

1. Introduction

● Background and Definitions

Production of advanced technology products (ATPs) is generally perceived as a positive indicator of a nation's competitiveness and technological development.¹ As a result, trade in advanced technology based goods, particularly semi-conductors, computers and aerospace products, has yet to be broadly liberalized for strategic, military and economic reasons.

There are several widely accepted definitions of advanced technology products. These include sectors with: a high content of "new" technology and significant "imbedded" R&D components relative to sales; steep learning curves and high risks due to short product life-cycles; low ratios of transportation cost to value; and rapid growth which often requires access to foreign markets. Increasingly, technology-intensive industries may also include "traditional" sectors of the economy such as the automobile industry.² Moreover, a high mobility of production for advanced technology products often leads to a physical separation of R&D facilities from production sites. ATPs by definition are products, and therefore do not necessarily reflect advances in processing technologies, unless the processing machinery itself is an ATP. Canadian trade in ATPs, for example, does not reflect important process-related innovation gains in Canada's resource sectors.

Most industrialized countries and a number of emerging economies provide incentives and other subsidies to nurture innovation. Reform of these practices as they relate to R&D can be politically sensitive because it is often assumed that government assistance will be welfare increasing for the economy as a whole. Indeed, Japan, Europe and increasingly the U.S. have moved subsidies from basic research to "precompetitive" or generic research, while R&D tax credits in Canada include product-oriented R&D. However, while gains from high technology trade are useful indicators of a nation's competitiveness and level of development, they are often difficult to quantify. The costly irony of this growing pattern of incentives is

¹ As there is no international agreement to define advanced technology products (ATPs), Industry Canada estimates of ATPs are based on a list developed by the U.S. Bureau of Census. To be considered an ATP, a product must contain a high value content of "leading-edge technologies from an advanced technology field." The value of the high-technology element must constitute a significant proportion of the total value of the selected classification code. Currently, ten fields are used to classify advanced technology products: biotechnology, life sciences, optoelectronics, information and communications, electronics, flexible manufacturing, advanced materials, aerospace, weapons and nuclear technology.

² This paper uses the terms technology intensive industries, advanced technology and high technology interchangeably.