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HAS CANADA CAUGHT DUTCH DISEASE?

Mohammad Shakeri and Richard Gray,
University of Saskatchewan

An ERCA Network

Mailing Address:
Department of Bioresource Policy, Business and Economics
University of Saskatchewan
3D34 - 51 Campus Dr.
Saskatoon, SK
S7N 5A8

Network Lead:
Dr. Richard Gray

Research Associate:
Kathy Larson

General Inquiries:
306-966-4026 or
306-764-3929

Fax: 306-966-8413

Email:
cairn.network@usask.ca

Website:
www.ag-innovation.usask.ca

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Issue

The term "Dutch Disease" originally referred to the adverse effects of the large North Sea natural gas discoveries on the Dutch manufacturing sector and economic growth. Dutch Disease is now an economic term that refers to the general effects of a commodity export boom on an economy. The booming sector drives up the cost of labour and other non-tradable inputs, which makes other tradable sectors, particularly the manufacturing sector, less competitive. Because the manufacturing sector tends to be more innovative than others, this can lead to permanently lower rates of growth in the economy.

In this policy brief we examine Dutch Disease in Canada. Given the sustained growth in Canadian oil and gas exports, we investigate whether Canada has contracted Dutch Disease and whether various Canadian manufacturing industries have been affected.

Policy Implications and Conclusions

We find evidence of Dutch Disease in many industries of the Canadian manufacturing sector. As illustrated in Figure 1, the results indicate that the direction and magnitude of Dutch Disease elasticity[1] varies substantially across industries likely, as theory explains, because of differences in market structure in terms of the market power. This dichotomy is also observed in the case of the industries related to the agricultural sector. Food and agricultural machinery industries suffer significantly from Dutch Disease. For every 1% increase in oil prices the output of these sectors decreases by 0.16% and 0.28%, respectively. In contrast, the agricultural chemical industry benefits from Dutch Disease with an elasticity of 0.38.

Based on the simulation results for the whole sample, each

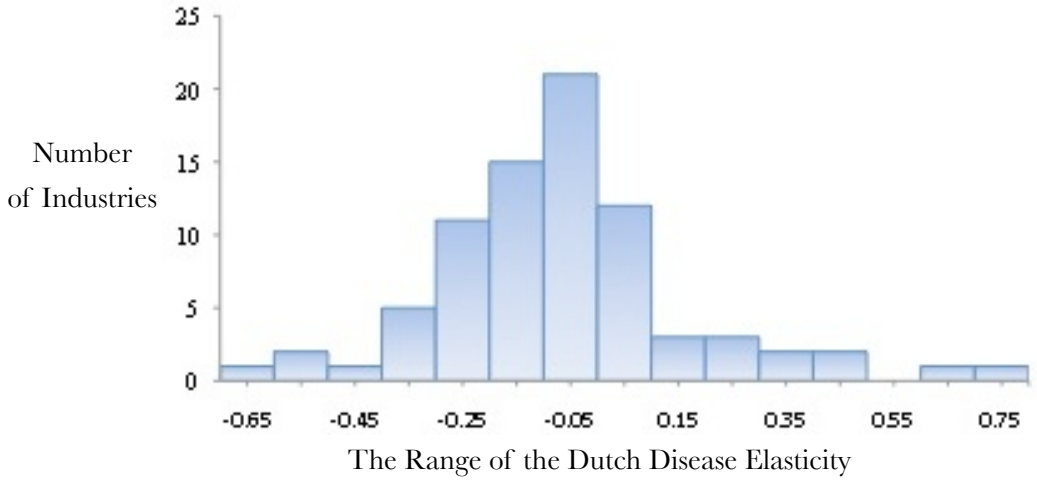

Figure 1. Histogram for Long-Run Dutch Disease Elasticity

industry would have experienced 0.3% additional output growth per year on average, if energy prices had remained at 1992 levels. Considering that the average annual industrial production growth was 2.8% for the 15-year period 1992-2007, the simulation results imply that the annual growth of each industry has decreased by about 11% on average as a result of the oil boom during this time period.

Since Canada is a vast country with large distances between provinces, it is expected that the effect of the oil sector boom - mainly located in Alberta - will differ across provinces. For example, it is observed that the growth of oil-related manufacturing sectors in the province of Saskatchewan – Alberta's neighbour to the east – is greater than in other provinces. Thus, examining the regional impacts of Dutch Disease can be an important topic for future research in this area.

Given the findings of this study show some evidence of Dutch Disease in the Canadian economy (at least in some industries), it seems future research should investigate what Canada can do to immunize its economy against this disease and avoid permanent lower rates of growth resulting from a contraction of tradable innovative industries. Based on the experience of other countries like Norway, policies to reduce the effects of Dutch Disease include: 1) resource royalties to facilitate the growth of the tradable sector (investment in research and innovation), 2) subsidies to maintain manufacturing output, 3) resource royalties collected in a fund and used to invest in international financial markets. Because of the volatile nature of resource revenues, the savings available in a fund can be used to "even out" government revenues between good and bad times. Implementing these policies will be difficult in Canada. In Canada, royalties on resource revenues are within provincial jurisdiction and therefore it might not be feasible to obtain a coordinated response from all levels of government.

Background

While Canada was a net importer of oil until the early 1980s, in recent years, export sales have increased sharply with higher oil prices. The value of the crude oil net exports has

[1] Dutch Disease elasticity is defined as the percentage change in the output of each industry as a result of one percent change in energy prices after controlling for other determinants of output including the role of energy as an input.

increased from $2,194 million dollars in 1982 to $17,327 million dollars in 2007. Since the early 1990s, the Canadian energy sector has experienced solid growth. Total oil production has increased by nearly 67% from 89 million cubic meters in 1991 to around 150 million cubic meters in 2007, while natural gas production has increased by over 84% from 113,490 million cubic meters in 1991 to around 209,362 million cubic meters in 2007. As a result, Canada has become an important player in world energy markets and is currently the seventh and third largest producer of oil and natural gas, respectively. Canada's position as a net exporter of energy is expected to remain firm given plans to continue developing the vast oil sand deposits. The inclusion of these deposits makes Canada home to the world's second largest proven reserves.

The experience of the resource-rich countries suggests that natural resource wealth can be a double-edged sword. On one side, it can help economic development and higher standards of living through raising national income. However, on the other side, it may lead to lower and unbalanced growth across other sectors of the economy. There are two main areas of active research that justify the notion that there may be a natural resource curse, although this thesis is not a widespread and general phenomenon. The first can be termed the political economy of resource rent generation and distribution. Based on this approach, the large windfall revenues from natural resources tend to give rise to rent-seeking behavior and fights over the distribution of these revenues, which in turn impede growth, as productive resources are drawn into nonproductive activities. The second research area- the one focused on in this research- covers the general equilibrium effects of a resource boom, which is known as Dutch Disease in economics literature. The term originally refers to the adverse effects of the natural gas discoveries of the 1960s on Dutch manufacturing, mainly through the subsequent appreciation of the Dutch real exchange rate. According to Dutch Disease theory, part of the boom revenues are spent on non-tradable goods, which leads to an appreciation of the real exchange rate, which in turn draws resources out of the tradable sector (manufacturing) into the non-tradable sector (services), to the extent that this tradable sector is exposed to international competition. Moreover, the increased profitability of a booming sector bids up the prices of factors of production, which results in a contraction of tradable sectors due to the reduction in production factors.

Considering that the manufacturing sector tends to be more innovative than other sectors and is a source of technological spillovers, Dutch Disease can potentially lead to permanently lower rates of growth in the economy. Thus, from a policy point of view, it is important to investigate whether Canada has caught Dutch Disease or not. If the Dutch Disease hypothesis is confirmed and policy makers recognize that this disease is costly for the economy, they can protect the economy by implementing appropriate policies which have been successfully used in other countries. While some studies (Macdonald, 2007; Bergevin, 2006) have analyzed the symptoms of Dutch Disease in Canada (reduction in industrial production), there is no a systematic study of the effects of the oil boom on the Canadian manufacturing industries' outputs. The main purpose of this brief is to review the results of the study that examines whether Canadian manufacturing industries have experienced Dutch Disease over

the period 1992-2007, while addressing the major problems which have been ignored in the previous studies.

Research Methods

The theoretical models of Dutch Disease indicate that this phenomenon happens mostly through changes in the real exchange rate as a result of a resource boom. Therefore, the study presents a two part empirical analysis to estimate the short- and long-run Dutch Disease effects for the Canadian manufacturing industries. The first part of the empirical analysis estimates the relationship between real exchange rate and energy prices as well as the other related factors and the second part estimates the effect of real exchange rate on output of the manufacturing industries, using quarterly data. By defining the real exchange rate so that a rise in the rate equals a rise in the relative price of manufactured goods, it is expected that the effect of this variable (which, in fact, is the price of tradables to non-tradables) on the output of manufacturing industries will be positive. However it should be noted that this expectation is based on the assumption that these industries are exposed to foreign competition and have little or no ability to set their own prices. The industries that cater to the domestic market as a result of trade protection or that possess monopolistic price-setting powers in their markets may benefit from the rise in domestic demand as a result of oil boom and therefore the sign of the real exchange rate for these industries would be negative. In general, there is justification for both positive and negative signs but a positive (negative) coefficient indicates that the industry is suffering (benefiting) from Dutch Disease. Based on the estimated relationships in the first and second stages, the Dutch Disease effect is derived by calculating the effect of energy prices on output of the manufacturing industries.

In estimation of Dutch Disease effects, there are two major problems that have been ignored in the previous studies and this study attempts to address them. The first, and most important, point is related to the level of aggregation for the tradable sector. The previous studies have usually considered two sub-sectors in the tradable sector: manufacturing and agriculture, however this level of aggregation will lead to biased results. The theoretical models indicate that the Dutch Disease effect is very sensitive to the structure of the industry including whether the industry is exposed to foreign competition or is catering to the home market as a result of trade protection, the role of changes in the cost of imported inputs associated to exchange rate movements and the ability of industry to pass these costs on in the form of higher prices. As Pesaran and Smith (1995) have emphasized, in an environment where cross-sectional heterogeneity is significant, the use of aggregate data may lead to heavily biased estimates. Therefore, it would be more appropriate to examine the Dutch Disease effect using disaggregated data. To incorporate this issue, the output equations for the Canadian manufacturing industries are estimated at 3, 4 and 5 digit levels of the North America Industry Classification System (NAICS) (about 80 industries).

Second, to have a robust estimate of the Dutch Disease effect (contraction of tradable industries due to appreciation of real exchange rate as a result of an oil boom) one should control for all other determinants of output in tradable industries. Although some studies have incorporated some factors including domestic monetary and fiscal policy, exogenous domestic supply shocks and international commodity price changes, there are some

unobservable or unmeasured factors affecting industrial reallocation in developed countries. For example, deindustrialization has been a natural phenomenon even in the United States and other advanced industrial countries that are not necessarily resource-rich, simply because, as households become richer, demand naturally tends to shift away from goods toward services. The other related factor is the emerging role of China in the world economy (see Macdonald (2007)). To control for these unmeasured factors, we will use the U.S. as a control country (which is not an oil exporting country) and the output of each specific industry for this country will be considered as an explanatory variable. By entering this variable to the output equation, we, in fact, control for all (measurable and unobservable) factors affecting the industrial production in industrial countries in general. Therefore, we can conclude that the observed symptoms (significant positive coefficients for real exchange rate) are indeed the evidence of Dutch Disease.

Results

The long run estimation results for the real exchange rate equation suggest that energy and other commodities both play an important role in explaining real exchange rate trends. The results also show that the relationship between energy and other commodity prices and the Canadian real exchange rate has changed from the fourth quarter of 2003. In the time period between 1992 and the third quarter of 2003, a 1% increase in energy prices led to an appreciation of the Canadian real exchange rate by 0.15 percent, keeping other things constant. However, after the third quarter of 2003, this effect increased to 0.54 percent. This change in the impact of energy prices on the real exchange rate is likely due to sharp increases in energy prices that had not been experienced before. Using the elasticity of real exchange rate with respect to energy prices and the estimations of the elasticity of output with respect to real exchange rate, the Dutch Disease elasticity for each industry (the percentage change in the output of each industry as a result of one percent change in energy prices after control for other determinants of output including the role of energy as an input) is calculated.

The results indicate that 53 of the 80 industries experienced a decrease in their output as a result of an increase in energy prices with the elasticity of -0.18 on average (after controlling for all major determinants including the role of energy as an input). This reaction is zero for three industries and is positive for 24 industries with the elasticity of 0.21 on average. While the average of the (long-run) Dutch Disease elasticity for the whole sample is -0.06, this elasticity tends to be concentrated between -0.30 and 0.10 (75% of industries fall within this range).

Based on the simulation results, among the industries that suffer from Dutch Disease (53 industries), each industry could experience an additional 0.93% in annual growth (on average) if energy prices remained at 1992 levels. However, this change would substantially vary across industries. On the other hand, among the industries that benefit from the oil boom (24 industries), each industry would experience 1.07% less annual growth (on average) if energy prices remained unchanged. Based on the results for the whole sample, each industry could experience, on average, 0.30% more annual growth, although it varies substantially across industries. Considering that the average of annual industrial production growth has been 2.8% for the 15-year period 1992-2007, the simulation results imply that the annual growth of each industry has decreased by about 11% on

average as a result of the oil boom during this time period.

In summary, the long run results indicate a type of dichotomy such that some industries suffer from Dutch Disease while some industries benefit from this phenomenon. Leather [316], Clothing [315], and Textile mills [313] industries suffer severely from Dutch Disease (their long run elasticities are around -0.35) and to a lesser extent, this negative effect is observed in Petroleum [324], Electrical equipment [335] and Furniture industries [337] (their long run elasticities are around -0.20). Food [311], Beverage [312], Transportation equipment [336] and Miscellaneous [339] industries also significantly suffer from Dutch Disease. On the other hand, it seems that industries like Printing [323] and Chemical [327] may benefit from the Dutch Disease phenomenon (their long run elasticities are around 0.20).

The beneficiary effect of Dutch Disease can be explained by this justification that these industries are not probably exposed to foreign competition and have enough ability to set their own prices. In fact, these industries may cater to the home market as a result of trade protection or have monopolistic price-setting powers in their markets and, therefore, they may benefit from the rise in domestic demand as a result of the oil boom. This interpretation is supported by looking at two measures for market power: the degree of product differentiation and the share of imports from U.S. in the domestic supply for each industry.[2] For example, the degree of product differentiation and the share of imports for the Electrical equipment industry, as an industry that suffers from Dutch Disease, are respectively 0.12 and 0.60 implying a low degree of market power compared to 0.29 and 0.38 as the average values of the sample. On the other hand, for the Printing industry, as one industry that benefits from Dutch Disease, these measures are respectively 0.50 and 0.07 implying a high degree of market power compared to the average values of the sample. Therefore, market structure in terms of the market power might be one of the factors determining the effect of a resource boom on different industries.

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[2] Intra-industry trade is used as a measure for the degree of product differentiation (with positive relationship). High (low) values for this measure and low (high) values for share of imports indicate high (low) degree of market power for domestic producers.