Session 4:
Real Linkages: Canada and the Rest of the World

Growth and Integration: The Emergence of China and India and the Implications for Canada

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Introduction

During the past two decades, India and China have experienced rapid economic expansion that has taken them from poor agricultural economies to countries that compete not only with other emerging-market economies but also with industrialized economies. While this accomplishment is broadly consistent with the predictions of the neo-classical convergence literature, it is nevertheless remarkable, because, as Pritchett (1997) noted, divergence and not convergence in per capita incomes across countries is the norm. Within this context, we address the following questions: What has caused China and India to successfully depart from the historical economic backwardness associated with poor countries? Is this growth sustainable? What are the implications for Canada?

There has been an extensive debate in the literature about the underlying factors supporting convergence among some developing economies and the economic success of industrialized countries. Acemoglu, Johnson, and Robinson (2001) and Easterly and Levine (2001), among others, have

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suggested that the strength of institutions lays the foundation for strong and sustainable economic activity.

Concomitantly, openness to trade is associated with the rich industrialized countries and with successful developing countries, especially the Asian "tiger economies." Thus, many authors, such as Frankel and Romer (1999), have concluded that openness to trade has, in itself, a large and beneficial impact on income. More recently, however, authors such as Rodrik, Subramanian, and Trebbi (2002) have questioned this result, arguing that institutions, not trade, are the source of growth. Rigobon and Rodrik (2004) and Yanikkaya (2003) even find evidence to suggest that trade contributes negatively to growth.

There is, therefore, no agreement as to whether trade is conducive to growth. However, this should not preclude a well-defined relationship between trade and growth. An extensive theoretical literature (see Findlay 1995, for example) suggests that factor accumulation is strongly influenced by trade and the long-run determinants of comparative advantage.

In this paper, we attempt to address this issue by positing that institutions influence growth directly and also indirectly by serving as a long-run determinant of comparative advantage.[1] To this end, we present empirical results supported by a theoretical model to provide evidence that trade does have an important effect on growth, but that this effect is non-linear and determined by the interaction of trade with institutional quality.[2] In particular, we find evidence that trade liberalization can reinforce the process of capital accumulation and growth in countries that have high-quality institutions, and reduce the incentives for capital accumulation and growth in countries with weak institutions. In that context, differences in institutional quality can induce specialization and trade consistent with divergences in long-run income levels. On the other hand, we find that the benefits of institutional reform are magnified in countries that are relatively open. We therefore argue that the impact of China and India's emergence in the world economy depends on both the process of trade liberalization and institutional reform.

Our research is also part of another strand of literature that has sought to relate the pattern of trade to the level of development. Garnaut (cited in

1. This view is consistent with the new and growing literature linking institutional quality and financial development (as in La Porta et al. 1998, for example) and financial development and comparative advantage (Beck 2002).

2. In this respect, our research is related to new work by Calderón, Loayza, and Schmidt-Hebbel (2004), who find a non-linear relationship between growth and trade, conditional on the level of per capita GDP.

Bhagwati 1999) has shown that the importance of China's exports of labour-intensive manufactures has risen dramatically since 1980, but it has simultaneously and symmetrically fallen in other East Asian economies. This changing pattern of trade in East Asia suggests that China's decision to integrate into the world economy has forced other East Asian economies to specialize in products with higher value added, or to step up the "ladder of comparative advantage," as Bhagwati refers to it.

Somewhat independently, other authors (such as Kwan 2002 and Rose 1997) have noted that East Asian economies behave like "geese flying in formation," suggesting that there is a well-defined relationship between their trade and their level of economic development. By extending Kwan's analysis, we find a clear relationship between a country's position on the ladder of comparative advantage and the quality of institutions in that country, thereby supporting our view that institutions affect growth in part through determining long-run comparative advantage. We argue, therefore, that China's rise in terms of the sophistication of the goods it exports can be explained by its institutional reforms that have encouraged investment and market activity.

It follows, therefore, that institutional reform and trade liberalization in China and India may be affecting the rest of the global economy. China especially is now a large trading nation. We find that the process of growth and trade liberalization in China has had a positive impact on the rate of growth in Canada. This occurs because, in our reading of the evidence, although China is increasingly stepping up the ladder of comparative advantage and competing with Canada in the production of some goods, Canada is responding by becoming increasingly specialized in the production of relatively sophisticated products. This process encourages capital accumulation and growth.

The rest of our paper is structured as follows. Section 1 presents a theoretical framework linking economic growth to institutional quality and trade openness. Under this framework, trade affects growth in a non-linear fashion through its interaction with institutional quality. This non-linearity has been overlooked in the literature. We find empirical support for this theoretical framework in section 2, and in section 3, we look at the process of reform in China and India and examine the impact on growth and the pattern of trade. We consider the impact on Canada in section 4 and offer concluding thoughts in the final section.

1 The Theory

Since we are concerned with the long-term implications of the integration and growth of the economies of China and India, we use a neo-classical trade and growth framework consistent with Manning (1981); Manning, Markusen, and Melvin (1993); Baxter (1992); and Findlay (1995). This theoretical framework is known in the literature as the Findlay-Komiya (FK) model (Brecher, Chen, and Choudhri 2002).[3] It combines a Ramsey neo-classical model of optimal savings with the Heckscher-Ohlin (HO) trade model.

In the FK model, an economy's comparative advantage reflects factors affecting the willingness to accumulate capital, not factor abundance, as in the HO model. For example, in Baxter's version of the model, a subsidy to the capital-intensive sector raises the return to capital and induces capital accumulation. Following the (Tadeusz) Rybczynski theorem, this process results in an expansion of the capital-intensive sector and a contraction of the labour-intensive sector. In a closed economy, the extent of capital accumulation is constrained by the domestic demand for the capital-intensive good. Essentially, the expansion of the capital-intensive sector continues until the relative price of the good falls sufficiently to offset the subsidy. In an open economy, however, this process continues until production is completely specialized or an adjustment in world relative prices constrains complete specialization. Therefore, under trade, policies positively affecting the willingness to accumulate capital (relative to those in other countries) can lead to higher levels of per capita GDP. However, as per the theory of the second best, trade can also exacerbate problems that inhibit growth, leading to lower levels of per capita GDP.

Consistent with the recent literature, we posit that, by protecting property rights and by solving common property, collective action, time inconsistency, and agency problems, good institutions encourage capital accumulation by raising the return to capital. Within the FK theoretical framework, differences in institutional quality across economies can create a divergence in the return to capital and per capita income in closed economies. Hence, good institutions can encourage growth, and the effect is magnified by trade. When an economy is open, specialization induces an increase in the demand for capital in the country with good institutions and a reduction in the country with poor institutions, reflecting the fact that countries with relatively good institutions tend to have a long-run comparative advantage in the production of capital-intensive goods, while countries with relatively weak institutions tend to have a comparative

3. Other related work includes Ventura (1997).

advantage in the production of relatively labour-intensive goods. This gives rise to a central theme of this paper: institutions, growth, and trade are closely linked, with trade inducing stronger growth in countries with good institutions and weaker growth in countries with relatively poor institutions.

2 Empirics

The theory presented in the previous section has two striking features. First, differences in institutional quality across countries influence comparative advantages and trade patterns. Second, trade affects growth through its interaction with institutional quality. This section examines the empirical evidence supporting these theoretical results. Particular attention is given to the non-linear impact of trade on growth, since it has been overlooked in the literature.

2.1 Institutional quality and patterns of trade

To assess the impact of institutional quality on trade patterns, we construct an index designed to rank countries according to their position on the ladder of comparative advantage and relate this measure to institutional quality. The first step in this brief analysis is to create for each three-digit SITC (Standard International Trade Classification) code, what Kwan (2002) refers to as a product sophistication index (PSI). This index measures, for each classification, the exporting country's expected per capita GDP. For example, handicrafts tend to be exported by countries with low levels of GDP and hence have low PSI numbers, while high-tech medical equipment is generally exported by countries with high income levels and hence have a high PSI numbers.[4] Having calculated this number for each commodity, we then calculate for each country an export sophistication index (ESI), which is the mean PSI value of its exports. Appendix 1 lists the ranking for 115 countries.

Figures 1a and b show scatter plots of ESI numbers for India, China, and Canada, using 2001 data, against various measures of institutional quality (political risk, and law and order) as reported in the International Country Risk Guide (ICRG) over the years 1996–2001.[5] The results show a clear relationship between institutional quality and the level of sophistication of a

4. In 2001, for example, the PSI for passenger motor vehicles was $26,131, while for natural rubber and latex, the PSI was $5,754 (in constant 1985 dollars, adjusted for purchasing-power parity).

5. In ICRG published monthly data, we have observations for the month of January only, so have chosen to use a five-year average to account for some of the noise that may be apparent in single observations.

Figure 1a
ESI vs. political risk index

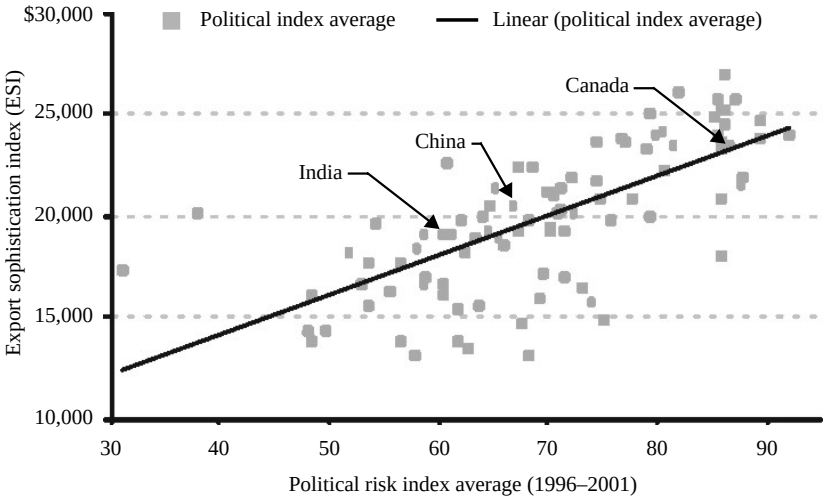
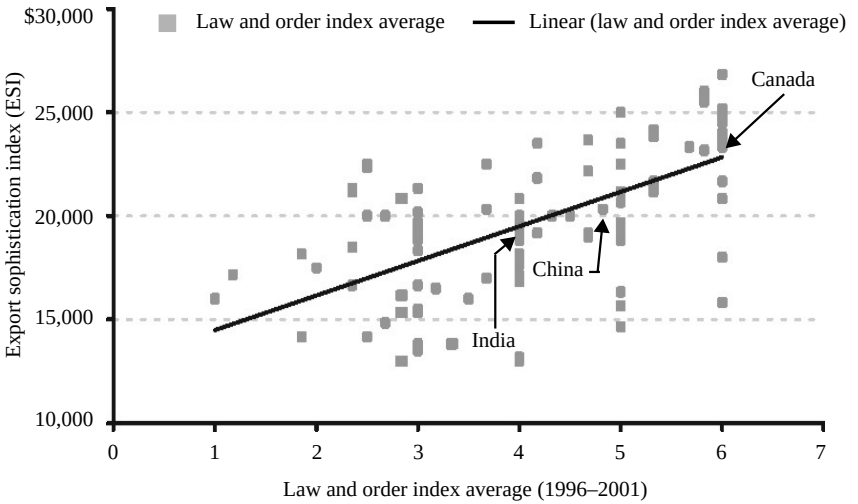


Figure 1b
ESI vs. law and order index average



country's exports. While such findings fall short of a formal test of our framework, they certainly suggest that institutions have an impact on trade patterns, and may also have an added impact on growth through their interaction with trade. The latter is the subject of our next section.

2.2 The interaction between institutions and trade, and the impact on growth

To examine the impact on growth, we turn to the literature on empirical growth. Traditionally, this literature has posited a linear relationship between growth and its determinants, such as trade openness and institutional quality. A common specification may take the following form:

$$\Delta y_{i,t} = \alpha_i + (\beta_0 - 1) y_{i,t-1} + \beta_1 X_{1i,t} + \beta_2 X_{2i,t} + \beta_3 X_{3i,t} + u_{i,t}, \quad (1)$$

where $y_{i,t}$ is (log) real per capita GDP in country i, α_i is a country-specific constant, $X_{1i,t}$ is a vector of country-specific explanatory variables, $X_{2i,t}$ is a measure of institutional quality in i, and $X_{3i,t}$ is a measure of i's openness at time t. Empirically, to take into account that an economy is growing towards its steady-state level, the lagged value of $y_{i,t}$ is also included. Lastly, u_i is an unobserved error term.

According to the theory presented in the previous section, however, the effect of trade also depends on the level of institutional quality, such that the degree of openness generates higher growth when trade occurs in an environment where institutions are better. This can be easily incorporated in equation (1) by assuming that $\beta_3 = (\gamma_1 + \gamma_2 X_2)$:

$$\Delta y_{i,t} = \alpha_i + \eta_t + (\beta_0 - 1) y_{i,t-1} + \beta_1 X_{1i,t} + \beta_2 X_{2i,t} + \gamma_1 X_{3i,t} + \gamma_2 X_{2i,t} {}^{*} X_{3i,t} + \mu_{i,t}. \quad (2)$$

We control for determinants of growth, other than institutions and openness. Real per capita GDP represents initial conditions (state variable). As such, this variable is measured at the beginning of each five-year period. Other explanatory variables (X_1) include investment as a share of GDP, share of government consumption in GDP, and the rate of inflation. These variables are measured as averages over five-year periods and represent the control variables.[6] The unobservable country-specific effects, α_i, are designed to capture the determinants of a country's steady state that do not vary over time and that are not already contained in the other explanatory variables.

6. For sources and definitions of the variables and the list of countries used in growth regressions, see Appendixes 2 and 3, respectively.

The methodology allows us to estimate the coefficients without having to restrict the individual effects to being either fixed or random. The time-specific effect, η_t, captures the effects of global shocks on economic growth common to all countries.

A weak-form test of our theoretical framework would be whether $\beta_3 > 0$. That is, the impact of trade is always positive $(\gamma_1 > 0)$, but having better institutions (greater value for X_2) results in an even more positive impact of trade on growth $(\gamma_2 > 0)$. A strong-form test of our theoretical framework translates into a positive impact of trade on growth $(\beta_3 > 0)$ when institutions are good, but negative $(\beta_3 < 0)$ when institutions are weak (alternatively, a negative direct impact of trade on growth $(\gamma_1 < 0)$ and a positive contribution from trade through the interaction variable $(\gamma_2 > 0)$).[7]

A negative coefficient for the state variable would be consistent with the prediction of the neo-classical growth model as it represents the convergence effect. The coefficients on government consumption and the inflation rate are expected to be negative.[8] The effect of the other control variables on growth is expected to be positive, with the possible exception of the openness variable if the strong form of our hypothesis holds.

We use a dynamic generalized method of moments (GMM) system estimator approach to estimate equation (2), following Arellano and Bond (1991) and Arellano and Bover (1995).[9] Briefly, the technique involves undertaking the following steps. First, the growth regression is expressed as a dynamic model in the level of real per capita GDP.[10] Second, we difference the regression equation in order to eliminate the country-specific effects.[11] Third, we instrument the explanatory variables using lagged values of the levels and differences of the original regressors and dependent variable. The latter step eliminates the potential inconsistency coming from the endogeneity of the explanatory variables, while differencing eliminates

7. In addition, $-(\gamma_1/\gamma_2) < \max(X_2)$, because X_2 is bounded.

8. Government consumption captures public expenditures that do not directly affect productivity but could distort private sector decisions.

9. The system estimator is preferred to the difference estimator when the regressors are close to an AR(1) process. This is especially pertinent for the estimation of growth equations.

10. The lagged dependent variables can be introduced to either fixed- or random-effects models.

11. By eliminating country-specific effects, we can no longer interpret the coefficient on the lagged level of per capita GDP as a convergence parameter. Convergence is generally accepted to be dependent on country-specific fixed effects, which are eliminated from our analysis. However, since convergence is not the topic of analysis, we do not concern ourselves with this problem.

the potential inconsistency resulting from the correlation between the unobserved country-specific effects and the explanatory variables.[12]

Our results from this procedure are reported in Table 1 (with *p*-values in parentheses). The first column reports the results for a specification using a measure of political risk as a proxy for institutional quality. The second specification uses a measure of law and order. In both cases, the interaction variable is defined as the product of trade openness and a measure of the quality of the legal system and property rights.[13] The specification tests do not reject the null hypothesis of correct specification, indicating that the instruments are valid and lending support to our estimation. Looking at the Hansen test of over-identifying restrictions, we cannot reject the null hypothesis that the over-identifying restrictions are valid. The null hypothesis of no first-order autocorrelation in the differenced residuals is rejected, but we do not reject the null hypothesis of no second-order autocorrelation. While the rejection of the latter would have implied inconsistent estimates, the rejection of no first-order autocorrelation does not imply that the estimates are inconsistent (see Arellano and Bond 1991).

The different variables are generally significant, and the signs of the coefficients are consistent with our priors. The coefficient associated with real per capita GDP is significantly negative in both regressions, confirming the conditional convergence hypothesis, a standard result in cross-country growth regressions. The coefficient for government expenditures is also negative and significant in both regressions, while the coefficient for capital formation is positive and highly significant. The results also suggest that institutions are important and contribute positively to growth.

The coefficient for trade openness is negative, while the interaction term is positive and highly significant. Given that the coefficient for trade openness is not significant, these results validate the weak-form test of our theoretical framework. Under this assumption, trade always has a positive impact on growth, but better institutions magnify the gains from trade. However, taking these preliminary results at face value, the point estimates appear to be broadly in line with the strong-form test of our theoretical framework. This suggests that the total impact of trade on growth is negative or positive, depending on the quality of institutions (Figure 2), implying that trade is beneficial only to countries with relatively high levels of institutional quality (such as Canada), which is not the case of India or China. However, the

12. See Bond (2002) for an accessible discussion of the GMM system estimation technique.

13. The decision to use different institutional variables in the direct and interaction terms was made to avoid problems of multicollinearity.

Table 1
Dynamic system estimator[a]
The interaction between institutions and trade

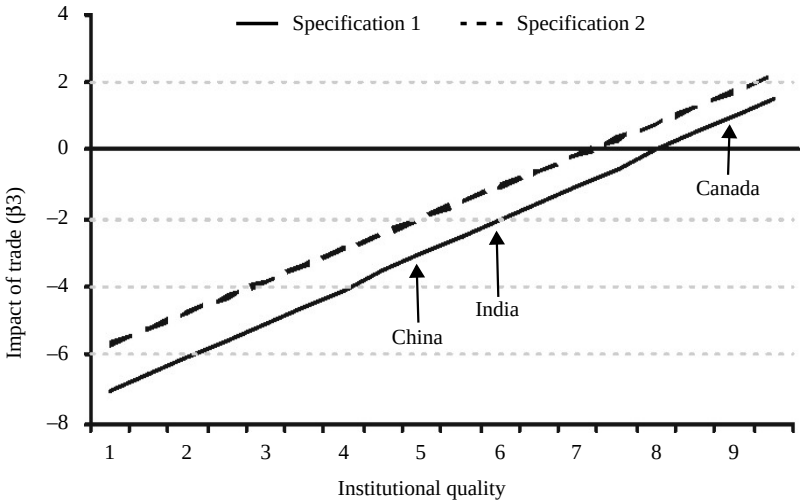
	Law and order	Political risk
GDP per capita	–3.823	–4.365
	(–0.076)	(0.031)
Inflation	–0.262	–0.207
	(0.633)	(0.698)
Capital formation	27.791	26.149
	(0.000)	(0.000)
Government expenditure	–18.308	–17.005
	(0.002)	(0.002)
Trade openness	–8.107	–6.607
	(0.168)	(0.188)
Institutional quality	3.542	0.430
	(0.013)	(0.001)
Interaction term[b]	1.013	0.926
	(0.003)	(0.006)
Constant	–1.990	–16.203
	(0.935)	(0.456)
Hansen test	0.310	0.430
AR(1) test for residuals	0.001	0.016
AR(2) test for residuals	0.121	0.100

a. Coefficients for time dummies and lagged dependent variable are not reported.
b. The interaction term is defined as the product of trade openness and the legal system and property rights score.

exclusion of China and India from the list of countries benefiting from trade openness may reflect the inherent measurement problems associated with measures of institutional quality. In particular, the recent reforms implemented in both countries, which will be discussed in the next section, may not be well captured by these institutional variables. Regardless, one clear result is that, having opened their economies in recent years, the future gains from institutional reform in India and China are likely to be magnified by trade.

The empirical analysis presented in this section is broadly consistent with our theoretical framework. First, our results suggest that institutional quality plays an important role in enhancing economic growth. Second, institutional quality also appears to influence the patterns of trade. These two findings are intrinsically linked. Institutional quality affects the pattern of comparative advantage across economies, and since countries accumulate production factors consistent with their comparative advantage, the quality of institutions also affects the rates of economic growth across different

Figure 2
The non-linear impact of trade on growth



economies. Third, our results indicate that trade could affect growth in a non-linear fashion through its interaction with institutional quality. This is a new, and in our view, important contribution to the literature on growth.

At this point, it is appropriate to add an important qualifier. Our analysis is purely positive. It does not make for a welfare analysis, and one cannot use our analysis to argue that trade liberalization will worsen economic welfare in a country with relatively weak institutions. Indeed, it may be a better allocation of resources to have investment taking place in countries with good institutions and to permit consumers in countries with poor institutions to consume a greater proportion of their income, thereby reducing the extent of any appropriation of their savings.

Nevertheless, in essence, these results suggest that emerging economies such as China and India, which have been improving their institutions, are reaping the benefits of past and present reforms, and the benefits are greater in more open economies. However, the impact of trade liberalization on these countries is unclear. To assess the potential impact on Canada, we need to investigate the reforms implemented in both countries and assess the prospects for further reforms. In the next section, we focus on China and India. We review their institutional reforms and examine the extent to which their growth is likely to be sustainable.

3 China and India

Having developed a general framework in which to analyze growth, trade, and the importance of institutions, we now examine China and India in detail to understand the extent to which the growth of these two economies can be sustained and the nature of the trade linkages between the two economies and the rest of the world. A review of institutional reforms is presented first, followed by trade reforms. This section also briefly discusses the relative position of China and India on the ladder of comparative advantage, and their economic prospects.

3.1 Institutional reforms in China

The first phase of the Chinese reform process occurred during the 1979–93 period. During that time, the authorities gradually decentralized the economic decision-making process. This resulted in fundamental changes in how goods and services were produced in China, but also in how the benefits of transactions were divided among economic agents. As such, these reforms, which will be discussed later, are interpreted as institutional in nature. They include the household responsibility system; reforms of the state-owned enterprises (SOEs) and the economic responsibility system; and the introduction of private sector enterprises and township and village enterprises (TVEs).

The household responsibility system (HRS) was introduced in 1979 to improve the efficiency of the Chinese agricultural system, which was burdened by production quotas and administered prices. Under the HRS, individuals could farm the communal land in exchange for a fixed production quota (effectively a lump-sum tax). Production in excess of the quota was allowed to be sold in the market, resulting in a remuneration system based on marginal productivity. This "dual-track" system introduced market-based incentives. By liberalizing agricultural production, prices, and wages in a predominantly agricultural economy, the HRS can certainly be interpreted as an institutional change. It resulted in a sharp improvement in labour productivity and a significant migration of labour out of the agricultural sector.[14]

14. Employment in agriculture as a percentage of total employment fell dramatically, from around 70 per cent at the beginning the reforms, to about 50 per cent more recently. Despite this large reallocation of labour, there are still 150 million excess workers in the agricultural sector, according to Brooks and Tao (2003). Furthermore, Heytens and Zebregs (2003) have found that the reallocation of labour was pivotal to high growth. Woo (1998) and Young (2000) have also noted the importance of labour migration.

In an effort to absorb the excess labour coming from the agricultural sector, the Chinese authorities introduced a number of reforms to improve the allocation of resources in the industrial sector. The authorities successfully promoted the growth of the non-state sector, including TVEs.[15] They also increased the autonomy of SOEs with regard to production, supply, marketing, the use of retained profits, experimentation with new products, and capital investment (Chow 2002). In addition, the economic responsibility system (ERS) allowed SOEs to remunerate workers based on their level of productivity. Finally, the dual-track pricing system was broadened to incorporate industrial goods. By transferring management decisions to business leaders, these reforms ensured a better allocation of resources and increased accountability and incentives to perform.

The second phase of the reform process (since 1994) is characterized by the implementation of policies strengthening the effectiveness of market forces. They include the reduction of preferential treatments to certain companies, the introduction of more transparent government accounting, the creation of a central monetary authority, the continued reforms of SOEs, the first stages of a social safety net, and addressing the issue of property rights and ownership (Qian 1999).

In an effort to formalize the gains achieved through previous reforms, Chinese authorities recognized the concept of private ownership and the rule of law in March 1999. Furthermore, on 14 March 2004, the authorities introduced a constitutional amendment affirming that "private property obtained legally shall not be violated." The amendment was explicitly designed to prevent state officials from appropriating private property. By increasing the political cost of returning to the old system, the entrenchment in the constitution serves as insurance and provides greater confidence in reforms. This development could have important implications for economic growth. Reducing the uncertainty surrounding ownership and property rights is pivotal in providing economic agents the incentives to save, and thus, to accumulate capital.

Prospects for further institutional reforms in China fall into three broad categories. First, financial sector reforms could provide substantial benefits in terms of a more efficient allocation of resources within the economy. In particular, the banking sector needs to be restructured, policy lending eliminated, and a credit culture developed. Second, reforms of SOEs,

15. Qian (1999) enumerates policies that promoted the emergence of the non-state sector: fiscal decentralization, the extension of the dual-track price system to manufactured goods, the legalization in 1984 of private enterprises employing more than eight people, the granting of permission for joint ventures between domestic and foreign investors, and the near-abolition of administrative regulations discriminating against rural enterprises.

presented earlier, have not been completely implemented. In fact, they were generally limited to smaller firms. The broadening and deepening of reforms of all SOEs could further improve the business environment. Third, China still lacks the organizational structure to support the new and evolving institutions. Without solid governing organizations to support them, institutions are likely to be weak in practice.

3.2 Institutional reforms in India

Compared with China, India's reform process was very modest and gradual, suggesting that introducing reforms in a democratic environment is much more difficult than in an authoritarian regime (Srinivasan 2003). Despite the relatively minor changes in policies introduced at the beginning of the 1980s, real GDP growth accelerated markedly, from an average of 3.5 per cent during the 1950–80 period to nearly 6.0 per cent in the 1980s. According to Rodrik and Subramanian (2004a), even these modest reforms indicated an attitudinal shift in government policies towards a more pro-business environment, spurring economic growth.

Before the reform process gathered momentum in 1991, following a balance-of-payments crisis, meeting the objectives stipulated in the government planning exercises meant pervasive government regulations. In particular, rules and regulations were established to ensure that economic resources (domestic capital and foreign exchange) were allocated towards government-sanctioned investment opportunities, regardless of profitability. To a large extent, the tentative industrial reforms of the 1990s were aimed at reducing these inefficiencies, which were symbolized by industrial licensing and reservation.

Industrial licensing can be viewed as the counterpart in India to the rules and regulations burdening SOEs in China. Under this policy, the state regulated inputs in the production process, including investment projects, but also the location of plants and their expansion, and the technology used by enterprises (Srinivasan 2002). Licensing requirements were virtually eliminated in July 1991, except in industries where there are environmental, safety, and strategic concerns. By curbing excessive regulation, the authorities improved the business environment and lowered barriers to entry, and hence improved the institutional environment that supports investment.[16]

16. As noted by Srinivasan (2003), the fact that all the regulations were generally ad hoc rather than rule-based, implied a chaotic incentive structure and an environment conducive to rent-seeking behaviour and political corruption.

Industrial reservation encompasses two major sets of policies. First, certain industrial sectors were deemed strategic, and as such, their development was reserved to the public sector. Restrictions were eased in 1991, and private involvement was allowed in certain sectors such as power and telecommunications. While these reforms meant potential increases in competition, very little was changed in terms of the management of Indian SOEs. As in China, reducing the government's direct involvement in economic activity through privatization met with strong resistance. This is especially relevant in a democracy.

Second, reservation also applied to certain manufactured goods for exclusive production by small-scale industries (SSIs). As of 2002, almost 800 items were reserved for production by these firms, although larger firms can produce SSI items if they export more than 50 per cent of their production. Very little progress has been achieved in abolishing or limiting the impact of this policy. This is crucial, given that approximately 40 per cent of India's total manufacturing output and 35 per cent of its exports fall under this regulation. A more detailed discussion of SSI and its implications under trade liberalization is provided in section 3.3, which focuses on trade reforms.

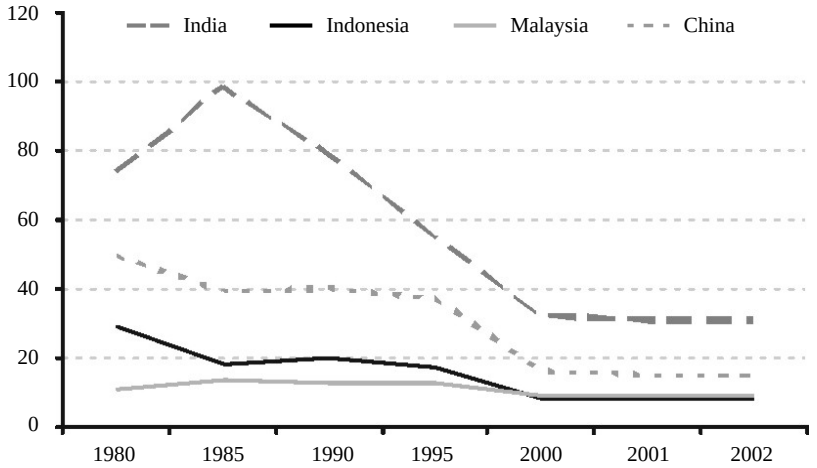
Other reforms could be implemented to improve the economic prospects of India. In particular, the bankruptcy and labour laws are quite restrictive, and their application is somewhat ad hoc. As an example, firms with more than 100 employees need the permission of the government to close down, even if the enterprises are not profitable. Federal-provincial fiscal interactions, public finances, and improving the state of the banking sector are also areas of future reforms.

3.3 Trade reforms in China and India

Given their similar import-substitution policy, both China and India were fairly closed economies before they started implementing trade reforms. In both cases, control mechanisms, such as prohibitive tariffs, quantitative restrictions, and import licensing, were leading to significantly reduced external trade possibilities (Lardy 2002; Srinivasan 2003).

In 1978, Deng Xiaoping's open-door policy promoted the opening of China to foreign imports and encouraged the development of the export-oriented sector. Tariffs, quotas, and licences needed to import and export fell considerably over the subsequent years, especially in 1992 and 1996

Figure 3
Tariff index



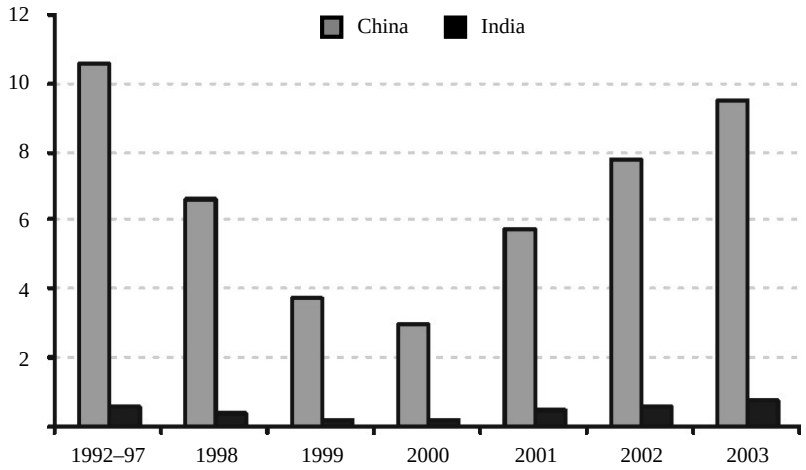
Source: The Fraser Institute.

(Figure 3).[17] However, in order to have a competitive tariff structure compared to other countries in the region, China must implement additional measures for trade liberalization.

Another policy that greatly improved external trade in China was the creation of open economic zones (OEZs) in 1982. They were established in an effort to attract foreign direct investment (FDI) as well as to promote exports.[18] Within these zones, investors could establish factories to take advantage of preferential tax and administrative treatment (duty-free imports to produce exports), collaborate with foreign companies (investment, manufacturing, and distribution), obtain market-based remuneration for employees, and avoid prohibitive taxation by the state (Démurger et al. 2002).[19] While there was a significant slowdown in FDI during the Asian

17. An analysis of the implementation of trade reforms reveals that trade policy was mainly concerned with the protection of high-value industry and high-tech industry and the need to protect financially vulnerable industries (Chen and Feng 2000).
18. Zebregs (2003) estimated that FDI contributed directly 0.4 percentage points to annual GDP growth during the 1990s (through capital deepening). This pales in comparison to its indirect contribution, which is estimated to be 2.5 percentage points.
19. India introduced the concept of OEZs before China. However, Indian authorities did not provide incentives, except for access to duty-free imports. Firms establishing in these zones had to face the same pervasive rules and regulations as in the rest of India. The attempt failed.

Figure 4
FDI inflows (percentage of total)



Source: *World Investment Report*, United Nations.

crisis, FDI has rebounded markedly in China (Figure 4). In 2003, China attracted around 10 per cent of world FDI, compared to less than 1.0 per cent for India. The large difference between China and India suggests that foreign investors perceive China as a much more business-friendly environment.

Further reforms are forthcoming under the World Trade Organization (WTO) commitments that China made in 2002. In particular, additional reductions in tariffs and quotas are expected. China is also committed to opening its service industry, including the banking sector. This could mitigate some of the risks associated with the current state of this sector.

India has also made efforts to reduce tariffs and quotas after its balance-of-payments crisis in 1991. The mean tariff rate decreased from almost 100 per cent in 1980 to around 30 per cent in 2001–02. While tariffs have fallen considerably, they are still relatively high compared to other nations in the region. For example, China's mean tariff was 15.3 per cent in 2002, while the mean tariff in Indonesia and Malaysia was about 8–9 per cent.

The inability of India to reduce its tariffs may reflect political-economy factors. In particular, the existence of SSI reservation limits the development of certain industries. The implication of the SSI reservation is that domestic firms may have to operate below their optimal (unconstrained) level of production, translating into inefficiencies and higher output prices. In that

context, foreign firms, unconstrained by SSI, have a considerable advantage. As a result, by lowering tariffs on these products, trade liberalization may reduce the output price below what is necessary for domestic firms to operate, thereby inducing an exit from the industry (if the government permits). Consequently, even if India has a comparative advantage in certain industries, trade liberalization, without the alleviation of SSI reservation, may result in a contraction of these industries, rather than an expansion. This is consistent with our theoretical framework and our empirical results—weak institutions are detrimental to economic prospects directly, but also indirectly through interactions with trade. Essentially, high tariffs in India may reflect the impact of government-induced inefficiencies in certain industrial sectors. This is also evidenced by India's regular use of anti-dumping measures within the WTO structure.

Not surprisingly, the impact of trade liberalization was more important in China than in India. As shown in Figure 5, China's measure of trade openness increased dramatically, from 5 per cent of GDP in 1972 to 55 per cent in 2002. For India, openness increased from 9 per cent of GDP in 1970 to 31 per cent in 2001. That said, the trade performance of both countries was generally better than that of the rest of the world, resulting in an increase in the importance of India and China in world trade (Figures 6 and 7).

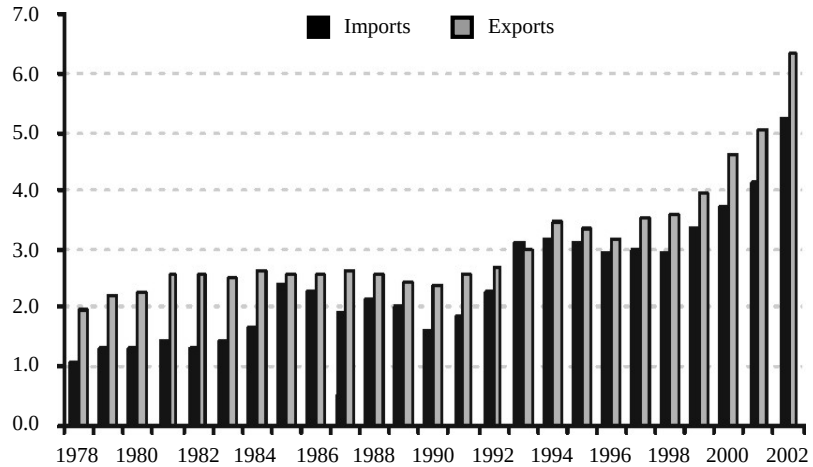
The lacklustre performance of India compared to China is also captured by the coefficients on country dummy variables estimated in a gravity trade equation (Figure 8).[20] A positive country dummy illustrates a high propensity for trade for that country compared to the rest of the world (after controlling for other determinants of trade). The equations were estimated for a large cross-section of countries for each year from 1985 to 1999. The coefficients reveal that over the period of estimation, China, South East Asia, and industrialized nations are "over-traders," while India's trade is average. That is, India's trade is similar to that of all other developing countries as a group, excluding the Asian tigers. Interestingly, while China's performance is remarkable, the results suggest that it is less of an over-achiever than other, albeit smaller, South East Asian economies. These estimates suggest that China has the potential to raise its trade performance even further. It is likely that this has occurred during the past four years, which were not included in the estimation period.

20. We used the Rose (2000) data set to estimate our gravity equations. Because we were interested in institutional quality, we augmented the equations with the law-and-order measure from ICRG. The results are available from the authors upon request.

Figure 5
Measure of openness, (*X* + *M*)/GDP

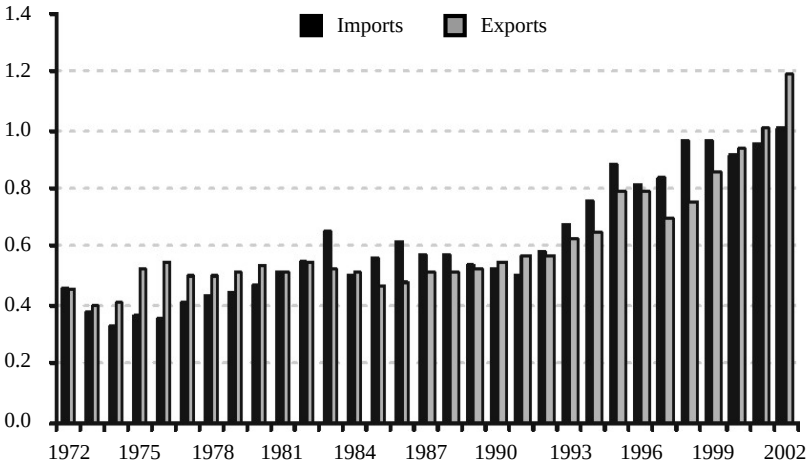
Source: World Bank.

Figure 6
China's share of world trade



Source: World Bank.

Figure 7
India's share of world trade



Source: World Bank.

Figure 8
Relative trade performance

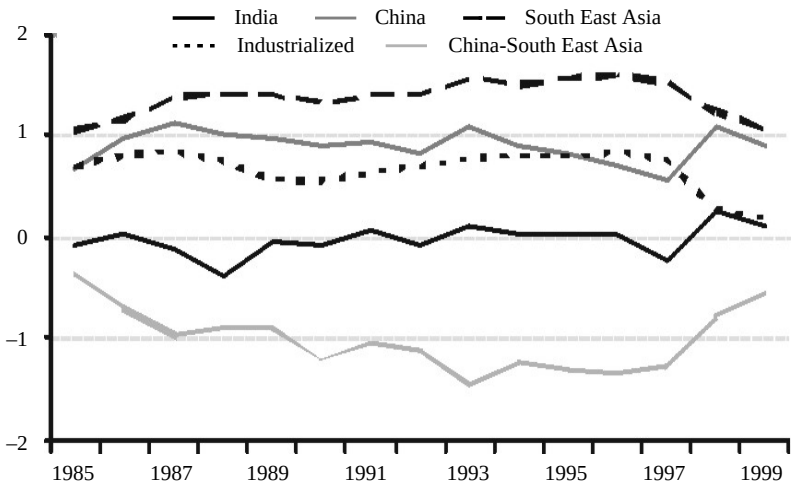


Figure 8 also illustrates the coefficient on a dummy for bilateral trade between China and the Asian tigers. It shows that once their propensity to over-trade is accounted for, bilateral trade between China and the Asian tigers is lower than with the rest of the world. This is understandable, to the extent that their economies are relatively similar. The results also reveal the impact of the Asian crisis, which saw a downturn in the over-performance of the South East Asian economies and a sharp upturn in the performances of India and China. The results suggest that the Asian crisis marked a change in the pattern of trade as the importance in trade of the industrialized countries was reduced, while China and India improved.

3.4 The ladder of comparative advantage and economic growth

The reform processes introduced by China and India have affected their relative positions on the ladder of comparative advantage. In 1985, with ESI scores of 14,376 and 14,383, India and China were effectively side by side on the ladder of comparative advantage, ranking 54 and 55, respectively. By 2001, however, China, with an ESI score of 20,468, had leapt to 41 on the ladder, surpassing India, which had slipped to 60 in the ranking, with an ESI score of 19,192.

Figures 9a, b, c, and d show a more detailed perspective of the evolution of the trade patterns of China and India. In 1985, their exports tended to overlap significantly, making them competitors in many areas. Over time, however, the share of exports with high PSIs increased significantly in China and to a lesser extent in India. This suggests that China's more rapid pace of economic expansion has resulted in a more rapid progression up the ladder of comparative advantage, compared to India.

This is consistent with our theoretical framework and our empirical analysis. Even when we abstract from the institutional changes discussed in detail above (which are not explicitly captured by institutional variables), China generally scored better on these measures (political risk, and law and order) than India (see Figures 1a and b). It is not surprising, therefore, that when market forces began to improve the allocation of resources in these economies, China's production structure moved towards more sophisticated goods and leap-frogged the Indian economy in the process.

These results suggest that improving institutions that support a market-based economy is important in shaping the comparative advantage of an economy. In addition to better institutions, China's more dramatic ascension may also reflect, in part, its greater openness, and hence its increased ability to specialize (especially if, as we allude to above, China's economic institutions had improved significantly more than our legal system and

Figure 9a
Share of exports ranked by PSI, India and China (1985)

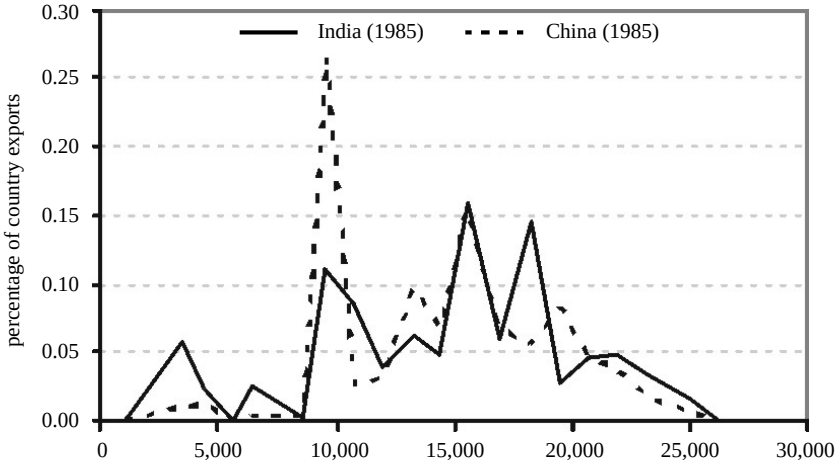


Figure 9b
Share of exports ranked by PSI, India and China (2001)

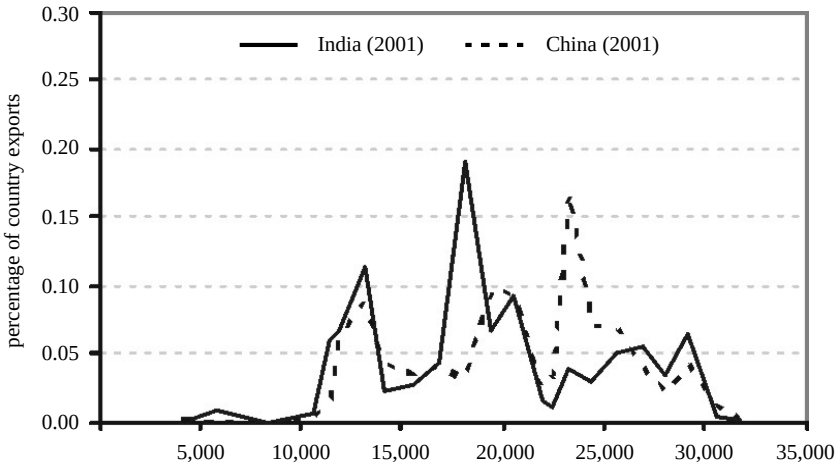


Figure 9c
China's changing pattern of exports

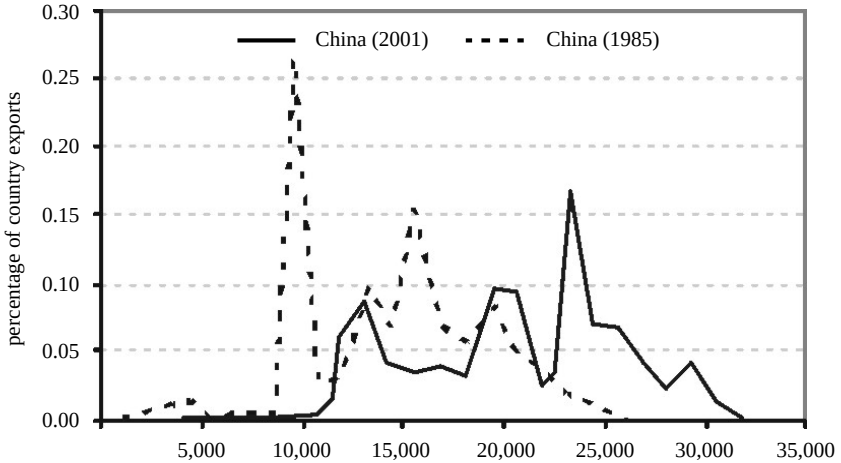
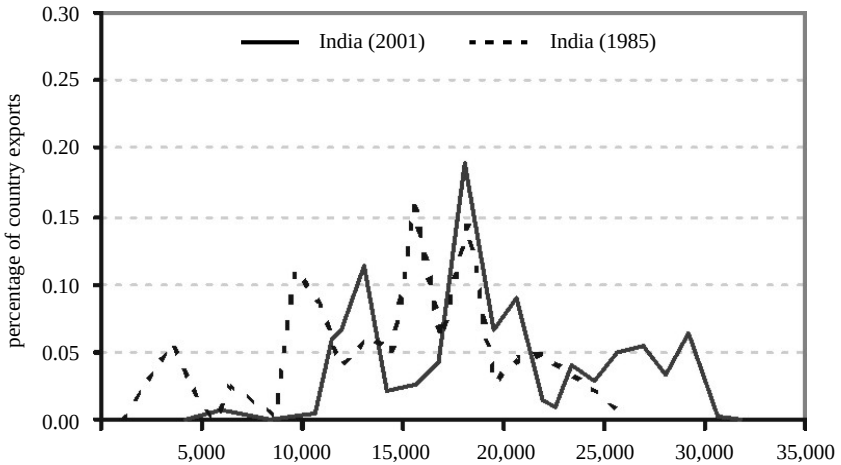


Figure 9d
India's changing pattern of exports 1985–2001



property rights measure would indicate). If this is true, then changes in comparative advantage should affect the process of factor accumulation and affect differently the growth processes in the two countries, a view supported by our empirical results.

4 The Implications for Canada

For Canada, the rapid growth rates and increasing openness in India and China have resulted in an increase in bilateral trade with Canada. Although it is difficult to estimate the contribution to Canadian growth from China or India's emergence without considerable qualification, our empirical results suggest that, with a score of 9.3 for the quality of its legal system and property rights, trade has been an engine of growth for Canada. For example, consider the impact of China on Canadian openness and growth. Over the period from 1997 to 2002, China's trade with Canada grew by approximately 109 per cent from US$6.1 billion to US$12.7 billion. Although this trade is relatively small compared to Canada's overall trade, its rapid growth nevertheless contributed approximately an extra 1 per cent to the value of the share of Canada's trade to GDP (from approximately 82 to 83 per cent of GDP). If one is prepared to throw caution to the wind and assume first, that the expansion in trade did not come at the expense of trade with Canada's other trading partners; and second, that our empirical estimates are robust; then, equation 2 suggests that this expansion in trade with China would produce a 1.9 per cent (= –6.6+0.926*9.3) growth premium spread out over five years (i.e., just under 0.4 per cent per year). This is a significant and positive result, although given the qualifications for its validity, we would not want to put much emphasis on the magnitude of this number.

4.1 Explaining Canada's trade-induced growth: Is there a "China effect"?

Over the period from 1985 to 2001, Canada's ESI rose from 20,062 to 23,745. Its ranking on the ladder slipped, however, from 10 to 16, losing ground to countries such as the Netherlands and Denmark. Nevertheless, an examination of the change in the distribution of Canada's exports (Figure 10a) suggests that Canadian exports have become more consolidated in high PSI goods at the expense of middle PSI goods. At the same time, however, comparing these to the distribution of exports of China and India (Figures 10b, c, d, and e), it is evident that Canada now faces considerably more competition from China in the middle PSI range. These graphs suggest that China's comparative advantage has changed over time with the result that

China is now competing directly with some of Canada's exports in the low to middle range of the distribution.[21]

Arguably, it is the increase in competition from China in less sophisticated products and the corresponding improvement in Canada's terms of trade that have encouraged Canadian exports to have become more consolidated in relatively more sophisticated goods. However, it could also be the case that during the period from 1985 to 2001, the composition of Canada's exports was affected by the process of bilateral trade liberalization with the United States. If Canada traditionally exported high PSI goods to the United States, for example, then it may simply be that the North American Free Trade Agreement (NAFTA) pressured Canadian exports to become more sophisticated. To address this issue, we break Canadian industry exports down into an industry effect and a destination effect using shift-share analysis.[22] Our hypothesis is that if the impact of NAFTA is driving our results, then Canada's consolidation in relatively high PSI goods will have been driven by a destination effect. On the other hand, if China's opening to the world is changing the relative prices of goods in favour of higher PSI goods, we should see the change in trade driven by industry-specific effects.

Mathematically, we write the net relative change (NRC) in Canadian industry *i* exports as follows:

$$NRC_i = \frac{\sum_d X^0_{i,d}(x_{i,d} - x)}{X_i^{1'}},$$

which can be rewritten as:

$$NRC_i = \frac{\sum_d X^0_{i,d}(x_d - x) + \sum_d X^0_{i,d}(x_{i,d} - x_d)}{X_i^{1'}}, \quad (3)$$

where $X^0_{i,d}$ is the initial level of industry *i* exports to destination *d*; x_d is the growth rate of Canadian exports to destination *d*; $x_{i,d}$ is the growth rate in industry *i* exports to destination *d*; and *x* is the growth rate of Canadian exports between 1985 and 2001. $X_i^{1'}$ is the hypothetical level to which

21. Graphs illustrating the distribution of bilateral trade show a similar pattern between China and Canada, but a relatively unchanged pattern of trade between Canada and India. Graphs are available from the authors upon request. Appendix 4 provides details of the top 20 exports of China and India, as well as the top 20 bilateral exports and imports between China and Canada and between Canada and India.

22. See Coughlin and Pollard (2001) for a discussion using exports from US states.

Figure 10a
Canada's changing pattern of exports, 1985 and 2001

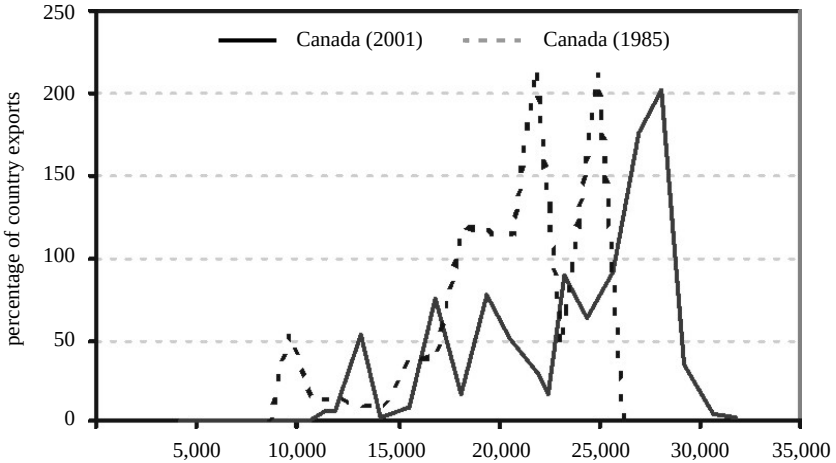


Figure 10b
Share of exports ranked by PSI, Canada and China (1985)

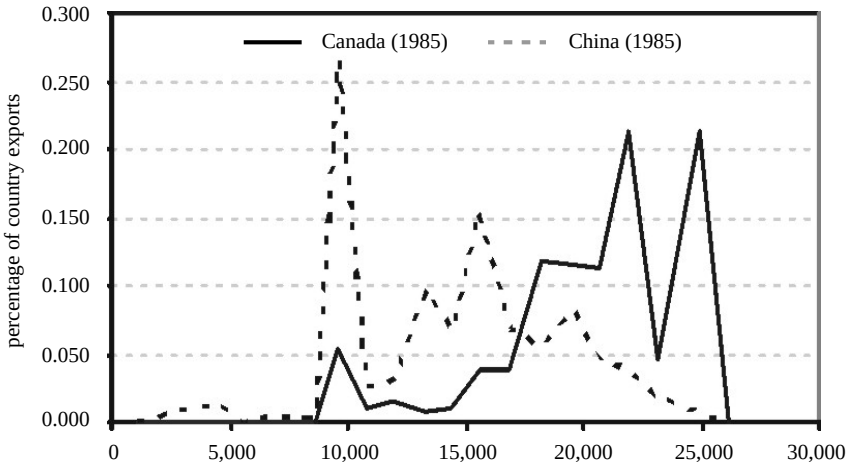


Figure 10c
Share of exports ranked by PSI, Canada and China (1985)

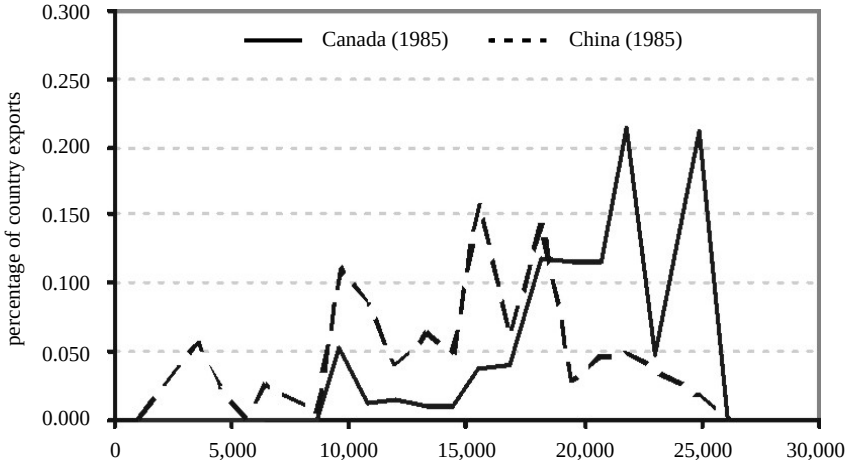


Figure 10d
Share of exports ranked by PSI, Canada and China (2001)

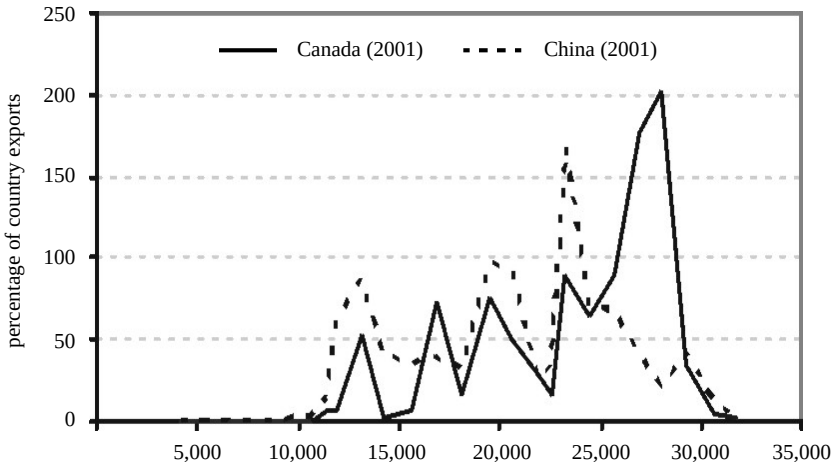
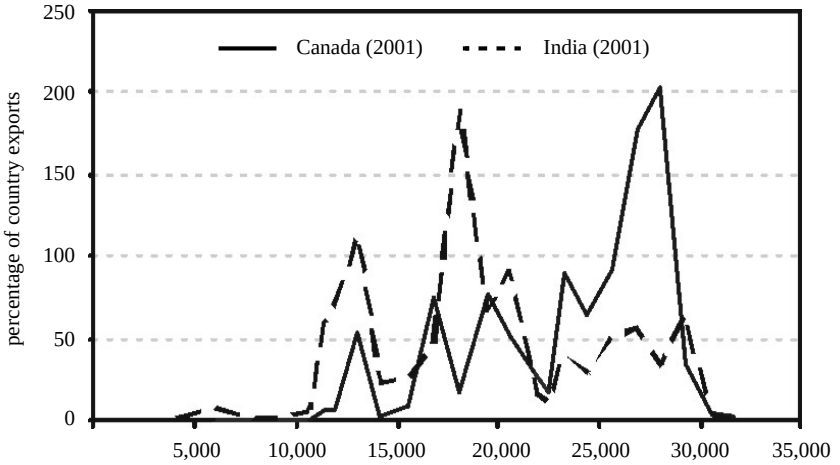


Figure 10e
Share of exports ranked by PSI, Canada and India (2001)



industry *i* exports would have risen in 2001 if they grew at the Canadian national average.

Equation 3 can be seen to be the sum of two components. The first is the destination-mix effect (DE), and the second is the industry-specific effect (IE). The destination effect captures that part of the NRC in industry *i* exports that occurs simply because there has been rapid growth in exports to a market that may have been a traditional destination for our exports. As stated, this will be important in factoring out some of the change in industry export performance that may have come from increased trade with the United States, for example. The second component is a residual. It captures that part of the net relative change in industry *i* exports that occurs because of better performance of that industry after controlling for destination effects. This second component is important for determining whether there has been a change in terms of trade, among other factors.

Tables 2a and b show the export shares for the top 20 Canadian exports, broken down by the three-digit SITC code (and PSI index number) for 1985 and 2001, respectively.[23] The last three columns show the net relative change and its breakdown into destination and industry effects. What is striking about Table 2a, which shows the 1985 top 20 exports, is that in each case when the industry had a positive NRC in the years that followed, it was

23. See Appendix 5 for a list of the top 20 bilateral exports between China and Canada and between India and Canada in 1985 and 2001.

Table 2a
Canada's top 20 merchandise exports, 1985

Rank	SITC classification	PSI 1985	Export share	NRC	DE	IE
1	781-Passenger motor cars, for transport of passengers	24,453	0.136	–0.111	0.098	–0.209
2	784-Parts and accessories of 722, 781, 782, 783	22,021	0.077	–0.498	0.105	–0.603
3	641-Paper and paperboard	21,561	0.056	–0.302	0.050	–0.352
4	782-Motor vehicles for transport of goods/materials	24,857	0.053	–0.268	0.089	–0.357
5	333-Petroleum oils and crude oils obtained from bituminous minerals	9,644	0.050	–0.195	0.100	–0.295
6	341-Gas, natural and manufactured	20,066	0.041	0.686	0.097	0.589
7	248-Wood, simply worked and railway sleepers of	18,157	0.040	–0.253	0.000	–0.253
8	041-Wheat (including spelt) and meslin, unmilled	19,119	0.032	–0.789	–0.625	–0.164
9	251-Pulp and waste paper	19,559	0.029	–0.373	–0.071	–0.302
10	971-Gold, non-monetary	16,492	0.020	–0.721	–0.002	–0.719
11	713-Internal combustion piston engines and parts	21,335	0.018	–0.250	0.095	–0.345
12	322-Coal, lignite, and peat	17,985	0.018	–0.699	–0.419	–0.280
13	684-Aluminum	20,362	0.016	0.052	–0.085	0.137
14	764-Telecommunications equipment and parts	24,624	0.016	0.455	–0.052	0.507
15	752-Automatic data processing machines and units	21,745	0.016	–0.640	0.027	–0.667
16	334-Petroleum products, refined	15,596	0.016	0.105	0.066	0.038
17	792-Aircraft and associated equipment and parts	20,722	0.014	1.277	–0.007	1.284
18	351-Electric current	22,356	0.012	–0.328	0.100	–0.427
19	287-Ores and concentrates of base metals, n.e.s.	11,350	0.012	–0.567	–0.187	–0.380
20	562-Fertilizers, manufactured	18,323	0.011	–0.346	–0.044	–0.302
ESI (for top 20)		20,523	0.681			
ESI (for all exports)		20,062				

Notes: NRC = net relative change; DE = destination-mix effect; IE = industry-specific effect.

Table 2b
Canada's top 20 merchandise exports, 2001

Rank	SITC code	PSI 2001	Export share	NRC	DE	IE
1	781-Passenger motor cars, for transport of passengers	28,289.924	0.121	–0.111	0.098	–0.209
2	341-Gas, natural and manufactured	17,422.757	0.069	0.686	0.097	0.589
3	333-Petroleum oils and crude oils obtained from bituminous minerals	13,121.331	0.040	–0.195	0.100	–0.295
4	641-Paper and paperboard	26,957.665	0.039	–0.302	0.050	–0.352
5	782-Motor vehicles for transport of goods/materials	26,131.618	0.039	–0.268	0.089	–0.357
6	784-Parts and accessories of 722, 781, 782, 783	27,233.507	0.039	–0.498	0.105	–0.603
7	792-Aircraft and associated equipment and parts	28,296.417	0.033	1.277	–0.007	1.284
8	248-Wood, simply worked, and railway sleepers of	21,012.443	0.030	–0.253	0.000	–0.253
9	764-Telecommunications equipment and parts	23,210.279	0.023	0.455	–0.052	0.507
10	251-Pulp and waste paper	23,254.386	0.018	–0.373	–0.071	–0.302
11	821-Furniture and parts thereof	19,741.757	0.018	2.210	0.079	2.131
12	334-Petroleum products, refined	19,269.410	0.017	0.105	0.066	0.038
13	684-Aluminum	22,255.232	0.017	0.052	–0.085	0.137
14	583-Polymerization and copolymerization products	26,700.321	0.014	2.319	0.085	2.234
15	713-Internal combustion piston engines and parts	27,503.228	0.013	–0.250	0.095	–0.345
16	714-Engines and motors, non-electric	27,923.287	0.013	0.605	–0.026	0.631
17	893-Articles of materials described in division	23,860.643	0.011	7.240	0.065	7.176
18	011-Meat, edible meat offal, fresh, chilled, or frozen	24,931.288	0.011	0.511	–0.022	0.534
19	751-Office machines	22,439.782	0.011	58.932	–0.019	58.951
20	041-Wheat (including spelt) and meslin, unmilled	23,512.501	0.010	–0.789	–0.625	–0.164
ESI (for top 20)		23,842	0.587			
ESI (all exports)		23,745				

Notes: NRC = net relative change; DE = destination-mix effect; IE = industry-specific effect.

due to a positive industry effect. When exports fell, having a negative NRC, a negative industry effect was involved in each case. Regardless of whether the NRC was positive or negative, there was no obvious relationship between the destination effect and the NRC. The same story is true for the top 20 exports in 2001: industry effects always line up with the NRC.

The shift-share analysis therefore seems to suggest that industry-specific effects are important in explaining the changing pattern of Canadian exports. This is, however, only a selection of the top Canadian exports, and it doesn't allow one to examine the full extent of the relationship between industry export performance and PSI. We wanted to make sure that the rightward shift that we see in Figure 10a was due to industry effects (consistent with changing terms of trade) or destination effects (due to NAFTA). Therefore, we ran the correlation of the log of PSI (both 1985 and 2001) with the log of NRC+1, the log of IE+1, and the log of DE+1.[24] Table 3 reports the results.

Interestingly, the coefficients suggest a positive correlation between industry export performance (NRC) and the PSI index, but it is not statistically significant. However, once destination effects are accounted for, we find a positive and statistically significant correlation between the industry effect and the PSI score for the industry. This suggests that the Canadian industries that are becoming relatively more competitive in the global markets are those that are positively related to the PSI; however, this effect is being diluted somewhat by export growth in traditional export markets.[25]

This is a simple analysis of the determinants of comparative advantage and Canadian export performance, but it is consistent with our expectations. That is, Canadian exports are being affected by industry-specific effects that could be due to the growth and liberalization of trade between Canada and those countries lower down on the ladder of comparative advantage. In particular, trade with these countries is inducing specialization further up the ladder in Canada. Moreover, given Canada's capacity to finance ongoing investment in these high-PSI industries, we expect this process to continue to feed Canadian growth in the future. Clearly, more research needs to be done to confirm this hypothesis.

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24. Taking logs helps to deal with the problem that NRC is bounded below by –1. Our analysis omits 23 small industries, which had an expected value of exports in 2001 of < $25 million.

25. Simple correlations such as these should be treated with caution, since they do not consider many of the other factors that determine industry and destination effects other than the PSI number.

Table 3
Correlation coefficients between PSI and NRC and its components

	PSI 1985	PSI 2001
Industry-specific effect (IE)	0.1351	0.1298
	(0.061)	(0.0719)
Destination-mix effect (DE)	0.0892	0.1069
	(0.2173)	(0.1388)
Net relative change (NRC)	0.113	0.1512
	(0.1178)	(0.0358)

Notes: *P*-values in parentheses.
Number of observation: 193.

Conclusion

This paper examines the growth and integration of the economies of China and India in the content of the world economy and considers the implications for Canada. To perform our analysis, we turned to the literature and focused on four "puzzle" pieces that seemed relevant. The first observation was that China and India are growing, somewhat against empirical odds, given that over the long run, per capita incomes diverge widely across economies (Pritchett 1997). Second, as has been noted by a number of researchers, such as Rodrik, Subramanian, and Trebbi (2002), income levels and growth are now widely thought to depend on the quality of institutions. Third, trade can play an important role in the growth process by allowing countries to specialize and accumulate capital according to their comparative advantage (Findlay 1995). Fourth, it is reasonable to expect that institutions, aside from driving growth, also play a role in determining a country's comparative advantage relative to others (Beck 2002).

Putting these pieces of the "growth and integration" puzzle together, we believe, produces a simple, general theory that explains the pattern of trade and growth across economies. Using our framework, we can conclude that, given the quality of their institutions, China and India have somewhat taken the middle ground in world trade, exporting mostly middle-level goods in terms of their sophistication. As a result, trade liberalization has not contributed to the process of growth in these economies. Nevertheless, their economies have grown, driven by institutional reform, and their trade has expanded (especially in China). Moreover, if China and India continue to improve the quality of their institutions, our results suggest that they can expect trade to magnify the benefits of institutional reform. In response, countries like Canada have become somewhat more specialized in sophisticated goods, triggering a process of capital accumulation and higher levels of Canadian GDP. We expect this process of Canadian trade-induced

growth to continue as India and China make further improvements in the quality of economic institutions and integrate themselves into the world economy.

Appendix 1
The Ladder of Comparative Advantage, 1985 and 2001

Country Name	ESI 1985	ESI 2001	Rank 1985	Rank 2001	Change
Japan	22,650	26,089	1	2	–1
Switzerland	21,789	26,933	2	1	1
Germany	21,407	25,698	3	4	–1
Sweden	21,049	25,194	4	6	–2
Austria	20,537	24,956	5	8	–3
United States	20,511	25,198	6	5	1
France	20,370	25,079	7	7	0
Ireland	20,230	25,846	8	3	5
Finland	20,220	24,723	9	9	0
Canada	20,062	23,745	10	16	–6
Belgium-Luxemburg	19,978	24,253	11	11	0
Denmark	19,765	23,816	12	14	–2
Italy	19,461	23,369	13	21	–8
Netherlands	19,336	23,953	14	13	1
Bulgaria	19,120	20,083	15	46	–31
Spain	19,015	23,798	16	15	1
United Kingdom	18,893	24,585	17	10	7
Israel	18,767	22,634	18	23	–5
Hungary	18,698	23,521	19	19	0
Hong Kong	18,597	21,726	20	30	–10
Korea (Republic of)	18,562	23,632	21	18	3
Singapore	18,174	24,083	22	12	10
New Zealand	18,047	23,517	23	20	3
Romania	17,892	19,203	24	59	–35
Malta	17,819	23,290	25	22	3
Barbados	17,812	22,456	26	26	0
Iceland	17,769	21,840	27	29	–2
Portugal	17,466	21,505	28	32	–4
Argentina	16,952	20,831	29	39	–10
Bahrain	16,863	19,227	30	58	–28
Bolivia	16,830	19,327	31	57	–26
Australia	16,646	20,942	32	37	–5
Norway	16,476	18,085	33	69	–36
South Africa	16,474	21,000	34	36	–2
Malaysia	13,609	21,997	67	27	40
Trinidad and Tobago	13,473	20,118	68	44	24
Mauritius	13,281	14,583	69	100	–31
Ghana	13,258	20,047	70	48	22
Senegal	13,238	18,409	71	65	6
Gambia	13,228	17,022	72	77	–5
Tunisia	13,210	16,479	73	84	–11
Morocco	13,207	15,933	74	90	–16
Sierra Leone	13,183	20,107	75	45	30
Jamaica	13,173	14,967	76	98	–22
Congo (Dem. Rep. of)	13,013	17,357	77	73	4
Vietnam	12,970	15,384	78	97	–19
Mali	12,913	19,823	79	49	30
Panama	12,757	19,420	80	53	27
Guyana	12,654	17,010	81	78	3
Syrian Arab Republic	12,619	14,743	82	99	–17
Kiribati	12,380	20,121	83	43	40
Suriname	12,302	14,439	84	101	–17
Equatorial Guinea	12,172	14,034	85	106	–21
Costa Rica	12,099	20,908	86	38	48
Egypt	11,848	19,006	87	63	24
Papua-New Guinea	11,598	15,534	88	94	–6
Bangladesh	11,552	13,082	89	113	–24
Guatemala	11,470	18,606	90	64	26
Côte d'Ivoire	11,396	19,035	91	62	29
Mauritania	11,263	14,380	92	102	–10
Malawi	11,140	13,211	93	111	–18
Chad	11,027	17,954	94	71	23
Ecuador	10,670	16,159	95	87	8
Benin	10,501	17,988	96	70	26
Gabon	10,456	13,895	97	108	–11
Honduras	10,420	16,726	98	81	17
Cameroon	10,361	16,352	99	86	13
Oman	10,228	15,818	100	91	9

Country Name	ESI 1985	ESI 2001	Rank 1985	Rank 2001	Change
Cyprus	16,465	23,681	35	17	18
Turkey	16,370	19,560	36	52	–16
Uruguay	16,099	21,432	37	33	4
Seychelles	16,010	16,768	38	80	–42
Philippines	15,986	22,537	39	24	15
Brazil	15,786	21,361	40	34	6
Greece	15,643	20,068	41	47	–6
Albania	15,446	15,492	42	95	–53
Mongolia	15,407	15,407	43	96	–53
Haiti	15,172	14,341	44	105	–61
Zambia	15,035	19,821	45	50	–5
Belize	15,031	17,108	46	75	–29
Chile	14,901	19,802	47	51	–4
Thailand	14,725	21,241	48	35	13
Zimbabwe	14,717	17,095	49	76	–27
Mozambique	14,576	19,398	50	54	–4
Sudan	14,465	14,358	51	103	–52
Nepal	14,459	16,362	52	85	–33
Jordan	14,381	19,354	53	56	–3
India	14,376	19,192	54	60	–6
China	14,348	20,468	55	41	14
Solomon Islands	14,271	18,122	56	68	–12
Pakistan	14,252	16,602	57	83	–26
St. Kitts and Nevis	14,246	21,562	58	31	27
Fiji	14,033	16,148	59	88	–29
Bhutan	13,944	21,905	60	28	32
Burkina Faso	13,846	19,382	61	55	6
Peru	13,810	19,120	62	61	1
Paraguay	13,808	20,481	63	40	23
Dominican Rep.	13,731	17,262	64	74	–10
Mexico	13,705	22,522	65	25	40
Guinea-Bissau	13,651	16,130	66	89	–23
Congo (Republic of the)	10,226	14,347	101	104	–3
Colombia	10,222	18,292	102	66	36
Nicaragua	10,051	18,272	103	67	36
Angola	9,957	13,765	104	109	–5
Kenya	9,716	16,713	105	82	23
Ethiopia	9,702	16,941	106	79	27
El Salvador	9,636	20,345	107	42	65
Sri Lanka	9,584	13,935	108	107	1
Lao People's Dem. Rep.	9,293	15,599	109	93	16
Comoros	9,231	12,580	110	114	–4
Madagascar	8,572	13,578	111	110	1
Togo	8,288	15,677	112	92	20
Uganda	6,218	17,777	113	72	41
Burundi	6,168	13,197	114	112	2
Rwanda	6,131	11,022	115	115	0

Appendix 2
Sources and Definitions of Variables

Dependent Variable

1. Growth rate of per capita GDP in constant 1995 US dollars. Refer to (A) for source.

Explanatory variables

- *Economic and Financial Variables*

All variables are obtained from the World Bank's World Development Indicators and computed as five-year averages for periods 1972 to 1976, 1977 to 1981, 1982 to 1986, 1987 to 1991, 1992 to 1996, and 1997 to 2001.

1. Per capita GDP in constant 1995 US dollars.
2. Gross capital formation as a percentage of GDP.
3. General government final consumption expenditure as a percentage of GDP.
4. Overall government budget balance, including grants as a percentage of GDP.
5. Domestic credit to private sector as a percentage of GDP.
6. Domestic credit provided by banking sector as a percentage of GDP.
7. Consumer price index, 1995 = 100.
8. Imports of goods and services from the world in constant 1995 US dollars.
9. Exports of goods and services to the world in constant 1995 US dollars.
10. GDP in constant 1995 US dollars.
11. Total trade as a percentage of GDP. Computed as ((no. 11 + no. 12)/ no. 13) from above.
12. Education levels: average years of secondary schooling in the total population, from the Barro-Lee data set on educational attainment.

- *Institutional Quality*

From the PRS Group's International Country Risk Guide.

1. Political risk.
2. Bureaucracy quality.
3. Corruption.
4. Democratic accountability.

5. Law and order.
6. Government stability.
7. Investment profile.

From the Fraser Institute's *Economic Freedom of the World: 2004 Annual Report*.

1. Legal system and property rights.

Appendix 3
List of Countries Used in Growth Regressions

IFS Code	Country Name
111	United States
112	United Kingdom
122	Austria
124	Belgium
128	Denmark
132	France
134	Germany
136	Italy
138	Netherlands
142	Norway
144	Sweden
146	Switzerland
156	Canada
158	Japan
172	Finland
174	Greece
176	Iceland
178	Ireland
181	Malta
182	Portugal
184	Spain
186	Turkey
193	Australia
196	New Zealand
199	South
213	Argentina
218	Bolivia
223	Brazil
228	Chile
238	Costa Rica
243	Dominican Republic
248	Ecuador
253	El Salvador
258	Guatemala
263	Haiti
268	Honduras
273	Mexico
278	Nicaragua
283	Panama
288	Paraguay
293	Peru
298	Uruguay
299	Venezuela

IFS Code	Country Name
336	Guyana
343	Jamaica
369	Trinidad and Tobago
419	Bahrain
423	Cyprus
429	Iran
436	Israel
439	Jordan
443	Kuwait
463	Syrian
469	Egypt
513	Bangladesh
518	Myanmar
524	Sri Lanka
532	Hong Kong
534	India
536	Indonesia
542	South Korea
548	Malaysia
564	Pakistan
566	Philippines
576	Singapore
578	Thailand
612	Algeria
616	Botswana
622	Cameroon
632	Comoros
636	Congo (Dem.)
652	Ghana
664	Kenya
676	Malawi
678	Mali
692	Niger
698	Zimbabwe
722	Senegal
724	Sierra Leone
742	Togo
744	Tunisia
746	Uganda
754	Zambia
853	Papua-New Guinea
924	China
944	Hungary
964	Poland

Note: IFS = International Financial Statistics.

Appendix 4
Export Shares: Top 20 World Exports
India and China

India 1985

Rank	SITC Code	PSI	Share
1	667-Pearls, precious and semiprecious stones, unworked	17,588	0.130
2	074-Tea and maté	3,537	0.058
3	281-Iron ore and concentrates	10,685	0.054
4	844-Undergarments of textile fabrics	9,604	0.046
5	334-Petroleum products, refined	15,596	0.046
6	611-Leather	15,078	0.038
7	652-Cotton fabrics, woven	15,851	0.037
8	036-Crustaceans and molluscs, fresh, chilled, frozen	9,537	0.034
9	659-Floor coverings, etc.	17,225	0.026
10	075-Spices	6,394	0.026
11	071-Coffee and coffee substitutes	4,775	0.024
12	057-Fruit and nuts (not including oil nuts), fresh or dried	10,976	0.024
13	658-Made-up articles, wholly/chiefly of textile materials	13,491	0.024
14	843-Outer garments, women's, of textile fabrics	14,647	0.023
15	612-Manufactures of leather or composition leather	12,432	0.022
16	654-Textile fabrics, woven, other than cotton/man-made	15,131	0.019
17	042-Rice	9,985	0.018
18	292-Crude vegetable materials, n.e.s.	16,464	0.018
19	541-Medicinal and pharmaceutical products	22,041	0.015
20	081-Feeding stuff for animals (no unmilled cereals)	15,813	0.014
ESI (for top 20)		12,853	0.694
ESI (all exports)		14,376	

China 1985

Rank	SITC Code	PSI	Share
1	333-Petroleum oils and crude oils obt. from bituminous mat.	9,644	0.241
2	334-Petroleum products, refined	15,596	0.066
3	652-Cotton fabrics, woven	15,851	0.037
4	651-Textile yarn	17,068	0.029
5	842-Outer garments, men's, of textile fabrics	13,610	0.025
6	658-Made-up articles, wholly/chiefly of textile materials	13,491	0.024
7	044-Maize (corn), unmilled	19,363	0.019
8	654-Textile fabrics, woven, other than cotton/man-made	15,131	0.017
9	653-Fabrics, woven, of man-made fibres	18,971	0.017
10	268-Wool and other animal hair (excluding wool)	14,280	0.016
11	845-Outer garments and other articles, knitted	13,949	0.016
12	263-Cotton	10,445	0.015
13	001-Live animals chiefly for food	15,962	0.015
14	899-Other miscellaneous manufactured articles	18,831	0.015
15	894-Baby carriages, toys, games, and sporting goods	16,857	0.014
16	851-Footwear	13,387	0.014
17	541-Medicinal and pharmaceutical products	22,041	0.014
18	056-Vegetable roots and tubers, prepared/preserved	13,687	0.013
19	261-Silk	4,145	0.013
20	322-Coal, lignite, and peat	17,985	0.013
ESI (for top 20)		13,217	0.632
ESI (all exports)		14,348	

India 2001			
Rank	**SITC Code**	**PSI**	**Share**
1	667-Pearls, precious and semiprecious stones, unworked	18,149	0.134
2	651-Textile yarn	18,061	0.040
3	334-Petroleum products, refined	19,269	0.034
4	658-Made-up articles, wholly/chiefly of text. mat.	13,612	0.031
5	844-Undergarments of textile fabrics	11,424	0.028
6	036-Crustaceans and molluscs, fresh, chilled, frozen	11,406	0.025
7	846-Undergarments, knitted or crocheted	13,098	0.025
8	842-Outer garments, men's, of textile fabrics	11,811	0.024
9	897-Jewellery, goldsmiths and other art. of prec.	20,948	0.024
10	281-Iron ore and concentrates	12,360	0.023
11	541-Medicinal and pharmaceutical products	29,565	0.023
12	845-Outer garments and other articles, knitted	13,630	0.021
13	659-Floor coverings, etc.	20,536	0.020
14	848-Articles of apparel and clothing accessories	11,457	0.017
15	514-Nitrogen-function compounds	28,989	0.014
16	652-Cotton fabrics, woven	18,249	0.014
17	843-Outer garments, women's, of textile fabrics	12,675	0.013
18	515-Organo-inorganic and heterocyclic compounds	29,275	0.013
19	851-Footwear	13,952	0.012
20	611-Leather	16,946	0.012
ESI (for top 20)		17,159	0.55
ESI (all exports)		19,192	1

China 2001			
Rank	**SITC Code**	**PSI**	**Share**
1	764-Telecommunications equipment and parts	23,210	0.074
2	752-Automatic data processing machines and units	23,266	0.049
3	842-Outer garments, men's, of textile fabrics	11,811	0.043
4	894-Baby carriages, toys, games, and sporting goods	20,122	0.037
5	851-Footwear	13,952	0.037
6	845-Outer garments and other articles, knitted	13,630	0.034
7	751-Office machines	22,440	0.033
8	778-Electrical machinery and apparatus, n.e.s.	25,663	0.025
9	775-Household type, elect. and non-electrical equipment	19,311	0.020
10	893-Articles of materials described in division	23,861	0.020
11	821-Furniture and parts thereof	19,742	0.019
12	776-Thermionic, cold and photo-cathode valves	24,740	0.018
13	846-Undergarments, knitted or crocheted	13,098	0.016
14	848-Articles of apparel and clothing accessories	11,457	0.016
15	658-Made-up articles, wholly/chiefly of textile materials	13,612	0.015
16	831-Travel goods, handbags, briefcases, purses	16,566	0.015
17	899-Other miscellaneous manufactured articles	23,521	0.015
18	771-Electric power machinery and parts thereof	21,704	0.014
19	772-Electrical apparatus such as switches, relays, fuses	25,719	0.013
20	844-Undergarments of textile fabrics	11,424	0.012
ESI (for top 20)		19,301	0.53
ESI (all exports)		20,468	1

Notes:
ESI: export sophistication index.
PSI: product sophistication index.

Appendix 5
Export Shares: Top 20 Bilateral Exports

China's exports to Canada, 1985			
Rank	**SITC Code**	**PSI**	**Share**
1	056-Vegetable roots and tubers, prepared/preserved	13,687	0.133
2	652-Cotton fabrics, woven	15,851	0.120
3	653-Fabrics, woven, of man-made fibres	18,971	0.106
4	658-Made-up articles, wholly/chiefly of text. mat.	13,491	0.097
5	057-Fruit and nuts (not including oil nuts), fresh or dried	10,976	0.088
6	894-Baby carriages, toys, games, and sporting goods	16,857	0.049
7	654-Textile fabrics, woven, other than cotton/man-made	15,131	0.035
8	263-Cotton	10,445	0.025
9	659-Floor coverings, etc.	17,225	0.024
10	851-Footwear	13,387	0.024
11	694-Nails, screws, nuts, bolts, etc. of iron, steel	22,199	0.019
12	541-Medicinal and pharmaceutical products	22,041	0.019
13	699-Manufactures of base metal, n.e.s.	20,282	0.017
14	899-Other miscellaneous manufactured articles	18,831	0.016
15	523-Other inorganic chemicals	20,225	0.011
16	893-Articles of materials described in division	20,501	0.011
17	287-Ores and concentrates of base metals, n.e.s.	11,350	0.010
18	269-Old clothing and other old textile articles	22,365	0.009
19	058-Fruit, preserved, and fruit preparations	12,027	0.009
20	074-Tea and maté	3,537	0.008
ESI (for top 20)		15,360	0.83

Export Shares: Top 20 Bilateral Exports

India's Exports to Canada, 1985			
Rank	**SITC Code**	**PSI**	**Share**
1	844-Undergarments of textile fabrics	9,604	0.215
2	843-Outer garments, women's, of textile fabrics	14,647	0.123
3	659-Floor coverings, etc.	17,225	0.074
4	667-Pearls, precious and semiprecious stones	17,588	0.063
5	287-Ores and concentrates of base metals, n.e.s.	11,350	0.053
6	654-Textile fabrics, woven, other than cotton/man-made	15,131	0.050
7	896-Works of art, collectors' pieces and antiques	20,073	0.045
8	075-Spices	6,394	0.045
9	071-Coffee and coffee substitutes	4,775	0.043
10	842-Outer garments, men's, of textile fabrics	13,610	0.032
11	611-Leather	15,078	0.025
12	074-Tea and maté	3,537	0.020
13	057-Fruit and nuts (not including oil nuts)	10,976	0.016
14	292-Crude vegetable materials, n.e.s.	16,464	0.014
15	424-Other fixed vegetable oils, fluid or solid	8,697	0.013
16	523-Other inorganic chemicals	20,225	0.013
17	042-Rice	9,985	0.013
18	658-Made-up articles, wholly/chiefly of textile materials	13,491	0.011
19	652-Cotton fabrics, woven	15,851	0.011
20	851-Footwear	13,387	0.010
ESI (for top 20)		12,660	0.89

Export Shares: Top 20 Bilateral Exports

Canada's exports to India, 1985			
Rank	**SITC Code**	**PSI**	**Share**
1	423-Fixed vegetable oils, soft, crude, refined	15,637	0.231
2	274-Sulphur and unroasted iron pyrites	18,231	0.175
3	562-Fertilizers, manufactured	18,323	0.118
4	251-Pulp and waste paper	19,559	0.073
5	278-Other crude minerals	14,682	0.058
6	641-Paper and paperboard	21,561	0.055
7	723-Civil engineering and contractors' plant and equipment	22,952	0.050
8	054-Vegetables, fresh, chilled, frozen	13,879	0.028
9	686-Zinc	17,955	0.028
10	674-Universals, plates, and sheets of iron	22,680	0.018
11	764-Telecommunications equipment and parts	24,624	0.014
12	682-Copper	15,016	0.014
13	233-Synthetic rubber	21,568	0.011
14	683-Nickel	19,449	0.009
15	784-Parts and accessories of 722, 781, 782	22,021	0.008
16	714-Engines and motors, non-electric	21,189	0.008
17	782-Motor vehicles for transport of goods/materials	24,857	0.008
18	728-Machinery and equipment specialized for part. indust.	23,189	0.007
19	541-Medicinal and pharmaceutical products	22,041	0.006
20	931-Special transactions and commodities, not classified according to kind	19,621	0.006
ESI (for top 20)		18,171	0.93

Export Shares: Top 20 bilateral exports

Canada's exports to China, 1985			
Rank	**SITC Code**	**PSI**	**Share**
1	041-Wheat (including spelt) and meslin, unmilled	19,119	0.388
2	641-Paper and paperboard	21,561	0.089
3	251-Pulp and waste paper	19,559	0.060
4	562-Fertilizers, manufactured	18,323	0.043
5	686-Zinc	17,955	0.041
6	682-Copper	15,016	0.035
7	287-Ores and concentrates of base metals, n.e.s.	11,350	0.030
8	233-Synthethic rubber	21,568	0.029
9	723-Civil engineering and contractors' plant and equipment	22,952	0.028
10	583-Polymerization and copolymerization products	21,549	0.026
11	274-Sulphur and unroasted iron pyrites	18,231	0.025
12	248-Wood, simply worked, and railway sleepers of wood	18,157	0.025
13	782-Motor vehicles for transport of goods/materials	24,857	0.023
14	247-Other wood in the rough or roughly squared	13,184	0.022
15	792-Aircraft and associated equipment and parts	20,722	0.019
16	764-Telecommunications equipment and parts	24624	0.016
17	046-Meal and flour of wheat and flour of meslin	19,116	0.011
18	512-Alcohols, phenols, phenol-alcohols, and their der.	19,894	0.008
19	714-Engines and motors, non-electric	21,189	0.008
20	266-Synthetic fibres suitable for spinning	20,800	0.008
ESI (for top 20)		19,269	0.94

Export Shares: Top 20 Bilateral Exports

Canada's exports to India, 2001			
Rank	**SITC Code**	**PSI**	**Share**
1	054-Vegetables, fresh, chilled, frozen/preserved, roots	18,816	0.30
2	641-Paper and paperboard	26,958	0.12
3	251-Pulp and waste paper	23,254	0.10
4	871-Optical instruments and apparatus	30,279	0.08
5	665-Glassware	25,219	0.07
6	562-Fertilizers, manufactured	17,739	0.07
7	278-Other crude minerals	19,256	0.05
8	287-Ores and concentrates of base metals, n.e.s.	12,844	0.03
9	674-Universals, plates and sheets, of iron or steel	25,796	0.02
10	728-Mach. and equip. specialized for particular industries	29,792	0.02
11	764-Telecommunications equipment and parts	23,210	0.01
12	931-Special transactions and commodities, not classified	26,555	0.01
13	233-Synthetic rubber	26,710	0.01
14	774-Electric apparatus for medical purposes	30,366	0.01
15	714-Engines and motors, non-electric	27,923	0.01
16	772-Electrical apparatus, such as switches, relays, fuses	25,719	0.01
17	751-Office machines	22,440	0.01
18	874-Measuring, checking, analyzing instruments	28,997	0.01
19	266-Synthetic fibres suitable for spinning	25,300	0.01
20	269-Old clothing and other old textile articles	24,841	0.00
ESI (for top 20)		22,470	0.92

Export Shares: Top 20 Bilateral Exports

China's exports to Canada, 2001			
Rank	**SITC Code**	**PSI**	**Share**
1	842-Outer garments, men's, of textile fabrics	11,811	0.07
2	894-Baby carriages, toys, games, and sporting goods	20,122	0.05
3	851-Footwear	13,952	0.05
4	764-Telecommunications equipment and parts	23,210	0.05
5	831-Travel goods, handbags, briefcases, purses	16,566	0.04
6	848-Articles of apparel and clothing accessories	11,457	0.04
7	821-Furniture and parts thereof	19,742	0.03
8	893-Articles of materials described in division	23,861	0.03
9	775-Household type electrical and non-electrical equipment	19,311	0.03
10	845-Outer garments and other articles, knitted	13,630	0.03
11	658-Made-up articles, wholly/chiefly of textile materials	13,612	0.03
12	778-Electrical machinery and apparatus, n.e.s.	25,663	0.02
13	844-Undergarments of textile fabrics	11,424	0.02
14	752-Automatic data processing machines and units	23,266	0.02
15	899-Other miscellaneous manufactured articles	23,521	0.02
16	699-Manufactures of base metal, n.e.s.	23,554	0.02
17	812-Sanitary, plumbing, heating, lighting fixtures	20,403	0.02
18	784-Parts and accessories of 722, 781, 782	27,234	0.02
19	695-Tools for use in hand or in machines	26,662	0.01
20	749-Non-electric parts and accessories of machinery	27,406	0.01
ESI (for top 20)		18,362	0.61

Export Shares: Top 20 Bilateral Exports

India's Exports to Canada, 2001			
Rank	**SITC Code**	**PSI**	**Share**
1	846-Undergarments, knitted or crocheted	13,098	0.13
2	842-Outer garments, men's, of textile fabrics	11,811	0.06
3	845-Outer garments and other articles, knitted	13,630	0.05
4	844-Undergarments of textile fabrics	11,424	0.05
5	667-Pearls, precious and semiprecious stones, unworked	18,149	0.04
6	651-Textile yarn	18,061	0.04
7	658-Made-up articles, wholly/chiefly of textile materials	13,612	0.04
8	659-Floor coverings, etc.	20,536	0.03
9	541-Medicinal and pharmaceutical products	29,565	0.03
10	514-Nitrogen-function compounds	28,989	0.03
11	036-Crustaceans and molluscs, fresh, chilled, frozen	11,406	0.02
12	749-Non-electric parts and accessories of machinery	27,406	0.02
13	897-Jewellery, goldsmiths' and other art. of prec. or semi-prec. mat.	20,948	0.02
14	851-Footwear	13,952	0.02
15	515-Organo-inorganic and heterocyclic compounds	29,275	0.02
16	843-Outer garments, women's, of textile fabrics	12,675	0.02
17	848-Articles of apparel, and clothing accessories excl. textile	11,457	0.02
18	075-Spices	10,266	0.02
19	287-Ores and concentrates of base metals, n.e.s.	12,844	0.02
20	654-Textile fabrics, woven, other than cotton/man-made	20,700	0.01
ESI (for top 20)		16,209	0.68

Export Shares: Top 20 Bilateral Exports

Canada's exports to China, 2001			
Rank	**SITC Code**	**PSI**	**Share**
1	251-Pulp and waste paper	23,254	0.14
2	792-Aircraft and associated equipment and parts	28,296	0.10
3	222-Oil seeds and oleaginous fruit, whole or broken	19,810	0.09
4	562-Fertilizers, manufactured	17,739	0.08
5	512-Alcohols, phenols, phenol-alcohols and their derivation	24,259	0.06
6	764-Telecommunications equipment and parts	23,210	0.06
7	784-Parts and accessories of 722, 781, 782	27,234	0.05
8	043-Barley, unmilled	24,455	0.04
9	524-Radio-active and associated materials	25,050	0.03
10	583-Polymerization and copolymerization products	26,700	0.03
11	287-Ores and concentrates of base metals, n.e.s.	12,844	0.03
12	041-Wheat (including spelt) and meslin, unmilled	23,513	0.02
13	266-Synthetic fibres suitable for spinning	25,300	0.02
14	714-Engines and motors, non-electric	27,923	0.02
15	036-Crustaceans and molluscs, fresh, chilled, frozen	11,406	0.02
16	728-Mach. and equip. specialized for particular industries	29,792	0.01
17	274-Sulphur and unroasted iron pyrites	23,182	0.01
18	211-Hides and skins (except fur skins), raw	25,110	0.01
19	282-Waste and scrap metal of iron or steel	24,197	0.01
20	749-Non-electric parts and accessories of machinery	27,406	0.01
ESI (for top 20)		23,246	0.83

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Discussion

Steven Kamin*

I have greatly enjoyed the opportunity to work with colleagues from the Bank of Canada on various issues over the years, and so it is a genuine pleasure to be here today to comment on an interesting and extremely topical paper.

I should note at the outset that the study by Desroches, Francis, and Painchaud is a work in progress. The authors address three substantial and distinct topics—(i) the evolution of the economies of China and India; (ii) cross-country correlations among growth, trade, and institutions; and (iii) the impact of China and India's emergence on Canada—but the paper is still feeling its way through to integrating the issues in a single analysis.

I will focus on the third topic, which I believe to be particularly important. As shown in Table 1, if recent trends in GDP growth continue, China, in particular, will grow to 24 per cent of the global economy by 2050. This will likely have significant effects on the global economy.

Thus, the research by Desroches, Francis, and Painchaud is extremely timely. I interpret their work as applying to the long run, when labour and capital are fully utilized, resources are fully reallocated according to comparative advantage, and, therefore, when China and India's growth is most likely to be beneficial for the industrialized economies. In the short term, however, additions to global supply could, in principle, outstrip demand, disrupting the global economy. Many commentators have high-

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Table 1
The growing role of China and India in the global economy
(percentage)

	China	India	US	Canada	Japan	Other East Asia***
Share of world population, 2002*	21	17	5	1	2	7
Share of world economy, 2002*	3	2	32	2	14	5
Assumed future GDP growth**	8	6	3	3	2	5
Share of world economy, 2050	24	5	24	2	6	8

Notes:
* Source: 2004 World Development Indicators.
** Loosely based on 1990–2002 growth rates.
*** Includes: Hong Kong, Indonesia, Korea, Malaysia, Philippines, Singapore, Taiwan, and Thailand.

lighted this threat, but how big is it really? Before I address the authors' long-run analysis, I'd like to sketch out an extremely crude estimate of China's current impact on Canadian and US growth. It is based generally on data for 2003, but I would emphasize that it is intended to be suggestive rather than definitive.

The top panel of Table 2 outlines the first channel of impact: China is lowering the prices that industrialized countries pay for manufactures, thus raising their terms of trade. A paper I wrote with colleagues at the Federal Reserve (Kamin, Marazzi, and Schindler 2004) estimates that Chinese exports have lowered overall import costs by about 0.75 per cent annually in Canada and 1.25 per cent in the United States. This raises real income by about 0.1 per cent in the United States and 0.2 per cent in Canada—we then assume it raises total demand and GDP growth by three-quarters of this amount in the short run.

Offsetting this gain, as shown in the second panel, is the divergence of industrial country demand from domestic to Chinese production. Assuming unit elasticities of demand for imports, China's action in lowering import prices leads to a proportionate rise in import volumes. This implies a leakage from GDP growth of roughly 0.2 percentage points for the United States and Canada, more than offsetting the benefits of improved terms of trade discussed above.

A third channel of impact is higher exports to China. I arbitrarily assume that any Chinese growth above 3 per cent is "exceptional," and that this exceptional growth leads (assuming a unit elasticity of Chinese imports with

Table 2
Guesstimate of short-term impact of Chinese growth on United States and Canada (percentage)

	United States	Canada
Channel 1: Effect of reduced import prices		
Change in import prices	–1.25%	–0.75%
Savings to import bill	+$15.8B	+C$2.6B
Savings/nominal GDP	+0.14%	+0.21%
Rise in spending/real GDP	**+0.11%**	**+0.16%**
Channel 2: Effect of higher imports from China		
Change in import prices	–1.25%	–0.75%
Change in import volumes	+1.25%	+0.75%
Change in real GDP	**–0.14%**	**–0.21%**
Channel 3: Effect of higher exports to China		
"Exceptional" Chinese growth	+5%	+5%
Exports to China/nominal GDP	0.37%	0.45%
Change in real GDP	**+0.02%**	**+0.02%**

	Oil	Copper	Cotton
Channel 4: Effect of higher commodity prices			
Annual price change*	21%	37%	9%
Annual demand change*	2.8%	2.6%	0.7%
China contribution to demand change*	+0.8%	+1.8%	+2.2%
China contribution to price change (guesstimate)	**+5.9%**	**+25.0%**	**+9%**
Canada			
Net exports/GDP:	1.20%	0.07%	–0.01%
Change in net exports/GDP	+0.07%	+0.02%	–0.00%
Change in spending/GDP	**+0.05%**	**+0.01%**	**–0.00%**
United States			
Net exports/GDP:	–1.05%	–0.01%	0.03%
Change in net exports/GDP	–0.06%	–0.00%	+0.00%
Change in spending/GDP	**–0.05%**	**–0.00%**	**+0.00%**

*Averaged over 2002–04

	United States	Canada
Summary		
Channel 1: Lower import prices	+0.11%	+0.16%
Channel 2: Higher import volumes	–0.14%	–0.21%
Channel 3: Higher export volumes	+0.02%	+0.02%
Channel 4: Higher commodity prices	–0.05%	+0.06%
Total	**–0.06%**	**+0.03%**

Notes: Calculations in this table are based primarily on data for 2003, and derive from various sources, including: International Monetary Fund, *International Financial Statistics* and *Direction of Trade Statistics;* Industry Canada, online database; International Copper Study Group; Statistics Canada; Energy Information Administration, *International Petroleum Monthly*; US Department of Commerce; and US Department of Agriculture.

respect to GDP) to proportionate additional growth in Canadian and US exports to China. Given the low level of exports to China, I guesstimate that recent Chinese growth has boosted Canadian and US GDP growth by only tiny amounts.

Finally, a fourth channel provides a drag on industrial country growth: China's impact on primary commodity prices. The table displays calculations for three important commodities, but others would be included in a comprehensive analysis. Focusing on the example of oil, prices have risen about 21 per cent annually over the past few years, while growth in Chinese demand has contributed almost one-third of the 2.8 per cent annual growth in global demand. If we assume, somewhat unrealistically, that all of the run-up in oil prices owes to higher demand, then we can attribute almost a third of that run-up—or 5.9 per cent—to Chinese growth alone. Then, taking into account the net export positions in oil of Canada and the United States, we estimate that Chinese oil-price effects have boosted income by roughly 0.1 per cent in Canada and reduced income by the same extent in the United States. Then, as before, we assume that three-quarters of these income effects translate into changed growth in GDP. The analysis of China's effect on the other commodity prices follows a similar approach.

Adding together all four effects (the last panel of Table 2), we see that US growth is lowered 0.06 percentage point annually, while Canadian growth is raised 0.03 percentage point. While keeping in mind how simplistic this exercise is, these short-term impacts are quite small, suggesting that China is going to have to become a considerably larger player in the global economy before its impact on Canada and the United States begins to approach the predictions of some commentators.

Now, in the long run, as I've noted, China and India will likely have a more positive impact on the industrialized economies. But how does one quantify the productivity gains resulting from more trade with these countries? Here, the authors offer a rather clever approach: they estimate a multi-country panel regression linking GDP growth to various determinants, including the ratio of trade to GDP. They then use their results to gauge the effect of increased trade with China on Canadian growth, putting it at 1.9 percentage point over a five-year period, or about 0.4 percentage point at an annual rate. Initially, I thought it was a bit bizarre to lift a regression out of a literature focused on structural reform and developing country growth, and apply the equation to the case of growth in Canada. Further reflection, however, persuaded me that the primary means by which China will affect Canada is by boosting trade, and this is exactly the effect that openness variables in cross-country growth regressions attempt to capture. Thus, the paper holds

the promise of using a straightforward back-of-the-envelope calculation to solve a difficult problem.

All that said, I do not take the results of the calculation very seriously. First, the trade-openness variable in the growth regression could easily be proxying for structural economic policies and institutions, rather than measuring the effects of openness per se; while institutional quality is held constant, this variable appears to capture mainly political and legal issues, and does not necessarily act as a good control for economic policies. Second, there is a huge literature devoted to estimating different variants of this regression, and one of the key lessons from this literature is that small differences in dynamic specification, explanatory variables, or instruments lead to big differences in coefficients—thus, I doubt that the estimated effect on growth of a 1 percentage point rise in openness is robust. Third, the coefficient on the trade-openness variable itself is estimated very imprecisely—therefore, a negative overall impact of greater openness on growth certainly falls within the model's 95 per cent confidence interval. Finally, I find the estimated effect of 1 percentage point greater openness on annual growth—0.4 percentage point—to be implausibly high. For example, the ratio of Canadian trade to GDP has risen about 20 percentage points since 1990—it is impossible to believe that growth should have risen 8 percentage points as a result. By this reckoning, the effect of NAFTA on Canadian growth should have been truly enormous!

As the authors acknowledge, even if their calculations were more reliable, the growth-regression approach is a bit of a black box: it tells you by how much trade with China boosts Canadian growth, but does not say why or how. Of course, any economist can answer that in general terms: trade with China should raise Canadian productivity by promoting specialization along lines of comparative advantage, so that Canada imports more goods that are intensive in low-skilled labour and produces more goods that are intensive in capital and high-skilled labour. The difficulty is to quantify this shift in product mix. The authors solve this problem by taking all the types of goods traded by China, India, and Canada, and assigning to each type of good a "product sophistication index," or PSI. This PSI is measured as the average real purchasing-power parity per capita income of the countries that export this type of good, weighted by their share in the global market for that good. Thus, the PSI for men's cotton underwear will probably look something like the per capita income of Honduras, while the PSI for precision machine tools may be closer to Germany's. The PSI approach is ingeniously simple and it works, as long as per capita incomes across economies are correlated with their endowments of capital and skilled labour, a not unreasonable assumption.

Using this approach, the authors document several interesting results. First, as one would expect, Canada exports a relatively high PSI mix of goods to China and India, and imports a relatively low PSI mix of goods from them in return. Second, the PSIs of Canadian exports to all countries have increased between 1985 and 2001, consistent with the view that Canada is specializing in producing higher-sophistication goods while giving up activities in the lower-sophistication goods categories. These results thus put some flesh on the bones of the argument that trade with developing countries promotes specialization in high-skilled, capital-intensive activities.

That said, I'd like to highlight two concerns. First, at least some of the increase in PSIs of Canada's exports between 1985 and 2001 may merely reflect increases in global per capita incomes; thus, even if Canada's export mix remained exactly the same, the PSIs of its exports could rise as the incomes of countries producing those goods rise. This suggests that what we'd like to see in response to low-priced import competition is not just an increase in Canada's PSIs, but an increase relative to that of other countries. I think the authors need to look into this more closely. Second, even if Canada's export mix has genuinely shifted towards more sophisticated products, the paper offers no evidence tying this shift directly to China and India. It might be useful for the authors to explore the change in PSIs for a broad range of industrial economies, and determine whether those countries whose trade with China rose the most were also those whose PSIs rose the most. Again, NAFTA seems like an important candidate for any changes in the Canadian export mix.

In conclusion, this paper is perhaps over-ambitious in its attempt to address too many important issues. I am convinced, however, that much of the work is interesting and will yield useful results with additional effort.

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