated R & D. One illustration might be, say, a specific auto company that does some production in California, but does little R & D there, since its auto R & D is centered in Michigan. In short, since R & D involves agglomeration it is easy to find numerous specific examples of truncation--even when, as in the case of California, a general truncation problem does not exist. (For every truncated establishment that Science Council authors have found in Canada, a

similar establishment in California could be found--although not necessarily in the same industry.)

Indeed, there is a fundamental difficulty with the view of "technological sovereignty", defined by Voyer (1978, p. 228) as "the technological capability to support national sovereignty"; that is, the mastery and control of "those technologies essential to Canadian development". The problem is that most R & D is an expensive overhead. No economy the size of Canada (or Italy, or France, or California) has the capability of producing the R & D needed for the development of all its industries; the borrowing of some foreign technologies (that is, "R & D truncation" as Council authors define it) is both desirable and inevitable. While Canada is capable of more R & D than it presently does--and indeed we would welcome developments which would induce more R & D (particularly those involving market enlargement)--Canada simply does not have the ability to do R & D across the board. Efficient R & D is often specialized R & D. To repeat one of the simplest messages of economics and one recognized by Britton and Gilmour (p. 164): Resources are scarce; choices must be made.

To sum up: Single-firm illustrations of R & D truncation prove nothing. Inadequate R & D can be established only by looking at total R & D expenditure by all firms in all industries--and it is these totals that tell us that we have a problem in Canada. But these totals don't tell us why. To answer that question there is no short cut. One must systematically compare the performance of domestic and foreign firms, as Caves, Porter, McFetridge, Safarian, Saunders and others have done. And, as we have seen, the most recent and sophisticated of these studies do provide some support for the Britton/Gilmour contention that foreign ownership influences R & D.¹ But these same studies also recognize many other influences on R & D. And they do not support the other Britton/Gilmour criticisms of foreign ownership, to which we now turn.

¹One of the R & D success stories Council authors cite is Northern Telecom. (See especially Cordell, 1971 and Britton and Gilmour, pp. 99-101.) It is difficult to sort out how much of the success of this company has been due to (1) its reduced dependence on foreign technology following the U.S. anti-trust decision of 1958, (2) its special sales relationship with Bell, and (3) its duty-free access to the U.S. market in many products, along with its own tariff protection in the Canadian market. (The third is particularly interesting insofar as it may illustrate how a firm can support an R & D program if it can gain access to foreign markets.) But with these three explanations at hand, the Weakest Link emphasizes only on the first.

Incidentally, the combination of free access to foreign markets along with protection at home is a good prescription for the development of an industry. The Japanese have been particularly successful in using this strategy (although

5. Additional Problems Attributed to Foreign Investment

Notice that both the traditional and Weakest Link views involve concern about two problems already noted ((P) and (Q)), principal of which is the possible loss of control over economic developments by Canadian policymakers. This concern, of course, goes beyond the traditionally-defined bounds of economics and directly into the important realm of political economy. But beyond this the two groups part company, as the Weakest Link goes on to contend that foreign ownership has an adverse effect on employment (arrow (S), which does not appear in traditional Figure 1).

Perhaps the strangest argument of all in the Weakest Link (p. 124) is the claim that foreign investment had resulted in a net overall loss of employment of 120,400 jobs in Canada by 1970. In a country in which a long list of provincial premiers would testify to the job-creating effects of foreign investment (as Britton and Gilmour themselves later concede, p. 184) how do these authors arrive at this remarkable conclusion? The answer is that they first take an estimate of the U.S. domestic employment gain from U.S.

of course, their access to foreign markets has only been 'relatively free'). However, in light of the give-and-take nature of tariff negotiations, it is, in general, becoming very difficult to arrange this combination. Moreover, while it may be in the interests of the industry, it is not necessarily in the national interest. [To establish a national gain would require establishing dynamic benefits from retention of own tariff sufficient to offset static net losses due to its effect on consumers and producers (after allowing for terms-of-trade effects). Although one might argue that this trade-off might be justified in the short run until the industry is well-established, it is more difficult--though not necessarily impossible--to justify in the long run.]

(Returning to Northern Telecom: Although this company enjoyed duty free access to the U.S. market in some products, this was not "free access" because of preference granted to American products by U.S. government purchases--an issue of considerable importance in the telecommunications industry. Northern Telecom has accordingly set up assembly plants in the United States, so that its output would fall under the Buy American umbrella.)

investment in foreign countries (a questionable estimate in any case because it was designed by the U.S. MNC's to counter as strongly as possible the U.S. trade union claim that, through foreign investment, the MNC's were exporting jobs). Britton and Gilmour then assume that this employment gain to the United States results in an equivalent employment loss to Canada (and other foreign countries). In short, they argue that, in the absence of evidence to the contrary, it may be assumed that foreign investment is a zero-sum game.¹ The mischief the zero-sum assumption would do to the analysis of almost any economic activity is clear. Indeed, in the absence of evidence to the contrary, a more natural assumption is that economic activities are not zero sum;² if they were, they would be unlikely to take place.

Moreover, one may seriously question why Council authors who are promoting R & D would want to place such heavy emphasis on its employment effects. After all, many of the major inventions through history (from the cotton gin to the computer) have in the first instance destroyed jobs. Emphasis on first-round job creation would lead to a focus on the sort of R & D that would generate employment-intensive processes. But much of the promising R & D lies elsewhere. Surely, one of the major responsibilities of those promoting R & D should be to explain to the public the medium and long term adjustments that tend to solve the problem of temporarily-displaced labor. (In many cases, of course, these are the same adjustments that tend

¹"As there is no evidence that this is not a gaming problem with a zero-sum, the net gains made by the U.S. economy from foreign investment may be treated as net losses to host economies; that is, benefits to the U.S. are detrimental to Canada." (p. 123).

²Zero-sum employment effects parallel the more familiar--but similarly erroneous--ultra-nationalistic view that foreign investment earnings are also zero sum.

to solve the problem of temporary labor displacement when trade is liberalized.

6. Concluding Observations

If Science Council authors like Britten and Gilmour limit themselves strictly to promoting R & D, there is little reason for them to come in conflict with traditional theory. Their "bête noire" is foreign ownership (as Figure 2 illustrates) and traditional statistical analysis does, in our judgment, suggest--although not strongly--that foreign ownership does indeed reduce R & D via (n). [Of course, they would still have to support their much more questionable further claim that foreign ownership in general and the import of foreign technology in particular should be restricted because it involves a welfare loss to Canada.] But there is little reason for them to attack the case for liberalized trade that contends that trade barriers are an important source of our export/scale/productivity problem. Such an attack is a very difficult one to sustain, and they already have their hands full in arguing that less foreign ownership and more R & D in Canada would involve a net welfare gain. Indeed, such an attack is likely to be counterproductive, since by defending trade barriers it tends to reinforce the export and scale problems that have traditionally weakened our R & D opportunities.

Now let's turn from Council authors' diagnoses to their cures.

C. POLICIES ADVOCATED IN THE WEAKEST LINK

In their policy proposals, Britton and Gilmour come down hard in favor of strong government intervention. Whereas business executives view those forms of government intervention that they favor (e.g., protective tariffs) as "industrial strategy", and those that they do not favor as "undesirable regulation",

Britton and Gilmour seem almost to favor intervention as a general principle. At least, this seems to be the *carte blanche* mandate they request (p. 164):

Government "intervention" at all levels is essential to reach the goals implied by technological sovereignty. Insofar as government intervention is largely responsible for the current industrial dilemma and for Canada's technological weakness, only government 'intervention' in the form of new policies and instruments is equal to the task of reversing the effects of several decades of misguided policy.

In other words, since intervention so far hasn't worked, we should use a new (stronger?) kind. This clearly is a long way from a modified free market philosophy, which would hold that if intervention hasn't worked, we should consider doing less of it. Moreover, it is important to note that Britton and Gilmour recommend intervention in the decision making not only of foreign-controlled firms, but of Canadian-owned firms as well.

Now let's consider some of the specific interventionist policies they recommend.

1. Pick Winners

It is not clear that, in practise, this is very easy to do; the government may be no more able than a stockbroker to translate this laudable general principle into specific, concrete action. On the question of which industries will be winners there is generally silence, or generalities too broad to be useful;¹ for a reasonably specific list of suggestions one must turn to a series of articles by Neil Paget in the Globe and Mail beginning on May 19, 1979: telecommunications, energy development, engineering and construction, transportation equipment, petrochemicals, and resource-related products. Two of these should be obvious

¹For broad generalizations, see for example, Britton and Gilmour (1978), pages 165 and 189.

winners--resource-related products and energy development--because of our resource endowments. Transportation equipment is a potential winner, partly because the 1965 Auto Pact opened up the U.S. market. In two other cases--petrochemicals and telecommunications--access to the U.S. market is also a key. In petrochemicals we already have some world scale plants; they don't need a subsidy as much as a big enough market in which to sell their product. Telecommunications (especially Northern Telecom) is a winner that has already been picked by the market, in part because of its relatively free access to the United States in a number of products. In other words, if we look at the idea of picking winners there are the obvious energy-related examples, plus firms that above all require access to a large sales base. Moreover, they tend--like Northern Telecom--to be firms that the market has picked, not the government.¹ The argument that the government is better at picking winners than the market is not an easy one to sustain. What U.S. government official would have five years ago picked the American textile industry as a winner? Yet this industry has been so successful that its exports to Japan and Europe are now high enough to be putting U.S. trading relations with these countries under strain.

Picking winners is often viewed as a key to Japanese success. But to say that the Japanese have been successful may not be too helpful. First, they have a much larger domestic market than Canada. Moreover, Japanese export success has historically been based on an undervalued yen that has tended to make whatever the Japanese picked a winner. Moreover, the Japanese public has been prepared to accept a level of wages and public service (including such basics as urban sewage systems) that would simply not be acceptable in

¹ Northern Telecom has had subsidies, but basically of the sort available to any similar Canadian company.

North America. Finally, another key explanation of Japanese success has been a level of investment that has typically run roughly double the Canadian rate. In short, for many reasons Japan's ability to pick winners does not provide a very good precedent for Canada. [Britton and Gilmour point to other aspects of Japanese policy with apparent favor (e.g., pp. 177-179), yet later concede that the Japanese model may be inappropriate for Canada (p. 179).]

Finally any review of past government success in picking winners should be tempered with the observation that governments have at times picked spectacular losers--such as the Concorde.

2. Subsidize R & D

The Weakest Link recognizes (p. 170) that it is erroneous to argue that R & D creates industrial strength; instead it is industrial strength that creates a fertile ground for research and development. R & D expenditure is like fertilizer; it won't work unless the ground is right. And, because heavy R & D firms typically require a large sales volume over which to cover their R & D overheads, that means a large market. Providing R & D subsidies to firms that don't have a market is like throwing fertilizer on rocks. In short, there is no point in designing a better mouse trap--or Concorde aircraft--if you can't sell it. Unfortunately, even if there is access to a large market, R & D subsidization may still not pay off. With the opening of the large European market, French subsidies to high technology industries may have met with some success in certain instances, but failure in others (cited in Palda, 1979, pp. 41-43).

In examining the Canadian case (where market access is limited) Porter's findings on the effectiveness of R & D subsidies (in Caves et al 1980, p. 25) are not encouraging: Although he isn't sure about the causal connections, his best-controlled study shows that subsidy by the Canadian government seems to have been associated with lower overall R & D expenditures; in other words, when the government provides a dollar of subsidy financing of R & D, more than \$1 of private R & D financing disappears. On the other hand, McFetridge and Howe (1976, pp. 66-67) conclude that there has been ^{such} no/crowding out, and suggest that government subsidies may have even stimulated private R & D financing somewhat. In our view, if a way can be found to subsidize R & D more efficiently than in the past, externalities in R & D may justify some subsidization, especially in view of the heavy direct and indirect research subsidies foreign competitors receive.¹ But to reduce the risk that it will be counterproductive (i.e., crowd out privately-financed R&D) the best way is not through grants, but rather through tax concessions that will leave the potential marketability of the product as an important input into the R & D decision. "R & D subsidy" is no magic catchword to success. Let the taxpayer beware.

3. Reduce Imports of Foreign Technology

In our view, one of the Weakest Link's most disturbing recommendations is that a strengthened FIRA should screen the import of foreign technology into Canada, allowing some in, while keeping some out. This raises two major questions. First, do we really encourage the development of technology in Canada by keeping ideas out? Would we end up reinventing the computer? Second, how is a government official administering such restrictions going to

¹For example, a major advantage of U.S. civil aircraft producers is the large U.S. government purchase of military aircraft, which allows the companies to cover their basic aeronautical R & D.

decide which technology should be allowed in and which should not? The Weakest Link provides no clear answers to this question. In general, its guidelines tend to be so general and unspecific that they could be used to cover as liberal or draconian an approach as a government official might like to take. Finally, in one of their infrequent attempts to be specific, a guideline is suggested (p. 182) which is, in general, logically impossible: maximize benefits and minimize costs (or to use their term, "disbenefits"). This raises the question of whether protection of Canadian technology is special pleading by Canadian technocrats--a particularly disturbing possibility if those who are now making this case eventually come to administer the protection using meaningless guidelines.

Another suggestion in the Weakest Link (p. 191) is that new technology should be imported, not by foreign subsidiaries, but rather by an independent Canadian firm in an arm's length licensing agreement. While this would tend to reduce the role of foreign ownership in the Canadian economy, it would involve a disadvantage, insofar as it results in a slower transmission of new technology. (Indeed, it is the relative speed of the parent-subsidiary transfer of technology that provides one of the major potential benefits of foreign investment.) The reason that arms-length transfers via license agreements tend to be slower is because there is a high degree of uncertainty about how much the payoff of the new technology will be. Thus the bargaining position of the two parties is unlikely to overlap: The seller tends to be optimistic about how successful the new technology will be, and must ask a price high enough to cover the possibility it does indeed have a very high payoff; on the other hand, the buyer must discount his price offer to cover the possibility the new technology will, for some unforeseen reason, not work. (In other words, the bargaining position of the buyer and seller are unlikely to overlap because, in taking account of uncertainty, they adjust their prices in opposite directions.)

Of course, this problem of uncertainty disappears when the new technique is fully proved out, at which time licensing agreements become feasible. But then it is no longer new technology.

This does not mean that we necessarily view a parent-subsidary transfer as the best means of acquiring foreign technology. Rather, we are simply observing that there does not seem to be any single all-purpose solution--a point implicit in Nilsson's comments (1978, p. 232).

The three policies so far discussed are designed to stimulate domestic R&D. The final two we now consider are the Weakest Link's answer to the question we cited earlier: How can high technology¹ Canadian firms be provided with a larger market?

4. Purchasing Preferences for Canadian-Made Products, Especially High-Technology Products, by all Three Levels of Canadian Government (p. 167)

Government purchasing policy is an inherently difficult area in which to make simple policy prescriptions. Even if other objectives (like creating a large Canadian market) are not introduced, it is still difficult to clearly set out an optimal purchasing policy. As an example of the conflicts that arise, one can argue that government purchases should be constrained to the lowest bid to prevent the exercise of payoff patronage; yet if this constraint is enforced how can government purchasers take account, as private firm purchasers do, of the extremely important issue of how available supply will be in the future?

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For problems in the Weakest Link's definition of high technology, see Palda (1979, pp. 14-17) and Safarian (1979, p. 326).

Government procurement policy is further complicated when the additional objective of creating a domestic market for Canadian products is introduced. Several difficulties arise: First, it is hard to make a case for strengthening non-tariff barriers (such as purchasing preferences) at any time; but it is especially difficult now. As a result of the Tokyo Round, there is now some prospect of reducing such NTB's--i.e., making it easier for foreign firms to bid for Canadian orders, and for Canadian firms to bid for foreign orders. This is an important opportunity for Canada because foreign orders that may be gained are typically many times as great as Canadian orders that may be lost. This negotiated gain in reducing NTB's may well be eroded in any case; but it is in Canada's interest to work to strengthen, not to weaken this agreement.

Second, such escalated protection means escalated costs to the taxpayer. To the original R & D subsidy paid to the Canadian producer, there is now added a further subsidy in the form of the higher price each government must pay to purchase products on a preferential basis.

Third, preferential government purchases may paradoxically shrink, rather than expand, the domestic market available to a Canadian firm. The problem is that any of the provincial governments under pressure to give preference to Canadian suppliers may extend this logic one step further and give even greater preference to its own provincial suppliers. Thus the preferential carving-up of the Canadian market that is already taking place¹ may be escalated. And it is easy to see how this introduces inefficiency. As each province purchases its own product, an efficient national producer loses out to

¹For example, electrical wire and cable is produced inefficiently in most provinces of Canada because of provincial purchasing preferences (Senate, 1978, p. 60).

inefficient local ones in every province but its own. An internationally competitive industry is not developed after all, and costs to the taxpayer escalate once again. There is now a triple subsidy: The original R & D subsidy to the Canadian firm; the subsidy the firm receives when its output is sold at a higher price because it is given Canadian preference; and the further subsidy the firm receives because its output is sold at a higher price yet again because it is given provincial or municipal preference. And in the end these subsidies are unlikely to benefit anyone. Instead they are likely to go into covering the excess costs of production of the small-scale inefficient firms operating in a Balkanized Canadian market.

5. Encourage Mergers of Existing Canadian Firms

Many writers have recommended that small-scale Canadian industry be allowed more freedom to merge. Some have gone even further in recommending that the government take an active role in promoting mergers (Britton and Gilmour, 1978, pp. 170-1) or in "bringing them about" (Gordon, 1978, p. 52). The resulting firms would have a larger share of the existing Canadian market, and could better capture economies of scale. It has always been our view that allowing (as opposed to forcing) such mergers may be desirable--provided they are allowed in a period when trade is being liberalized. Thus import competition would be reducing Canadian price, as merger-induced efficiency would be reducing costs. In this way, increased efficiency from economies of scale would be realized throughout the economy (rather than retained as higher profits by the industries concerned); this would also protect the consumer from exploitation by an increasingly monopolized industry. In short, Canadian industry needs (1) larger scale production

runs, and (2) increased competition. And in many industries in our small economy, the only way to get both is through foreign competition.¹

D. CONCLUSIONS

In this paper we have tried to bring together an overall picture how the already-known pieces in Canada's trade/ownership/technology puzzle fit together. It is our hope that Science Council writers will also try more clearly to define the overall picture they are painting, and that this will remove many of the contradictions that now surround their position--in particular the contradictions that surround commercial policy in Figure 2.

In addition to this general observation, we have some specific final criticisms. In putting forward a recommendation for more R & D subsidy in Canada, Britton and Gilmour have badly overstated their case: Canada without their program has not had as "miserable a performance as an industrial nation" (p. 26) as they frequently imply; nor, with their program is it likely to become as much of an industrial leader as they predict. Their case is still far too much a brief for a special interest group. To pass judgment on large R&D subsidies requires an assessment of the benefits and costs of such a

¹Gorecki's statistical study leads to his conclusion (1976, p. 75) that in a number of instances, economies of scale cannot be achieved in the domestic market without raising monopoly problems. For further detail on the problems involved in trying to achieve economies of scale by concentrating on the domestic market alone, see Daly et al. (1968, pp. 45-46), Hindle (1978) and Wonnacott (1975, Ch. 13).

program. They have attempted to describe the benefits. Where is their assessment of costs?¹

Effectively subsidizing R & D involves difficulties that are often not adequately addressed. Some forms of R & D subsidy are better than others: In particular, subsidies should be carefully tailored to go initially to firms with promise; and further subsidies should go to firms that are able to translate promise into success. Success should be defined as ability to sell in the sort of large market that is required to justify high-overhead R & D--and this typically involves substantial exporting. In recommending outright R & D grants (rather than, say, tax incentives that are worth something only when a firm does succeed) the Council seems to us to be inadequately selective. There seems to us to be a real risk that R & D subsidies which are not tied to marketing performance may (except for job-creating effects in the scientific community) turn out to be largely a waste.

¹Safarian (1979, pp. 329-30) suggests that at times Britton and Gilmour seem to have developed a new approach to cost-benefit analysis: heavy concentration on the benefits of the policy they favor, and the costs of the one they oppose.

This peculiar approach to cost-benefit analysis is also illustrated by Voyer's criticism (1978, p. 229) of Globerman:

Globerman also seems to feel that technological sovereignty is some kind of overhead cost; 'a public good which should be paid for by all Canadians.' We believe that it is a benefit and not a cost.

But when Globerman uses the term "public good" he is recognizing that this good, like any other, involves a benefit. His point is that we should look at the cost, as well as the benefit side. Voyer's reaction seems to deny that there is a cost side.

An example of the assumption in The Weakest Link that the policy being attacked involves a net cost occurs on p. 90: The rhetorical question: "Foreign capital has brought foreign technology. Who is paying? For how long?" takes it as self evident that the flow of foreign technology into Canada has involved a substantial net cost.

This leads to our final major reservation. In viewing foreign trade, many of the recommendations by Council authors are counter-productive. Specifically, their opposition to trade-liberalizing recommendations that would increase our market access are particularly inappropriate for a small economy like Canada. The best precedent for Canada is not a large economy like Japan or the United States; although no precedent fits perfectly, a better one seems to be Sweden--and the Swedes have a free trade agreement with the EEC, the giant to their south. Since heavy R & D industries typically require a large market, we should begin to think hard about how we can get better access to world markets without further delay. The reason is that broad new initiatives to liberalize trade cannot realistically be debated, negotiated and fully phased in until well into the decade of the 90's--even if we start now. Given this time frame, it is inappropriate to give lip service to liberalized trade in the future, while opposing further initiatives today.

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