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A Commentary on Canadian International Competitiveness

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I. Introduction

Merchandise exports accounted for 22% of Canadian GDP in 1990. With such a large portion of our domestic income dependent on international sales it becomes clear that our international competitiveness has a direct impact on the standard of living in Canada. If we lose our competitive edge then our exporters will earn less income, and domestic suppliers will be unable to compete with imports from abroad. When viewed in this way, we see that all businesses in Canada that deal in tradeable goods or services must be internationally competitive in order to survive.

Competitiveness does not just mean being more efficient than domestic firms in our principal export markets. We must also be able to compete with our indirect competitors. These indirect competitors are those that are also trying to sell goods and services in our principal export markets. We may have insignificant levels of direct trade with these indirect competitors, but if we are not more efficient than them then we will lose our principal export markets to them. For this reason, it is important that we consider more than just Canada-US competitiveness. We must also consider our ability to compete with other countries that are either our current or potential indirect competitors.

Consider the US automobile market. In 1989, 30% of US imports of automobiles came from Canada, while 44% came from Japan and 15% came from the EEC. If we wish to increase our share of the US auto market, not only must we compete with domestic US manufacturers, but also with the Japanese and European manufacturers who export to the US.

This paper will narrow its focus by concentrating on Canadian competitiveness in manufacturing industries. This sector has become an increasingly important component of Canadian merchandise exports. Non-resource based manufacturing industries' exports, have grown from 32% of merchandise exports in 1980, to 47% in 1990. Comparisons will be made against the US because they have the largest share of world trade and are our largest export market (representing 74% of merchandise trade in 1989). Comparisons between Canadian manufacturers and Japanese manufacturers will be made because Japan is the second largest

bilateral trading partner of both Canada and the US. Other G7 countries will be considered in order to assess Canada's potential to compete on a multilateral basis and to retain market share in the US against indirect competition.

The elements of competitiveness that will be examined have been selected in order to provide a brief overview of Canada's competitive position, and the importance of being competitive. Topics to be covered include growth in real output, the importance of trade in the manufacturing sector, the level and measurement of productivity, and the level and impact of volatility and uncertainty about exchange rates, input costs, and prices. The emphasis in analysis is on long-run developments and historical trends, and not year-to-year fluctuations or current positions.

II. Data Sources

The principal data source used in this analysis is the OECD's STAN (structural analysis) database. This database contains data on manufacturing industries obtained from Statistics Canada and other OECD statistical agencies. The industries in the database are classified using a modified ISIC Revision 2 classification scheme for purposes of international comparability.

One of the drawbacks in making international comparisons of statistics is that the comparisons are limited by the weakest source of data. As a result, many of the comparisons presented here are as much as five years out of date, limited by the availability of data from one or more of the Group of 7 (G7) large industrialized countries. However, in all cases where the STAN database is used, more recent data *is* available from Statistics Canada.

III. Manufacturing Output and Trade

Real output in the Canadian manufacturing sector increased on par with the G7 average between 1971 and 1987 when expressed in terms of Canadian purchasing power equivalents (see

figure 1). Throughout most of the period from 1971 to 1983, growth in Canada was at or below the levels in the US and Japan. The period from 1983 to 1987 saw Canadian growth rise above the G7 average, as well as above levels in the US and Japan. However, Canadian growth levels seem to have declined thereafter (see figure 2).

Despite an average level of output growth, Canada has differed significantly from the G7 average in the importance of trade in its manufactured goods market. The ratio of the current price value of manufactured goods exports to the current price value of manufactured output indicates to what extent domestic output is marketed abroad. In Canada, this ratio was 34% in 1987, while the G7 average was 24%. Hence the share of goods exported was more than 40% higher in Canada than in the average G7 manufacturing industry. Figure 3 shows that Canada has long had a relatively high export orientation in its manufacturing sector, and that in Canada and G7 economies in general, trade has become an increasingly important source of income.

Canada also has a high level of imports of manufactured goods. In 1987, the value of manufactured imports was 35% of the value of domestic production, compared to a G7 average of 23%. It is misleading to interpret this figure as a failure on the part of Canadian manufacturers to attract domestic consumers. The need for specialization in a small open economy will ensure that not all manufactured goods are produced domestically, and *should* be imported. However, this figure does suggest that Canadian consumers are much more internationally orientated in their consumption, therefore, it is important for domestic manufacturers to be internationally competitive if they are to maintain even domestic sales. Figure 4 shows that this trend towards an international orientation in consumption has slowly, but surely, been growing among all of the large industrialized economies.

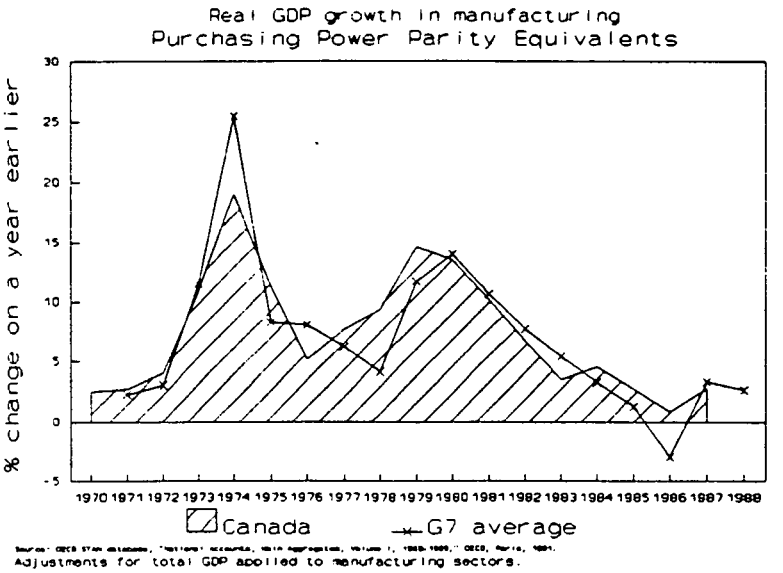

Figure 1

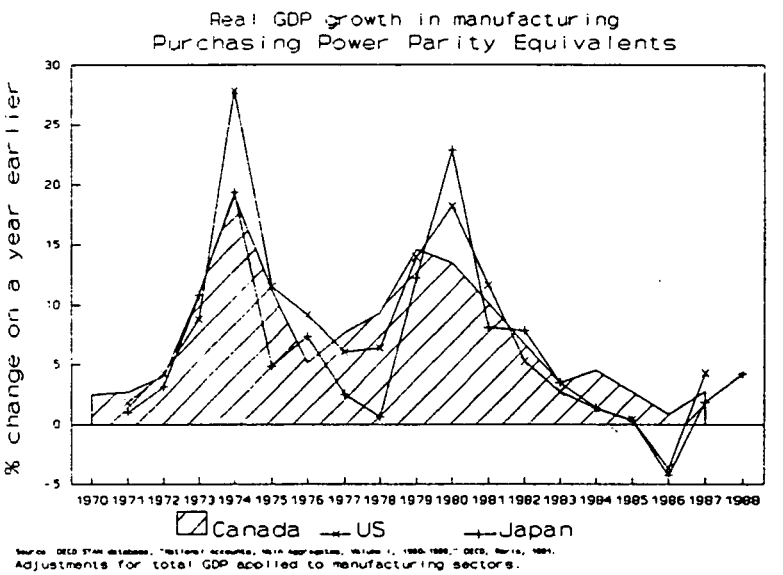

Figure 2

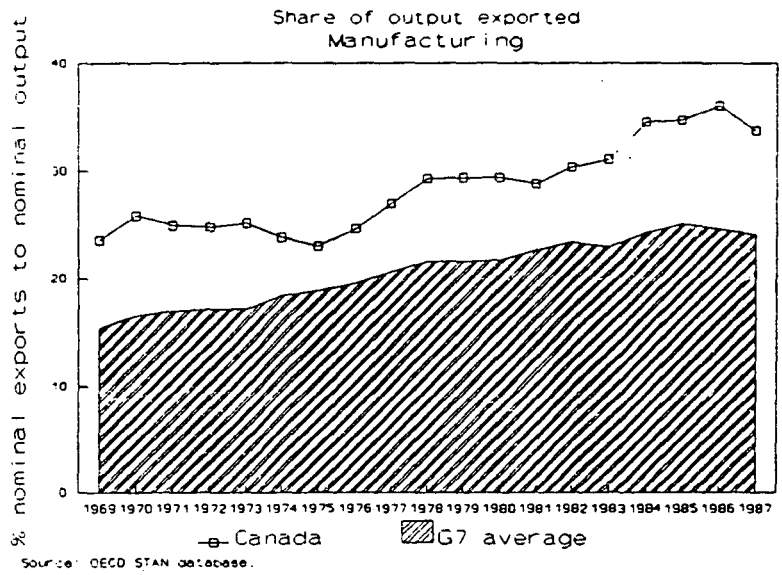

Figure 3

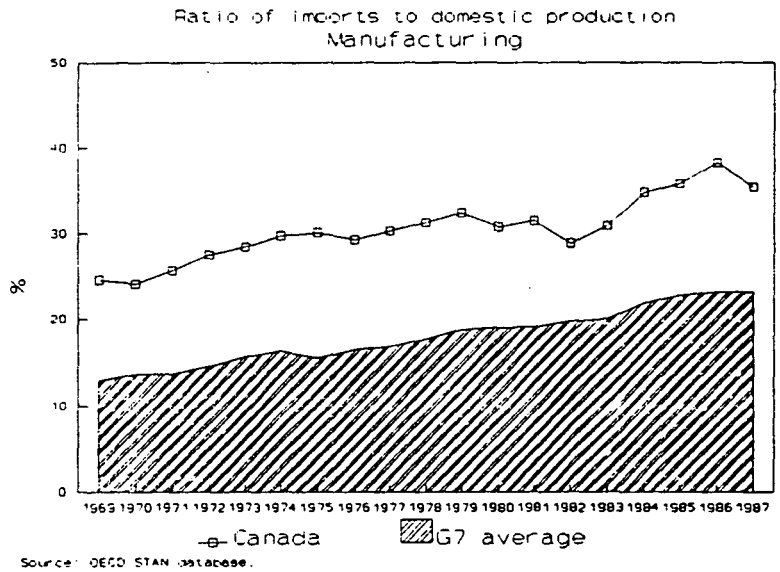

Figure 4

IV. Productivity

Productivity increases when more output can be produced with a given level of inputs (factors). Because productivity improvements tend to reduce the cost of production, and

free up productive resources for other uses, they can be considered to be sources of competitive advantage. Data for productivity analysis is relatively easy to obtain, as long as one is not terribly concerned with its quality. Probably more important, this data is available across a wide range of industries, regions, and countries, although comparisons must be made with care. Economists, in particular, consider productivity because it allows them to make use of the microeconomic theory of the firm and production. This gives them a well defined starting point for their statistical models, and a theoretical foundation for their assessments.

There are two general classes of productivity measures: partial factor productivity measures, and total factor productivity[1] measures. Partial factor productivity measures hold one of the inputs in the production process constant and measure changes in the level of output achieved per unit of this input. Total factor productivity (TFP) measures hold all inputs in the production process constant and measure increases in the ability to produce output holding the level of all productive inputs constant. The usual inputs considered are "capital," "labour," and occasionally, "materials."

One key assumption in international factor productivity comparisons is that a common production function characterizes industries in all countries. In total factor productivity measures, this implies that each particular factor of production is weighted in the same way in the overall production function or index of each country. Any discrepancies in output are attributed to differences in overall productivity differences. The assumption of a common production function is fairly reasonable among developed economies. However, the implication of this assumption is that any errors or discrepancies in the measurement or definition of inputs in the production process will be

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[1]Occasionally referred to as multi-factor productivity.

falsely attributed to productivity differences.

Partial factor productivity measures suffer from the same tendency to attribute measurement differences to productivity differences. In addition, these measures fail to account for the ability to substitute between inputs in the production process, and will confuse factor substitutions for productivity changes. For instance, if capital is substituted for labour then the output per unit of labour will increase even if the cost of the new capital equals the labour savings and no "real" productivity gains have been obtained. Because only one of the factors is held constant, partial factor productivity measures are unable to discern between productivity changes in the factor being held constant, and fluctuations in the usage or productivity of the other inputs in the production process.

It is important that production indices be standardized to account for differences in the value of output between countries. Using exchange rates to convert the output in one country to the currency of another country produces inaccurate estimates because exchange rates serve as a poor proxy for relative purchasing power parity. The use of exchange rates is common, however, and cross country comparisons so adjusted should be viewed only as approximations of actual productivity differences. The series used in this paper have been adjusted using the purchasing power parity adjusted exchange rates developed by the OECD for use in comparing GDP figures. By adjusting for relative purchasing power differences we are able to eliminate nominal deviations resulting from differences in inflation rates, and concentrate on *real* changes in output and productivity.

Despite their sophistication, total factor productivity measures vary widely. There are a number of reasons for these differences including differences in the form of the production function used, and differences in the way in which factors of production are measured. However, these measures do tend to reveal similar trends.

Table I summarises a number of annualized total factor productivity growth estimates

from three groups of researchers, each using slightly different approaches. To get an idea of the discrepancies involved in these estimates, consider the two estimates for Canada during the period from 1960 to 1973. The first researcher, Kendrick (1982), concluded that during that period Canadian producers were each year able to produce 2.9% more than the previous year using the same mix of inputs. For the same period, Christensen, Cummings, and Jorgenson (1980) estimated that this growth rate was 1.8%.

Cross country comparisons of TFP measures produced using the same techniques do provide fairly consistent results. The estimates in table I indicate that during the period from 1960 to 1973, and from 1964 to 1973, Canadian productivity growth was higher than the US, but lower than the G7 average. Canadian and US productivity growth remained lower than the G7 average during the 1970s, but it is not clear whether Canadian or US growth was the higher of the two.[2]

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[2]These differences may not be statistically significant.

Table I. Total Factor Productivity Growth Estimates

	TFP 1	TFP 2	TFP 3
Canada			
1960-73	2.9	1.8	
1964-73			3.3
1973-79	-0.1		
1974-77			1.1
United States			
1960-73	1.9	1.3	
1964-73			2.5
1973-79	0.6		
1974-77			0.7
G7 Average			
1960-73	3.8	2.7	
1964-73			5.2
1973-79	1.1		
1974-77			2.3

Sources: TFP 1, Kendrick (1982). TFP 2, Christensen, Cummings, and Jorgenson (1980). TFP 3, Nadiri and Mohnen (1981).

Among partial factor productivity measures, output per unit of labour is the most commonly cited. A related measure is the value added per employee, which more closely measures the contribution of labour to production. This measure suggests that Canadian labour productivity growth lagged behind that in the US and Japan until after the recovery following the 1981-82 recession (see figure 5).

Some of Canada's higher growth in real output in the 1980s can likely be attributed to this difference. A linear regression of the difference in real output between the two countries on the difference in real value added per employee provides us with an indication of the extent of this correlation. The results show that this labour productivity measure, in itself, can account for about a quarter of the relative movements in Canadian and US real manufacturing output from 1970 to 1987. Over the more recent period from 1980 to

1987, a third of the movements can be accounted for by labour productivity differences.

Figure 5

However, North American labour productivity has not been outstanding in comparison to other large industrialized economies. Between 1970 and 1987 Canadian labour productivity growth has remained at or below the G7 average (see figure 6).

V. Volatility and Uncertainty

Persistent differences in the level of inflation as well as the volatility of inflation have an impact on competitiveness.

If inflation rates differ between competing countries then the general production costs that they face will begin to diverge, leaving one of the countries at a competitive disadvantage. If Purchasing Power Parity (PPP) holds then these price differentials will be offset by exchange rate movements. However, there is little evidence to suggest that PPP holds over the short to medium run. In addition, there is little reason for PPP to ever hold for non-traded

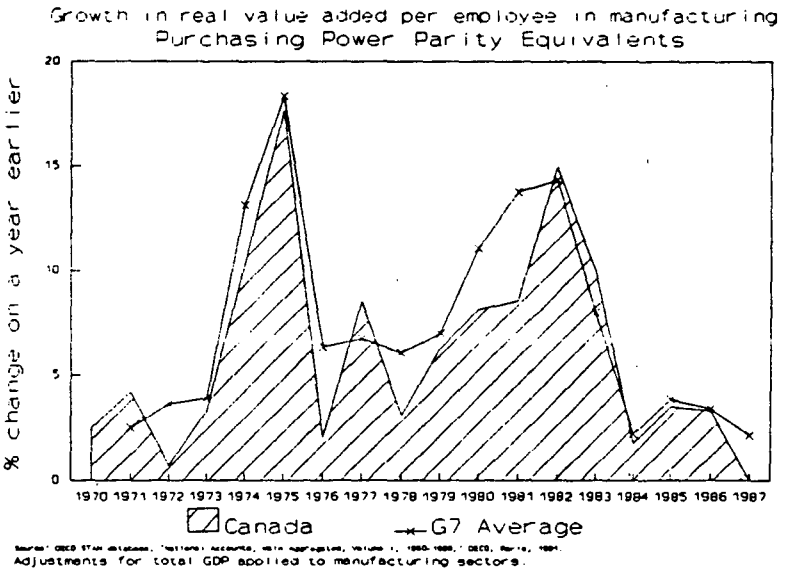

Figure 6

goods and services, so in particular, the effects of wage inflation can persist in the long run.

If we convert inflation rates into a common currency then we can assess their impact on international trade. Figure 7 uses the Canadian dollar as the common currency for a comparison between Canadian, Japanese and US inflation rates. In terms of a common currency, we can see that Canadian and US price levels are much more collinear in their movement than Japanese prices. On the one hand, this can be viewed as a consequence of the high levels of trade volume between Canada and the US. The close movement of prices in the two countries also account for the greater success of Canadian and US firms in penetrating each others markets. Collinearity in prices is both a consequence of high levels of bilateral trade, as well as a factor in determining the success of said trade. Naturally, the principle cause of the close collinearity in inflation rates is the close connection between US and Canadian economic growth. A comparison of Canadian inflation and the G7 average, in figure 8, shows the general pattern of collinearity among large

industrialized economies and Canada, which is less evident than with the US.

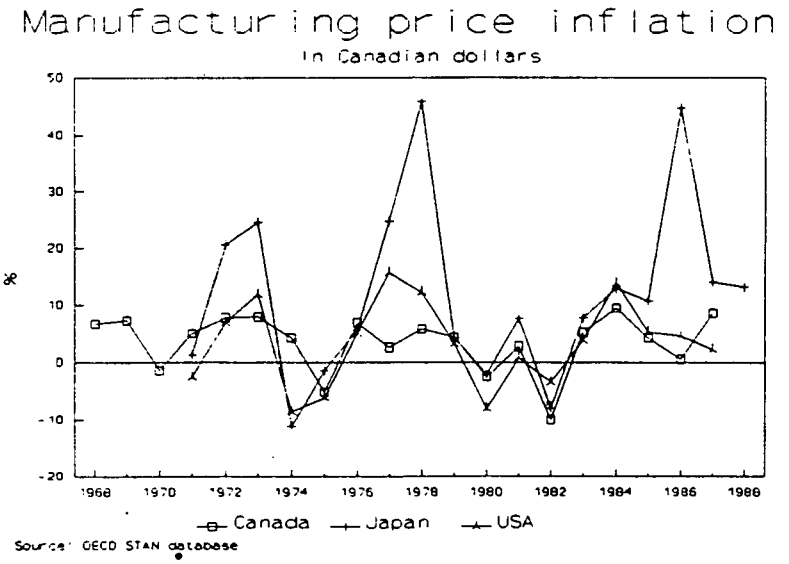

Figure 7

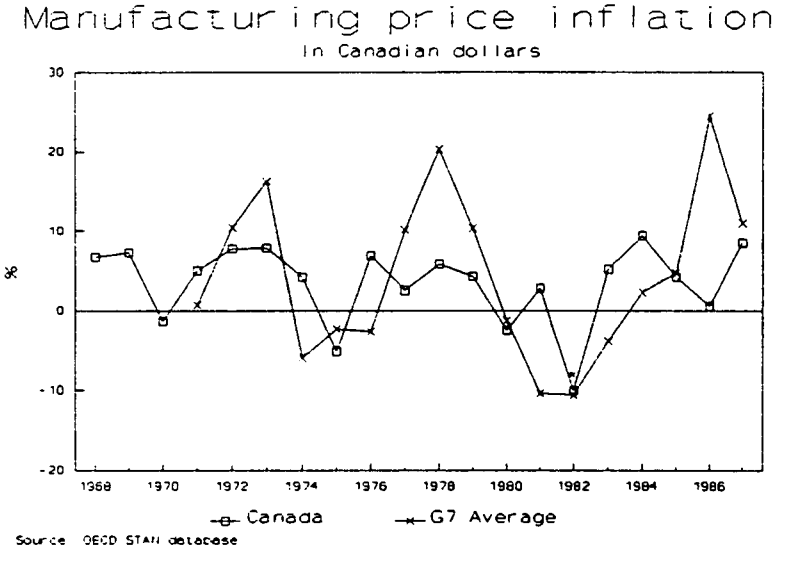

Figure 8

Even if PPP holds between countries, volatility in price levels can lead to a competitive disadvantage. Volatile prices make

it difficult to plan production levels, and consequently lead to production inefficiencies. If the supply price also becomes volatile, then the producer is more apt to experience losses in its market share during brief periods of high inflation. At present, there are no effective ways for producers or marketers to insure themselves against price level volatility making their trade performance especially vulnerable to these movements.

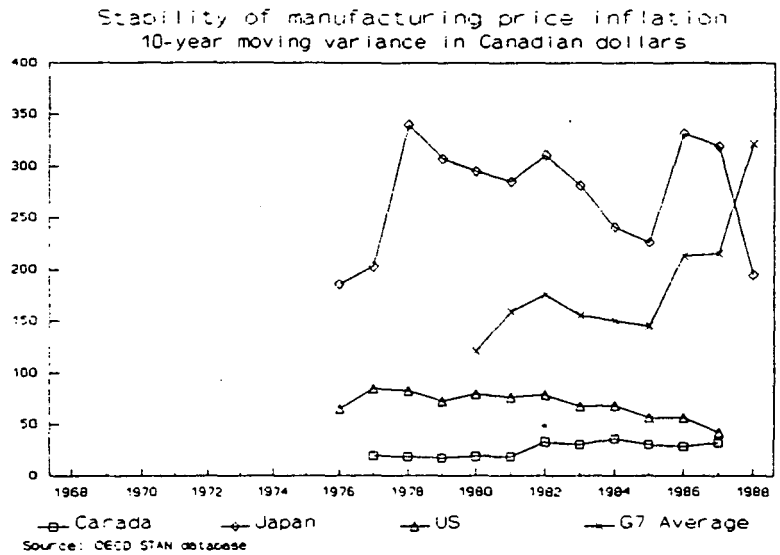

Figure 9

Inflation volatility may also lead to exchange rate volatility. While exchange rate movements *will* tend to offset the effects of long-run, or even short-run, changes in price levels, they can not offset the effects of inflation volatility. Instead, volatility in the inflation rate creates greater uncertainty about long or short run movements in the price level, resulting in more frequent realignment of inflation expectations and hence in exchange rates. This greater level of uncertainty, at any given instant, about inflation trends tends to increase risk premiums on futures and forward currency exchange contracts. This makes it more

expensive for exporters and importers to cover themselves again exchange rate risk.

Exchange rate volatility is compared in figures 10 and 11. The rates are converted into US dollar prices for foreign exchange and a twelve month moving variance is applied. In order to allow the variances to be compared, the exchange rates in each moving twelve month period are indexed in terms of the exchange rate in the first of the twelve periods. In other words, the first exchange rate in each twelve month variance calculation is set equal to 100, and the other exchange rates are defined relative to the first.

Figure 9 shows the 10-year moving variance of the inflation rates in figures 7 and 8, as expressed in Canadian dollars. The inflation rates for Canadian manufacturers are naturally the lowest because, as the domestic suppliers, they are not subject to the volatility of foreign exchange markets. This difference in variance can be viewed as the "home-team" advantage. Despite the need for foreign exchange, however, US inflation variance is very close to the Canadian levels. This factor gives US marketers an advantage over others in competing for a share of the Canadian market. The Japanese are more disadvantaged, in terms of volatility, than the average G7 exporter. This is primarily due to the high volatility of Japanese exchange rates. While these differences in volatility need not be experienced directly, because of the ability to engage in long-run foreign exchange contracts, they do have an impact on the cost of trade because greater volatility higher premiums on these contracts.

Interest rate differentials between countries will tend to be higher as a result of exchange rate volatility because the volatility leads to higher premiums on futures contracts. In countries in which central banks intervene in currency markets, with managed exchange rates, exchange rate volatility will also have a tendency to make interest rates more volatile as market forces implicitly force central banks to maintain uncovered interest parity.

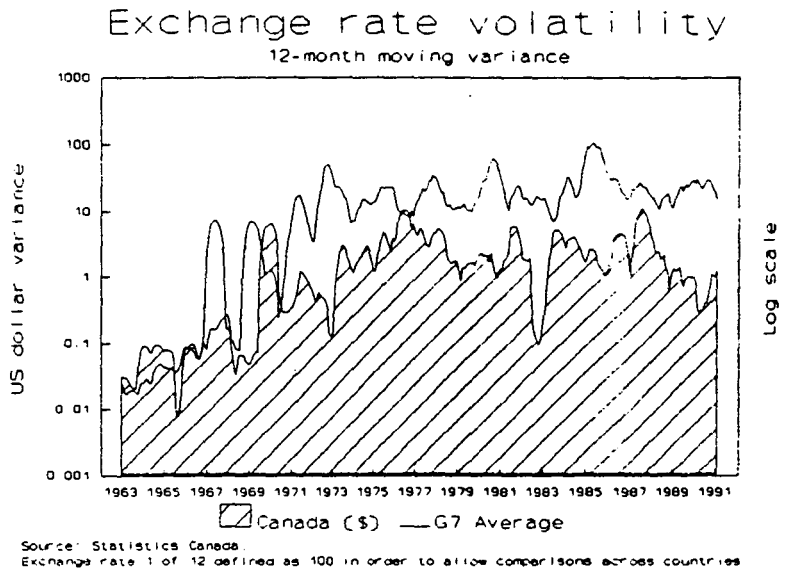

Figure 10

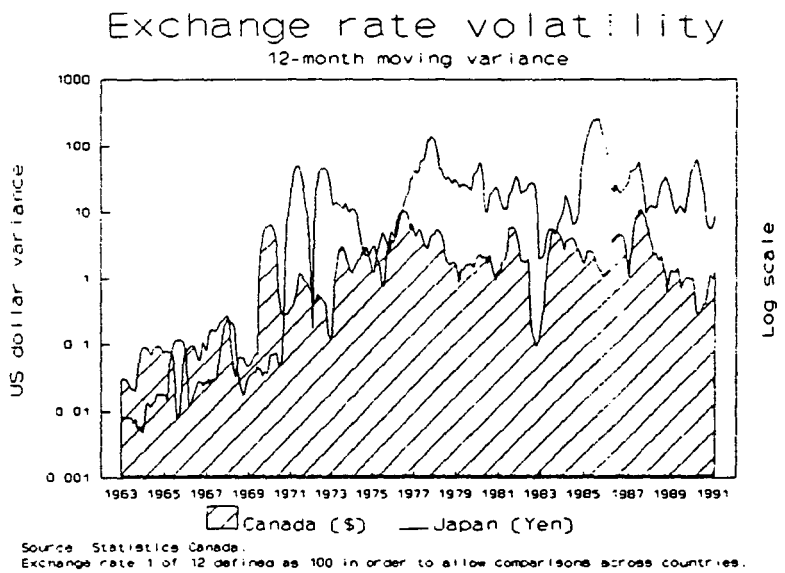

Figure 11

VI. Conclusions

The Canadian manufacturing sector has experienced relatively strong, but not outstanding growth in comparison to the G7 and the US. In light of the Canadian industry's

reliance on trade for purposes of income generation, this growth in real output indicates a degree of competitiveness on par with its trading partners. TFP growth estimates indicate a rather lackluster level of productivity, but at least that has been on par with the US. The growth in real value added per employee seems to confirm this diagnosis during the 1970s, however, this measure does seem to indicate somewhat of a turnaround during the 1980s. One outstanding point has been the Canadian industry's relatively low common-currency inflation rate and inflation volatility, and our collinearity in experience with our principle trading partner, the US. This may have been directly related to the high level of trade between the two countries, both as a cause and as an effect. This clearly gives Canada an advantage in the US, but also visa versa. Stability, however, should benefit both parties.

A warning seems an appropriate conclusion. Individual indicators do not, in themselves, tell us much about the overall ability of an industry to compete internationally. Furthermore, it is not a simple matter to take a set of indicators and weight them in such a way as to obtain an overall assessment. It has been common practice to implicitly or explicitly assign weights to these indicators in a subjective manner, but this tends mearly to reinforce preconceived notions. Therefore, care should be taken when the reader interprets how these and other competitiveness indicators relate to overall performance.

References

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