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The Reliance of Canadian Imports on the US is Worse Than you Think

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The reliance of the Canadian economy on its trade with the US has long been discussed (Beaulieu and Song, 2015), and the debate was recently revived by the corona-crisis and the renegotiation of NAFTA. A key statistics often used to gauge this dependency is that more than half of Canadian imports originate from the US.

We argue here that Canada's reliance on the US is even greater than what is usually thought. By examining data recording the value of Canadian imports by product, production country, exporting country and transport mode, we show that the US is not only the main supplier of Canada, but also a critical logistical hub for Canadian imports that are not produced in the US. Half of the goods imported from non-US suppliers enter Canada through the US-Canada border. In total, about 80% of Canadian imports are tied to the US, either because the goods are produced there, or because the goods cross the US to enter Canada.

We argue here that Canada's reliance on the US is even greater than what is usually thought. By examining data recording the value of Canadian imports by product, production country, exporting country and transport mode, we show that the US is not only the main supplier of Canada, but also a critical logistical hub for Canadian imports that are not produced in the US.

This exposure to a single trade partner raises legitimate concerns about the resilience of the Canadian economy in case of extreme events such as pandemics, natural disasters, unilateral decisions on trade policy, or civil unrests, hitting the US. This makes the questions about diversification away from the US pressing.

Of course, the reliance on the US would not be an issue if Canadian importers could change the sourcing of their imports at no cost and without delay. However, there are significant costs associated to switching suppliers (see eg. Martin et al. 2020). Changing the logistical chain may seem easier, but it also induces organizational costs, time costs, and environmental costs that should not be neglected.

We show such a dependency to a single trade partner is unique among developed countries. Canadian dependency to the US as a logistical hub is illustrated by Canada's imports of Mexican products. More than 90% of imports from our second main trade partner are routed through the US and are thus exposed to disruptions in this country. The US is also a critical hub for imports from China and Korea en-route to Canada.

The reliance of Canadian imports on the US varies across product categories. Imports of printing, paper and motor vehicles products are strongly related to the US both as a producer and a logistical hub: more than 80% of Canadian imports of these products are tied to the US in the end. Imports of pharmaceutical products and textile and clothing products rely less on the US (about 50% of imports being tied to the US in these sectors). These product-level variations generate a heterogeneous exposure of Canadian industries to the US in terms of supply of their inputs. We leverage the input-output table to compute the "direct" and "indirect" US-content of the inputs used by Canadian industries, i.e. the inputs tied to the US used by the producers in these industries or by their domestic suppliers. We show the reliance of Canadian manufacturing sectors on inputs produced or distributed by the US is extremely high. Even though much smaller it is also non negligible for services.

Box 1: Data and definitions.

We use Statistics Canada's Canadian International Merchandise Trade Database (Statistics Canada, 2015). The data report the value and quantity of Canadian imports disaggregated by 6-digit HS product, country of origin (where the good is produced) and country of export (from where the product is finally exported), mode of transport, and port of entry. We have these data for the year 2015. Information on both the country of origin and the country of export allows us to track the place of production of imported products, and the (last) logistical hub trough from which these products are exported to Canada.

A product might thus not be produced in the US but exported by this country. In the paper, we refer to this situation as "imports from a US platform". The formal definition given by the Census is the following: "Exports of foreign goods (re-exports) consist of commodities of foreign origin that have previously been admitted to a U.S. Foreign Trade Zones or entered the United States for consumption, including entry into a CBP bonded warehouse, and which, at the time of exportation, are in substantially the same condition as when imported".

Our data and the unique geography of Canada allow us to track a last type of trade flows, which we call ''in-transit imports''. These imports are neither flagged as having a US origin or as being imported from the US, but the granularity of the data allows us to determine that they entered Canada through the Canada-US ground border. These are the flows for which the US is neither the origin nor the exporting country of the goods, but goods enter Canada by ``road'' or ``rail'' (the only ground border of Canada being with the US). The US Census' definition for this type of trade flows is: ``Goods shipped through the United States, Puerto Rico, or the U.S. Virgin Islands from one foreign country or area to another foreign country or area without entering the consumption channels of the United States. In-transit shipments should not be part of the U.S. international trade data''. Unlike imports from "US platform", in-transit shipments are not recorded in US statistics.

To summarize, our data on Canadian manufacturing imports offer three shades of reliance on the US:

- goods that are produced in the US,
- goods that are not produced in the US but are exported to Canada via US logistical platforms,
- goods that are not produced in the US nor shipped to Canada through a US logistical platform, but transit through the US on their way to Canada.

Note the data do not allow us to track in-transit imports that enter Canada *by air* through US airports. Our measure of the reliance of Canada on the US is thus a lower bound.

Three shades of exposure to the US

The US intervenes as a trade partner for Canada in three different ways: *i)* it might be the origin country of the goods that enter Canada; *ii)* it might be an export platform for the goods that enter Canada; *iii)* it might be a transit country for the goods that enter Canada (see Box 1 for the exact definition of these three categories based on our detailed Customs data).

In 2015, it appears that 55.4% of the value of Canadian imports has the US as its origin country, which is very close to the figures released by *Statistics Canada*. However, an additional 13.9% of the value of Canadian imports is not produced in the US but is exported by the US, which acts as an export platform country in this case. And finally, another 8.3% of Canadian imports transits through the US without being recorded in the data as part of the US exports to Canada.

In total, nearly 80% of the value of Canadian imports originates from the US in some way or another, out of which more than 20 p.p. is related to the US for logistical, and not production, matters. The reliance of Canada on the US for its imports is thus much greater than suggested by the statistics we usually use.

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Canada, an outlier in terms of reliance on the main trade partner

Canada is a clear outlier regarding its reliance on its main trade partner. To realize it, we compute the share of the main supplier in the imports of more than 200 countries. We do this for the imports registered in terms of origin country on the one hand, and in terms of exporting country on the other, as provided by two widely used international databases.[1] This second measure allows us to account for export platform flows, but unfortunately we still miss the transit shipments that are impossible to track in internationally harmonized trade data.

The figures we obtain for Canada are reassuringly remarkably close to those we obtain with the detailed Customs data, even though the data sources are different. In Figure 1, we plot the share of the main trade partner in overall imports (in terms of country where the goods are produced) against the GDP and the GDP per capita of the importing country. Three main messages emerge from this figure (and the picture is very similar when measuring the main trade partner in terms of country from where the goods are exported). First, the reliance of Canada on its main supplier, the US, is far above the average observed across countries in the world, equal to 56% against 27% on average.[2] Second, bigger and richer countries rely less, on average, on their main trade partner.

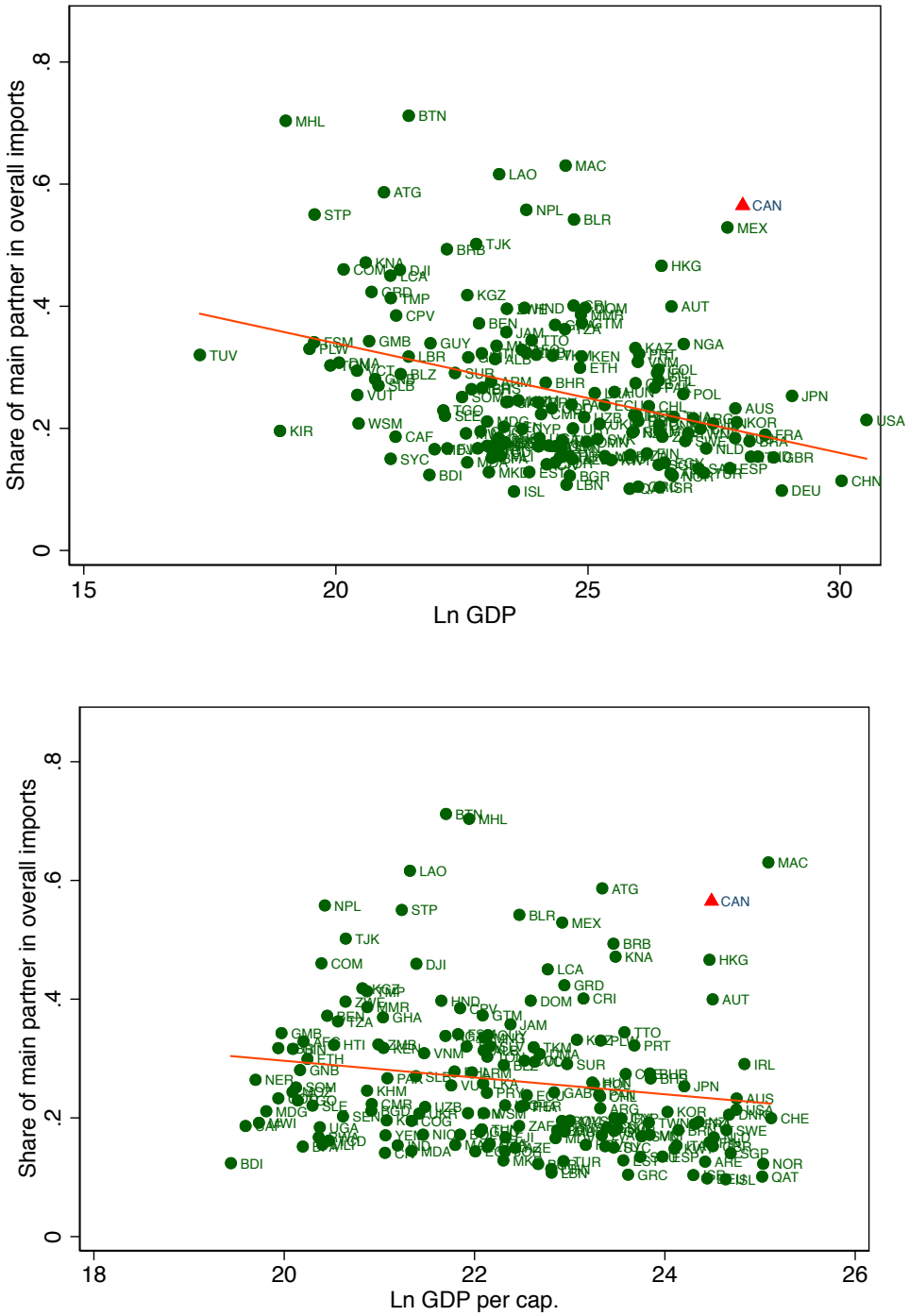
The reliance of Canada and Mexico on the US is thus far above what we usually observe among similar countries in terms of size or economic development.

Third, all of the countries that are at the top of the distribution with Canada in terms of reliance on their main trade partner are tiny and/or poor countries and islands (e.g. North Korea, Bhutan, Macau, Andorra, Lao, Antigua and Barbuda, Nepal or Belarus), except Mexico. The reliance of Canada and Mexico on the US is thus far above what we usually observe among similar countries in terms of size or economic development.

[1] The imports in terms of origin country come from the BACI database, which is built and maintained by CEPII (see Gaulier & Zignago 2010) based on the Comtrade data. This latter database is the one we use for the imports registered in terms of exporting country. It is built and maintained by the United Nations based on information released by national customs.

[2] When we consider the country that exports the goods (but does not necessarily produce them), this share is equal to 70% against 33% on average.

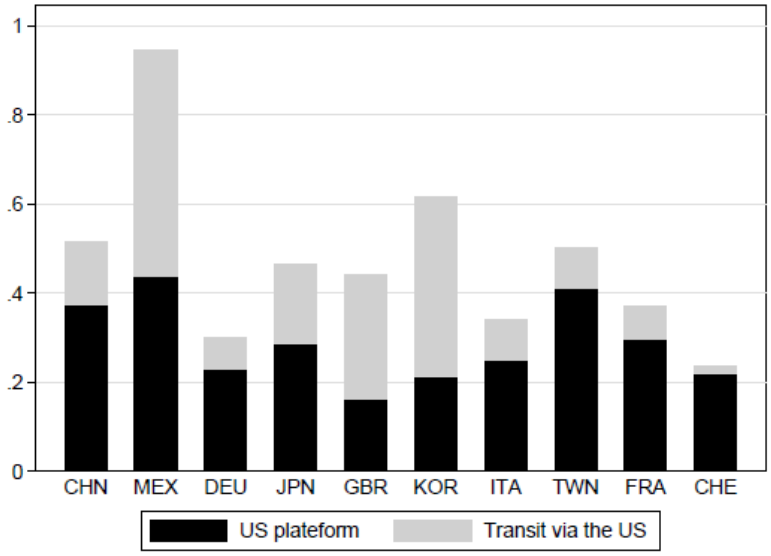
Figure 1: Share of the main supplier in overall imports by country



Reliance of Canadian imports on the US by trade partner

For several of Canada's main trade partners, the share of their exports to Canada that pass through the US is far from negligible. Figure 2 provides information on the share of Canada's main trade partner exports that are related to the US either through export platform or just through transit. The countries are ranked based on their share in total Canadian imports from the 2nd main partner to the 11th main partner (the main partner, the US, is excluded).

Figure 2: Share of Canadian imports from its top partners routed through the US



More than 90% of Canadian imports from Mexico transit through the US or is sent via US export platforms. This is surprising because a part of Mexican exports could be directly shipped to Canada or sent by plane. The US is also a major hub for Canadian imports from China, Taiwan, and South Korea; the share of imports from these countries that is tied to the US ranges from 50% to 60%. For Japan and the UK, it is about 45% of their exports to Canada that pass through the US. Indirect exports to Canada through the US are less prevalent for EU countries such as France, Germany, or Italy, but their share is still high (30% to 35%).

The US is a key hub for the imports of Canada from its main economic partners. Extreme events hitting the US would thus be a major issue not only for imported goods that are produced in the US, but also for a substantial share of the Canadian imports produced in Mexico, the UK, and several Asian countries.

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Reliance of Canadian import on the US by sector

The share of Canadian imports that are related to the US in some way or another varies substantially across sectors. Figure 3 presents the reliance of Canadian imports on the US across (ISIC) sectors. Consistent with the aggregate figures, the US is a major hub for Canadian imports across all sectors. The share of US-related imports in total imports ranges from 50% in the pharmaceutical industry to 90% in the printing and recorded media industry.

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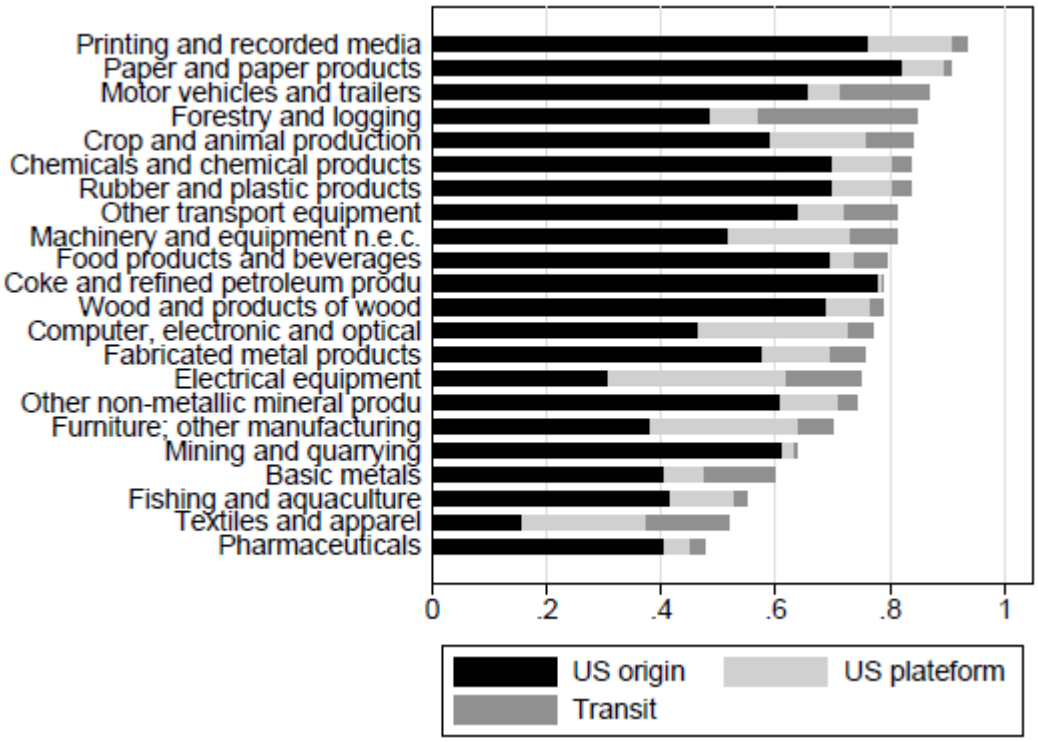
The pharmaceutical industry and the textile and apparel industry are interesting because their shares of US-related imports in overall imports are close but hide different patterns. The pharmaceutical goods produced in the US drive the lion share of the dependency of Canada on the US in the pharmaceutical industry. The textile and clothing industry is quite different because foreign products that are not produced in the US but cross the US before reaching Canada drive 75% of the dependency on the US. The imported goods that are the most tied to the US are in the printing industry, the paper industry, and motor vehicle industry. This reliance is largely due to the fact that the US produces the goods imported by Canada in these sectors. If one focuses on goods for which the US is a major logistical hub for Canadian imports (but not the original producer), electronic products, electrical equipment, and furniture clearly stand out.

Figure 3: Three shades of exposure to the US, a sector view



Exposure of Canadian industries to the US

Canada is an open country, and a substantial share of its domestic production relies on the use of foreign inputs. We now examine the US-content of inputs used by Canadian industries. The total share of US-related inputs in total inputs used by an industry is given by the industry's direct consumption of US-related inputs plus the US-related inputs that enter the production of the domestic inputs used by this industry. As explained in Box 2, to have a comprehensive view of the reliance of Canadian industries on the US for the sourcing of their inputs, we combine the Canadian input-output matrix with the sector-level share of imports tied to the US we can compute from the trade data described in Box 1.

Box 2: US-related content of the inputs used by Canadian industries.

For each Canadian industry, we compute the share of US-related inputs in total input usage. This measure is given by the industry's direct consumption of US-related inputs plus US-related inputs that enter the production of the domestic inputs used by this industry. The specific formula is:

$$M = D + AM = (I - A)^{-1} D$$

where M is a vector with elements m_i^{US} measuring the value of US related inputs used in this industry, D is the vector of elements d_i^{US} measuring the direct use of US-related inputs, and A is a matrix with elements $a_{ji} \equiv \frac{x_{ji}}{y_j}$ with y_j is the production in industry *j*, and x_{ij} is the value of inputs *j* used in the production of industry *i*.

For the computation, we use the WIOD input-output matrix of Canada (see Timmer et al. 2015) that we combine Canadian import data.

Our computations reveal that for the average Canadian industry, 15% of inputs are directly sourced from the US, either because they are produced there or because they cross the US to enter Canada. To get a complete picture of the exposure of this industry to US-related inputs, the sourcing from the US of its domestic suppliers must also be considered. Once this indirect reliance on US-related imported inputs is accounted for, we find the US-related content of the inputs used by the average industry rises to 24%.

Figures 4 and 5 present the ten industries that rely respectively the most and the least on the US in terms of inputs supply. The most reliant industries are manufacturing industries such as vehicle, plastic and rubber products, or computer and electronic products. More than half of the inputs used in the motor vehicle industry are directly or indirectly related to the US for example.

Services are among the least reliant industries, with an exposure to US-related inputs below 10%. Their reliance is however way above the share of US-related inputs directly used in their production process. This large discrepancy is explained by the fact that services use inputs from industries that rely more on the US than they do themselves.

These results show the exposure of Canadian producers to the US in terms of sourcing of their inputs is quite heterogeneous across industries. Whereas manufacturing industries are the most reliant ones, services are not immune to trade disruption with the US.

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Figure 4: Most US-reliant Canadian industries

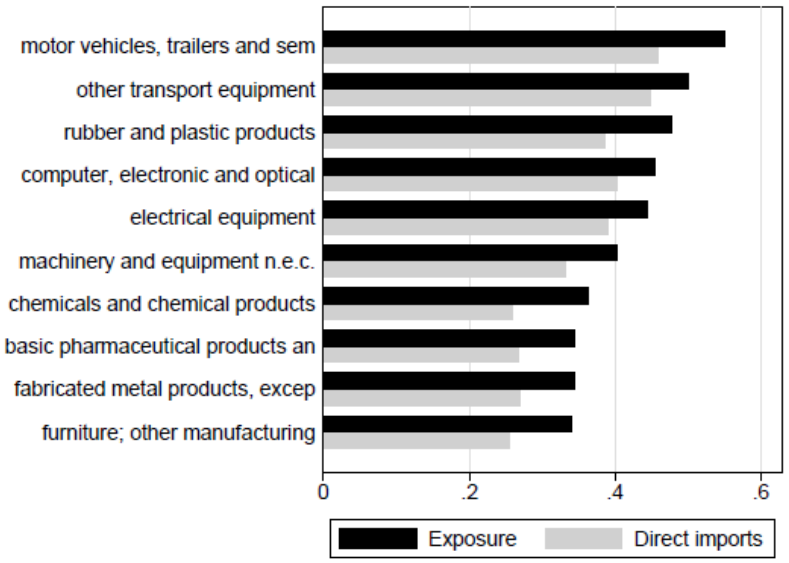
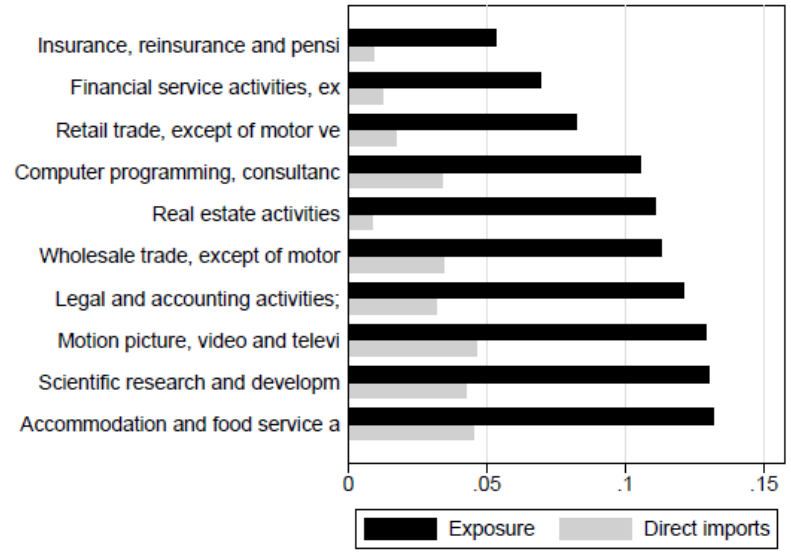


Figure 5: Least US-reliant Canadian industries



Concluding thoughts

Canada is extremely reliant on the US: half of its manufacturing imports are produced in this country, and more than 20% are not produced in the US but are exported from or transit trough its southern neighbor. The reliance of the Canadian economy on the US is thus worse than what is usually thought.

This dependency means that any disruption in economic activity in the US could dramatically affect Canadian producers and consumers. After the recent controversy about the exports of masks by the firms 3M and the difficult renegotiation of the NAFTA with the Trump administration, we think it is time to discuss again Canadian's supply strategy so as to reach a greater import diversification. Of course, the US is a natural trade partner for Canada. Its size and geographic position ensure an efficient provision that benefits Canadian industries and consumers in normal times. However, these efficiency gains come at a cost that materializes during extreme (and fortunately rare) events. The trade-off between the fragility due to a lack of diversification and the gains from specialization should be revisited considering the 80% figure we documented here, bearing in mind that the various options for reorganizing our sourcing strategy might not all have the same implications in terms of monetary, time, and environmental costs.

In our view, the diversification of our imports away from the US encompasses two main dimensions. First, Canada should keep on diversifying the origin of the products it imports in sectors such as paper, chemical, rubber or food industries. Fully exploiting the potentialities of existing agreements such as the recent Canada-EU free trade agreement or developing new bilateral trade agreements with Asian partners or the UK, would certainly help in this respect.

Second, Canadian firms could reconsider their logistical chains to reduce the reliance of Canada on the US as a logistical hub. An effective way to do so would be to increase the share of goods produced in Mexico, Great-Britain, South Korea, Japan, and China that is directly imported. Margins of improvement in this dimension seem to exist in sectors such as the textile, electrical equipment, and computer industries.

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