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Should Canada Diversify its Trade Pattern? An Overlapping-Generations CGE Analysis of Trade and Ageing

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Abstract

This paper examines the economic impact on Canada of hypothetical trade diversification scenarios away from the U.S., in a context of world demographic changes. Although population ageing in Canada is expected to have a negative impact on economic welfare, international trade should prop up real consumption per capita through terms of trade improvements during the first half of the 21st century. The paper shows that the gains resulting from the globalization of trade flows might be intensified through an accurate "North-South" trade diversification pattern that takes into account the extent and timing of ageing in diverse regions of the world.

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Key words: *Globalization, trade policy, trade diversification, population ageing, overlapping generations, computable general equilibrium modeling*

JEL Classification: C68; D58; F13; F15; J11

Résumé

Ce papier examine l'impact économique sur le Canada, de scénarios hypothétiques impliquant une plus grande diversification de ses échanges commerciaux, dans un contexte de vieillissement de la population. Bien que l'on s'attende à ce que le vieillissement de la population canadienne ait un effet négatif sur le bien-être, le commerce international permet de soutenir la consommation réelle par tête grâce à une amélioration des termes d'échange durant la première moitié du 21ième siècle. Cela reflète un écart de vieillissement de population entre le Canada et plusieurs de ses partenaires commerciaux plus jeunes, dont les projections démographiques impliquent un choc d'offre négatif relativement plus faible, et donc une augmentation du prix relatif des biens produits au Canada. Les gains résultants de la mondialisation des flux de commerce pourraient donc être intensifiés par une diversification de commerce qui prendrait en compte l'amplitude et l'asynchronisme du vieillissement des populations de diverses régions du monde. L'implication politique principale de cette analyse est que la diversification du commerce canadien en faveur de pays qui vieillissent plus vite que les Etats-Unis, comme le Japon ou l'Europe, n'est pas nécessairement désirable

Mots clés: *Mondialisation, politique commerciale, diversification du commerce, vieillissement de la population, générations imbriquées, modélisation en équilibre général calculable*

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1. Introduction

As observed by Head (2007), Canada's debate on trade policy is typically centered on two questions, one strategic and one tactical. The strategic question is whether Canada should diversify its trade pattern away from the U.S., or whether it should pursue deeper integration with the U.S. The tactical question is how we should do so. For example, Canada could engage more with the rest of the world through multilateral trade negotiations (the Doha Round), through formal free trade and investment agreements with selected countries, through ad hoc bilateral trade and investment promotion (Team Canada missions) or through a unilateral decision to free-trade regardless of what other countries do (Helliwell, 2002; Dobson, 2006; Head, 2007). Canada could pursue deeper integration with the U.S. by reducing the burden of the border, through harmonization of regulatory procedures, common external tariff, customs union, liberalization of NAFTA rules of origin, liberalization of the remaining restrictions on U.S. direct investment in Canada, free movement of labor, and negotiations to curb U.S. trade remedy laws (*e.g.*, Dobson, 2002; Harris 2003; Goldfarb 2003; Hart, 2007; Mandel-Campbell 2008, Georges 2009).

Although strategic and tactical issues are clearly nested, the focus of this paper is mainly on the strategic and controversial question of whether Canada should diversify its trade away from the U.S. Many opponents and proponents in this debate typically trumpet "huge" potential gains resulting from their favoured option without providing much estimate of these gains. Indeed, empirical evidence is rare and when it exists, does not necessarily corroborate these claims. Moreover, the available empirical evidence does not take into consideration an important feature of the 21st century, the demographic

changes around the world that accompany the globalization process for goods and services, capital and labour.

The objective of this paper is thus to provide a stronger guidance in this debate by quantifying the economic impact of trade diversification within the perspective of an overall ageing world, when globalization is intensifying both international trade and capital flows. For this, we use a multi-country overlapping-generations computable general equilibrium model that takes into account the demographic shock that several regions of the world will experiment during the first half of the 21st century. The model represents seven regions of the world that make up the world economy: Canada, the U.S., Japan, the E.U., China, India and the rest of the world (ROW) which is aggregated into one region to close the model. The model has an overlapping-generations structure based on Samuelson (1958), Diamond (1965) and Auerbach and Kotlikoff (1987). Each region produces one single good which is an imperfect substitute to the good produced in any other region (the Armington assumption). Consumers in each region consume a basket of all the imperfectly substitute goods produced in all regions of the world. In this paper we restrict our analysis to endogenous capital flows, assuming immobility of labor between countries.

Our simulations show that although population ageing in Canada is expected to have a negative impact on economic welfare, international trade should prop up real consumption per capita through terms of trade improvements during the first half of the 21st century. This reflects a population ageing gap between Canada and many of its trading partners (including the U.S.) with "younger" populations whose demographic projections entail relatively smaller negative supply shocks and lesser relative price

increases. However, the gains resulting from the globalization of trade flows might be intensified through an accurate pattern of North-South trade diversification that takes into account the extent and timing of population ageing in diverse regions of the world. The main policy implication of this analysis is that a diversification of Canada's trade away from the U.S. in favor of faster-ageing countries or regions such as Japan or E.U. (a North-North trade diversification scheme) is not necessarily desirable.

The rest of the paper is as follows. Section 2 reviews some positions in the strategic debate of trade policy; it also provides demographic projections for some regions of the world in the 21st century and shows why trade and ageing issues are intimately linked in the globalisation trends of trade, capital and labour flows. This justifies the use of a multi-country model of overlapping generations that simulates world population ageing while also gauging the economic impact of trade diversification. Section 3 provides some simulation results and explores the demographic argument in favour of North-South trade diversification schemes while questioning the benefits of North-North diversification schemes away from the U.S. Section 4 gives some policy implications, qualifies our research, and concludes.

2. Trade policy debate, population ageing, and globalization

Tables 1 and 2, based on the GTAP 6 database (Dimanaran and McDougall, 2005), provide a convenient starting point to the strategic trade policy debate in Canada by illustrating the bilateral import and export shares of Canada and several other countries/regions, U.S., European Union (E.U.), Japan, China, India, and an aggregate of the Rest of the World (ROW). For example, 61% of Canadian import originates from the U.S. (Table 1), while 75% of our export goes to the U.S. (Table 2). Aside trade with the

E.U., Canadian trade with other markets and in particular with emerging markets such as China and India is clearly marginal -- 3.7% and 0.5% of our import originate from these countries, while 1.8% and 0.3% of our export go to these two countries.

2.1 Trade policy debate

The strategic positions on Canadian trade policy are easily foreseen from these two tables. On one hand, some politicians and commentators argue that the Canadian economy is too much exposed to the U.S. economy and that alternative markets must be developed in order to diversify away from the U.S. economy. One could argue, for example, that the recent financial crisis and subsequent faltering of the U.S. economy has changed the dynamics of the world market and that this should remind Canadians of the risk involved in having so many eggs in the American basket. This position is far from being new; there are indeed well-known historical attempts to reduce Canada's vulnerability to the U.S. by seeking closer economic links elsewhere. For example, in 1957, Dienfenbaker the –then– Prime Minister of Canada announced that Canada would switch 15 percent of its trade from the United States to Great Britain. In the 1970's, under Prime Minister Trudeau, the government searched for closer economic link with the European Community. On the other hand, others advocate an almost exclusive focus of trade policy on the U.S. For example, Hart (2007) claims that: "more than ever, the two-way movement of goods and services across the Canada-U.S. border is Canada's economic lifeline…Engagement with our Southern neighbour is the indispensable foundation of any Canadian policy to maximise benefits from international trade and investments."

The fact is that in the 2000s, trade "negotiation resources" have been spread thinly between multilateral trade negotiations at the WTO, bilateral or regional trade negotiations, Team Canada missions to promote trade and investment across the world, and several initiatives that have been undertaken to reduce the increasingly dysfunctional impact of the Canada-U.S. border administration (due, in part, as a response to the new security realities created by 9/11). And although economic life without the U.S. is difficult to imagine, especially due to the geographical proximity of both countries, the true issue with respect to the strategic question and the best allocation of "negotiation resources", as pointed out by Head (2007), is about our effort on the margin: "Would the allocation of more resources to deeper integration with the U.S. generate larger marginal net benefits than a similar resource allocation directed at broader integration with the rest of the world?" Hart (2007) claims that "teams up to 85 individuals representing 20 or more federal agencies routinely travel back and forth between Canada and South Korea in pursuit of a trade agreement that may never see the light of the day". On the other hand, Pastor (2008) ironically refers to the "North American game of Scrabble" which, since 2001, leads political leaders of Canada, Mexico and the U.S. to devise intergovernmental committees, meeting periodically to "spell new acronyms that purport to be initiatives", while if one measures progress by examining the growth in trade, the reduction in wait times at the borders, and the public support for integration, all of these initiatives have failed miserably.

As pointed out in the introduction, both opponents and proponents in this debate typically claims "huge" potential gains resulting from their favoured option without providing much evidence. With respect to deeper integration with the U.S., Georges

(2009) evaluates, using a CGE methodology, the economic impact of moving to a North American customs union by decomposing the concomitant gains occurring from liberalizing rules of origins (ROO) and establishing a common external tariff. Canadian real GDP could increase by 0.5% on a permanent basis, but most of this gain would originate from the elimination of ROO. The study also shows that the gains resulting from a potential customs union have been falling over time relative to a beneficial impact of about 1% of real GDP that could have been captured in the 1990s. The reason is that ROO are now less distortionary than when NAFTA was concluded due to the erosion of NAFTA tariff preference since the phasing in of the Uruguay Round measures. Hence this option, which would require an intensive use of negotiation resources due to a current lack of interest in the U.S. for a customs union with Canada, does bring "some", but certainly not "huge", net benefits. Furthermore, if the Doha Round of multilateral MFN liberalization was pursued, a quite hypothetical statement at this stage, the perceived additional gains that could be captured from a customs union would also continue to plummet.

The claims related to significant gains from diversifying trade away from the U.S. are even less substantiated and one objective of this paper is to shed some light on their magnitude. Demography is often used as an argument for the relative decline in importance of the North American market and the need for diversification. For example, Helliwell (2002) claims that: "North America is destined, through the joint forces of demography and catch-up, to be a smaller and smaller share of the world economy. To focus emphasis on the smaller part of the global pie may seem attractive during booming times in the United States economy, but would be a short-sighted strategy".

2.2 Population ageing and globalization

Population ageing will indeed be a defining feature of the economic landscape of major industrialized and some emerging countries during the course of the 21st century. Population ageing is typically explained by a combination of factors: declining fertility rates, rising life expectancy, and net migrations. Most OECD countries, albeit at different degrees, have experienced significant declines in fertility rates and increases in life expectancy since the 1960s and 1970s. When we look at non-OECD countries, population growth in China is also slowing and its population will age at a rapid pace over the next decades, while the population in other emerging non-OECD countries, like India is still growing rapidly and their populations remain relatively young. Latin America is also at the beginning stages of a demographic process with a relatively young population.

More specifically, Table 3 provides the assumptions behind the "medium variant scenario" of the United Nations (UN) demographic projections in each region of the world. Over the next 10 years, the total fertility rate (i.e., the number of children per woman in her lifetime) is assumed to average 1.3 in Japan, 1.5 in E.U. and Canada, 1.8 in China, 2.0 in the U.S., and 2.3 in India. The UN demographic projections also assume that the total fertility rate in many regions of the world will eventually converge to 1.85 by 2050 although it will remain lower in Japan (1.6) and in E.U. (1.76).

Also, according to current data, Japan and Canada enjoy higher life expectancy at birth, followed by the U.S., E.U., and China. Moreover, the UN demographic projections assume that life expectancy will rise by 5 to 6 years over the next 50 years for these countries. In contrast, India has a much lower life-expectancy at birth, although the UN

demographic projections assume that life expectancy in India will rise rapidly over the next decades, from 65 years in 2005-2010 to 75.6 years in 2045-2050. Finally, the projections assume that Canada, E.U., the U.S. and Japan will continue to enjoy net in-migration over the next decades, while India and China will face net international out-migration.

The demographic assumptions behind Table 3 can be used to project the extent and timing of ageing across developed and developing countries. Figure 1 illustrates the magnitude of the demographic shock using a simulated elderly dependency ratio (population 65+ as a ratio of the population 15-64) by regions of the world, over the period 1980 to 2070.[1] As can be seen, Japan is by far the fastest ageing country, with the elderly dependency ratio rising from 25% in 1990 to 70% by 2040. The E.U. has the second highest elderly dependency ratio, followed by Canada, although the *change* between 1990 and 2040 is similar to Canada. The elderly dependency ratio is expected to rise from 25% in 1990 to about 50% in 2040 in the E.U., compared to a rise from 18% to 43% for Canada. In contrast, the U.S. has a more moderate increase in the elderly dependency ratio, which is projected to move from 20% in 1990 to 32% in 2040 in part because the U.S. has a much higher total fertility rate than in most industrialized countries.

The Chinese elderly dependency ratio follows a quite different pattern than in the other regions of the world. In 1990, China had one of the lowest elderly dependency ratios (about 10%). However, the drastic fall in the fertility rate combined with net out-

[1] Figure 1 gives a baseline old-age dependency ratio consistent with the UN medium variant demographic projections. It is generated by superimposing, into our multi-country OLG model, laws of motion of populations calibrated using exogenous demographic factors such as fertility rates and life expectancy (survival rates).

migration will lead to a sharp increase in the elderly dependency ratio over the next several decades, reaching 30% in 2040 and continuing to rise. Finally, India has a relatively young population and its elderly dependency ratio is expected to rise modestly from 10% in 1990 to less than 20% in 2040.

There is a rich and abundant literature of country-specific studies examining the macroeconomic and fiscal implications of population ageing. However, country-specific analyses usually neglect the aspects of globalization. Ignoring the rest of the world can be misleading in terms of implications for growth in living standards, labor market flows, and international capital flows, for a number of reasons. First, globalization and the rise of a huge, but relatively unskilled labor force in China and India may have significant implications for incomes in North America and Europe. For example, based on the Heckscher-Ohlin model and the factor price equalization theorem, it has often been argued that trade with China may be one of the factor contributing to the tendency for a distributional shift in rich countries against unskilled workers in favor of the higher skilled, even in the context of immobility of labor across countries. While much of the initial research suggested that trade has played only a small role in raising inequality -- as skill-using and unskilled-labor-saving technological change would have the same effect -- more recent work focusing on the role of imported intermediate inputs has generated larger estimates of the negative impact of trade on unskilled wages in rich countries (Feenstra, 2000, and Feenstra and Hanson, 2004).

Second, country-by-country demographic analysis might lead to the conclusion that greater immigration is a valuable option to offset declining fertility rates. This may not be true in a global context, where immigration is a zero-sum game. For example,

while Canada may think of itself as a small open economy for immigration purposes, and thus able in theory to import as many immigrants as it wants, (see Fougère, Harvey, Mérette, and Poitras, 2005), this is simply not true of the OECD as a whole. In particular, international competition for skilled workers is becoming a more important issue, and it can only be examined in a global context, preferably with endogenous labor flows.

Finally, there is empirical evidence that demographic changes induce international capital flows. According to Higgins (1998), the demographic "center of gravity" for investment demand should be earlier in the age distribution than that for the savings supply. Typically, it is argued that in a world of increasing capital mobility, the difference in pace and magnitude of demographic changes across countries may lead to international capital flows between faster and slower ageing regions of the world. The international capital market would be able to offer better returns to savings to faster ageing countries, which other things equal, would tend to export their excess savings and run a current account surplus, while also stimulating capital-deepening and therefore growth in younger countries. Using simulated multi-regions overlapping generations models, Börsch-Supan, Ludwig, and Winter (2006), Krueger and Ludwig (2007), Fehr, Jokisch and Kotlikoff (2005), Équipe Ingénue/Ingenue Team (2007), and Feroli, (2003, 2006) have shown that population ageing will indeed induce capital flows between countries.

The multi-country OLG literature cited above does not truly model international trade. Typically, these models feature a one-good world. All countries produce the same perfectly substitutable good so that, although the investment-saving balance will lead to current account deficits or surpluses, the only transaction with other countries takes place

in the form of physical capital investment. Other traded goods flowing between countries are not modeled. The model that we have developed formally introduces trade in goods between countries by using the Armington assumption of imperfectly substitutable goods. Each region in the model produces one single good which is an imperfect substitute to the good produced in any other regions. Therefore, households in each region consume a basket of all the imperfectly substitute goods produced in all regions of the world. For the purpose of this study, we aggregated all sectors of the GTAP6 database into one single (imperfectly substitutable) good for each country.[2] A brief description of the model is given in the Appendix, while a full description of the model, its calibration and the demographic shock is provided in Mérette and Georges (2009).

3. Simulated Results

Population ageing will lead to a reduction in labor force growth. Thus, it can be interpreted as a negative labor supply shock which reduces potential output. Figure 2 presents the impact of population ageing in our multi-country model on real GDP per capita over the period 1980 to 2070. As expected, among all regions, Japan and E.U. are the most negatively affected by population ageing, with an earlier and sharper decline in real GDP per capita. Relative to the "no-ageing" steady state scenario, real GDP per capita in both Japan and E.U. begins to fall at the start of the 21st century, while it continues to increase for a while in the other regions.[3] The fall in the Japanese and E.U.

[2] However, the code of the model is written more generally to allow for a sectoral decomposition and multi sectoral production in each country and this feature will be used for future extensions.

[3] Our objective is to gauge the impact of ageing with respect to a control scenario without ageing --a "non-ageing" steady state scenario. Establishing a "shock minus control" measure of ageing by "removing" a large demographic shock is not a conceptually easy exercise because the model assumes rational expectations in a variety of markets. For example, we cannot simply subtract from our simulated results the calibrated values generated for a specific year or a specific period of time (1980-2000), and which are based on the assumptions that the economy, in that period, is at a steady state with stable populations. By doing this we would remove both the "pure" demographic shock as well as the impact of the change in

GDP per capita (due to ageing) is about 15% between 2000 and 2050. Although Japanese workers typically retire later than workers in other regions, this is not sufficient to offset the negative effect of population ageing on real GDP.

Soon, North America will also be negatively affected by ageing. Indeed, real GDP per capita for Canada and the U.S. peaks in 2010 and declines thereafter. The impact of ageing on Canada is however much more pronounced with a fall of 13% between 2010 and 2050 versus 8% for the U.S. during the same period. Looking at the other side of the ageing spectrum, India has a relatively young population and, as can be seen in Figure 2, strongly benefits from the demographic changes as its real GDP per capita increases until 2030 with respect to the initial steady state and then stabilizes thereafter at that level.

Finally, the impact of ageing in China is stunning. The Chinese economy has an abundant workforce at the turn of the 21st century, and this contributes to raise real GDP per capita until 2010. Eventually however, as the demographic shock in China due to the one-child policy starts to kick off, the supply of labor falls and contributes to lower real GDP per capita below the initial steady state. By 2070, the fall in real GDP per capita (of close to 20% with respect to 2010) is even stronger than the one Japan is likely to experience.

Although the fall in GDP should contribute, through an income effect, to lower consumption per capita, globalization through international trade should help sustaining consumption in most OECD countries through favorable terms of trade effect. Most of

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expectations about the future demographic shock. To better capture the pure demographic shock we therefore subtract, from the simulated values obtained over the 1980-2070 horizon, (the most pertinent horizon in regard to the demographic transition), the simulated values reached in year 1980. This procedure cancels off the expectations about demographic transition already embodied in stock variables such as physical capital stocks and net assets position in 1980 and therefore provides a better approximation of the pure impact of ageing.

the multi-country OLG literature discusses a "one-good" world and therefore cannot capture this terms of trade effect. However, in our model, the goods produced are assumed to be imperfectly substitutable across countries (the Armington assumption) and the price-elasticity of demand for a country's good is not infinite. Agents consume a diversified basket of goods. Therefore, if for demographic reasons the relative supply of a country's good shrinks with respect to the other countries' supply, then the relative price of its good should increase and older (younger) than average countries should see an improvement (deterioration) in their terms of trade (Table 4). An improvement in the terms of trade means that countries can import more than before, for unchanged real export, so that *ceteris paribus*, their real consumption can increase. Thus, in an open economy context with imperfectly substitutable goods, real consumption per capita is not likely to fall as much as it would in either a closed-economy or a one-good world-economy context. In contrast, younger countries might have a smaller increase in their consumption per capita (relative to a closed economy or a one-good world benchmark) as they experience deterioration in their terms of trade which requires, *ceteris paribus*, supplying more of their goods on world markets.

Globalization permits consumers of all countries to access a geographically more diversified basket of goods and to increase the foreign component of their basket. Figure 3 illustrates that older and more "open" countries benefit from consuming a larger share of those goods produced by younger countries and whose price did fall relatively. Real consumption per capita in Japan tends to fall because of the strong negative income effect (Figure 2). Although Japan could potentially benefit from a strong appreciation in its terms of trade, it does not materialize because it is a relatively "closed" economy. In

contrast, the much more open economies of E.U. and Canada strongly benefit from the terms of trade appreciation. Indeed, this "price" effect more than offsets the income effect of Figure 2 and real consumption per capita continues to increase up to 2020, after which it declines until 2050 by roughly 3% for Canada. Notice that in North-America, the relative performance between the economies of the U.S. and Canada is reversed. While in terms of GDP per capita, the U.S. is doing better, Canada's per capita consumption, thanks to its more open economy, does not fall below its 2010 level for most of the 21st century, whereas the U.S. will be below its 2010 level for most of the century.

India gets a strong boost in real consumption per capita despite terms of trade deterioration due to a strong positive income effect. This income effect is itself stimulated by capital deepening in India and the ROW (see Mérette and Georges (2009) for further details). The case of China is again striking, especially when observing the diametrically opposite directions taken by China and India's real consumption paths from 2020 on. For China, both income and price effects contribute to reinforce the negative impact on real consumption per capita. Indeed, the timing of the one-child policy makes the Chinese economy both a (still) relatively young country with respect to OECD countries but an old one with respect to India and other parts of the world. Being caught between younger and older countries, the relatively closed Chinese economy does not benefit from terms of trade appreciation occurring to the older, more open, OECD countries, nor does it strongly benefit from capital deepening through net foreign capital inflows. This analysis is pursued further in Mérette and Georges (2009).

Figure 4 shows how Canada would gain if it was diversifying its trade away from the U.S. in favour of specific trade partners. For these experiments, we reduce the U.S. share in Canadian consumer basket from the current 61% to 51% while successively increasing the share of other partners as shown in Table 5. This reorientation of trade flows is not likely to happen quickly even under draconian policy measures. Therefore the change in shares is implemented permanently, but incrementally, by 2.5% points every ten-year over a forty-year period, starting in 2020 until the full share change is achieved in 2050.[4]

Our results indicate that relative to the benchmark case of strong dependence of Canada's trade with the U.S. economy, Canadians would benefit from a diversification scheme with India, and to a lower degree with China, but would lose from a diversification scheme with E.U. or with Japan. For example, if Canadians were increasing the share of Indian goods in their consumption basket by 10 % points, this would be enough to offset the negative impact of ageing by propping-up the real consumption per capita along a slowly upward-sloping path above its 2020 level. Therefore, between 2020 and 2050, real consumption per capita in Canada would increase by about 1.5% instead of falling by 3%. Hence, real consumption per capita would be roughly 4.5% above its benchmark level in 2050 if this diversification scheme was introduced. Other diversification schemes do not provide such benefits. In particular, diversification with E.U. or Japan would accentuate the loss of welfare that is expected due to population ageing. The choice of diversifying to Europe instead of India would cost Canadians roughly 6% of real consumption by 2050.

[4] From a modeling perspective this shock is implemented by exogenously changing the share parameters in the Armington-based import demand functions.

Figure 5 shows the results for both North-North and North-South diversification schemes. In the North-North diversification away from the U.S., the share of Japanese and E.U. goods increases each by 5% points in the Canadian consumption basket (while the U.S. share falls by 10% points). The North-South diversification scheme represents a weighted average of the previous diversification schemes to China, India, and the ROW – the 10% points share increase is spread equally between China, India, and the ROW. The ROW is a composite of all remaining countries/regions of the world, such as Russia, Africa, South-America, Oceania, Arabic countries, Turkey and Turkic countries. Figure 5 illustrates that, according to our simulations, North-South diversification schemes may improve Canadian welfare by propping up real consumption per capita, whereas North-North diversification schemes away from the U.S. would amplify the expected burden associated with population ageing in Canada. The choice of diversifying to the North (Europe and Japan) instead of the South (China, India, and ROW) would cost Canadians roughly 5% of real consumption by 2050.

Clearly, there are a myriad of assumptions underlying any CGE model, and this is also the case here. Therefore it is important to conduct a sensitivity analysis to put the magnitude of our results in the context of alternative assumptions that might impact some variables explored in the paper. One key parameter in our study is the Armington elasticity of substitution between goods of the regions included in the model. It is set in the reference analysis at +2.5 (the value provided in the GTAP6 database). We now vary the value of this parameter by about ±30% [+1.8; +3.2] and show the impact of this variation on the real consumption per capita associated with the North-South and North-North trade diversification scenarios. Figure 6 shows a confidence interval

(corresponding to the high and low Armington elasticity values) for both scenarios, each centered on the real consumption path corresponding to the Armington value in the reference analysis (as in Figure 5). Of course, the terms of trade effect described above is stronger with a higher Armington elasticity of substitution (i.e., when consumers react more to price changes). However, the key result in Figure 6 is that a variation in the Armington parameter does not change fundamentally our previous result. For example, when compared to a North-South trade diversification scenario, a North-North scenario would continue to cost Canadians roughly 5% of real consumption by 2050 at both high and low parameter values.

Our analysis of trade diversification has focused on import diversification. Yet, many commentators seem to stress export diversification. However, Goldfarb (2006) raises doubt about export diversification as a way to increase economic welfare. She applies the concepts of return and risk of the investment portfolio theory to a country's "trade portfolio" using export growth and export values as measures of return, and export volatility as a measure of risk. If further geographic diversification of Canadian export reduces volatility while maintaining or only slightly decreasing export values, then such diversification could improve economic welfare. Goldfarb argues eventually that "over the past decade, Canadian export to the U.S. have been less volatile on average than have exports to most other regions…Shifting exports away from the U.S. over the past decade would likely have increased volatility and decreased trade growth, making Canada worse off, assuming all else was equal".

While we are sympathetic to the position she is pushing, we argue that the emphasis of our paper on *import* trade shares instead of *export* shares or export

diversification is more relevant to the case of trade diversification. Export is not an end in itself (at the macro level of the economy, of course, not necessarily at the micro-level of the individual firm) and, to quote Krugman (1993), "the need to export is a burden that a country must bear because its import suppliers are crass enough to demand payments". Unlike the misleading mercantilist "concession language" of trade negotiators, trade theory shows that the main objective of international trade and the ensuing gains from trade for a country as a whole comes from the possibility to import some goods at a relatively lower price than the opportunity cost to produce them with domestic resources.

In order to illustrate this point, we now assume that India decides to increase its share of Canadian goods by 5% points (of its total imports) while reducing the share of goods originating from the rest of the world by 5%. Table 6 shows the benchmark and counterfactual shares. We see that this maintains Canada as a smaller import supplier to India than the U.S., but a larger import supplier than Japan or China. Figure 7, however, shows that the economic welfare of Canadians as approximated by real consumption per capita remains virtually unchanged, which tends to confirm that *import* trade shares are more crucial to the case of trade diversification as a way to improve economic welfare than *export* shares or export diversification.

4. Conclusion: policy implications, caveats, and extensions

To the strategic question of whether Canada should diversify its trade pattern, our answer is a strongly-qualified yes, with three substantial caveats. First, the quest of the Canadian government for regional trade diversification and FTAs with some countries seems out of tune with our analysis given their foreseeable faster-ageing demographic patterns. Canada has embarked on a series of bilateral negotiations as documented in

Tables 7-9. Three new FTAs have been signed (but not yet ratified) in 2008: two of these are with South-American countries (Peru and Columbia), and one with European countries forming the European Free Trade Association (EFTA). Pending bilateral trade negotiations are currently conducted with other Central and South American countries (Panama, Dominican Republic, Central America CA-4, the Caribbean Community), with some Asian countries (Korea, Singapore), one Arab country (Jordan), and, most recently, with the E.U. (the Canada-European Joint Report Towards a Comprehensive Economic Agreement).

We share the opinions of Head (2007) and Hart (2007) that agreements with countries like Israel, Costa Rica and Chile are unlikely to bring high benefits *per se*, and devoting major resources to an agreement with other small Central and South-American countries also seems of dubious value. Brazil (or Mercosur) however, (which is not included explicitly but is part of the ROW in our model), would probably be a more relevant partner. Moreover, our demographic argument for North-South trade diversification raises serious concerns about the relevance and economic impacts of the recently concluded free-trade agreement between Canada and the EFTA as well as the trade-related negotiations between Canada and the E.U. which have been officially launched in Prague in May 2009. In the absence of strong support from the business community as a whole, such negotiations are easily derailed by import-competing interests. It took ten years to successfully negotiate a FTA between Canada and the EFTA even if this is a "first-generation" type of agreement with an emphasis on tariff elimination and which does not include substantial new obligations in areas such as services, investment, and intellectual property. Some news already suggest that officials

from both sides of the Canada-E.U. negotiations appear to be strides apart about what exactly is on the table. Incidentally, this might be a good opportunity for Canadian trade policy makers to reflect on the wisdom of this negotiation's resource allocation.

However, India's demography and evident economic momentum argues for greater Canadian policy ambition. As suggested by Dobson (2006), "Canada needs a comprehensive strategy that goes beyond the International Policy Statement that sets a rather narrow goal of surpassing $2 billion in exports to India by 2010 or an incremental initiative to facilitate industry and scientific collaboration". Our study shows that there is room for a deeper investigation of the potential benefits of a bilateral negotiation with India. Furthermore, as pointed out by Dobson (2006), "an FTA negotiation would send a powerful signal of commitment to Canadian business interested in penetrating the Indian market and using India as a platform for Asian operations". The key point, here, is that the "positive" influence of export lobbying would offset the negative lobbying influence of the import-competing interests, which could accelerate negotiations. Finally, as shown by Mérette and Georges (2009), although the growth potential of China has attracted much attention worldwide, an analysis that takes into account the global demographic context shows that India, more so than China, is a key promising developing country of the 21st century if it pursues its effort to integrate the world economy through both trade and capital flows liberalization while accelerating the movement of its workforce out of agriculture into the unskilled-labor intensive industry of the "organized" sector (Panagariya, 2006).

For our second caveat, much related to the tactical issue of *how* to diversify trade away, we need to be very explicit about what our modeling exercise does and does not.

In this paper, our focus is on the welfare impact of an exogenous change in trade shares that would diversify our trade pattern away from the U.S., and not on the mechanism that might lead to a change in these shares. However, the size, composition, and direction of trade flows result from the decisions of millions of private producers and consumers. These decisions may be influenced by government policy, but large and rapid shift of trade shares might require draconian policy measures.

As mentioned in Section 2, Dienfenbaker announced in 1957 that Canada would switch 15 percent of its trade from the United States to Great Britain. At the time, as stated by Hart (2002), it would have required a doubling of U.K. exports to Canada, a willingness by Canadians to shun the many desirable goods they were buying from the U.S. while substituting less desirable goods from the U.K., and a capacity by U.K. customers to absorb twice the value of Canadian shipments they were purchasing. Of course, this policy was rather naïve and blurred by nostalgia of Canada's historic ties to Britain and by a lack of appreciation of the extent to which commercial ties with U.K. customers and suppliers had been severed and new ones with the United States put in place.

Fearing that our proposal be compared to that naïve policy impromptu, we stress the importance of supplementing our analysis by (CGE) studies of policies and institutions that might cause endogenous changes in trade shares, whether multilateral or bilateral trade negotiations, or less formal trade missions (although, as pointed out by Head and Ries (2007), Canada's trade missions appear to have no significant effect on bilateral trade with the visited country).

Third, trade policy is not solely within the control of a single government. Rather, it requires the active cooperation of at least one other government, either in the negotiation of new agreements extending improved access or other commitments, or in the implementation of various other concessions. In other words, it is not sufficient to identify trade partners that might be a good fit for Canada, we also need to promote what we can offer.

This caveat might appear awkward given that the economist's case for free trade is essentially a unilateral one: a country serves its own interest by pursuing free trade (eliminating tariff and non-tariff barriers) regardless of what other countries may do. However, as Kruman (1997) puts it, "policy-oriented economists must deal with a world that does not understand or accept that case. Anyone who has tried to make sense of international trade negotiations eventually realizes that they can only be understood by realizing that they are a game scored according to mercantilist rules, in which an increase in export – no matter how expensive to produce in terms of other opportunities forgone – is a victory, and an increase in imports – no matter how many resources it releases for other uses – is a defeat."

The implicit mercantilist theory of "concession" language that underlies trade negotiation does not make sense on any level but it nevertheless governs actual policy and if we "have a fairly liberal world trading system, it is only because countries have been persuaded to open their markets in return for comparable market-opening on the part of their trading partners;…in practise, countries seem willing to do themselves good only if other promise to do the same." (Krugman, 1997.) Hence our question, why should India be interested in a FTA with Canada?

One response is suggested by Dobson (2006) when she claims that: "Since 1991, successive governments have sought to liberalize trade and capital flows to increase India's share of world trade and to integrate more deeply into the world economy. As well, India has played a leading role in the multilateral negotiations at the WTO;… [bilaterally,] the United States is India's obvious strategic priority in the Western hemisphere, but recent analyses of the feasibility of a comprehensive U.S.-India bilateral FTA conclude that it is a radical idea for both countries whose time has not yet come, even though it would bolster India's economic liberalization agenda." Hence, a negotiation with Canada would be a significant strategic signal of India's potential importance to the North American economies and would serve Indian interests beyond the Canadian market.

Our study implicitly includes Brazil and Russia to the extent that these countries are part of the ROW region that closes the model. In future research we plan to explicitly introduce Brazil and Russia into our framework to contrast BRIC economies (Brazil, Russia, India, and China) with JEU economies (Japan, E.U. and the U.S.). The decline in working-age population is projected to take place later in BRIC than in JEU, but will be steeper in Russia and China than in India and Brazil. More favorable demographic shifts in BRIC suggest that JEU may want to develop further North-South trade. The later ageing process in India and Brazil over Russia and China also suggest that the economic opportunities may become larger with the former two economies in the second quarter of the 21st century.

Appendix: Structural Description of the Model

The OLG model that we have built is composed of seven regions that make up the world economy: Canada, the United States, Japan, the European Union, China, India and the rest of the world (ROW). In the following we describe briefly the production sector in each region, the household sector, the government sector, the PAYG pensions systems, and the market equilibrium conditions.

A.1 The production sector

In each region *j*, a representative firm produces at time *t* a single good using a Cobb-Douglas technology. The firm hires labor and rents physical capital. Both factors are region specific. With *Q* representing output, K physical capital, L effective units of labor, *A* a scaling factor and α the share of physical capital in value added, a region specific production function is:

$$Q_{j,t} = CD\left(K_{j,t}, L_{j,t}; A_j, \alpha_j\right). \tag{1}$$

Firms are assumed to be perfectly competitive and factor demands follow from profit maximization.

A.2 Household behavior

Each region of the world is represented by 7 representative households in an Allais-Samuelson overlapping generations structure. Individuals enter the labor market at the age of 15, retire (in average) at age 65 and die at the end of their 84th year. We classify generations into seven age groups *g* (*i.e.*, 15-24, 25-34, …75-84 age groups) and each period in the model effectively corresponds to 10 years. Younger children are fully dependent on their parents and play no active role in the model. Variations across countries, in particular about the age of retirement, are taken into account in the model.

A household's optimization problem in region *j* consists of choosing a profile of consumption over the life-cycle, in order to maximize a CES-type inter-temporal utility function of consumption, subject to discounted lifetime income. Inter-temporal preferences of an individual born at time *t* are as follows:

(2) $$U_j = CES\left(C_{j,t,g}; \gamma_j, \psi_j\right), \qquad \text{with } 0 < \gamma < 1,$$

where *C* denotes real consumption; ψ is the pure rate of time preference and γ is the inverse of the constant inter-temporal elasticity of substitution. The household does not leave bequests to its children in this simple framework.

Assuming no borrowing constraints and perfect capital markets, the present value (*PV*) of household wealth is the discounted sum of labor income received at each period of time, $Y^L_{j,t,g}$, over lifetime:

(3) $$PV\left(Y^L_{j,t,g}, Pens_{j,t,g}; \tau^L_{j,t}, \tau^K_{j,t}, CTR_{j,t}, ret_{j,t}\right)$$

where *ret* is the rate of return on physical assets, τ^K the effective tax rate on capital, τ^L the effective tax rate on labor, and *CTR* the contribution to the public pension system. We assume that labor income is a function of the individual's age- and qualification-dependent productivity (earnings) profile $EP_{j,qual,g}$, itself defined as a quadratic function of age *g* with parametric values chosen to ensure that the maximum is reached between mid-life and retirement. Retirees' pension benefits, *Pens*, are proportional to their lifetime labor earnings. The fraction is defined by the pension replacement rate *PensR*.

Differentiating the household utility function with respect to its lifetime budget constraint yields the intertemporal first-order conditions for consumption. In the second optimization step, households of each generation must allocate their consumption

expenditures across the available seven imperfectly substitutable regional final goods using CES sub-utilities (the Armington assumption).

A.3 Investment and asset returns

The accumulation of each region's capital stock (*Kstock*) is the usual law of motion subject to depreciation:

$$Kstock_{j,t+1} = Inv_{j,t} + (1-\delta_j)Kstock_{j,t} \quad (4)$$

where *Inv* represents investment and δ the depreciation rate of capital. The investment technology is characterized by a CES function that also combines goods from the seven different regions. Financial markets are fully integrated. This means that financial capital is perfectly mobile across countries and undifferentiated so that interest rate parity holds. Government-issued bonds and capital shares are perfect substitutes and therefore bear the same *ex ante* return.

A.4 Government sector

For each region, the government budget constraint is standard. Public expenditures and debt services compose the expenditure side, whereas taxes on labor income, capital income and consumption constitute the sources of government revenues. Debt-to-GDP is maintained constant in the simulations. Pay-as-you-go pension benefits are financed exclusively by contribution rates on labor income.

A.5 Market and aggregation conditions

The model assumes that all markets are perfectly competitive. The equilibrium condition for the goods market is that each regional output must be equal to total demand originating from all regions. Labor and physical capital are immobile across regions, so a market exists for these two production factors in each region.

The world capital market must be in equilibrium, that is, the world stock of wealth accumulated by households at end of period *t* must be equal to the value of the world stock of capital and the value of the world stock of government bonds at end of *t*.

Note that the current account of region *j* can be derived from this model as the difference between national savings and domestic investment. Alternatively, the current account is either given as the trade balance plus the interest revenues from net foreign assets holdings, or as the difference between nominal GNP (GDP including interest revenues on net foreign assets) and domestic absorption. All three alternative formulations have been coded as an internal check for the model.

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Table 1. Bilateral import shares

↓	CAN	USA	EU	JPN	CHN	IND	ROW
CAN	0.0	15.7	1.1	2.1	1.7	1.3	1.2
USA	60.8	0.0	10.4	18.0	10.6	9.6	17.0
EU	15.3	22.8	54.5	19.3	17.3	26.2	30.5
JPN	3.9	9.9	3.3	0.0	17.8	4.2	8.5
CHN	3.7	8.9	3.0	14.7	0.0	4.4	6.2
IND	0.5	1.0	0.7	0.7	0.8	0.0	1.2
ROW	15.8	41.7	27.1	45.2	51.8	54.3	35.5
Total	100.0	100.0	100.0	100.0	100.0	100.0	100.0

Source: GTAP6

Table 2. Bilateral export shares

→	CAN	USA	EU	JPN	CHN	IND	ROW	*Total*
CAN	0.0	74.6	10.1	3.1	1.8	0.3	10.2	100.0
USA	16.2	0.0	29.3	8.2	3.3	0.7	42.3	100.0
EU	1.4	11.5	54.5	3.1	1.9	0.6	26.9	100.0
JPN	2.1	27.5	18.0	0.0	10.7	0.6	41.2	100.0
CHN	2.2	28.5	18.9	14.9	0.0	0.7	34.8	100.0
IND	1.7	19.9	28.6	4.7	3.5	0.0	41.6	100.0
ROW	1.6	22.2	28.4	7.6	5.9	1.4	32.9	100.0

Source: GTAP6

Table 3. Total fertility rate, life-expectancy at birth and net migration by regions of the world

Countries/Regions	**2005- 2010**	**2015-2020**	**2025-2030**	**2035-2040**	**2045-2050**
Canada					
Total fertility rate	1.53	1.55	1.65	1.75	1.85
Life-expectancy at birth	80.7	82.0	83.2	84.2	85.3
Net Migration (thousands)	200	200	200	200	200
USA					
Total fertility rate	2.05	1.94	1.85	1.85	1.85
Life-expectancy at birth	78.2	79.5	80.7	81.8	83.1
Net Migration (thousands)	1199	1100	1100	1100	1100
EU					
Total fertility rate	1.45	1.52	1.61	1.69	1.76
Life-expectancy at birth	74.6	76.4	78.2	79.7	81
Net Migration (thousands)	951	792	808	808	808
Japan					
Total fertility rate	1.27	1.30	1.40	1.50	1.60
Life-expectancy at birth	82.6	84.2	85.2	86.1	87.1
Net Migration (thousands)	54	54	54	54	54
China					
Total fertility rate	1.73	1.83	1.85	1.85	1.85
Life-expectancy at birth	73	74.9	76.6	78.1	79.3
Net Migration (thousands)	-350	-345	-320	-320	-320
India					
Total fertility rate	2.81	2.32	1.97	1.85	1.85
Life-expectancy at birth	64.7	68.4	71.4	73.7	75.6
Net Migration (thousands)	-250	-240	-240	-240	-240

Source: UN Population Division, World Population Prospects: The 2006 Revision, Medium Variant Scenario

Table 4. Terms of trade (1980 = 1)

	1990	2000	2010	2020	2030	2040	2050	2060
CAN	1.00	1.00	1.01	1.01	1.02	1.03	1.04	1.04
USA	1.00	1.00	1.01	1.01	1.01	1.01	1.01	1.02
EU	1.01	1.02	1.03	1.04	1.06	1.07	1.08	1.09
JPN	1.00	1.01	1.02	1.03	1.04	1.05	1.05	1.06
CHN	1.00	1.00	1.00	1.00	1.01	1.01	1.02	1.02
IND	1.00	1.00	0.99	0.99	0.99	0.99	0.99	0.98
ROW	0.99	0.99	0.98	0.98	0.97	0.97	0.97	0.97

Source: Authors' simulations

Table 5. Current and counterfactual country shares in Canada's import

↓	Benchmark import shares	Diversifying to EU	Diversifying to Japan	Diversifying to China	Diversifying to India	Diversifying to ROW
CAN	0.0	0.0	0.0	0.0	0.0	0.0
USA	60.8	50.8	50.8	50.8	50.8	50.8
EU	15.3	25.3	15.3	15.3	15.3	15.3
JPN	3.9	3.9	13.9	3.9	3.9	3.9
CHN	3.7	3.7	3.7	13.7	3.7	3.7
IND	0.5	0.5	0.5	0.5	10.5	0.5
ROW	15.8	15.8	15.8	15.8	15.8	25.8
Total	100.0	100.0	100.0	100.0	100.0	100.0

Source: GTAP 6 and Authors' computations

Table 6. Current and counterfactual country shares in India's import

↓	Benchmark import shares	Diversifying to Canada
CAN	1.3	6.3
USA	9.6	9.6
EU	26.2	26.2
JPN	4.2	4.2
CHN	4.4	4.4
IND	0.0	0.0
ROW	54.3	49.3
Total	100.0	100.0

Source: GTAP 6 and Authors' computations

Table 7. Free Trade Agreements

Agreements Partners	Announced and "In force" dates
Canada-US FTA	12-Oct-1987 *(superseded by NAFTA, which includes Mexico)*
North American FTA	01-Jan-1994
Canada-Israel	01-Jan-1997
Canada-Chile	05-Jul-1997
Canada-Costa Rica	Announced: August 2001; 01-Nov-2002
Canada-EFTA (European FTA)	Announced: October 9, 1998; 26-Jan-2008
Canada-Peru	Announced: June 7, 2007; 29-May-2008
Canada-Columbia FTA	Announced: June 7, 2007; 21-Nov-2008

Source: Foreign Affairs and International Trade Canada

Table 8. FTA bilateral trade negotiations

Canada-Panama	Announced: May 6-7, 2008; Inaugural trade negotiations: October 27-31, 2008
Canada-Dominican Republic	Announced: June 7, 2007; Inaugural trade negotiations: December 10-14, 2007
Canada-Central America-4 (El Salvador, Guatemala, Honduras and Nicaragua – the CA-4)	Inaugural trade negotiations: November 21, 2001; Renewed formal negotiations: February 23-27, 2009
Canada-Caribbean Community (CARICOM*)	Announced: July 19, 2007; Inaugural meeting of trade negotiators: October 18, 2007
FTAA: Free Trade Area of the Americas	Call for early resumption of FTAA negotiations: November 4-5, 2005
Canada-European Joint Report Towards a Comprehensive Economic Agreement	Announced: October 17, 2008; Inaugural trade negotiations: May 6, 2009
Korea	Announced: November 19, 2004; Inaugural trade negotiations: July 15, 2005
Singapore	Announced: October 21, 2001; Inaugural trade negotiations: January 2002
Jordan	Negotiation concluded: August 25, 2008

*CARICOM Members are: Antigua and Barbuda, The Bahamas, Barbados, Belize, Dominica, Grenada, Guyana, Haiti, Jamaica, Montserrat, Saint Lucia, St. Kitts and Nevis, St. Vincent and the Grenadines, Suriname, Trinidad and Tobago.
Source: Foreign Affairs and International Trade Canada

Table 9. Foreign Investment Promotion and Protection (FIPAs)

Canada – Bahrain	Pending
Canada – Tunisia	Pending
Canada – Tanzania	Pending
Canada – Indonesia	Pending
Canada – Madagascar	Negotiations concluded
Canada – Vietnam	Pending
Canada – Mongolia	Pending
Canada – India	Negotiations concluded
Canada – China	Pending
Canada – Jordan	Negotiations concluded
Canada – Kuwait	Pending
Canada – Peru	20-Jun-2007
Canada – Croatia	30-Jan-2001
Canada – Costa Rica	29-Sep-1999
Canada – Lebanon	19-Jun-1999
Canada – Uruguay	02-Jun-1999
Canada – El Salvador	Signed: 31-May-1999
Canada – Armenia	29-Mar-1999
Canada – Thailand	24-Sep-1998
Canada – Panama	13-Feb-1998
Canada – Venezuela	28-Jan-1998
Canada – Egypt	03-Nov-1997
Canada – Ecuador	06-Jun-1997
Canada – Romania	11-Feb-1997
Canada – Barbados	17-Jan-1997
Canada – Philippines	13-Nov-1996
Canada – Trinidad and Tobago	08-Jul-1996
Canada – South Africa	Signed: 27-Nov-1995
Canada – Latvia	27-Jul-1995
Canada – Ukraine	24-Jul-1995
Canada – Hungary	21-Nov-1993
Canada – Argentina	29-Apr-1993
Canada – Czech and Slovak Federal Republic	09-Mar-1992
Canada – USSR	27-Jun-1991
Canada – Poland	22-Nov-1990

Source: Foreign Affairs and International Trade Canada

Figure 1. Simulated elderly dependency ratio by regions of the world – 65 year old and above as a ratio of 15-64 year old

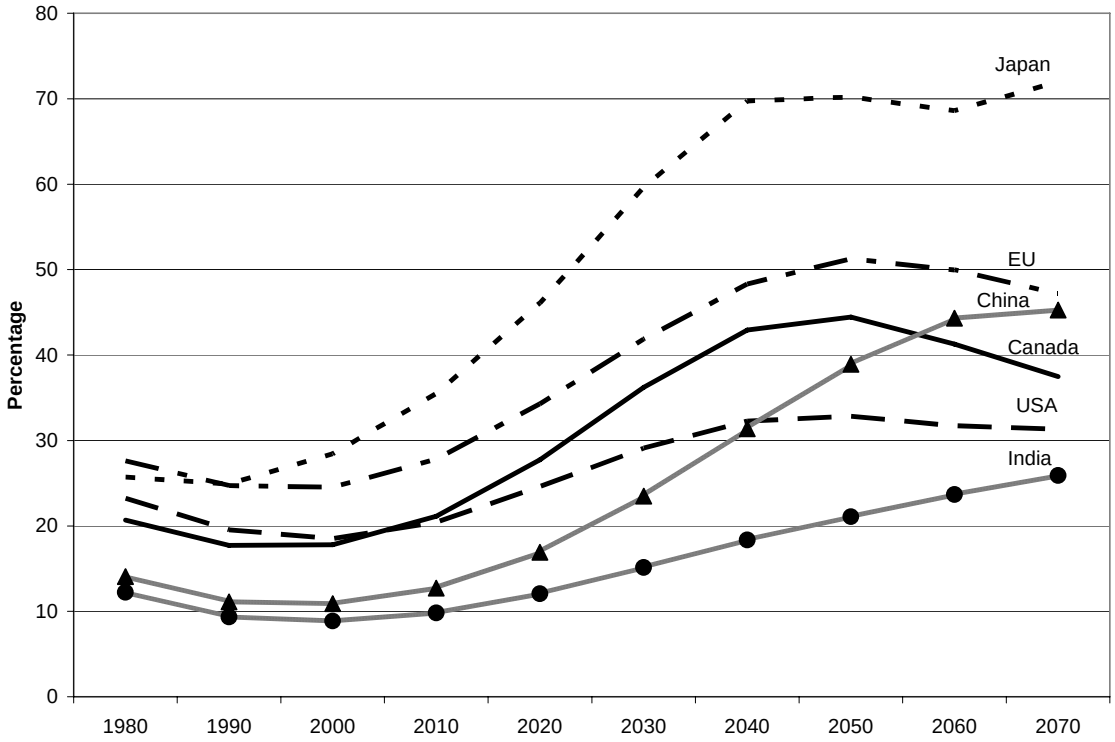

Figure 2. Real GDP per capita -- Relative deviation with respect to initial steady state

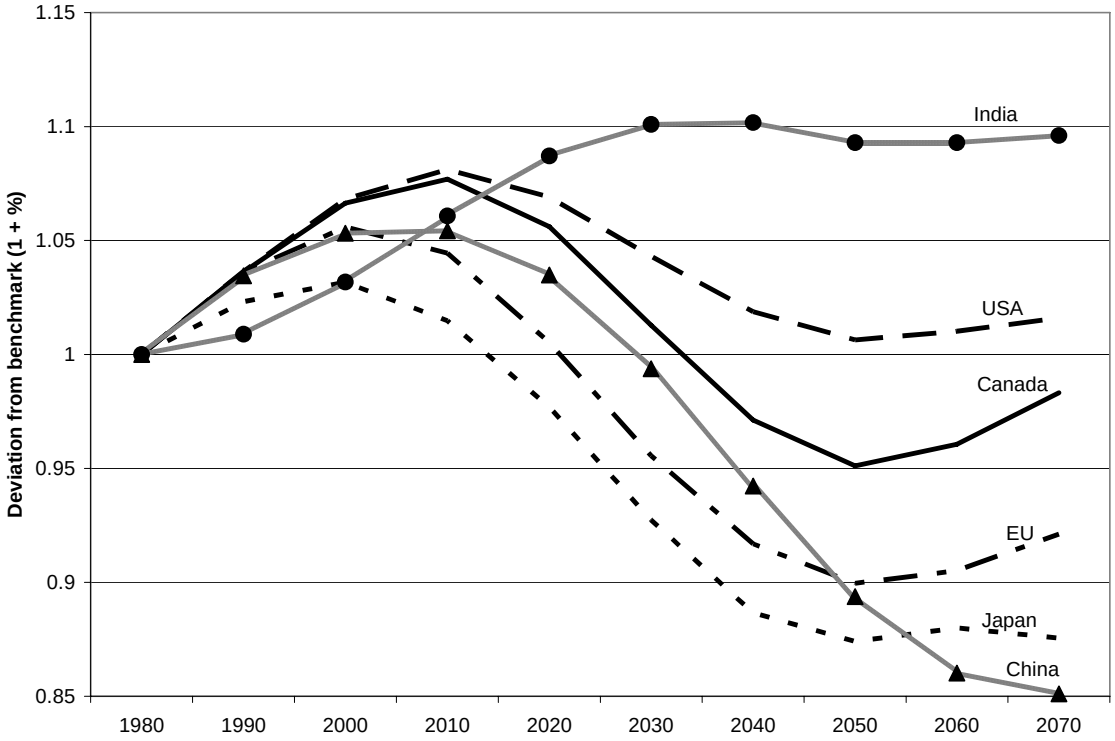

Figure 3. Real consumption per capita -- Relative deviation with respect to initial steady state

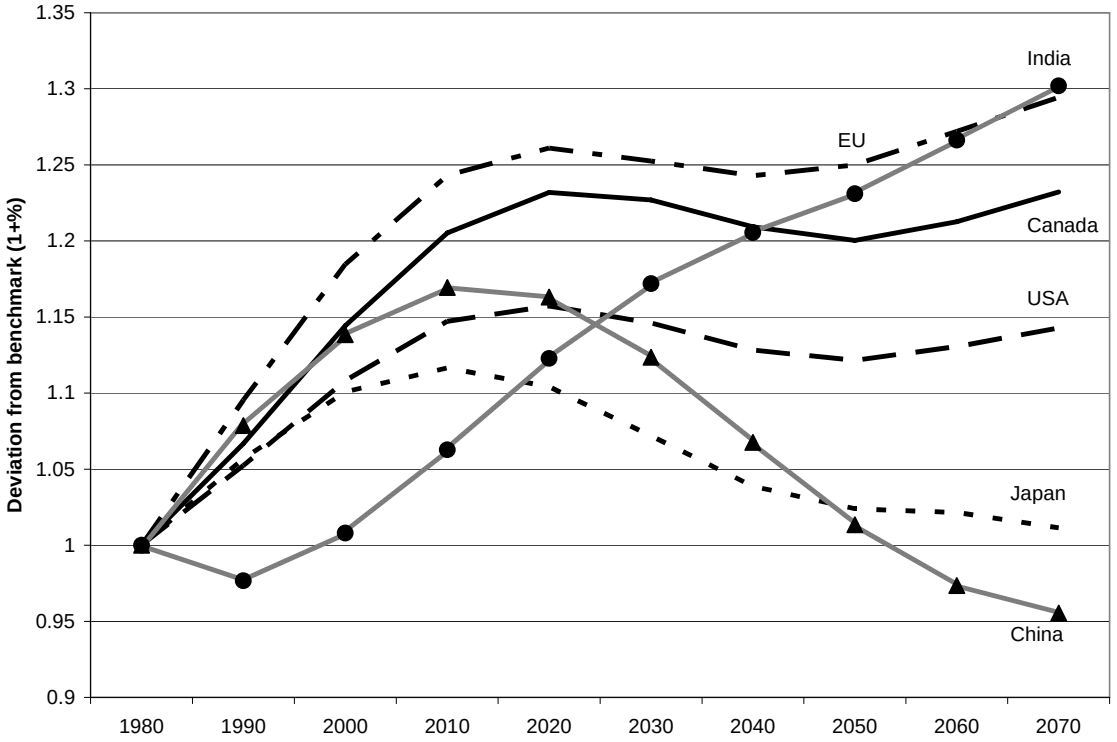

Figure 4. Diversifying Canada's import away from the U.S. -- Relative deviation with respect to initial steady state

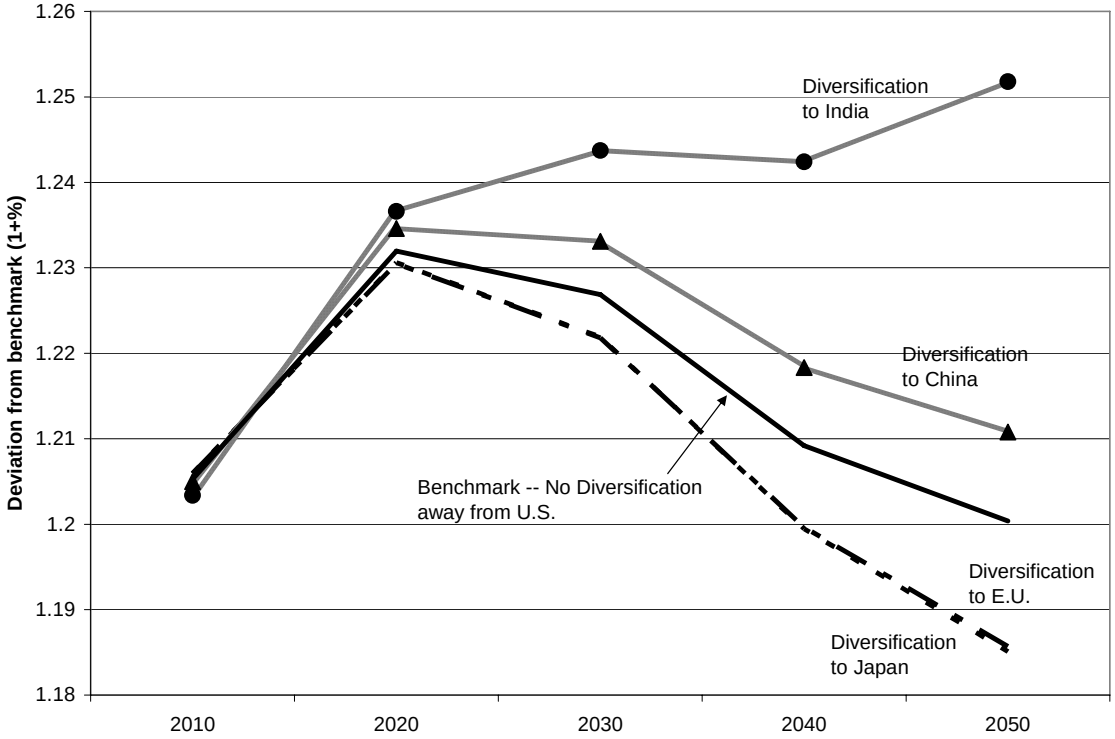

Figure 5. North-North and North-South diversification schemes -- Relative deviation with respect to initial steady state

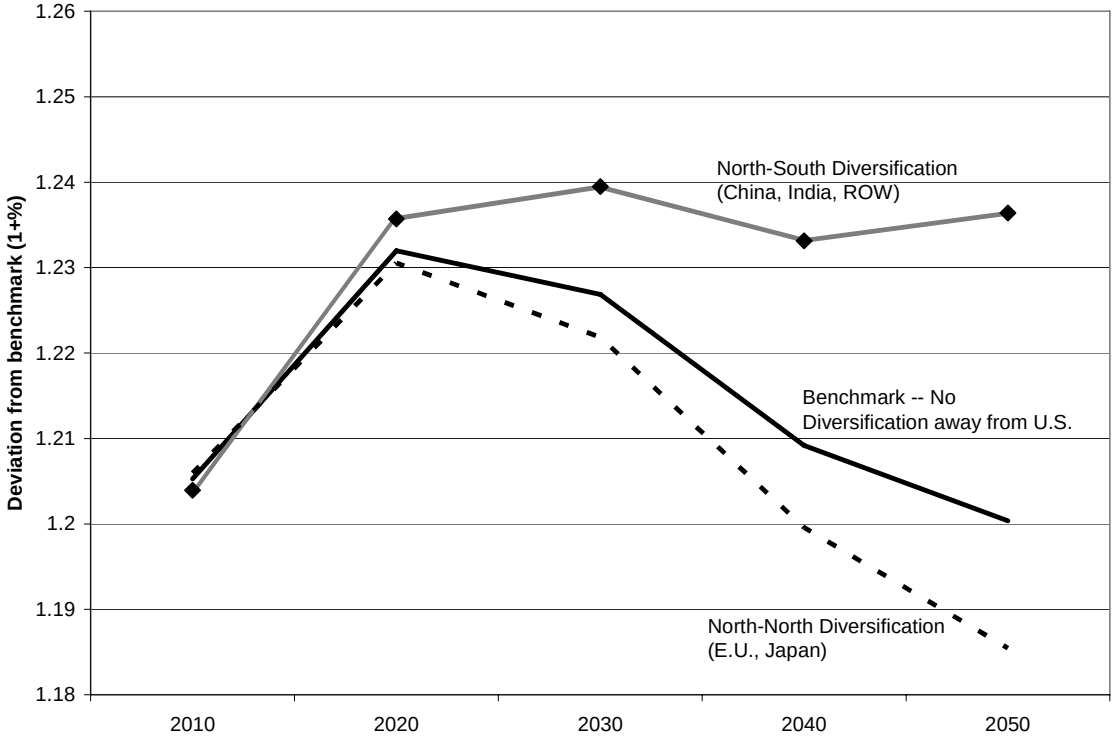

Figure 6. Sensitivity analysis on the Armington elasticity of substitution

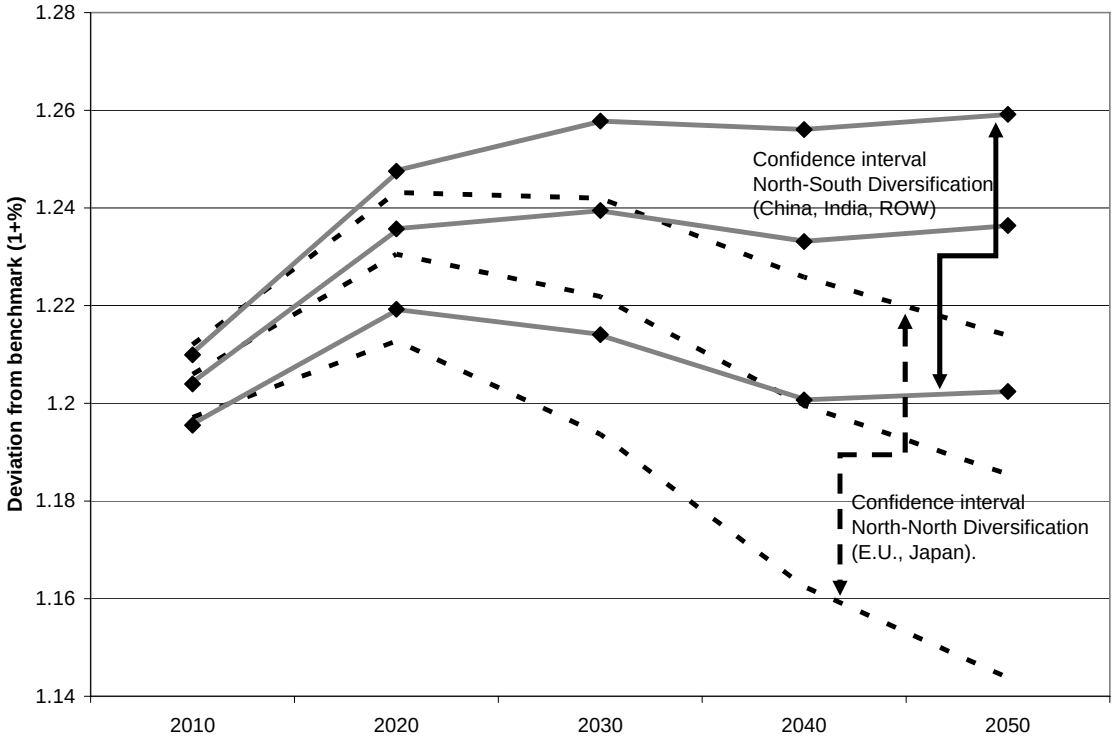

Figure 7. India's diversification of its import suppliers in favour of Canada -- Relative deviation with respect to initial steady state