The evolving quality of trade between Canada and the United States

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This article examines the quality level of trade between Canada and the United States, 1979–2003, to investigate the relevance of staples theory for Canada. After disentangling the quality levels of trade, it is found that the pattern of quality-level trade changed significantly around the time free trade was established between Canada and the United States. Before free trade, Canada was moving into the lower end of quality, but after the establishment of free trade, Canada is now moving into the higher end of quality trade with the United States. This observation potentially means that Canada is moving out of the staples trap.

L'évolution constante de la qualité des échanges commerciaux entre le Canada et les États-Unis

Cet article étudie le niveau de qualité des échanges commerciaux entre le Canada et les États-Unis de 1979 à 2003 afin d'examiner la pertinence de la théorie des matières premières (≪staple theory≫) pour le Canada. Après avoir dégagé les niveaux de qualité des échanges commerciaux, nous montrons que la structure du niveau de qualité des échanges commerciaux a subi des changements importants à l'époque de l'adoption du traité de libre-échange entre le Canada et les États-Unis. Avant l'entrée en vigueur du libre-échange, le Canada se dirigeait vers le bas de l'échelle de qualité, mais depuis l'établissement du libre-échange, le Canada s'oriente vers une qualité supérieure en matière d'échanges commerciaux avec les États-Unis. Cette tendance aura sans doute pour conséquence de permettre au Canada d'échapper au piège des matières premières.

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Introduction

A theory of economic growth and development that was developed specifically to explain Canada's economic history is Harold Innis's staple theory. The specificity to Canada lay in the theory's consideration of Canada's specific geographical and historical circumstances (Barnes *et al.* 2001). Defining staples as set of minimally processed primary resources such as lumber, pulp and paper, fish, fur, and minerals, Innis' (1956) staples theory is a theory of economic growth (or lack thereof) that is based on the export of these goods to a principal economy. Once exported to the principal economy, these staples are then used in manufacturing to produce final goods. The defining nature of a staples economy is that it is on the margin of the global economic system, dependent on a foreign metropolis to purchases its wares.

Because of this economic dependency, staples growth is incomplete industrial development—although economic dependency, and its deleterious consequences, is a component of Innis' staples theory, it should not be confused with Dependency Theory (see Baran 1957 and Frank 1978). Rather than stimulating economic diversification, economic development revolves around the support of the staples industries (Barnes *et al.* 2001). The standard trajectory of economic development (primary resources → manufacturing → services), generally referred to as the Clark–Fisher hypothesis, is stifled because producers are export-oriented and most often foreign-owned, not particularly concerned about local economic development (Watkins 1963). Although there are other problems that manifest themselves in stifled economic development (a lack of consumption variability, varying employment rates by trade and productivity gaps), this particular form of development is referred to as the staples trap. It should be noted, however, that being trapped in the first of the three stages of economic development is not simply externally imposed on an economy. Part of the staples development, and its corresponding trap, is the establishment of an internal belief that staple production is a country's role in the global economy (Carey 1975; Watson 1977), leading governments, and other organizations to support further staples development and reinforce the trap. Consequently, a particular culture of production emerges within the staples economy that reinforces its own existence (Barnes *et al.* 2001).

Despite the deleterious effects of economic dependency and a lack of internal economic development, there are reasons, of course, for why such a pattern of development emerges even though it is not optimal for the staples economy in the long run. Staples production has high fixed costs that necessitate the involvement of foreign-owned companies in the early development stages. These foreign-owned firms are often involved in other stages of the production process (research and development, the production of machinery to extract the staples goods and the manufacturing processes that use the staples goods as inputs) involving the staples goods, and these stages are most often pre-existing in the principal economy rather than the staples economy. This leads to a corresponding lack of local control over firms leaving the staple economy governments impotent in the face of demands from the foreign-owned firms for infrastructure and favourable business environments, generally subsidizing their presence (Gunton 2003). As a result, the staples economy remains a staples economy, dependent on its principal. This is the staples trap.

Although Innis' staples theory was developed to explain the development of eastern Canada and the Prairies, recent studies have investigated a variety of different staple sectors such as forestry (Hayter and Barnes 1990; Wallace 1996; Parker 1997; Hayter 2000; Barnes *et al.* 2001), mining, fishing (Clapp 1998), and most recently coal (Gunton 2003), particular in British Columbia. Although instructive in understanding the nature of economic change in Canada's regions, there is a curiosity in applying staples theory to a modern Canada: the Canadian economy has moved into manufacturing and service sectors of the economy, particularly since the Second World War. Indeed, Canada's largest export sector is within a manufacturing sector (automobiles and parts) that is extensively studied by economic geographers, namely, John Holmes (1983, 1992, 1993, 1996, 2000).

In addition, there has been the emergence of the 'new staple economy' (see Britton 1996). In the new staple economy, staples have changed: raw logs have become pre-fabricated homes, grain

has become ethanol, and ores have become metals. These types of changes, however, are indicative of the movement out of the staples trap because they necessarily involve the movement away from minimally processed goods to intermediate and final consumption goods. The result is more value-added in Canadian production, and the products should no longer be referred to as 'staples' if these transformations are occurring. The raw materials used in production have not changed, rather the value-added is now increasingly undertaken in the host country, not the principal country.

As such, if staple goods are becoming less important for Canada's economic development and growth (automobiles and parts have increased their export share to over 25 percent), is staples theory still a relevant theory to analyze Canada's economy? Yes. The Canadian government's provision of medical health care, and later the relatively low value of the Canadian dollar, has generated a relatively inexpensive labour force (15–20 percent labour costs savings over the United States, hereafter referred to as US). Consequently, in the automotive sector, Canada attracts a disproportionately large share of labour-intensive automotive production such as final assembly and particular labour-intensive automotive parts, whereas the high value-added production of body stampings, engines, and transmissions are located in the US—Canada's largest automotive sector trading partner. This spatial division of labour and operations led to a 'distinctive pattern of trade between Canada and the United States' (Holmes 1993, 26): an international trade surplus in automobiles and an international trade deficit in automotive parts for Canada. In addition, the decision-making processes were geographically segregated because the head offices of the three large automakers were all in the US. This is the pattern of development that staples theory predicts, but in a manufacturing sector.

Rather than undertaking a case study of manufacturing in a particular industry and a particular place, this article analyzes the international trading patterns of all sectors in the Canadian economy with the US. Although Canada does trade with other countries, the vast majority of its trade is with the US and that trade has been steadily increasing. Consequently, the dominant features of a staples economy are best found in Canada–US trade. If staples theory, and its corresponding similarity to manufacturing, states that a staples economy is an exporting economy, then analyzing the nature of Canadian exports is a natural place to discover whether or not Canada is still in a dependency role. Staples goods, by definition, are low value-added because of the small amount of processing undertaken. Correspondingly, if Canada's manufacturing sectors are also in a 'staples' trap, these sectors are involved in low value-added production. Using an economic methodology of differentiating high-, medium- and low-quality goods in trade, the nature of value-added is investigated using international trade data assuming that higher-quality goods (measured by relative prices) are high value-added goods. The limitation of this approach is that high-quality goods can only be identified when the same good is both exported and imported, so this measure is an underestimate of high value-added goods. It is found that from 1979 to 1988, most of Canada's industrial sectors were indeed involved in low value-added exports, indicative of the staples trap. However, after 1994, Canada has been moving into high value-added exports, implying that Canada is currently in the process of redefining its place in North America's spatial division of labour.

The remainder of the article is organized as follows. The data and measurement methodology to distinguish the different quality types of trade is presented in the following section. The 10 years of Canada's international trade with the US prior to the Canada–US Free Trade Agreement (CUFTA) is discussed in Section 3. Section 4 presents Canada's trading patterns since the inception of the CUFTA. Section 5 concludes that Canada appears to be moving out of the staples trap.

Data and the Measurement of Trade Quality

Data

The data used in the analysis of 1979–1988 international trade patterns for Canada with the US are detailed commodity-based international trade data provided by The Center for International Data at the University of California-Davis (see

Feenstra 1996, 1997 for a detailed account of these data). These data are provided using the Standard Industrial Trade Classification (SITC), an old classification system for international trade data. For comparability with the 1989–2003 time period, the SITC classifications are converted into their equivalent Harmonized Tariff Schedule (HTS) classification. These data contain the yearly dollar value and quantity of products traded, allowing for international trade to be decomposed into their component parts (discussed later) in order to obtain a better picture of the dynamics of Canada–US international trade relations.

The data used in the analysis of 1989–2003 international trade patterns for Canada with the US are also detailed commodity-based international trade data, but provided by Statistics Canada (2004). These data are measured using the HTS with yearly dollar values and quantities for products traded at the 10-digit (imports) and the 8-digit (exports) levels of aggregation. In order to facilitate comparisons with exports and imports, the 10-digit import classifications were recoded to match the 8-digit export classifications. All data, 1979–2003, are converted into constant 1997 Canadian dollars, and the commodity level data are subsequently aggregated to industrial sectors. These industrial sectors are defined by Statistics Canada and are reported in Table 1.

One obvious limitation of the use of these data is that they only measure trade in goods and ignore services. However, because services represent advancement through the trajectory of economic development, the lack of these data is of little concern; portions of an economy may be moving into the service sector, but it is the goods characterized by staple production that are of concern here. There may be an increase in services exports indicating the movement out of the staples trap, but if the dominant portions of the economy are in the primary and manufacturing sectors this information may be of little value. A further limitation of these data is that intra-corporate trade cannot be differentiated from 'true' international trade. This is particularly a problem with automotive trade between Canada and the US that encompasses more than 25 percent of all trade. However, because of data limitations, there is little that can be done to relieve this limitation.

Table 1
Industrial sector definitions, by two-digit harmonized system

Industrial sector	Number of aggregated products	Two-digit HTS code
Animal Agriculture	636	01, 02, 03, 04, 05
Vegetable Agriculture	532	06, 07, 08, 09, 10, 11, 12, 13, 14
Food	421	15, 16, 17, 18, 19, 20, 21
Beverages and Tobacco	84	22, 23, 24
Mining, Quarrying and Petroleum	262	25, 26, 27
Chemicals	1,334	28, 29, 30, 31, 32, 33, 34, 35, 36, 37, 38
Plastics and Rubber Products	258	39, 40
Wood Products	242	44, 45, 46
Paper Products	240	47, 48
Printing and Publishing	29	49
Leather	161	41, 42, 43
Textiles	652	50, 51, 52, 53, 54, 55, 56, 57, 58, 59, 60
Clothing	378	61, 62, 63, 64, 65, 66, 67
Non-metallic Mineral Products	267	68, 69, 70, 71
Basic Metals and Fabricated Metals Products	776	72, 73, 74, 75, 76, 78, 79, 80, 81, 82, 83
Non-electrical Machinery	652	84
Electrical Machinery	368	85
Motor Vehicles and Parts	153	87
Other Transport Equipment	89	86, 88, 89
Professional Goods	296	90, 91, 92
Other industries	209	93, 94, 95, 96, 97

NOTES: The two-digit HTS code is the first two digits in the longer commodity classification codes—eight digits for exports and 10 digits for imports. The first two digits represent the coarsest commodity grouping in the HTS. The number of aggregated products is based on the total number of commodities listed in the tariff schedule within each industrial sector, not those actually traded.

The Measurement of Trade Quality

The international trade in goods is separated into inter-industry trade and intra-industry trade. Inter-industry trade is based on comparative advantage such that each country exports the good it has a comparative advantage in to the other country. Therefore, the goods traded are distinct from each other, originating from different industries, trading food for clothing for example. This type of trade is a reciprocal relationship, but because each country imports and exports different goods, it is referred to as one-way trade: each

good only travels in one direction. In contrast, intra-industry trade is not based on comparative advantage. Rather, the more similar the countries are the more intra-industry trade the two countries will partake—intra-industry trade, notably discussed by Balassa (1966), is the type of trade modelled in the new trade theory (see Krugman 1979, 1980, 1981; Lancaster 1980). The goods traded are generally not distinct from each other, only differing based on characteristics. Those characteristics may be based on quality (a trading pattern first discussed by Linder 1961), trading a Mercedes-Benz for a Yugo, or based on other attributes not related to quality, such as colour, shape, sound, etc. Those intra-industry goods differentiated based on quality are called vertically differentiated goods, whereas goods differentiated based on non-quality attributes (similar quality goods) are called horizontally differentiated goods.

The measurement of international trade quality has been recently undertaken indirectly by a number of scholars (Rauch 1999; Schott 2004; Hallak 2006), but there is a more direct measure of trade quality at the product level that is attributed to Abd-el-Rahman (1991), more recently used by Hummels and Klenow (2005). The benefit of using a product level measure of quality, as opposed to the more traditional industry level data, is that quality is defined at the product level. Using the automotive example above, Mercedes-Benz and Yugo are distinct quality within the same industry. Although trade classifications at the product level may still group these two automobiles in the same HTS classification (similar engine size, interior volume, etc.), using product-level data may separate these two products, whereas industry-level data cannot. This direct measure of international trade quality decomposes international trade into its component parts: one-way trade (inter-industry) versus two-way trade (intra-industry), and within two-way trade quality is defined based on whether trade is considered to be vertically differentiated or horizontally differentiated intra-industry trade.

Vertically differentiated intra-industry trade is bilateral international trade within a single product category that identifies either the importer or the exporter as trading a high-quality product—the other product is deemed as relatively low quality. Horizontally differentiated intra-industry trade, however, is international trade that is within a single product category, but there are no distinctive quality differences. This type of trade is commonly referred to as medium-quality trade. It should be noted, however, that the terminology of medium-quality trade is made in reference to high- and low-quality trade because both countries may be importing high-, medium- or low-quality goods. Because of data limitations, no absolute measures of quality can be ascertained within horizontally differentiated intra-industry trade.

Before any quality differences can be measured, the distinction between inter-industry and intra-industry trade must first be made. The Grubel and Lloyd (1975) Index is the most widely used measure of intra- versus inter-industry trade, measuring the degree of trade overlap within a single product category, but this Index has a limitation with regard to the establishment of the quality of intra-industry trade. Although the Grubel–Lloyd Index measures the degree of trade overlap, it does not indicate when trade becomes two-way trade. This criterion is important because only those goods deemed to be involved in intra-industry trade are then further decomposed into their quality categories.

Abd-el-Rahman (1991) separates inter- and intra-industry trade through the direct measurement of trade overlap:

$$\text{Two} - \text{way trade if: } \frac{Min(X_{p,t}, M_{p,t})}{Max(X_{p,t}, M_{p,t})} > \gamma\% \qquad (1)$$

where X represents exports, M represents imports, p represents the product and t represents the year. If the lesser value (*Min*) of international trade within a specific product category is at least γ percent of the greater value (*Max*) of international trade within a specific product category, the bi-lateral trade flow is considered to be two-way trade. If the lesser value is below this level of trade overlap, the trade overlap is not considered significant. Consequently, the structural feature of this type of trade is considered to be one-way (Abd-el-Rahman 1991). The critical dimension of this measure is the threshold level, γ, to be used in the analysis.

If the definition of two-way trade is taken to the extreme, the simultaneous import and export

of goods of any value within the same product classification should be considered two-way trade. Some studies have used such a threshold. However, the most common threshold for identifying two-way trade is 10 percent. In the present analysis, significant overlap is considered to be 20 percent. The choice of past analyses' thresholds has been arbitrary, but the choice of 20 percent in the present analysis is based on a comparison of a two-way trade index (TW) with the Grubel–Lloyd (1975) Index and theoretical expectations.[1] When the TW is calculated using a threshold of 20 percent, the Grubel–Lloyd (1975) Index has similar values for Canada–US international trade. This threshold is used because of the wide acceptance of the Grubel–Lloyd (1975) Index in the study of international trade and is supported by theoretical expectations.

The TW is calculated as follows:

$$\mathrm{TW} = \frac{\sum_i (X_i + M_i)}{\sum_j (X_j + M_j)}, \tag{2}$$

where X_i and M_i represent exports and imports classified as two-way trade, and X_j and M_j represent all exports and imports. Consequently, this index, originally proposed by Fontagné and Freudenberg (1997), measures the share of all trade that is classified as two-way trade. The primary difference between the Grubel–Lloyd Index and the TW index is that the Grubel–Lloyd Index measures the degree of trade overlap, whereas the TW index considers all trade over the 20 percent threshold to be two-way trade. With a method of identifying two-way trade from one-way trade established, the quality of two-way trade can now be identified.

Assuming that price differences represent quality differences even under imperfect information (see Stiglitz 1987), the differences in the unit values (UV) or prices of traded products represent both quality and value-added differences. The higher quality may simply be the result of higher-quality materials: the discovering, processing and handling of these higher-quality raw materials necessarily creates a higher value-added product. However, higher quality may also be generated by (more) skilled labour and capital inputs in the production process. Either way, value-added is increased. Unit values are defined for each product category as the total value of trade within that category relative to the quantity of products traded within that category. This measurement provides an average price of the products traded within this category. Of course, the more disaggregated the classification system the better this method represents the price of the commodities. Herein lays the utility of using the eight-digit HTS that has approximately 10,000 commodity classifications. These categories are so specific that different commodities have different quantity measures such as litres, kilograms, number, etc., while the SITC classification system is more general and uses tonnes as its quantity variable for all commodity categories.

Horizontally differentiated intra-industry trade may then be defined as having a unit value of exports within a product category that is similar to the unit value of imports in that same product category. Of course, some allowance must be made for price variation for goods with similar quality. Consequently, another threshold needs to be established. This is operationalized as follows:

$$\frac{1}{1+\alpha} \leq \frac{UV^X}{UV^M} \leq 1+\alpha, \tag{3}$$

where UV^X and UV^M are the units values of exports and imports, respectively, and α is the threshold used to measure the degree of price variance that is acceptable. Past research has used both 15 and 25 percent quality thresholds, with the choice of either threshold having little impact on the results and 15 percent being most common. As such, the 15 percent threshold is used here. If two-way trade has a price variation that falls within this range, the trade is considered to be of medium quality, horizontally differentiated (HD).

Vertically differentiated intra-industry trade, on the other hand, occurs when the ratio of the export and import unit values is greater than the threshold. When this occurs, there are quality differences between the goods exported and the goods imported:

1 In other research I have undertaken a sensitivity analysis of the two thresholds, α and γ. The results of this sensitivity analysis indicate the appropriate thresholds are: $\alpha = 15$ percent and $\gamma = 20$ percent. However, it should be noted that there is some volatility in the indices for some industrial sectors that is attributed to these thresholds. The volatility largely disappears when the quality threshold, α, is raised, but this data smoothing is at the cost of losing a theoretically tested threshold.

$$\frac{UV^X}{UV^M} > 1+\alpha \quad \text{or} \quad \frac{UV^X}{UV^M} < \frac{1}{1+\alpha}. \tag{4}$$

If, for example, Canada's export unit value is greater than its import unit value (from the US) for a specific product category, Canada trades a relatively high-quality product for a relatively low-quality product, and if Canada's export unit value is less than its import unit value for a specific product category, Canada trades in a relatively low-quality product for a relatively high-quality product: vertically differentiated high-quality trade (VDHQ) and vertically differentiated low-quality trade (VDLQ), respectively. These are the trade categories that apply to staples theory. If Canada is dominantly involved with VDLQ goods in its trade, then Canada still has the characteristics of a staples economy, but if Canada is moving into VDHQ goods in its trade, it is breaking out of the staples trap. To facilitate this interpretation, all references to quality are in regard to Canada's trade.

The utility, and limitation, of this classification method is that it measures relative quality. There is no difficulty here when discussing low-quality and high-quality international trade, but a difficulty does arise with medium-quality international trade. There is actually no way to know the quality of the trade in this category; both Canada and the US may be trading high-, medium- or low-quality goods: we only know the quality is the same. There is, however, an advantage to this relative classification. If Canada must import a high value-added good in order to export a high value-added good (i.e., Canada does not actually add the value-added), the unit value difference between the intermediate and final goods will not be as great as if Canada added the value-added in the product. Consequently, a Canadian industry that exports a high value-added product will not necessarily be deemed as high value-added industry. In addition, as pointed out by the US General Accounting Office (1995), unit value measures are subject to measurement errors and corresponding variation in unit values. However, in the current analysis, extreme unit values are generally present for commodities with small volumes of trade and are present for both exports and imports in that commodity classification. Consequently, their impact is minimized when data are aggregated to industrial sectors and may simply be an artefact of how commodities are coded in customs declarations, so they are not removed from the analysis.

These three classifications can be used to create indices representing their shares in overall trade. The sum of HD, VDHQ and VDLQ relative to the total value of two-way trade (TW):

$$TWHD_j = \frac{\sum_{p_i \in j} \sum_{HD} (X_{p,t} + M_{p,t})}{\sum_{p_i \in j} \sum_{Z} (X_{p,t} + M_{p,t})}, \tag{5}$$

where *HD* represents horizontally differentiated trade, *Z* represents all trade types, $p_i \in j$ represents product *i* in industry *j* and *t* represents the year. A similar formula is used in the calculation of the shares of two-way trade in vertically differentiated products (VDHQ and VDLQ).

Another limitation with the data used in this analysis is that quantities are not reported for every product category. This non-existence of quantities is sometimes a result of confidentiality when particular products are produced by only a few firms. But sometimes, quantity information is missing because the same product category is recorded using different quantity units. Different exporters and importers measure their trade using different units. The result is that the percentage of horizontally and vertically differentiated trade does not always equal the value of total two-way trade. Consequently, the proportions of trade based on quality should be viewed as a sample of all two-way trade in most industrial sectors. To assist in the interpretation of the indices provided later, the TW is supplemented with a restricted two-way trade index (TWR). TWR is a measurement of two-way trade that includes only those product categories that report quantities for both imports and exports and is referred to in the analysis later, but for reasons of brevity, it is not included in the tables below—this index is available from the author.

Although this is a limitation of the quality-based trade measures with the available Canada–US international trade data, this limitation does not decrease the value of measuring quality-based trade in this manner. On the contrary, insight is gained through the identification of what types of trade, based on quality, have increased and/or decreased in those industries that have quantities well represented in the data. An interesting question that arises is whether Canada's increases in

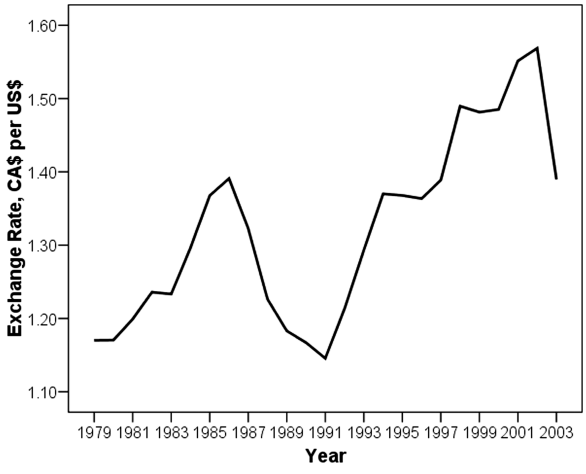

Figure 1
Canada–US exchange rate, 1979–2003

international trade to and from the US have been from increases in low-quality trade at the expense of high-quality trade, or vice versa? If Canada's low-quality trade has increased, Canada's role in the international division of labour would be to provide cheap, labour-intensive goods originating from relatively low-paying jobs. This type of increase in international trade volumes maintains the status quo of a staples economy. However, if increases in international trade are in high-quality trade at the expense of low-quality trade, Canada may be moving out of its staple trap.

Lastly, a cautionary note is in order. Exchange rate movements may impact this measurement. For example, if the Canadian dollar becomes cheaper relative to the US dollar (the trend over the entire study period, see Figure 1), the value of US imports will rise and the value of Canadian exports will fall. This confounds the interpretation of the indices. Unfortunately, these indices are calculated as ratios of values so any correction for the exchange rate will simply cancel out. As such, exchange rate movements need to be considered as the reader interprets the results later.

Canada–US Quality Trade, 1979–1988

Table 2 shows that two-way trade at the national level has increased its share steadily in the 10 years prior to the free trade agreements. The level of low-quality market trade at the aggregate level has remained relatively constant, decreasing slightly, whereas medium- and high-quality market trade at the aggregate level have both increased their shares. Prior to 1984, high-quality goods exhibited significant increases in their share (7–31 percent of trade, 1979–1984), but that share subsequently dropped to just below 20 percent with medium-quality market trade taking its place. Given that low-quality market trade has remained relatively constant, the increases in two-way trade are attributed to increases in both medium- and high-quality market trade.

What this means for Canada is that in the years preceding the CUFTA, higher-quality goods dominated Canada–US international trade. At this same time, one-way trade also decreased. This has implications for labour in Canada. The movement towards higher-quality goods in trade, and therefore production, is a shift towards the increased need for skilled labour to produce the higher-quality products and the corresponding wage increases. This is indicative of a movement out of the staples trap.

At the industrial sector level, two-way trade increased or remained relatively constant in all industrial sectors except Animal Agriculture; Mining, Quarrying, and Petroleum; and Leather. Incidentally, these three industrial sectors also decreased their levels of international trade, decreased their trade shares, and increased their shares of low-quality market trade over the study period. Animal Agriculture and Leather also exhibit sharp decreases in their shares of high-quality market trade.

The overall trend for the industrial sectors is an increase in the low-quality market trade contrary to the aggregated results. The most notable increases are in Food (17–44 percent), Beverages and Tobacco (2–25 percent), Plastics and Rubber Products (3–45 percent), and Textiles (9–29 percent). Needless to say, this common trend in so many industrial sectors does not manifest itself in the national aggregate indices. Therefore, the effects of a small number of industrial sectors are dominating the national aggregated results. These industrial sectors are primary and fabricated metals, non-electrical machinery, electrical machinery and motor vehicles and parts,

Table 2
Industrial sectors, by trade type, 1979 and 1988

		1979	1988			1979	1988
Total trade	TW	0.472	0.688	Leather	TW	0.822	0.646
	HD	0.136	0.217		HD	0.084	0.044
	VDHQ	0.067	0.176		VDHQ	0.531	0.350
	VDLQ	0.110	0.079		VDLQ	0.122	0.216
Animal Agriculture	TW	0.287	0.189	Textiles	TW	0.125	0.479
	HD	0.177	0.010		HD	0.000	0.057
	VDHQ	0.033	0.037		VDHQ	0.022	0.027
	VDLQ	0.076	0.133		VDLQ	0.088	0.290
Vegetable Agriculture	TW	0.138	0.280	Clothing	TW	0.318	0.475
	HD	0.004	0.003		HD	0.000	0.012
	VDHQ	0.015	0.028		VDHQ	0.008	0.114
	VDLQ	0.012	0.188		VDLQ	0.055	0.149
Food	TW	0.307	0.573	Non-metallic Mineral Products	TW	0.706	0.646
	HD	0.011	0.056		HD	0.000	0.003
	VDHQ	0.115	0.046		VDHQ	0.007	0.020
	VDLQ	0.173	0.439		VDLQ	0.032	0.083
Beverages and Tobacco	TW	0.190	0.437	Primary and Fabricated Metals	TW	0.460	0.353
	HD	0.000	0.000		HD	0.025	0.094
	VDHQ	0.156	0.140		VDHQ	0.080	0.109
	VDLQ	0.020	0.246		VDLQ	0.302	0.091
Mining, Quarrying and Petroleum	TW	0.392	0.110	Non-electrical Machinery	TW	0.539	0.830
	HD	0.002	0.000		HD	0.046	0.176
	VDHQ	0.009	0.020		VDHQ	0.197	0.183
	VDLQ	0.002	0.016		VDLQ	0.130	0.074
Chemicals	TW	0.199	0.351	Electrical Machinery	TW	0.680	0.792
	HD	0.013	0.076		HD	0.085	0.116
	VDHQ	0.029	0.064		VDHQ	0.187	0.407
	VDLQ	0.117	0.186		VDLQ	0.339	0.170
Plastics and Rubber Products	TW	0.379	0.829	Motor Vehicles and Parts	TW	0.737	0.985
	HD	0.069	0.102		HD	0.512	0.612
	VDHQ	0.258	0.248		VDHQ	0.058	0.370
	VDLQ	0.033	0.453		VDLQ	0.164	0.000
Wood Products	TW	0.198	0.223	Other Transport	TW	0.424	0.954
	HD	0.000	0.002		HD	0.000	0.000
	VDHQ	0.016	0.018		VDHQ	0.041	0.000
	VDLQ	0.030	0.030		VDLQ	0.060	0.418
Paper Products	TW	0.120	0.141	Professional Goods	TW	0.189	0.194
	HD	0.032	0.031		HD	0.000	0.009
	VDHQ	0.015	0.069		VDHQ	0.030	0.052
	VDLQ	0.047	0.031		VDLQ	0.000	0.012
Printing and Publishing	TW	0.507	0.644	Other	TW	0.928	0.992
	HD	0.000	0.000		HD	0.000	0.000
	VDHQ	0.004	0.015		VDHQ	0.006	0.002
	VDLQ	0.380	0.494		VDLQ	0.030	0.020

SOURCE: Feenstra (1996, 1997).

consisting of 25–35 percent of all Canada–US international trade depending on the year of measurement.

Of these four industrial sectors, primary and fabricated metals is the only industrial sector to decrease its share of two-way trade, 46–35 percent. Although a substantial drop, the low-quality trade share dropped an even greater amount, 30–9 percent. Making up this difference are increases in both medium- and high-quality trade.

Therefore, this industrial sector was undergoing a substantial change in its export and import structures long before tariff and non-tariff barriers to international trade began to fall in 1989.

Non-electrical machinery exhibits a marked increase in its two-way share of trade (54–83 percent), with an increase in medium-quality trade, but significant volatility in both high- and low-quality trade. Overall, the trend in high-quality trade appears to be relatively constant, whereas the trend in low-quality trade is negative, but moderate. A difficulty with these interpretations in this industrial sector is its low TWR values, relative to its TW values. Consequently, much of the change in the product quality component of trade within this industrial sector is likely being lost due to a lack of appropriate data.

Electrical machinery, however, shows a significant drop in low-quality market trade (34–17 percent), while high-quality market trade increases significantly (19–41 percent)—medium-quality market trade remained relatively constant, increasing slightly. Therefore, not only do the increases in high-quality market trade account for the moderate growth in two-way trade (68–80 percent) in this industrial sector, but it also displaced a large portion of low-quality market trade.

Motor vehicles and parts low-quality market trade decreased from 16 to 0 percent over the study period with high-quality market trade increasing significantly from 6 to 37 percent—medium-quality market trade also increased, but more moderately (51–61 percent). These changes in the nature of motor vehicles and parts trade occurred while two-way trade increased substantially from an already high level (74–99 percent). Although all four industrial sectors had similar trade in their respective indices, the changes in the Motor Vehicles and Parts and Electrical Machinery industrial sectors are clearly the driving force behind the patterns at the national aggregated level.

These results show the utility of the use of high-, medium-, and low-quality trade classifications in analyzing international trade. For all practical purposes, two industrial sectors are behind the nationally measured changes in trade patterns. Most notable is the disconnect between the changes in the quality composition of international trade at the national level and most Canadian industrial sectors. In all industrial sectors aside from Primary and Fabricated Metals, Non-electrical Machinery, Electrical Machinery, and Motor Vehicles and Parts, low-quality trade exhibited substantial increases. Only in the four industrial sectors mentioned here did low-quality trade exhibit substantial decreases. Therefore, the vast majority of industrial sectors have likely experienced increases in lesser-skilled employment with corresponding lower wages. In conjunction with the large expansions of exports that occurred to the US (see Table 3), the expansion of low-quality trade in the majority of Canadian industrial sectors indicates the characteristics of a staples economy, but only in particular places. Needless to say, Canada's place in the North American economy was far from constant before free trade agreement negotiations began with the US in the mid-1980s.

Canada–US Quality Trade, 1989–2003

As a consequence of using different data sets for the two time periods, there is a 'level effect' present when comparing the indices in different time periods for some industries. This is not considered problematic, however, because it is the *trends* in these indices that are of concern. The earlier time period's data are available to 2001, but the HTS data are considered superior to capture trade quality. Incidentally, no such level effects are present in the aggregated trade data by industrial sector in Tables 3 and 5.

At the aggregate country level, the TW is relatively constant over time. The corresponding industrial sector indices for two-way trade, however, show some changes that are quite large in magnitude (see Table 4). Only a few industrial sectors (Mining, Quarrying and Petroleum; Clothing; Non-metallic Mineral Products; Motor Vehicles and Parts; and Other) have decreases in their two-way trade—Clothing and Non-metallic Mineral Products have large decreases in two-way trade. The significant difference in the share of two-way trade in Motor Vehicles and Parts between the two study periods is because of the significantly greater level of disaggregation in the latter time period—fewer commodities are grouped together using the HTS. It should also be noted, however, that little is expected to occur to the Motor Vehicles and Parts industrial

Table 3
Canada–US trade, increase factors and shares, 1979–1988

	Export increase factor	Import increase factor	Total increase factor	Export share		Import share		Total share	
				1979	1988	1979	1988	1979	1988
Total trade	1.35	1.30	1.33						
Animal Agriculture	0.99	1.01	0.99	3.8	2.8	0.7	0.6	2.4	1.8
Vegetable Agriculture	0.35	0.78	0.44	9.5	2.4	3.1	1.9	6.5	2.2
Food	1.93	0.68	1.11	0.5	0.7	1.1	0.6	0.8	0.6
Beverages and Tobacco	2.72	1.35	2.03	0.4	0.8	0.5	0.5	0.4	0.7
Mining, Quarrying and Petroleum	0.73	0.60	0.70	17.3	9.3	6.2	2.8	12.2	6.4
Chemicals	1.00	1.18	1.08	5.4	4	5.1	4.6	5.3	4.3
Plastics and Rubber Products	2.39	1.27	1.66	1.4	2.5	3.1	3	2.2	2.7
Wood Products	0.77	0.79	0.77	8.1	4.6	1.4	0.8	5	2.9
Paper Products	1.21	1.28	1.22	11.2	10	1.5	1.4	6.7	6.1
Printing and Publishing	2.84	1.24	1.51	0.2	0.5	1.3	1.3	0.7	0.9
Leather	1.25	0.68	0.89	0.3	0.3	0.6	0.3	0.5	0.3
Textiles	4.01	0.63	0.86	0.1	0.4	2.2	1.1	1.1	0.7
Clothing	2.44	0.63	1.29	0.2	0.3	0.4	0.2	0.3	0.3
Non-metallic Mineral Products	0.93	0.67	0.79	3.1	2.1	4.5	2.3	3.7	2.2
Primary and Fabricated Metals	1.60	0.96	1.35	7.9	9.3	6	4.4	7	7.1
Non-electrical Machinery	1.76	1.06	1.26	6.4	8.3	19	15.5	12.2	11.5
Electrical Machinery	2.42	1.60	1.86	2.1	3.8	5.3	6.5	3.6	5
Motor Vehicles and Parts	2.49	1.13	1.68	16.9	31.1	29.4	25.6	22.7	28.6
Other Transport	1.71	1.18	1.40	1.5	1.9	2.5	2.2	1.9	2
Professional Goods	1.71	1.22	1.31	0.5	0.6	2.6	2.4	1.5	1.4
Other	1.79	8.01	4.76	3.3	4.3	3.5	21.8	3.4	12.2

SOURCE: Feenstra (1996, 1997).
NOTES. The increase factor is the ratio of 1988–1979 trade volumes. A value of unity means that the trade volumes are the same in both years and a value greater than unity means that trade volumes have increased over time.

sector as a result of the CUFTA or the NAFTA because this industrial sector has had its own trade agreement with the US for some time: The Canada–US Automotive Products Agreement of 1965. This is not to say that this industrial sector has not undergone any change resulting from these agreements—the addition of Mexico within the NAFTA may indeed impact this industrial sector—but this is beyond the scope of the current analysis.

While most other industrial sectors showed growth in their two-way trade, a number of industrial sectors did have significant increases (Animal Agriculture, Chemicals, Plastics and Rubber Products, Paper Products, Printing and Publishing, and Textiles). As shown earlier, these increases in Canada–US two-way trade originates from increased exports in most industrial sectors (see Table 5). This has important implications for the Canadian economy because the measured changes in Canada—US international trade are on the Canadian side of the border—it is the Canadian industries, in their respective regions, that are adjusting to this new international trading relationship. Also, most of the industrial sectors did not undergo large changes in their shares of international trade.

With regard to the quality of international trade in this time period, at the national level, Canada's shares of medium- and high-quality trade rise after the implementation of the CUFTA: medium-quality trade (HD), though dropping in 2003, is trending upward throughout the study period (0.133–0.157, 1989–2002); high-quality trade, which is much less volatile than medium-quality trade, is also trending upward throughout the study period with a drop in 2003 (0.079–0.112, 1989–2002); and aside from a spike in 2003, low-quality trade is trending downward over the study period. Curiously, the changes in the quality level of international trade, particularly the increase in high-quality trade at the expense of low-quality trade, occur after the NAFTA enters into force in 1994. This result indicates, but does not prove, that the NAFTA may have had an impact on Canada–US international trade that is

Table 4
Industrial sectors, by trade type, 1989 and 2003

		1989	2003			1989	2003
Total trade	TW	0.582	0.579	Leather	TW	0.649	0.640
	HD	0.133	0.122		HD	0.268	0.026
	VDHQ	0.079	0.085		VDHQ	0.094	0.342
	VDLQ	0.095	0.127		VDLQ	0.141	0.035
Animal Agriculture	TW	0.258	0.386	Textiles	TW	0.380	0.682
	HD	0.033	0.184		HD	0.037	0.226
	VDHQ	0.046	0.144		VDHQ	0.160	0.094
	VDLQ	0.172	0.054		VDLQ	0.182	0.335
Vegetable Agriculture	TW	0.240	0.340	Clothing	TW	0.641	0.495
	HD	0.048	0.103		HD	0.053	0.128
	VDHQ	0.014	0.077		VDHQ	0.363	0.088
	VDLQ	0.134	0.096		VDLQ	0.092	0.134
Food	TW	0.503	0.627	Non-metallic Mineral Products	TW	0.636	0.415
	HD	0.118	0.314		HD	0.284	0.019
	VDHQ	0.181	0.146		VDHQ	0.037	0.085
	VDLQ	0.204	0.167		VDLQ	0.062	0.023
Beverages and Tobacco	TW	0.199	0.307	Primary and Fabricated Metals	TW	0.484	0.640
	HD	0.056	0.186		HD	0.104	0.189
	VDHQ	0.011	0.052		VDHQ	0.090	0.052
	VDLQ	0.132	0.069		VDLQ	0.090	0.108
Mining, Quarrying and Petroleum	TW	0.106	0.055	Non-electrical Machinery	TW	0.776	0.837
	HD	0.055	0.031		HD	0.008	0.013
	VDHQ	0.014	0.018		VDHQ	0.211	0.234
	VDLQ	0.038	0.006		VDLQ	0.050	0.088
Chemicals	TW	0.280	0.482	Electrical Machinery	TW	0.745	0.808
	HD	0.059	0.066		HD	0.018	0.012
	VDHQ	0.074	0.118		VDHQ	0.254	0.142
	VDLQ	0.065	0.132		VDLQ	0.033	0.069
Plastics and Rubber Products	TW	0.699	0.867	Motor Vehicles and Parts	TW	0.808	0.731
	HD	0.180	0.265		HD	0.332	0.239
	VDHQ	0.078	0.051		VDHQ	0.020	0.031
	VDLQ	0.179	0.291		VDLQ	0.148	0.263
Wood Products	TW	0.173	0.188	Other Transport	TW	0.554	0.575
	HD	0.006	0.038		HD	0.000	0.015
	VDHQ	0.025	0.056		VDHQ	0.043	0.307
	VDLQ	0.100	0.050		VDLQ	0.002	0.005
Paper Products	TW	0.184	0.399	Professional Goods	TW	0.532	0.535
	HD	0.039	0.146		HD	0.000	0.001
	VDHQ	0.005	0.087		VDHQ	0.014	0.009
	VDLQ	0.116	0.034		VDLQ	0.007	0.033
Printing and Publishing	TW	0.597	0.992	Other	TW	0.703	0.635
	HD	0.000	0.000		HD	0.000	0.000
	VDHQ	0.000	0.000		VDHQ	0.033	0.003
	VDLQ	0.000	0.000		VDLQ	0.017	0.004

SOURCE: Statistics Canada (2004).

independent of the CUFTA. In order to properly asses the effect of the NAFTA, many factors such as the economic performance of the US economy, financial markets, and changes in the value of the Canadian dollar that may have coincided with the NAFTA's timing must be controlled for in an inferential analysis.

Industrial sectors that have undergone increases in their two-way trade generally have increased their levels of high-quality trade at the

Table 5
Canada–US trade, increase factors and shares, 1989–2003

	Export increase factor	Import increase factor	Total increase factor	Export share		Import share		Total share	
				1989	2003	1989	2003	1989	2003
Total trade	2.62	1.97	2.32						
Animal Agriculture	2.36	1.80	2.21	2.4	2.1	1.0	0.9	1.7	1.7
Vegetable Agriculture	3.56	1.88	2.26	0.8	1.0	2.5	2.3	1.6	1.5
Food	7.56	4.00	5.52	0.8	2.2	1.2	2.4	1.0	2.3
Beverages and Tobacco	2.22	2.67	2.40	0.8	0.6	0.6	0.8	0.7	0.7
Mining, Quarrying and Petroleum	4.60	2.07	4.15	11.4	20.0	2.9	3.0	7.5	13.4
Chemicals	2.79	2.89	2.84	4.0	4.3	5.4	7.9	4.6	5.7
Plastics and Rubber Products	4.52	2.83	3.52	2.8	4.9	4.8	6.9	3.7	5.7
Wood Products	2.85	1.85	2.65	4.6	4.9	1.3	1.2	3.1	3.5
Paper Products	1.36	2.95	1.58	10.0	5.2	1.9	2.9	6.3	4.3
Printing and Publishing	3.60	1.65	2.00	0.5	0.6	1.7	1.4	1.0	0.9
Leather	1.33	0.67	1.00	0.3	0.1	0.3	0.1	0.3	0.1
Textiles	5.00	1.88	2.62	0.4	0.8	1.6	1.5	1.0	1.1
Clothing	9.67	2.50	5.57	0.3	0.9	0.4	0.5	0.3	0.8
Non-metallic Mineral Products	2.13	1.63	1.89	2.0	1.7	2.4	2.0	2.2	1.8
Primary and Fabricated Metals	1.85	2.01	1.92	9.4	6.6	7.0	7.2	8.3	6.8
Non-electrical Machinery	2.22	1.70	1.88	9.5	8.0	21.0	18.2	14.8	12.0
Electrical Machinery	2.64	1.62	1.96	4.2	4.3	10.0	8.2	6.9	5.8
Motor Vehicles and Parts	2.07	1.88	2.00	30.7	24.3	26.1	25.0	28.6	24.6
Other Transport	3.74	1.44	2.60	2.3	3.3	2.5	1.8	2.4	2.7
Professional Goods	2.50	1.97	2.13	1.0	1.0	3.4	3.4	2.1	1.9
Other	4.18	2.26	3.29	1.9	3.0	1.9	2.2	1.9	2.7

SOURCE: Statistics Canada (2003).

expense of low- and/or medium-quality trade—it is not uncommon, however, for medium-quality trade to also rise. This result is the opposite of that in the preceding period. From 1979 to 1988, industrial sectors that exhibited the most notable changes in the composition of international trade are Animal Agriculture and Leather. Animal Agriculture has since increased its share of two-way trade, whereas Leather has continued to decrease two-way trade, but only moderately. In the previous period, Animal Agriculture increased its share of low-quality market trade at the expense of medium- and high-quality market trade, and similarly for Leather. However, the opposite is true in this latter study period. In the case of Animal Agriculture, both medium- and high-quality market trades have increased at the expense of low-quality market trade; for Leather, high-quality market trade has increased at the expense of both low- and medium-quality market trades. This pattern of substituting into high- and medium-quality market trade at the expense of low-quality market trade is also present in those industrial sectors that exhibit growth in two-way trade, 1979–1988. Vegetable Agriculture, Food, Plastics and Rubber Products, Textiles, and Non-electrical Machinery all exhibit this trade pattern in the latter study period.

One industrial sector worthy of special note because of the current geopolitical situation is that of Mining, Quarrying and Petroleum. In the former time period, this industrial sector showed a significant decrease in trade volumes (dominantly through exports) and a corresponding sharp fall in its share of two-way trade. In this latter time period, the Mining, Quarrying and Petroleum industrial sector has regained the lost ground since 1979 with respect to its share of trade (again, mainly through exports), but its share in two-way trade continues to fall. This clearly runs counter to the general results and has implications for the regions in Canada involved in the trade, namely, Alberta, Saskatchewan, and Newfoundland.

Overall, this movement into high- and medium-quality market trade in the majority of industrial sectors under free trade, rather than only a few, shows promise for Canada's integration

into the North American economy that is not based on a dependency relationship. As a consequence of the levels of skilled labour and capital in the US relative to Mexico, the US trades relatively high-quality goods for relatively low-quality goods with Mexico, if that trade can be classified as two-way trade—this is the general finding of Schott (2004), with respect to product quality and the wealth of nations. Given that Canada trades high-quality goods for low-quality goods on average with the US, and the majority of that trade is classified as two-way trade, the ranking of high-, medium- and low-quality market trade appears to follow a north-to-south relationship. That is, it appears that Canada is specializing in the export of high-quality market goods, the US is specializing in the export of medium-quality market goods, and Mexico is specializing in the export of low-quality market goods—the spatial division of quality trade. This statement is made with caution because no Canada–Mexico data are analyzed here. It may also be the case that Canada and the US both import and export high-quality goods. However, because of the nature of the measurement of quality (it is relative, not absolute) Canada only appears to be exporting high-quality goods for low-quality goods. In addition, changes in the low-, medium- and high-end portions of the market dominantly occur at or after the time of the NAFTA entering into force, once again indicating that the NAFTA may have had an independent affect on the Canada–US trading relationship that has pulled its various industries out of a staples dependency.

In some of the industrial sectors (Printing and Publishing, Other Transport, Professional Goods, and Other), the levels of TWR are very low relative to TW (non-existent for Printing and Publishing). As indicated earlier in the section on data and methodology, this occurs when quantities are not available for all of the commodity categories. Consequently, product quality can only be calculated for very few of the commodities in these industrial classifications making any inferences on the level of product quality in trade suspect.

Summary and Conclusions

Canada's trading relationship with the US has been analyzed in many ways over the years. Using detailed product-level international trade data for Canada and the US, this article investigates changes in the composition of trade quality to assess Canada's dependency role with the US according to staples theory. After outlining a methodology that differentiates low-, medium-, and high-quality two-way trade, it is found that the nature of Canada's trade quality has altered significantly since the inception of free trade in 1989.

In the 10 years preceding the free trade agreements, Canada was generally maintaining its position as a staples economy, exporting relatively low-quality goods for relatively high-quality goods in most industrial sectors. After the establishment of free trade, however, particularly with the inclusion of Mexico to free trade in North America through the NAFTA, Canada began to move into relatively high-quality trade for most of its industrial sectors. Given that Canada is a patchwork quilt of industrial sectors (Britton 1996), industrial sectors correspond to Canadian regions. Therefore, before the establishment of free trade between Canada and the US, only Motor Vehicles and Parts and Electrical Machinery were moving out of the staples trap, but after the establishment of free trade most industrial sectors and, therefore, most regions of Canada are moving out of the staples trap. However, this may not be the case for Mining, Quarrying and Petroleum (Alberta, Saskatchewan, and Newfoundland), as discussed earlier.

Consequently, there appears to be a new spatial division of labour in quality-based international trade patterns occurring in North America. Usually, it is thought that Canada specializes and trades in the low value-added goods with the US, along the lines of the arguments made in the staples thesis (see Barnes *et al.* 2001). However, the result presented here undermines that assertion. Most industrial sectors are moving away from inter-industry trade and into intra-industry trade in high- and medium-quality goods. It should be noted that these trends should be investigated in a few years in light of the strengthening of the Canadian dollar to determine if these trends persist.

The inclusion of Mexico into the North American free trade area, and/or the corresponding trade policies to deal with Mexico's inclusion, has more favourably placed Canada with regard to its

most significant trading partner, the US. Although this point is not discussed by Trefler (2004), this finding is consistent with Trefler's (2004) effect of the CUFTA. Resulting from the CUFTA, skill levels, wages, and productivity have all increased in Canada, providing the necessary conditions for increased quality production: a higher-paid, higher-skilled Canadian workforce (see Baldwin and Gu [2004] for a discussion of the effect of free trade on Canadian productivity). Although it may be premature to make a general claim that Canada is now beginning to work its way out of the staples trap (and which is beyond the scope of this article), it certainly appears as though this may be the case.

This analysis shows the utility of decomposing aggregate trade into its constituent parts to better understand the dynamics of Canada's relationship with the US. Since the mid-1990s, Canada appears to be moving out of the staples trap—future research should investigate this finding at a provincial level. This movement is not only occurring by increasing its levels of high-quality trade at the expense of low-quality trade (which implies increases in the value-added in the production process) but also through the diversification of its manufacturing trade base.

Although Canada's dependence on the US through international trade remains high, that dependency is qualitatively different than it was before the establishment of free trade within North America. Canada's trading relationship with the US and Mexico is now one that places Canada at the top of the spatial division of quality trade. This does not in any way diminish the importance of Canada's high degree of dependency on the US through trade—indeed Canada's dependence has increased since the inception of free trade with the US. This result of Canada's new place in the spatial division of quality trade does, however, put Canada in a position where it is better able to release itself from a dependency role now that it appears to be out of the staples trap.

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