Third, relatively small scale production has long typified Canada's manufacturing base outside the resource and automotive assembly sectors. As this production, including that generated by a limited domestic machinery sector, has not been strongly export-oriented, it is not surprising that small and medium sized firms spend little on R&D: only $1.4 billion in 1990 by the 3,150 firms in Canada with fewer than 500 employees that undertake research and development.

Finally, foreign controlled firms tend to have higher R&D to sales ratios than Canadian firms across a wide range of manufacturing sectors regardless of the size of firm.[55] But this is not to say that foreign investors in Canada dedicate the same resources to R&D here as they do in their home markets. The high degree of foreign ownership has affected R&D expenditures in at least two critical sectors: motor vehicle assembly and parts manufacture; and, to a lesser degree, petrochemicals and oil and gas. Relatively successful R&D industries such as aerospace and telecommunications have dedicated between 12% and 20% of sales to R&D in recent years. On the other hand, the auto sector has performed miserably at only 0.2% of sales in 1990, compared to 3.2% in the U.S. and Germany, and 3% in Japan, thus reducing the opportunities for contributing to a stronger R&D culture in Canada. Moreover, Canadian-owned companies control only 20% of the auto parts sector, but do almost half of the little R&D that is performed. Big 3-related parts producers make only a marginal R&D effort.

(ii) Trade Policy Responses:

We cannot remain competitive over the long haul with this track record on research and development. More can and must be expected of business, the education system and governments. Trade policy can assist in a number of ways, as outlined below.

Investment and R&D

Clearly defined and comprehensive rules on investment in the host country create a climate of security that is conducive to further investment and the increased pace at which new technologies are introduced through capital stock and through in-house R&D. This security is further enhanced by incorporating these rules in treaty form as recently done in the NAFTA. From an R&D perspective, the development of such rules should remain sensitive to the poor R&D performance of much of the private sector in Canada and the consequent need to retain the use of public policy tools (e.g., government funding linked to R&D; performance requirements to undertake

[55] Investment Canada, "Business Performance", Tables 3A and 3B.