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China's Rise as an International Trading Power

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China's Rise as an International Trading Power

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Abstract

This research reviews the policies that have shaped China's manufactured export explosion, and examines long trend statistics on the evolution of China's trading partners and the goods it trades in the post-reform period. Common characteristics in China's trade experience with those of earlier successful export-based economies of East Asia are detailed. The authors find that China's pattern of trade and trading partners are similar to those of more market-based Asian economies, but that the Chinese economy's orientation toward foreign trade is much greater than expected for an economy of its size and level of development. The authors argue that China still has a long way to go in terms of its export boom, especially if compared to the experiences of South Korea, Japan, and Taiwan. This suggests that China is on track to become one of the world's most formidable trading powers and its export policies and export performance will exert increasing influence on how the global trade regime evolves in the future.

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I. Introduction

Since China initiated economic reforms in 1979, its economic growth has been exceptional (Table 1). The average income of a Chinese citizen has risen from US$717 in 1980 to US$4,726 in 2003.[1] Over the same 1980-2003 period, China's exports and imports increased at an annual rate of 10.2 percent and 9.4 percent, respectively. Export growth has regularly outpaced output growth, with the share of exports in China's Gross Domestic Product (GDP) rising from 13.9 percent in 1985 to 19.3 percent in 1992 to 30.1 percent in 2003.[2]

China's trade growth since 2001 has been particularly strong, with average annual growth rates of Chinese exports and imports increasing to 26 and 28 percent, respectively. The rapid growth in trade is due to the rise of markets for capital, labor, and consumer goods within China; to China's domestic economic policies that have facilitated production of the labor-intensive goods in which it has a comparative advantage; and to continued rigidities in China's domestic markets. China's rapid export growth has raised tensions with major trading partners, many of whom have initiated anti-dumping actions and imposed safeguard quotas on imports from China. The specter of increased competition from Chinese firms and consumers for scarce oil and other natural resources has concerned foreign policymakers as they consider the implications of China's spectacular trade growth for their economies and the global economy. It is in this policy context that we analyze the trade policies adopted by China's governments and the resulting trade flows that have transformed the Chinese economy and forced trading partners to reconsider their strategies for generating future economic growth.

Our chapter begins by reviewing how China's trade and trade policies have evolved since the start of the country's economic reforms. The process of China's accession to membership in the World Trade Organization (WTO) and its implementation of foreign direct investment (FDI) and trade liberalization measures promised in its accession protocol figures prominently in our story. The second section examines how the composition of goods and service traded and the value of trade with particular countries and regions has changed. We also consider the extent to which China's export surge is similar to the earlier export surges by Asian economies—Hong Kong, South Korea, Taiwan, Japan, Thailand, Indonesia, Singapore, and Malaysia—in the 1949-2003 period. The paper concludes by assessing future prospects for China's international trade.

II. A Brief Overview of China's Policies Towards International Trade

In the reform era (1978-), China's policies towards international trade have rapidly evolved, moving from the prohibition of trade in all but a few products to a relatively liberal stance towards both imports and exports. China's rapid trade liberalization has been

[1] The income figures have been adjusted to reflect international price difference, i.e., they are purchasing power parity estimates.

[2]Our estimates do not incorporate recent revisions in China's GDP that increase overall GDP levels. The revisions also have the effect of reducing the share of traded goods in GDP by increasing the share of GDP from non-tradable services.

accompanied by a generally rapid liberalization of its stance towards FDI. Analysis of trade flows is facilitated by considering policies towards both trade and FDI, as foreign firms can service the Chinese market either by exports or by producing their products within China. We note a shift in China's trade liberalization after its admission to the WTO in 2001, with trade liberalization shifting from policy changes applying to all trading partners to policy changes applying to particular trading partners. Finally, China's sustained post-2000 economic growth has induced the national government to devote considerable political effort to finding and securing raw materials and energy inputs vital to the continued growth of its manufacturing sector and overall economy.

China's trade flows during the reform period were regulated by a network of bilateral Most Favored Nation (MFN) agreements until its WTO accession in December 2001. The MFN agreements mandated that China provide its trading partners with the most favorable trade arrangements negotiated with other trading partners, and vice versa. Europe (in 1978) and the United States (in 1980) both granted MFN status to China soon after it initiated economic reforms, gaining China immediate access to the world's two largest export markets.[3] China's import barriers were initially very high but have secularly declined over the last 25 years due to both negotiated and unilateral tariff reductions by the Chinese government; the decline of state-owned enterprises (SOEs) which tend to buy from other SOEs; and to improvements in China's distribution networks. China has also benefited from the global reduction in trade barriers stemming from the 1995 WTO Agreement. Clarete et al. (2004) used a gravity model to analyze China's trade prior to WTO accession and concluded that China's network of MFN agreements generally allowed its exports to gain access even to economies that were members of Preferential Trading Areas (PTAs) and that might have been expected to heavily discriminate against trade from non-members.

The MFN treaty network was successful in jump-starting China's trade but provided flawed institutional foundations for long-run trade relationships. One problem was the uncertainty clouding China's MFN status with the United States. U.S. federal law, specifically the Jackson-Vanick amendment to the 1974 Trade Act, requires that the MFN status of communist countries be linked to a review of their immigration policies. After the 1989 Tiananmen Square incident, U.S. legislators used the annual vote on MFN renewal to make statements on human rights violations in China. Since the votes in Congress were usually closely contested, future access to the U.S. market by China's manufacturing firms was far from assured, which—among other things—limited investment in mainland Chinese manufacturing plants focused on the U.S. market.

A second problem with reliance on the network of MFN relationships was that the value of an alternative institutional arrangement—membership in the General Agreement on Tariffs and Trade (GATT)—increased in value with the establishment of the World Trade Organization in 1995. By incorporating a governance mechanism for resolving trade disputes, the value of the WTO-GATT multilateral rules increased to non-members, such as

[3] In the 1980s both the European Union and the United States had high tariffs and restrictive quotas on the import of a broad range of agricultural products. Since China's initial exports were heavily weighted towards agricultural products, these barriers were binding constraints. China's shift in the mid-1980s towards the export of labor-intensive goods lessened the impact of U.S. and E.U. tariff and non-tariff barriers on Chinese exports due to the lower protection afforded these products.

China, where exports constituted a large share of GDP. The value of the WTO as an institutional foundation for trade also increased because of its incorporation of a wide array of rules governing intellectual property in traded goods, trade in services, and government procurement. These rules were not usually included in MFN agreements, yet had the potential to fuel growth in China.

To become a WTO member, China announced and implemented numerous policy reforms during the mid-to-late 1990s designed to provide the institutional foundations for well-functioning product, labor, and capital markets and adopted many of the economic institutions required by the WTO, e.g. minimum standards of intellectual property rights and required enforcement procedures; national treatment of foreign products and firms; and bound tariff rates. A 1999 trade agreement with the United States provided the signal to firms in China and elsewhere that WTO membership for China was close. After nearly 15 years of negotiations that included signing bilateral agreements with 37 countries, China entered the WTO in December 2001. As reflected in its accession protocol, China had made nearly 700 commitments to WTO members to reduce import barriers in specific product markets and to end discrimination against foreign-invested enterprises in most sectors. Most of the commitments were front-loaded and were implemented by December 2004. Other commitments including completion of promised tariff cuts, quota removals, and the end of geographic restrictions on some types of foreign investments are still in process. The full package of commitments will not be fully implemented until 2010.

The American Chamber of Commerce-China, an organization that has incentives to identify problems with China's compliance, concluded in December 2004 that China "is substantially in compliance with its WTO deadlines and specific obligations".[4] Major exceptions are the enforcement of intellectual property rights; allowing entry of foreign-invested telecom service providers and wholly-foreign-owned construction firms; and allowing various types of product distribution by foreign-invested firms.

China's accession to the WTO was accomplished only after it agreed to special provisions allowing member countries to restrict Chinese exports during specified transition periods. For example, paragraph 242 of the U.S.-China Memorandum of Understanding on China's entry to the World Trade Organization and a similar provision in the European Union (EU) Agreement provide WTO members with the right to impose a 7.5 percent (6 percent for woolens) "safeguard" quota on annual increases in imports of textiles and apparel from China through 2008 if Chinese imports were "due to market disruption, threatening to impede the orderly development of trade." Second, Article 16 of China's Protocol of Accession to the WTO also allows WTO members to impose safeguard quotas when "imports of a product from China are increasing rapidly, either absolutely or relatively, so as to be a specific cause of material injury or threat of material injury to the domestic industry."[5] The trigger to impose these "special" safeguards is less stringent than that specified for usual WTO safeguards, as it examines the effect of all imports rather than just those from one country. This "special" safeguard provision does not expire until December

[4] American Chamber of Commerce-China (2005).

[5] The protocol is available at http://www.wto.org/english/thewto_e/acc_e/completeteacc_e.htm. (last accessed on August 6, 2005).

2013. Third, China's accession protocol specifies that China will be treated as a "non-market economy" in anti-dumping cases through December 2016. This means that an analogue economy must be identified and their prices used to calculate production costs and countervailing duties. Nielsen and Rutkowski (2005) and Chu and Prusa (2005) have concluded that this standard tends to bias results of anti-dumping cases strongly against China. Both the tendency for rising numbers of anti-dumping actions and the "safeguards" agreed to by China in its WTO accession agreements suggest that China's trading partners will have wide purview to pursue protectionist measures against Chinese imports during the next several years. The combination of the textile-apparel safeguard (through 2008), the product-specific "special" safeguard (through December 2013), and the non-market assumption in anti-dumping cases (through December 2016) provide WTO members with unilateral tools to raise the domestic prices of their imports from Chinese and thereby limit the growth of Chinese imports. While WTO membership has helped to secure access to the Chinese market by foreign firms—either via direct foreign investment or exports—and to secure access to foreign markets by Chinese firms, it has also put in place a medium-term minefield of legal measures that foreign firms can use to restrict the flow of Chinese imports to their markets.

We mention China's rapid liberalization of FDI flows in passing, because it has influenced the size and composition of China's trade flows (Zhang and Soong 2000). The activities of foreign firms in China were initially restricted to a limited number of sectors; required to export the bulk of their production; and in many instances required to have a Chinese partner with 50 percent or more ownership. Relaxation of these requirements for most industries has led to massive FDI flows from Asia, Europe, and North America. The accumulation of a large stock of FDI in China has altered China's trade flows, as many foreign firms import intermediate goods, assemble them in China, and export final products to foreign markets. This is important, as foreign firms have come to play a large role in China's international trade, and the share of exports being produced in foreign–invested firms represents an increasing share of enterprises in China (Zhang and Soong 2000).

Prior to its 2001 WTO accession, China was not party to any PTAs except its many bilateral MFN agreements, as its political leadership may have been consumed with the massive negotiating efforts required to gain WTO entry and likely wished to avoid the perception of going against the principal of non-preferential trade arrangements that underpins the WTO. Since WTO accession, China has quickly embraced the formation of PTAs as a mechanism for securing trade liberalization and furthering the access of Chinese firms to important foreign markets. China's vigorous negotiation of PTAs has ushered in a wave of new PTAs in Asia following years of lackadaisical progress. As of July 2005, China was negotiating or had proposed PTAs with Australia, Chile, India, Indonesia, New Zealand, Pakistan, Singapore, South Africa, Thailand, and four regional grouping— the Association of South East Asian Nations (ASEAN), the Gulf Cooperation Council, Mercosur, and the Shanghai Cooperation Organization (SCO).[6] In November 2002, China and ASEAN announced an agreement to implement a PTA with the original 6 ASEAN member countries by 2010 and with less developed ASEAN members by 2015.[7] As part of the PTA

[6] The Mercosur PTA includes Argentina, Uruguay, Brazil, and Paraguay. The SCO—founded in 2001—is composed of China, Kazakhstan, Kyrgyzstan, Russia, Tajikistan, and Uzbekistan.

[7] See Tongzon (2005) for an optimistic assessment of potential gains from the ASEAN-China PTA.

implementation process, China and ASEAN embarked on the "Early Harvest" program, in which China and ASEAN reduced tariffs on specified agricultural products from 1 January 2004 and have agreed to eliminate them by 1 January 2006. Preliminary reports signal "Early Harvest" to be a success, with trade in agricultural products increasing in both directions. Another tangible step in the implementation of the China-ASEAN PTA occurred on 20 July 2005 when low preferential tariff rates were instituted on over 7,000 industrial goods traded by member countries.

Antkiewicz and Whalley (2004) emphasize that China's PTA agreements have focused on preferential reductions in tariff rates and elimination of non-tariff barriers, unlike U.S.-initiated PTA agreements that tend to address a broader scope of issues, including investment and intellectual property rights. Frustration with the slow progress in the Doha Round of WTO negotiations may be one reason that China—a large country—has pursued PTAs despite research showing that most gains accrue to the smaller partner (Lee et. al. 2004). China's PTA drive may also reflect its strategic interest in promoting economic integration with its neighbors, fostering economic growth and stability in its 'backyard', and increasing its political and economic influence in neighboring Northeast and Southeast Asian countries. McLaren (1996) and La Croix and Grandy (1997) have cautioned that PTAs which asymmetrically benefit small economies can in some circumstances make the small country dependent on the large country's willingness to continue the PTA agreement. Finally, PTA negotiations should also be viewed as a critical component of the Chinese government's drive to raise its leadership role internationally.

China's push to conclude PTAs with Australia, Chile, New Zealand, the Gulf Cooperation Council, Mercosur, and the SCO may be tied to its ongoing effort to secure long-term supplies of critical natural resources—oil, minerals, intermediate agricultural inputs—for its rapidly growing manufacturing and transportation industries. State-owned trading and resource enterprises have entered into long-term contracts with resource suppliers around the globe, thereby replicating similar contracts entered into by the developed countries. The contracts' prices are typically tied to world market prices and entail significant risks for the Chinese companies entering into these contracts.

III. Trends in China's International Trade

This section identifies the major stylized facts and trends of China's international trade and discusses the implications of those trends for China and its trading partners. Between 1978 and 2004, the value of exports as a share of total GDP in China underwent a huge increase (see Table 1). In 1978 China's exports comprised only 4.2 percent of GDP while in 2004 they comprised 35.9 percent. Over the past 20 years, average annual growth rates in the real value of exports have been high—though widely fluctuating--ranging from 5.6 to 32 percent. The value of imports also increased rapidly, nearly keeping pace with increases in the value of exports. Because export growth slightly outpaced import growth, China's modest trade deficits turned into modest trade surpluses, and in 2004 to a large trade surplus. Both import and export growth rates have increased since 2000, with annual growth rates exceeding 20 percent for both series.

Since the late 1970s, China has undergone a fundamental shift in its trade partners. Early in the period, China's foreign trade was primarily oriented toward other Eastern Bloc countries, and displayed a pattern typical of these economies. Over the course of the 1980s and 1990s, China's trade refocused dramatically towards large market economies, Asian economies, and countries with large endowments of natural resources. China's exports to both Europe and North America expanded greatly between 1995 and 2003 (rising from a value of 54.1 to 180.1 billion constant year 2000 $US – more than a threefold increase), while its imports from non-OECD (Organizations of Economic Cooperation and Development) countries grew even more rapidly. In terms of the individual countries that have been China's largest trading partners, the most striking changes over the past 30 years include: 1) the rise of the United States as a leading market for Chinese exports, 2) the secular decline of Japan as a market for Chinese exports and its continued leading role as a source of imports, 3) the remarkable rise of Korean exports to China since the two countries opened trade in 1989, and 4) the continuing low shares of large EU economies in both Chinese imports and exports, e.g. only Germany makes the top ten list of suppliers of imports to China. China's international trade patterns have changed sufficiently that they have come (since the late 1990s) to resemble those of other export-oriented manufacturing economies of Asia: Trade surpluses from the sale of manufactures to OECD countries are used to finance trade deficits for the purchase of resources and intermediate inputs from non-OECD countries.

Are China's exports to and imports from different countries consistent with predictions of economic theory and historical data on international trade of countries of a similar size and level of development? To answer these questions, trade volumes must be adjusted for a host of characteristics of the trading countries, e.g. size of the economies involved, distances between countries, and linguistic and cultural affinity. We utilize export and import intensity indexes derived from "gravity models" that adjust the expected level of trade for these characteristics to gain insight into this issue.[8] The main findings from the gravity model analysis include: China's level of exports and imports are significantly above what one would expect given its size and level of development; China's tendency to trade at higher than predicted levels has generally increased over time; and there were marked differences in the strength of China's actual trade relationships vis-à-vis expected trade links across individual countries (and aggregating these, across global regions). China's export and import intensities were highest, i.e., China's level of trade was higher than expected, with Africa, Latin America, and the Middle East, and lowest with Asia.

Figure 1 compares the observed level of China's exports against the level of exports expected from gravity model estimates that account for the effect of economy size, distance, and similar variables in determining the level of exports between countries. Points on the diagonal line reflect cases in which the expected and observed exports were equal; points above (below) the line are ones in which observed exports exceed (fall below) expected exports. The gravity model's predicted trade flows can be understood as representing the level of exports one would expect if China's trade reflected global averages of modeled characteristics on trade flows. Figure 2 makes the same comparison for China's imports. Both figures show that for the vast majority of countries, observed exports from and

[8] See paper's Appendix for an extensive discussion of the methodology underlying the gravity model.

observed imports to China exceed predicted levels. The share of countries for which observed exports exceed predicted exports has increased over the course of the reform period. In 1985, this was the case for 50 percent of the countries to which China exported goods, while by 2002 it had reached nearly 90 percent. Calculations of gravity-model import intensities for China also suggest observed imports exceeded predicted imports from most countries. The proportion of countries for which Chinese imports exceeded predictions of the gravity model was, however, lower than that found for Chinese exports. This share has been increasing over time, rising from just under 35 percent in 1985 to 57.5 percent in 2002.

Two major findings emerge from this analysis: Changes over time in China's trade intensity elasticities are consistent with China's departure from a centrally planned economy oriented toward trade with other communist bloc economies in the late 1980s to a more market-based economy displaying patterns of trade that broadly resemble those of its trading partners; and its estimated adjusted export intensity elasticities clearly reveal China's excessive orientation toward foreign trade given its size and economic characteristics. We discuss below factors that may be responsible for the latter trend.

The changing product composition of China's trade

GDP growth induces changes in factor endowments, the licensing and development of new technologies, and ultimately, induces changes in the composition and size of a country's trade flows. Given China's dramatic economic expansion, we consider whether its exports and imports have become more diversified; more capital-intensive; and more technology intensive as its economy and trade have grown.

Detailed data on the products comprising China's imports and exports are publicly available for most countries at relatively high levels of aggregation that employ broad categories of goods that combine products that are not close substitutes. Much more detailed data are, however, available for U.S.-China trade. We use detailed (10-digit HS) time series data collected by the U.S. government covering over 17,000 product and commodities categories for the 1992-2004 period to track changes in the content of China's trade.[9] Table 2 shows that the increase in the value of U.S. imports from and exports to China over the 1992-2004 period was accompanied by a dramatic increase in the number of products traded. The number of products imported by the United States from China increased from 6,602 in 1992 to 11,995 in 2004, while the number of products exported by the United States to China increased from 3,447 to 6,551. When we compare the increases in the number of goods traded with China to increases in the number of goods traded with all countries, the magnitude of the increase in the breadth of U.S.-China trade becomes even more apparent. The number of export goods increased from 8,036 in 1992 to 8,856 in 2004 and the number of import goods increased from 14,762 in 1992 to 16,824 in 2004.

We calculate Herfindahl indexes to determine whether the increase in the number of products traded between the United States and China has resulted in trade becoming more or less concentrated on specific product categories. The Herfindahl Index for U.S. imports from China increased only slightly between 1992 and 2004, indicating that Chinese imports

[9] HS is the Harmonized System of product classification for exports.

have become a little less diversified across (more specialized to) particular product categories--with the decline in diversification occurring after 1998 (the Herfindahl index actually rose slightly between 1992 and 1998). On the other hand, the Herfindahl Index for U.S. exports declined substantially between 1992 and 2004, indicating that U.S. exports to China have become much more diversified across particular product categories. We also note that China's exports to the U.S. display a much greater diversity across product categories than U.S. exports to China, as indicated by the relative magnitudes of the Herfindahl Index reported on Table 2.

Figures 3 and 4 characterize the changing composition of China's exports to and imports from the rest of the world over the years 1985 to 2002. The tables detail the value and share of China's total exports/imports divided across six broad categories: 1) primary commodities, 2) labor-intensive and resource-based manufactures, 3) manufactures with low skill and technology intensity, 4) manufactures with medium skill and technology, 5) manufactures with high skill and technology, and 6) unclassified products. Although this involves very large product categories, it reveals much about the relative growth of the principal sectors of the Chinese economy involved in trade.[10] The main trends in terms of the evolution of China's exports across these broad categories of goods are: 1) declines in the shares—but not real value—of primary commodity and labor-intensive/resource-based manufactured exports, 2) the modest proportion and rise (1985 to 1995) and subsequent fall of the share of exports accounted for by manufactured goods with low skill and technology inputs, and 3) the large and sustained rises in the share and value of China's manufactured exports based on production processes relying on high skill and technology inputs. These results strongly suggest that China's exports are becoming more skill intensive and that China's comparative advantage is gradually shifting in this direction.

Changes in the value and share of goods imported by China over time also display a number of noteworthy—although less clear—trends, which also underline the apparent technological advancement of manufactures production in China. The value of all broad categories of imports increased each year between 1985 and 2002 (except 1998 due to the Asian Financial Crisis). Average annual import growth over the 1985-2002 period was highest for labor-intensive and resource-based manufactures, and lowest for manufactures with low levels of embodied skills and technology, which fell from a 17.8 percent share of total imports in 1985 to a 5.8 percent share in 2002.

Has the surge in Chinese imports and exports provided China's firms with market power in selected markets? Market power, i.e., the ability of a producer to influence market price by changing its production, requires a single producer (or coalition of producers) to produce a large share of market supply; varies inversely with the price elasticity of demand for the product; and decreases the easier it is for new firms to enter the market. Market power is typically considered with reference to the market share of an individual firm or enterprise, but to the extent that China remains a non-market economy and central government planners still direct and coordinate the efforts of China's enterprises, concern about potential monopoly power by a coalition of Chinese firms in a single industry is

[10] This categorization follows one used by the United Nations Conference on Trade and Development (UNCTAD). See UNCTAD (2002), pp. 87-92, for details on how goods were categorized.

relevant. When we examine products aggregated into 900 categories, we find that the 2002 market share of Chinese firms was substantial in silk, apparel and clothing, and coking coal. The generally high elasticity of demand for these products and the relative ease of entry of new firms into these industries suggest that neither individual Chinese firms nor coalitions of firms are likely to be able to exercise market power.

China's increased demand for primary commodities is also leading to concerns about increased global competition for scarce commodities—particularly non-renewable natural resources—and emerging Chinese monopsony power in these markets. While increased Chinese demands may serve to bid up global prices in markets with inelastic supplies, the small Chinese share of these markets makes it unlikely that monopsony power could be exercised. In the case of petroleum markets—the focus of much media and policymaker attention–China's share of global crude and refined petroleum imports represented only 6 percent of global oil trade in 2002, far too small a share to enable China to exercise monopsony power. Even a doubling of this market share—as may occur over the next two decades—is unlikely to provide China with substantial monopsony power in the petroleum market.

China's global market shares of particular imported or exported products should increase as the level of specificity used in defining particular goods increases and as one considers single economies rather than the global economy. Using the detailed data available on U.S.-China exports and imports—which define trade across more than 17 thousand types of goods—to assess China's market shares, we find that the number of goods and commodities for which China supplied more than half of total U.S. imports nearly doubled during the years considered; rising from 620 goods (9.4 percent of all goods traded between the countries) in 1992, to 1,157 goods (12.5 percent) in 1998, and to 1,410 goods (17.8 percent) in 2004. The corresponding figures for goods that China supplied 90 percent or more of total U.S. imports were: 111 goods (1.7 percent) in 1992, to 253 goods (2.7 percent) in 1998, and to 481 goods (4 percent) in 2004. The goods for which China supplies a majority or greater share of total U.S. imports include specialized agricultural products, chemicals, and very specific types of textiles and other light manufactures. The number of U.S. exports that constitute a significant share of Chinese imports is smaller but has also been increasing. In 1992, there were 22 such goods (0.6 percent of number of U.S. exports to China) for which U.S. share in total Chinese imports exceeded 50 percent. By 2004, this figure had risen to 77 goods and a 1.2 share.

China's trade growth and the transformation of its domestic economy

The growth of China's international trade during the reform period has been fueled by structural and institutional changes and rigidities, and has also generated changes in China's economy. One factor behind China's high trade growth is the web of constraints on trade between China's provinces and provincial level municipalities. These constraints stem from each province's preferences for goods produced by provincial SOEs which, in turn, are legacies of older accounting and performance monitoring systems established when the economy operated under central and provincial plans. These systems have declined in importance and evolved, but localities continue to face incentives for preferences toward local producers in their procurement and development planning. Limited transport infrastructure between provinces has often meant that it was less costly for Chinese firms to

deliver goods to major seaports (and then to overseas markets) than to deliver them to internal markets. Lastly, the growth of foreign-invested firms—which naturally tend to have stronger links to markets outside China and technologies to produce products demanded by consumers in high-income countries—has resulted in increased export orientation.[11]

Table 3 details how the expansion of China's exports has altered the composition of enterprises (divided across SOEs, foreign-invested firms, and private domestic firms) in recent years. The table also highlights the rise in the importance of production processes that are integrated with multinational production systems in China. Because the value-added from final exports of internationally integrated firms is usually a minority share of the product's price, the reported value of China's exports overstates Chinese contributions to the production process and tends to over-emphasize the role of China in the international production chain (Naughton 1996).

China's expansion in trade has coincided with a period of profound social and economic change in China. Space constraints allow us only to highlight a small number of key trends and developments related to the implications of China's trade expansion for its domestic economy. Some of the weightiest outcomes of China's expanded trade have been the country's rising wealth, increasing incomes, and falling poverty. Since the beginning of China's export boom, per capita GDP in China has risen at an average annual rate of 8.1 percent. This rise in average incomes in China has translated into remarkable falls in poverty incidence. Using the official national income poverty line of the Chinese National Bureau of Statistics, the number of poor in rural China fell from 250 million in 1978 to just over 29 million in 2001, which corresponds to a change in the rural poverty incidence from 33.1 to 3.2 percent over the period.[12] Nearly half of this decline in poverty was achieved during the few years that followed the initial economic reforms in China. By 1984, the poverty incidence had already fallen to 15.1 percent. If one considers the World Bank US$1 PPP per day standard generally used for international comparisons of poverty incidence—which is available for a shorter period—poverty fell from 28.5 percent in 1987 to 16.6 percent in 2001 (World Bank 2005). The rising welfare and standard of living of many of China's least economically fortunate citizens is also underlined by indicators such as the share of underweight children in the population: Between 1990 and 1998 the share fell from 22 to 12.6 percent.[13]

However, the level of inequality in China has risen sharply along with average incomes. Disparities in wages and income levels of Chinese households have increased and disparities in the standard of living and development between coastal areas—where most exporting firms are located—and inland provinces have risen sharply.[14] Average incomes

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[11] See Bajona and Chu (2005) for discussion of SOE regulation and impact of China's WTO accession on such regulation.

[12] China Statistics Press (various years). Urban poverty is less clearly defined and has been measured for a much shorter period than rural poverty. Estimates reveal urban poverty incidence to be much lower than in rural areas.

[13] Fen and Chan-Kang. (2005), p. 10.

[14] The role of trade opening in altering rural-urban economic disparities in China is assessed in Anderson et al. (2003), and Huang and Rozelle (2003).

are lower and poverty incidences are higher in rural areas, particularly in inland provinces. According to estimates reported in the World Bank's *World Development Report* (2001), in 1996 about 70 percent of China's rural poor lived in western provinces.[15] Inequality within rural and urban areas has also increased sharply since 1980.[16] Inequality in urban areas has increased steadily since 1981, while inequality in rural areas fell from 1981-1985 (-1.12 percent average annual change) and 1995-1998 (-0.81 percent), but rose during 1986-1994 (2.81 percent) and 1999-2001 (2.71 percent).

The concentration of export- and import-oriented businesses in a few higher-income coastal provinces is striking.[17] Guangdong alone accounted for over 35 percent of China's exports and 33 percent of China's imports in 2003.[18] The next largest trading provinces were Jiangsu (14.25 percent), Shanghai (13 percent), Zhejiang (nearly 8 percent), and Shangdong (nearly 6 percent). These 5 provinces together accounted for 75.6 percent of the value of China's exports in 2003. Expressing the value of exported and imported goods across provinces in per capita terms makes the geographic concentration of trading activities in a few coastal provinces even clearer. The value of exports per resident of Shanghai, Guangdong, and Tianjin was equivalent to US$2,854, US$1,979, and US$1,391, respectively. This compares to per capita values of exports of only US$21 and US$29 in Guizhou and Gansu provinces—two of the least trade-oriented provinces.[19] Foreign direct investment and production by foreign-invested firms are also concentrated in these leading coastal provinces. During the short period (1999-2003) for which the Chinese National Bureau of Statistics has reported FDI and value of provincial output by enterprise type (i.e., SOE, foreign-invested and other—principally privately-funded domestic firms), the share of exports from foreign-funded firms has increased sharply.

Other important domestic implications of China's trade opening and trade growth that can only be mentioned in passing include repercussions on wage rates, rising government revenues and resources for infrastructure investment, the stability of China's banks, and the growth in the "floating" population of internal migrants in China's cities. Both the persistence of provincial trade restrictions and preferences and state subsidies to and regulation of SOEs, and gaps in the institutional and physical infrastructures that connect China coastal cities and ports abroad and those that connect China internal markets, prompt successful foreign-invested and privately owned domestic firms to seek opportunities abroad in preference to domestic markets. We note only that these developments can be traced—at least in part—to the country's trade growth and represent opportunities and challenges to Chinese policymakers charged with channeling the process of globalization in China to productive and sustainable outcomes.

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[15] See Ravallion and Chen (2004) for a more detailed review of poverty trends in China since 1980.

[16] Ravallion and Chen (2004), tables 10, 11, and 15.

[17] The role of China's trade policies on firm location is discussed in Batisse and Poncet (2004) and Jin (2004).

[18] Provincial rankings in terms of value of exports and value of imports are generally the same.

[19] A comparison of the value of exports from each province as a share of the total value of final goods and services produced in the province yields similar results.

Export growth: China v. other export-oriented Asian economies

We conclude our analysis of available data pertaining to China's rising trade by comparing China's experience with that of earlier export-oriented Asian economies that experienced export booms. Figure 5 displays export growth for China and selected Asian countries, with the initial year normalized as the year in which rapid export growth began in each country. Only South Korea's export boom has occurred at a higher growth rate (in percentage terms) than China's. However, other Asian countries that have experienced export booms loom close behind China. Figure 5 suggests that if China's export boom plays out along the lines of export booms in comparison countries, then high export growth rates will likely continue for at least another decade.

Comparison of China's experience with the experiences of other Asian economies reveals a number of other interesting findings. First, the rapid growth in the value of China's imports—which follow a similar trend to its exports—contrasts markedly with Japan's experience. A significant share of the growth in Chinese imports since 2000 is attributable to rising import of intermediate inputs to which Chinese firms added significant labor services and then export as final products. China's high propensity to import—particularly notable for a large, poor country—is a critical part of China's drive to modernize state-owned enterprises, as import competition typically raises the productivity of domestic firms (Weinstein and Lawrence, 2001). Second, China's overall trade accounts have generally registered surpluses or deficits of less than 2 percent of GDP, although trade surpluses in excess of 4 percent of GDP have accumulated since 2003. China's trade deficits and surpluses with particular trading partners have sometimes been substantial, e.g. the large surpluses with the United States since 1997 and the large deficits with Korea and several ASEAN countries since 2001.[20] Some of the reasons for its large trading imbalances with individual countries include fixed exchange rates which preclude macroeconomic adjustment for imbalances at the individual country level; imbalance between savings and investment in the economies of some key trading partners; China's subsidies and business loans to state-owned enterprises; product mixes in country-pairs that are suitable for one country's demands but not for the second country's demands (e.g., US manufactures oriented toward relatively high-income US consumers may be unaffordable to most mainland Chinese); barriers to trade both within China and in foreign countries; the relationship between foreign investment and trade (discussed above); China's lack of enforcement of copyrights in export goods such as computer software and films;[21] and the desire of China's central bank to accumulate additional reserves to insulate the yuan from temporary political and economic shocks as well as speculative attacks.

In general, we expect the ratio of exports to GDP to have a negative correlation with the overall level of GDP, as larger countries are more diverse—stimulating greater internal

[20] China's trade accounts with individual countries have been difficult to measure and interpret due to the *entrepôt* role played by Hong Kong and the unique treatment of a major trading partner, Taiwan, in its data (Fung and Lau 2003).

[21] The International Intellectual Property Alliance, a coalition of seven U.S. industry trade associations, estimates that the estimated U.S. trade losses due to China's piracy of copyrighted U.S. products in 2004 amounted to US$2.5 billion. While this is a huge figure for the industries involved, it represented just 1-2 percent of the U.S. trade deficit with China in 2004. See http://www.iipa.com.

trade—and have sufficiently large markets to absorb the output of large manufacturing industries. Taking this into account, China's ratio of exports to GDP seems high, more in line with those of its smaller neighbors. It stands in sharp contrast to Japan, once again highlighting the distinctiveness of the export booms and growth experiences of these two large Asian economies. China's much higher ratio suggests the stronger outward orientation of China's economy and likely reflects the much lower level of internal economic integration in China (Young 1998). One important implication of the much higher level of exports from China vis-à-vis Japan is that the Chinese economy would be expected to be more vulnerable to global economic downturns than Japan's economy.

V. Prospects and Challenges

Our analysis has detailed changes in the volume, pattern (across countries and regions), and types of goods traded by China since the mid-1980s. China's pattern of trade has changed dramatically to reflect its increasing market orientation and its evolving comparative advantage. China's trading partners and mix of goods traded now resemble those of most industrialized export-oriented economies in Asia. This represents a sharp transition from its earlier eastern bloc-oriented trading pattern and reliance on two *entrepôts*—Hong Kong and Singapore—for transport and marketing services for its exports. Examination of the strength of China's trade ties with its trading partners generally suggests that China's trade follows a pattern typical of its more market-oriented neighbors, and reveals the country's stronger ties to other economies in the East and Southeast Asia region are consistent with the economy's size and its level of development, and the relatively close proximity of regional trading partners.

Results from our examination of historical data on provincial location, firm type, and mode of production of enterprises in China highlight the consequences of rising trade for the structure of China's domestic economy. China's rapid trade growth has enabled rising average income and reduced poverty incidence, but has also been associated with sharp increases in regional and local inequality. The high growth in trade has led to a significant decline in the relative importance of SOEs versus private firms in the economy as a result of the higher growth in private firms. Although the problem of government reform of unprofitable SOEs remains a serious challenge, the high rate of trade growth has greatly eased this challenge and allowed a much more gradual process than those that were carried out in other former communist/centrally planned economies.

Comparison of China's export boom with those in other export-oriented Asian economies suggests that China's export growth rate has been higher than those in the other Asian export boom countries (except South Korea). The high growth rates have combined with the large size of China's economy to generate an export expansion of unprecedented scale. The export growth experiences of earlier boom economies suggest China's high rate of export growth is likely to continue for at least another decade, unless impeded by overseas market restrictions. The implications of China's growth for the global economy are much greater than those of earlier Asia export boom economies in part because China's population in 2005 represents 15 times as many people (1.3 billion) as Japan circa 1953 (87 million). Earlier Asian export booms persisted for 20-30 years. If China's export boom (measured from 1984), were to last as long as Japan's export boom (33 years), then China's high rate of GDP growth registered in recent decades would likely continue for at least 12 more years.

Were China's GDP to increase by levels comparable to those achieved in Korea or Malaysia during the period of their export booms, the increase in the size of the Chinese economy would be astounding. According to some forecasts, China's GDP will reach US$5.59 trillion (in year 2003 US$) and be equivalent to 36.2 percent of U.S. projected GDP by 2017—nearly triple the current percentage of 12.4 percent, if recent growth trends continue.[22]

Growth of exports from China at such levels would likely induce a protectionist backlash. An illustration of incipient protectionism against China's exports may already be available in the case of textile trade, where recent trade restrictions imposed on Chinese textile exports after the 1 January 2005 expiration of the Multi-Fiber Arrangement quotas illustrate the scale of China's export growth and its impact on textile prices globally, and may foreshadow further protectionist measures against the country. The WTO has predicted that China's share of the world market in textiles and apparel will jump to 50 percent in 2007, from 17 percent in 2003, and that China will supply 65-90 percent of the world market by 2010. China reported that its textile exports to E.U. countries grew 82 percent in the first four months of 2005 over the prior year, and the U.S. Office of Textiles and Apparel reported that Chinese apparel exports to the United States grew 66 percent in the April-May 2005 period compared to a year earlier.[23]

Responses to the increase in China's textile exports have been quick and unforgiving. The United States executed its right to impose a 7.5 percent "safeguard" quota on annual increases in imports of textiles and apparel from China. Negotiations to increase that quota failed until November of 2005, when an agreement was reached in which textile shipments were expected to increase a total of 3.16 percent above what would have been allowed under the previously imposed annual cap. In June 2005, China signed a Memorandum of Understanding with the EU in which China agreed to limit its annual growth rate of textile and clothing exports to the EU to between 8 and 12.5 percent. The agreement with the United States expires in 2008 and with the EU in 2007. After 2008, the EU has agreed to "exercise restraint" regarding trade restrictions against all categories of Chinese textiles while the U.S. has made no such promise. A review of China's Protocol of Accession to the WTO suggests that China's chief trading partners in the West have broad authority to impose 'safeguard' measures in response to rapid rises in their imports from China. Considered along side the trend toward increasing use anti-dumping actions, this suggests that China's WTO membership will offer it little recourse should countries initiate more restrictions on imports from China.

However, there are some grounds for optimism concerning growth prospects for China's trade. WTO-induced reductions in average tariff rates have catalyzed China's accelerated export growth in the few years since accession, and the WTO offers some protection (e.g., dispute adjudication) against future discriminatory trade restrictions against China. WTO accession led to increased trade opening in China, where average import tariffs have fallen from 43.2 percent in 1992 to 9.9 percent in 2004. Reduced tariffs have lowered the cost of imported intermediated inputs and enhanced economic prospects of fast growing processing and assembly enterprises, helping China to integrate into global production

[22] See Wilson and Purushothaman (2003).

[23] For example, see Buckley (2005).

chains and increase employment for workers moving from agriculture. The country's accession to WTO member status also underlined the stability of China's economic reforms, helping to reinforce the stability of institutional arrangements in the country and spurring greater FDI into China. Since 2002, China has emerged as a leading advocate of freer global trade—particularly in liberalization of existing tariffs and trade restrictions on agricultural goods. In terms of bilateral negotiations, China has agreed to implement a PTA with ASEAN by 2010, and has initiated PTA negotiations with 25 countries.

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Table 1. China's Output and Trade, 1978 to 2003

(millions, in year 2000 $US)

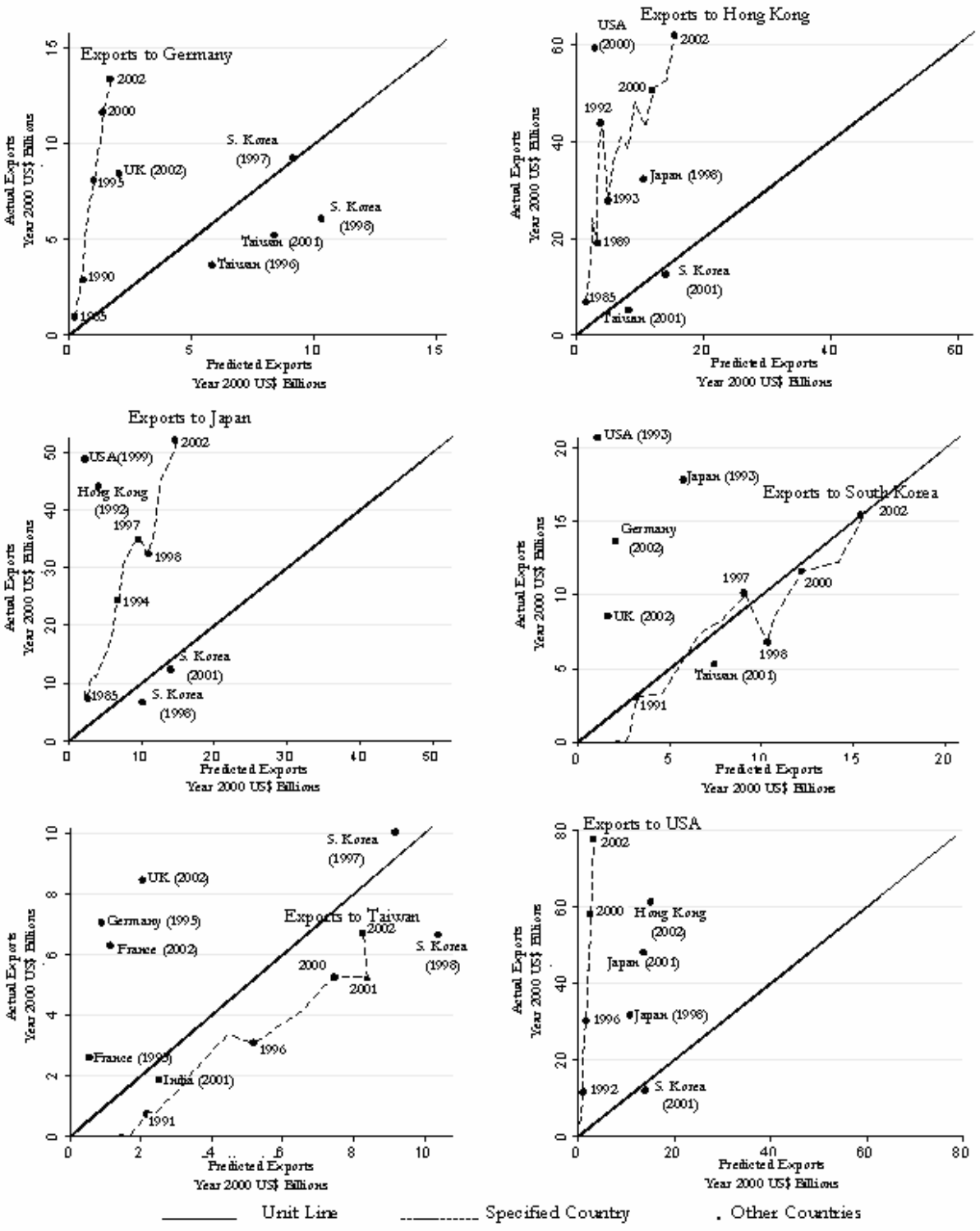
	1978	1980	1985	1990	1995	1998	2000	2001	2002	2003	2004
GDP (millions, in yr. 2000 $US)	146,412	169,828	282,637	412,729	726,859	934,348	1,080,741	1,161,797	1,258,226	1,375,178	1,508,937
Average annual growth rate (%)	11.7	7.7	10.7	7.9	12.0	8.7	7.5	7.5	8.3	9.3	9.7
GDP in PPP* $US	644,331	748,030	1,241,218	1,812,589	3,255,583	4,188,219	4,824,695	5,200,987	5,606,735	6,089,508	7,262,000
Average annual growth rate (%)	11.7	7.7	10.7	7.9	12.4	8.8	7.3	7.8	7.8	8.6	19.3
Exports (millions, in yr. 2000 $US)	6,208	10,433	27,581	72,914	153,963	181,379	249,117	263,481	323,648	425,863	541,393
Average annual growth rate (%)	1.7	29.6	21.5	21.5	16.1	5.6	17.2	5.8	22.8	31.6	27.1
Export/GDP (%)	4.2	6.1	9.8	17.7	21.2	19.4	23.1	22.7	25.7	31.0	35.9
Imports (millions, in yr. 2000 $US)	9,985	11,218	42,871	62,516	136,606	138,578	224,870	240,629	293,569	401,168	512,246
Average annual growth rate (%)	17.9	6.0	30.8	7.8	16.9	0.5	27.4	7.0	22.0	36.7	27.7
Import/GDP (%)	6.8	6.6	15.2	15.1	18.8	14.8	20.8	20.7	23.3	29.2	33.9
Net Exports/GDP (%)	-2.6	-0.5	-5.4	2.5	2.4	4.6	2.2	2.0	2.4	1.8	1.9
Net FDI Inflows (mil., yr. 2000 $US)	0	33	1,674	4,051	37,054	43,188	38,387	43,707	48,996	51,993	55,571
Average annual growth rate (%)			119.6	19.3	55.7	5.2	-5.7	13.9	12.1	6.1	6.9
FDI/GDP (%)	0.0	0.0	0.6	1.0	5.1	4.6	3.6	3.8	3.9	3.8	3.7

Note: Numbers expressed in monetary units show nominal values converted to $US at the official exchange rate and deflated to year 2000 values using the GDP deflator for China. PPP* (Purchasing Power Parity) converts the value of China's GDP to $US using an exchange rate conversion factor derived from the United Nations International Comparison Programme's (ICP) PPP estimates.

Sources: Data on exports and imports (1978-2003) come from International Monetary Fund (IMF) *Direction of Trade Statistics* (2005).
China's GDP deflator, GDP, FDI, and PPP conversion factor data (1978-2003) come from World Bank *World Development Indicators* (2005).
For background and explanation of the ICP see http://pwt.econ.upenn.edu/icp.html (last accessed January 23, 2005).

Figure 1. Actual versus Predicted Exports of China

(Year 2000 US$ Billions)



PLEASE NOTE: The versions of Figures 1 and 2 that appear in the working paper that is available for downloading from the internet are presented in low resolution and lose much of the detail (due to file size constraints). High resolution versions of Figure 1 and Figure 2 can be accessed by clicking these hyperlinks.

Figure 2. Actual versus Predicted Imports of China

(Year 2000 US$ Billions)

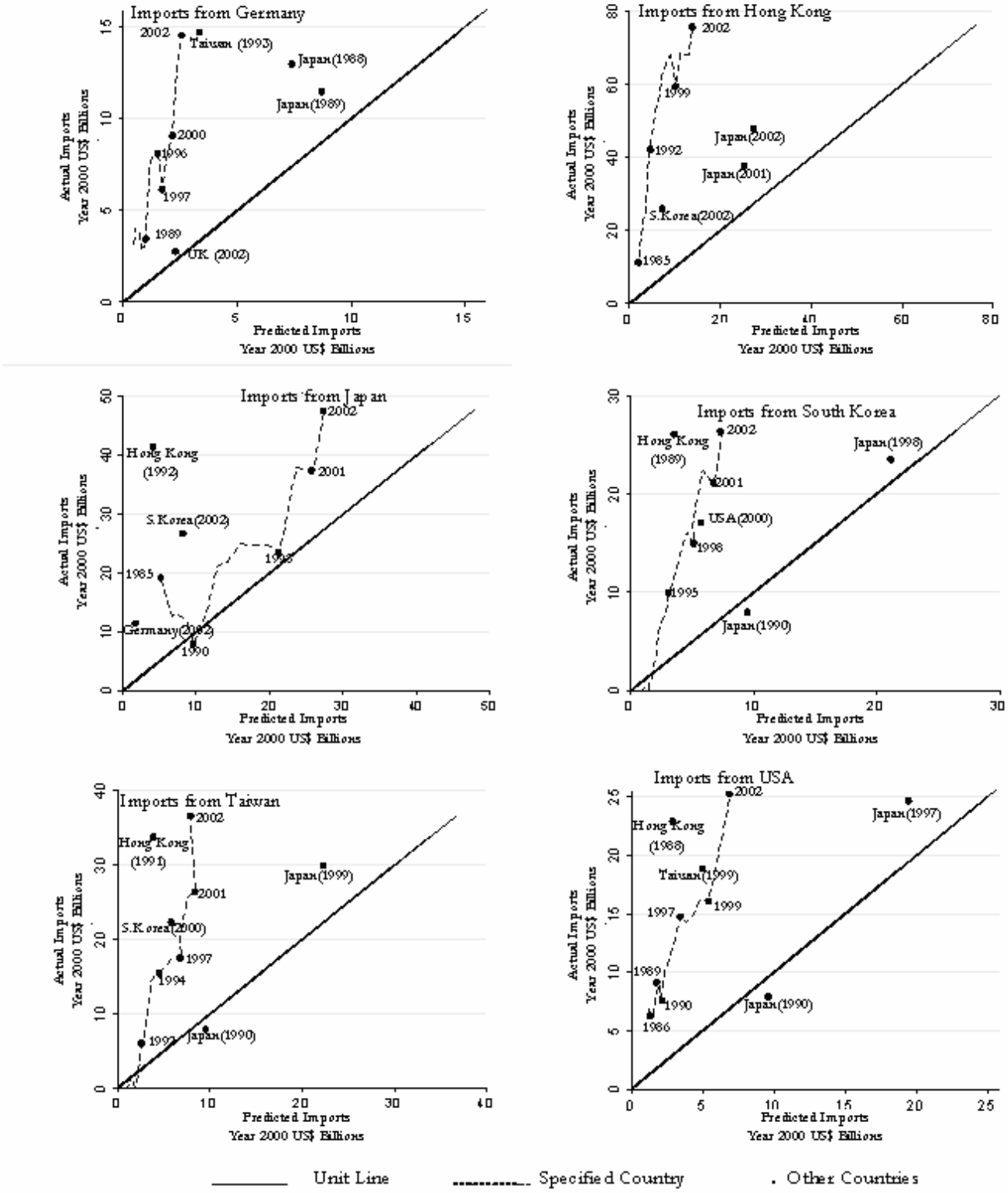


Table 2. The Value and Range of Goods Traded between China and the US

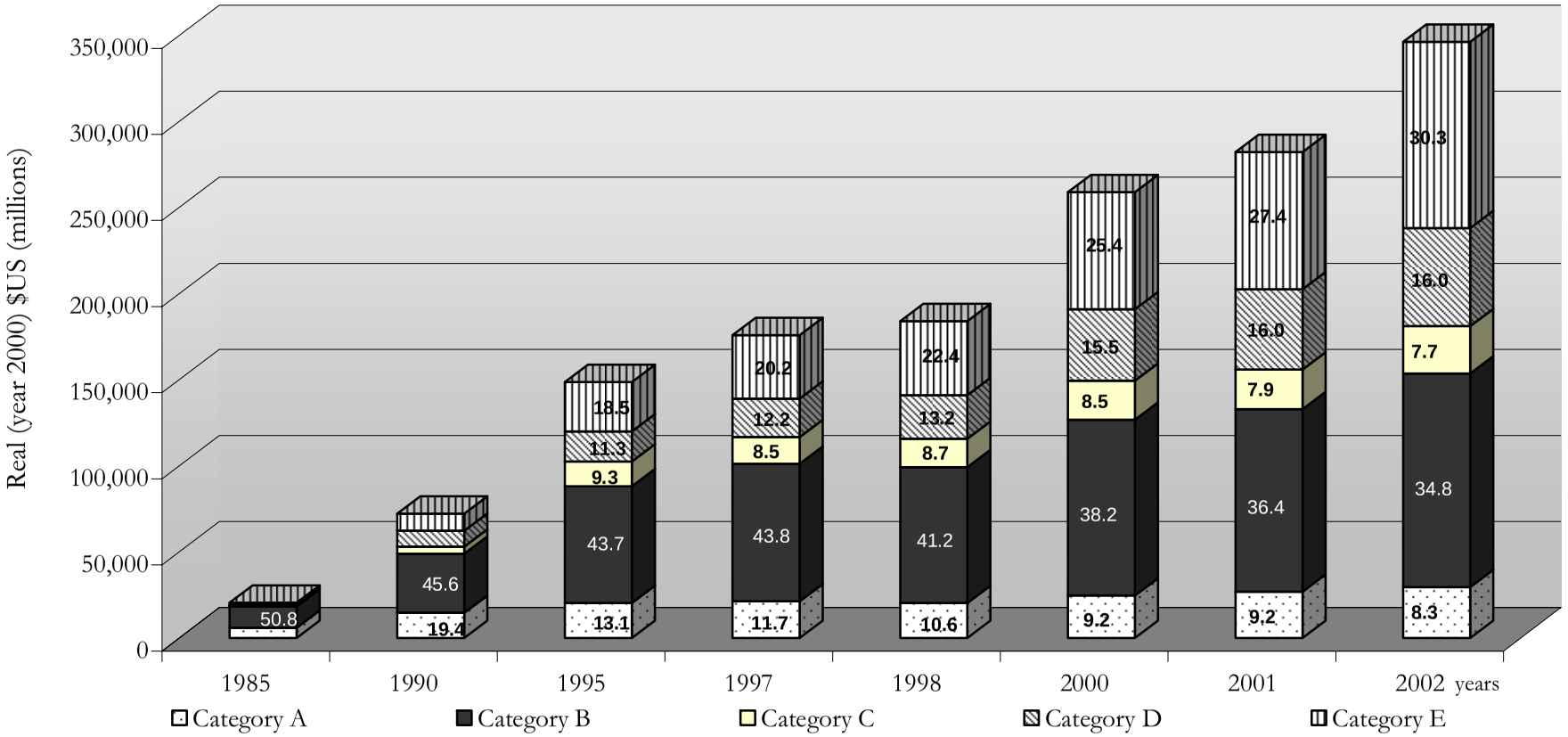
	World			China		
	1992	1998	2004	1992	1998	2004
USA Import from:						
Value of all goods traded (Millions, in yr. 2000 US$)	616,614	945,249	1,348,353	28,587	70,253	179,454
Number of goods traded*	14,762	16,324	16,824	6,602	9,254	11,995
Herfindahl Index	5.952	3.408	6.822	4.770	4.540	5.462
USA Export to:						
Value of all goods traded (Millions, in yr. 2000 US$)	518,795	707,087	751,170	8,243	14,058	31,701
Number of goods traded*	8,036	8,546	8,856	3,447	5,309	6,551
Herfindahl Index	5.134	4.575	3.200	62.098	56.521	11.331

Notes: The export (import) Herfindahl Index for a country is defined as:

$H_j = \Sigma (x_i / X_t)^2 \cdot 1000$, where x_i is country j's exports (imports) of product i and X_t is country j's total exports (imports) from country i.

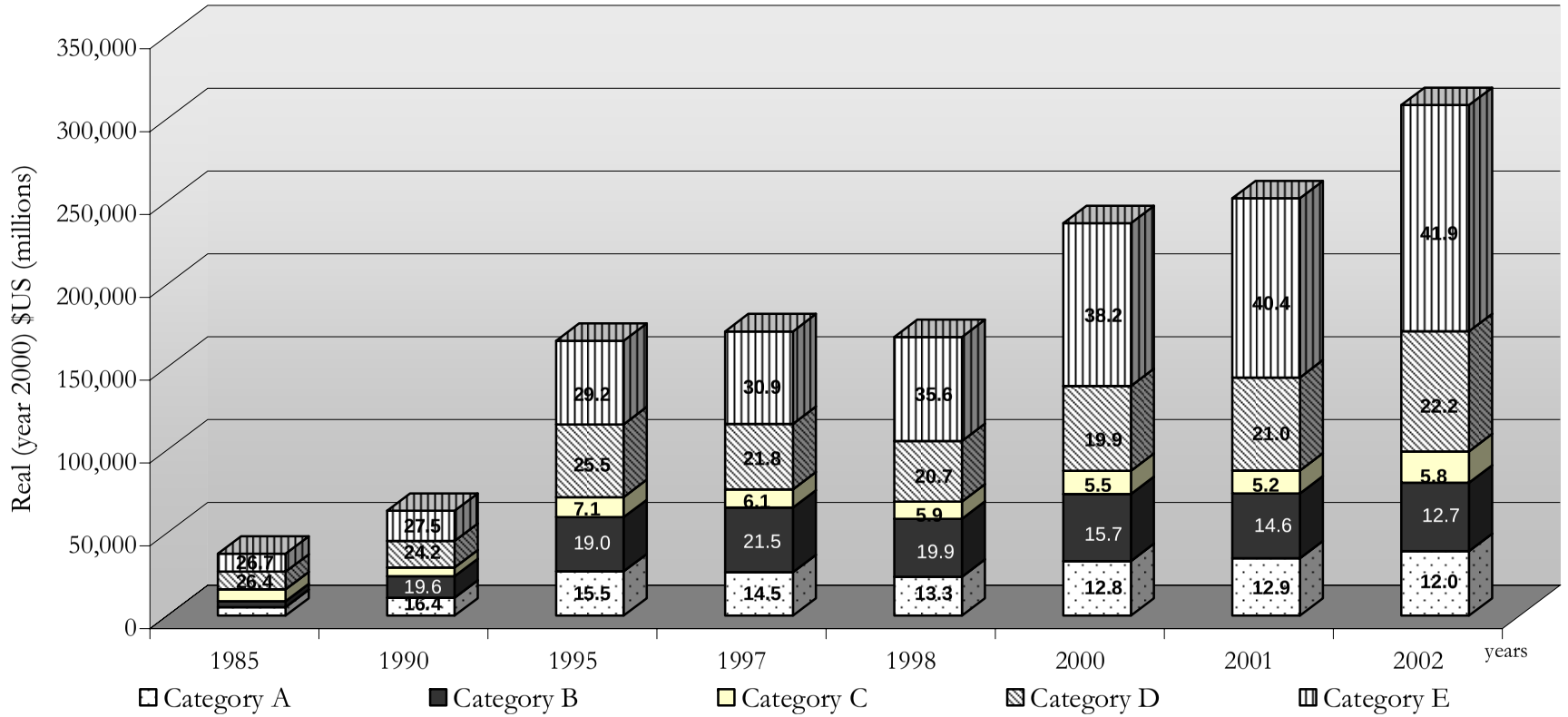
Source: Authors' calculations based on data from USA Trade Online. http://www.usatradeonline.gov/.

Figure 3. Changing Composition of China's Exports Across Types of Goods (1985 to 2000)



Notes: Sectors are defined as follows: (A) Primary commodities; (B) Labor-intensive and resource-based manufactures; (C) Manufactures with low skill and technology intensity; (D) Manufactures with medium skill and technology intensity; (E) Manufactures with high skill and technology intensity; and (F) Unclassified products. The definition of sectors follows UNCTAD (2002).
The numbers that appear on the columns give the share of total exports in that year of each product type.
Source: Authors' calculations based on UNCOMTRADE data from Statistics Canada (2005).

Figure 4. Changing Composition of China's Imports Across Types of Goods (1985 to 2000)



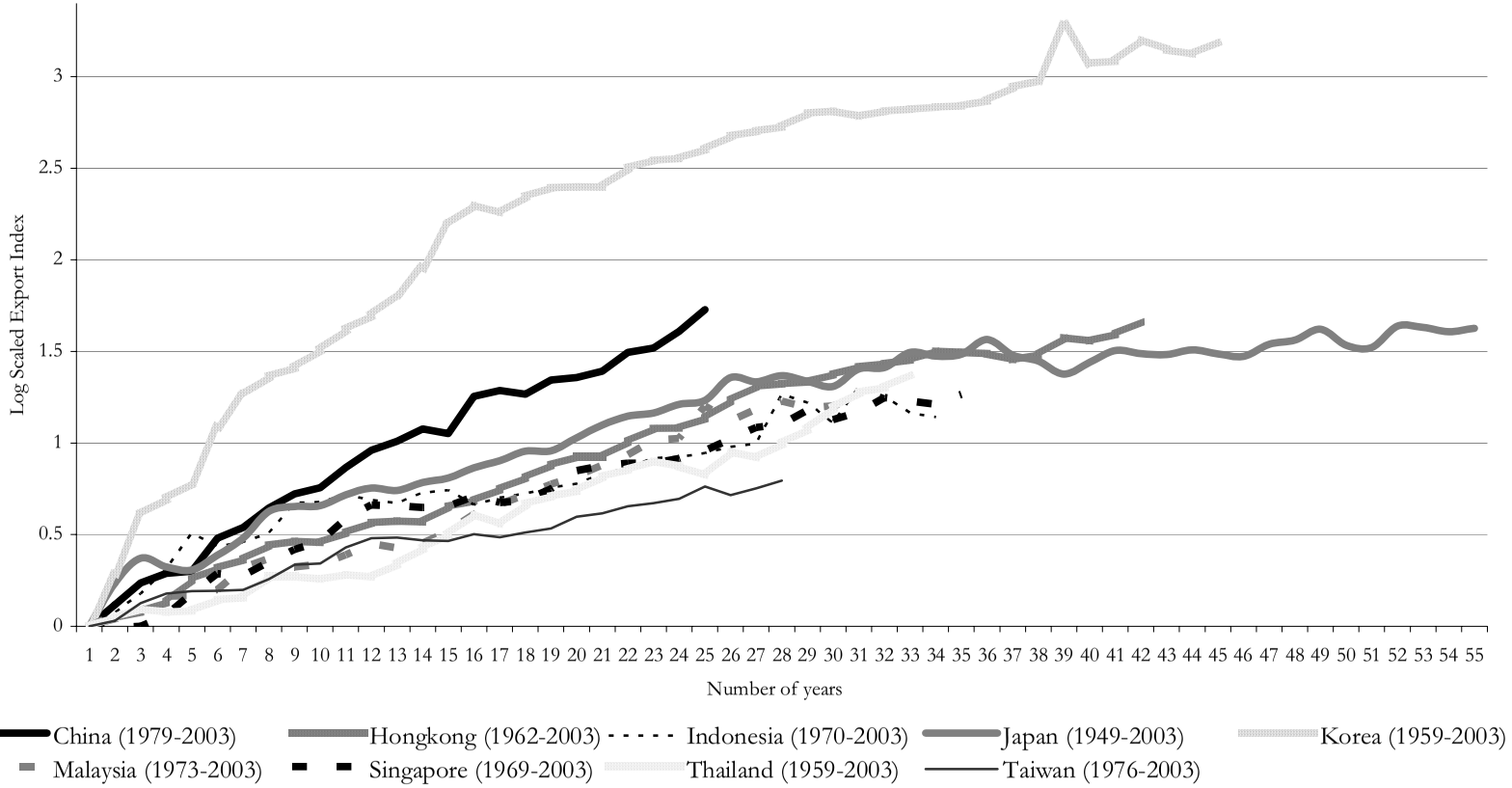
Notes: Sectors are defined as follows: (A) Primary commodities; (B) Labor-intensive and resource-based manufactures; (C) Manufactures with low skill and technology intensity; (D) Manufactures with medium skill and technology intensity; (E) Manufactures with high skill and technology intensity; and (F) Unclassified products. The definition of sectors follows UNCTAD (2002).
The numbers that appear on the columns give the share of total imports in that year of each product type.
Source: Authors' calculations based on UNCOMTRADE data from Statistics Canada (2005).

Table 3. Composition of China's Trade Across Mode of Production and Enterprise Ownership

	Value (nom.$US billions)		Shares	
	2001	2004	2001	2004
EXPORTS	266.15	593.37	100.0	100.0
by mode of production				
Conventional Trade	111.92	243.64	42.1	41.1
Processing Trade	147.45	327.99	55.4	55.3
Processing trade with supplied material	--	68.57	--	11.6
Processing trade with imported material	--	259.42	--	43.7
Other Mode	6.78	21.74	2.5	3.7
by type of enterprise				
State-owned Enterprises	113.23	153.59	42.5	25.9
Foreign-funded Enterprises	133.24	338.61	50.1	57.1
Other Enterprises	19.69	101.17	7.4	17.1
Collective Enterprises	--	31.79	--	5.4
Private Enterprises	--	69.25	--	11.7
IMPORTS	243.61	561.42	100.0	100.0
by mode of production				
Conventional Trade	113.47	248.23	46.6	44.2
Processing Trade	93.98	221.74	38.6	39.5
Processing trade with supplied material	--	53.72	--	9.6
Processing trade with imported material	--	168.02	--	29.9
Other Mode	36.16	91.45	14.8	16.3
by type of enterprise				
State-owned Enterprises	1,035.50	1,764.50	42.5	31.4
Foreign-funded Enterprises	1,258.60	3,245.70	51.7	57.8
Other Enterprises	142.00	604.00	5.8	10.8
Collective Enterprises	--	177.20	--	3.2
Private Enterprises	--	419.80	--	7.5

Sources: Department of Planning and Finance, Ministry of Commerce (2005).

Figure 5. Export Growth Experiences of Selected Export-Oriented Economies of Asia



Note: The base is defined as the first year in which the three-year moving average of the annual export growth rate was greater than or equal to 5% for at least three years in succession. When countries first begin to export goods, export growth rates tend to be very high due to the small denominator in the growth calculation. To address this problem in defining high growth spells, the figure does not consider growth rates based on export values of less than US$ 100 million (in year 2000 $US).

Table 4. Average Annual Growth Rate of Real Exports in Different Periods for China and Selected Earlier Rapidly Developing Economies

	Period	Number of Years	Annual Growth Rate	Post Financial Crisis Period	Number of Years	Annual Growth Rate
China	1979-2003	25	18.428	1999-2003	5	18.614
Hong Kong	1962-1995	34	11.131	1999-2003	5	10.119
Indonesia	1970-1974	5	33.584	1999-2003	5	-3.550
	1976-1980	5	13.662			
	1986-1996	11	16.681			
Japan	1949-1974	26	14.521	1999-2003	5	4.306
	1979-1984	6	10.349			
Korea	1964-1987	24	21.374	1999-2003	5	5.597
	1994-1996	3	11.181			
Malaysia	1973-1980	8	14.955	1999-2003	5	5.469
	1983-1996	14	11.936			
Singapore	1969-1980	12	15.234	1999-2003	5	6.562
	1987-1996	10	9.965			
Taiwan	1976-1981	6	15.242	1999-2003	5	5.859
	1983-1987	5	13.880			
Thailand	1959-1967	9	9.223	1999-2003	5	9.323
	1971-1981	11	14.166			
	1984-1996	13	14.224			

Source: Authors' calculations based on IMF Direction of Trade Statistics (2005) and Asian Development Bank (ADB) - *Key Indicators 2004* (http://www.adb.org/statistics) for Taiwan data.

Appendix: Gravity model estimates applied in the paper.

A number of indicators are commonly used to measure the strength of trade relationships between countries in empirical examinations of international trade. These indicators gauge the level of trade against the size of economies, and other structural characteristics important in determining trade levels (e.g., distance between the countries). The simplest measures are the deflated value of exports or trade volume and the trade share: $S_{i,j} = x^T_{i,j} / x^T_{i,W}$ where $S_{i,j}$ is the share of trade between country i and j to country i's share of total world trade; $x^T_{i,j}$ is exports from country i to country j, and $x^T_{i,W}$ is total exports of country i to the world. Exports, imports, or trade volumes (exports plus imports) can be used in calculating this summary statistic. The trade share highlights the importance of trade between two countries and is useful for comparing trade flows over time between two countries. However, its usefulness is limited in cross country comparisons as economies of different size can be expected to trade in proportion to the overall size of their economies.

The trade concentration ratio or trade intensity index (Frankel 1997, Petri 1993) overcomes the economy-size problem encountered in cross-country comparisons of trade shares by gauging trade levels between countries i and j in relation to country's i's average trade share across all countries of the world. The trade intensity index is defined: $I_{i,j} = (x^T_{i,j} / x^T_{i,W})/(x^T_{i,W} / x^T_{W,W})$, where notation is as above with the addition of $x^T_{W,W}$ which is total global exports. If the trade intensity index equals one, trade partners are trading with each other in the same intensity as they are trading with the world as a whole, whereas values above (below) one indicates trade between the countries is at a level above (below) their average levels of trade with the rest of the world.

However, it is widely documented in empirical studies of trade that the distance between countries strongly influences their level of trade since distance tends to be highly correlated with transport costs. Ng and Yeats (2003) use this insight to refine the trade intensity index so that it takes into account the distance between countries in calculating their trade intensity. They propose a trade index that adjusts index values for the average estimated effect of distance on global trade patterns. Specifically, the trade intensity index is adjusted according to the distance between the capitols of two trading countries. The adjustment coefficient is derived from a standard gravity model coefficient capturing the average effect of distance on trade flows between pairs of countries worldwide as estimated using cross-sectional time series data on the value of exports or exports plus imports over time. In the analysis offered in this paper, we extend this approach by adding adjustments related several country characteristics that are know to influence the level of trade between countries. This approach follows a widely applied model used in empirical studies of international trade commonly referred to as 'gravity model estimation.'[24] In this paper we estimate a full gravity model and adjust the standard trade intensity index by each of the statistically significant parameters from the model. Accordingly, our 'gravity model adjusted

[24] The gravity model and its theoretical underpinnings as applied to analyze international trade flows have been developed in a number of papers: Deardorf (1984), Helpman and Krugman (1985); and Helpman (1987). The name comes from an analogy between key factors explaining gravitation under Newton's theory (mass and distance) and the analogous role economy size (GDP) and distance play in explaining trade flows under the gravity model of international trade. Frankel (op. cit., p. 61) cites Helpman and Krugman as the originators of the standard gravity model.

trade intensity index' adjusts for several factors found to systematically affect trade between countries. Our specification of the gravity equation follows the specification in Clarete et al. (2003), and is as follows:

$$ln(T_{ijt}) = [\beta_0 + \beta_1 lnD_{ij} + \beta_2 ln(Y_i)_{t-1} + \beta_3 ln(Y_j)_{t-1} + \beta_4 ln(Pop_i)_t + \beta_5 ln(Pop_j)_t + \beta_{10} ln(Area_i) + \beta_{11} ln(Area_j) + \beta_{15} Smctry_{ij}] + [\beta_8 Landl_i + \beta_9 Landl_j + \beta_7 Cont_{ij} + \beta_6 Islandl_i + \beta_6 Islandl_j] + [\beta_6 Lang_{ij} + \beta_{13} Colony_{ij} + \beta_{12} ComCol_{ij} + \beta_{14} Col45_{ij}] + \varepsilon_{ijt}$$

where *i* and *j* denotes trading partners (country *i* is the exporting country and *j* is the importing country), and *t* denotes time. The left hand side variables divide into three groups denoted by the square brackets. For first group contain the base variables of the gravity model and capture notions of economy size and country size considered fundamental in driving trade flows under the gravity model. All the models estimated include these variables, so it is also referred to as the base gravity model. The second group of variables captures geographic characteristics, besides the distance between the trading countries that are expected to influence their level of trade. The third group of variables captures shared historical and linguistic ties between countries that may be expected to strengthen trade relationships.

Notation of the variables in the model—and the expectation regarding the relationship between the level of trade and each variable—are as follows:[25]

- T_{ijt} denotes the value exports (or imports) of country *i* to country *j* at time *t*,
- D_{ij} is the linear distance between capital cities of the trading countries—distance is expected to have a negative association with trade level since it proxies transport and transaction costs,
- *Y* is real GDP of country *i*/*j* in year *t*-1 (in constant year 2000 dollars), the variables enters the model with a one year lag to address potential endogeneity between trade levels and GDP—larger economies are expected to trade more,
- *Pop* is the population of country *i*/*j* in year *t*—countries with larger populations are generally expected to trade less because of their larger domestic markets,
- *Area* is the land area (in square kilometers) of country *i*/*j*—countries with large land areas are expected to trade less because greater land area is associated with larger internal markets and greater availability of resources domestically,
- *Smctry* is a binary variable which is unity if both country *i* and *j* had constant boundaries between 1985 and 2002 (with the break up of the Former Soviet Union, Yugoslavia, and other countries, several new countries were formed after 1985 resulting in interrupted time series data)—countries with steady borders are expected to have higher trade due to their greater stability and cultivation of trading relationships over time,

[25] The rationale for the inclusion of particular variables and expectations regarding their relationship to trade levels is widely discussed in the literature developing and applying the gravity model of trade, for example see discussions in Linneman (1966), Krugman (1991), and Frankel (op. cit.).

- *Landl* is a binary variable which is unity if country *i/j* is landlocked (no sea ports of direct sea access)—landlocked status is expected to be associated with lower trade due to higher trade costs,
- *Cont* is a binary variable which is unity if country *i* and *j* border one another—countries sharing a common land border are expected to trade more due to proximity and ease of overland transport ,
- *Islandl* is a binary variable which is unity if country *i/j* is a small island country—small island countries are expected to trade at a higher rate due to limited domestic market and natural resources,
- *Lang* is a binary variable which equals 1 if *i* and *j* share a common language (zero otherwise)—shared language and historical ties through colonialism are expected to increase trade links between countries,
- *Colony* is a binary variable which equals 1 if country *i* established a colony in country *j* or *vice versa*,
- *ComCol* is a binary variable which is unity if *i* and *j* were colonies of the same colonial power,
- *Col45* is a binary variable which is unity if *i* and *j* had a colonial relationship after 1945, and
- ε_{ij} represents model error and the effect of other influences on bilateral trade that are omitted.

Estimation coefficients can be interpreted as measuring the elasticity of exports with respect to changes in the explanatory variables.

Data on exports used in the estimates are drawn from World Trade Analyzer (WTA), a trade database provided by the International Trade Division of Statistics Canada. It contains adjusted United Nations Conference on Trade and Development (UNTAD) source data on over 180 countries' international trade activities at four-digit level of Standard International Trade Classification (Rev 2) from 1985. An important feature of this data is that recorded imports and exports of trading countries are rectified so that exports reported by the exporting country are consistent with the imports reported by the importing country, which is not the case in the original UN-COMTRADE data upon which the WTA data is based. The model is estimated for pairs of countries that recorded positive trade, so omits cases where exports equal to zero were recorded. Accordingly, the model explains the level of trade among trading countries rather than trade per se (i.e. the decision of whether to trade at all, and the level of trade). This treatment of observed cases of zero trade also alleviates the issue of transforming zero cases into logarithms, which is typically handled by the addition of an arbitrary small constant to such cases before they are transformed into logarithms.

Data on the distance between trading countries and related geographic characteristics were obtained from the *Centre d'Etudes Prospectives et d'Informations Internationales* (CEPII) database.[26] The database incorporates geographical variables for 225 countries, including information on distance between the capital and largest cities of each pair of countries, and

[26] Available online at http://www.cepii.fr/anglaisgraph/bdd/distances.htm

dummy variables indicating whether a country is landlocked, and whether pairs of countries are contiguous or share a common language or post-WWII colonizer. Combining the CEPII data with detailed data on trade from the WTA yields a panel of 24,492 country pairs (across 157 countries) during the period 1985 to 2002. Other sources of data from which variables used in our gravity model estimates are drawn include: the World Bank's World Development Indicators (WDI 2005), the Asian Development Bank's Key Indicators (KI 2005), and data available on Jon Haveman's international trade data website.[27] Unfortunately, some economies that have had close trade relationships with China historically, such as Russia, North Korea, do not have GDP data in the WDI so had to be dropped from the analysis. However, most Asian countries and all OECD member economies are included. Ultimately, missing data for selected countries and years resulted in the loss of some observations leaving an average of 24,649 country pairs with an average of 18 years of data for the regression (Appendix Table 1 summarizes descriptive statistics of variables in our dataset and the source of each variable). Because the WTA cleans and corrects data to ensure concordance between exports reported from country A to country B and imports reported by country B from country A, regressions run on exports or imports will produce equivalent results. We estimate our models for exports, which follows standard practice (trade volumes are also used as the dependent variable in some gravity model estimates).

The gravity model is estimated using the random effects generalized least squares (GLS) panel estimator (sometimes referred to as the random error components panel estimator) on the full dataset, as well as using standard log-linear generalized least squares regression on cross-sections of selected individual years of our data. The random effects estimator breaks up the standard regression residual into two components: one component captures the systematic error observed in estimated trade for each country-pair while the second component captures the regular residual. Estimation coefficients reflect a weighted average of the cross-sectional and time-series association between the dependent and independent variables included, and the weighting is defined by the estimation parameter theta—which is reported for our estimates (technical details on the random effects estimator are available in Greene (2003)). The panel estimator is usually a more efficient estimator since it makes use of the complete cross-sectional time series of observations country-pair exports while the cross-sectional estimation results offer somewhat easier interpretation and the evolution of results over time can yield useful insights into how trade has evolved and the factors driving trade flows have evolved over time.

Appendix Table 2 summarizes results from our random effects generalized least squares panel regression estimates for the base gravity model and three extensions of this model. Following the approach of Ng and Yeats (op. cit.), we also estimated a simpler regression predicting trade for country-pairs based only on the distance between them, which is applied to derive the distance adjustment used in the distance-adjusted trade

[27] Data of development indicators for Taiwan are from ADB (2005), while data for other countries were drawn from WDI 2005. Haveman's trade data available at http://www.macalester.edu/research/economics/PAGE/HAVEMAN/ Trade.Resources/TradeData.html (last accessed on February 14, 2006)

intensity index but are not reported on Table 2 due to space constraints.[28] The parameters used in the 'gravity adjusted trade intensity index' figures reported and discussed in the paper were obtained from model 4 reported on the table, but we report the four variants of the model to highlight the robustness of the model to the inclusion of variables in addition to those included in the base model.

The overall statistical significance of the estimation models is evaluated using a Wald Chi-square test, while the need for the random effects estimator as opposed to treating the cross-sectional time-series data simply as a cross-section and applying regular GLS is tested by applying a Breusch-Pagan Langranian Multiplier test (technical details also in Greene, op. cit.). In the cases of both these diagnostic statistics, the probability of a false rejection of the null hypotheses that the model has no explanatory power over the dependent variable and country-pair specific error terms included in the random effects estimator have a variance of zero (thus regular GLS estimator can be used) is reported on our tables. Results of both tests are reported at the bottom of Appendix Table 2 and highlight the statistical significance of the models and support application of the random effects GLS estimator. "R-square" values reported for the model estimates indicate they perform well in explaining variation in the level of trade between countries—explaining 65 to 67 percent of the variation in observed bilateral trade flows.[29] The parameter rho shows the fraction of variance due to the error component associated with country-pairs over time, and equals .70 for all the models. The greater explanatory power of variation in the level of bilateral trade between country-pairs over time is also implied by the estimated thetas, which range between 44 and 85 percent (across models and observations) and are the weights are given to the time-series component of the estimator. The high values of the estimated rho and theta parameters recommend application of the random effects estimator as a more efficient estimator.

The statistical significance of estimation parameters is tested using a test that is functionally equivalent to a standard t-test applied in OLS and GLS regressions. Estimation coefficients can be interpreted as elasticities following standard treatment of log-linear regressions. In all the model estimates reported, the base variables of the gravity model (i.e., distance, economy size, land area, population) as well as the additional geographic and historical variables included in model variants are highly statistically significant and have the expected sign. Our estimation results are generally consistent (both in sign and in magnitude of the trade effects estimated for individual variables) with those obtained in the published literature.[30] The robustness of model estimates to the addition of new variables is indicated

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[28] The distance variable had the expected negative sign (-0.953) and was statistically significant at a 99 percent level of confidence; however the overall R^2 for this simple model was only 3.9 percent. We noted that Ng and Yeats (op. cit.) use the trade intensity index rather than real value of exports as the left hand side variable in their regression.

[29] As noted at the bottom of Table two, the "R-square" statistics reported for random effects GLS estimates differs from the R-square computer in regular OLS regression and has slightly different properties, however its interpretation is similar (see STATA, 2003, p. 194-195).

[30] See, for example, results reported in Frankel and Romer (1999), Soloaga and Winters (2001), Clarete et al. (2003), Rose (2004), and Yamarik and Ghosh (2005). Our results are most similar to those of Rose, but share common signs and levels of statistical significance with the estimates reported in all of these papers with the exception of the variables for population and contiguous borders which obtain estimation coefficients that vary across the papers.

by the similarity of individual parameter estimates obtained across models 1 to 4. Distance between countries has the largest negative association with level of trade, while economy size (GDP) has a largest positive association with trade levels. Countries with larger land endowments are found to trade at significantly lower levels, while population was associated with lower imports and greater exports. Lastly among variables included in the base gravity model, countries with unchanging borders throughout the period 1980 to 2002 have significantly higher levels of trade than new nations or countries experiencing boundary changes.

Three of the models also include additional variables capturing aspects of their geography that influences their level of foreign trade as expected. Landlocked countries have significantly lower levels of trade in terms of both exports and imports, but the magnitude of the associated estimation parameter is relatively small. Countries sharing contiguous borders trade at significantly higher levels, as expected, and the magnitude of the associated estimation parameter was large. Small island countries engage in foreign trade at significantly higher rates than other countries, although the associated estimation parameter was relatively small.

Lastly, the last two estimation models (3 and 4) added variables capturing historical and linguistic ties between the trading partners to the estimation equation. Countries having a common language, as expected, tend to trade at higher levels then other countries, and the positive effect was large (i.e. roughly the same magnitude as sharing contiguous borders). The three variables indicating previous colonial linkages or share colonial histories between the trading countries each have a positive and statistically significant effect on trade levels. This suggests that countries that have undergone periods of colonial domination tend to have a stronger orientation towards foreign trade than non-colonized countries and countries with colonial ties historically tend to have strong trade ties to the present day.

Estimation parameters from model 4 are used to calculate the level of trade expected based on country-pair characteristics. The predicted trade levels provide a counterfactual against which actual trade levels can be compared to judge whether two countries trade to a greater or lesser extent than one would expect given their characteristics. The predicted trade level is also used to calculate the trade intensity index, which compared to the actual trade intensity index. Deviations between predicted and actual trade are interpreted as reflections of policy and other effects not captured in the gravity model on bilateral trade.

We also estimate our gravity model using standard linear regression on single year cross-sections of our dataset. Although less efficient estimator in terms of taking advantage of the larger sample size and longitudinal nature of the available data, these estimates are undertaken because they provide insight into the evolution of variables influencing trade over time and provide results with more familiar and simpler interpretation. Results from five year intervals of the single year cross-sectional estimates (i.e., 1985, 1990, and so on) are summarized on Appendix Table 3. Examination of the results from these single-year estimates highlights the robustness of the panel results, as most of the variables in the model maintain the sign and statistical significance obtained in the panel estimates (e.g. distance between countries has a large and statistically significant coefficient in all years). Overall, these estimates perform well in terms of explaining cross-sectional variation in bilateral trade

flows; R-square statistics range between 62 percent and 70 percent, and all models are statistically significant at the 99 percent level.

The magnitudes of most of the right hand side variables included in the model are either steady or fluctuate without any clear pattern; however, some exceptions to this are worth discussing. We note that the estimated coefficients for distance steadily increase over the years covered in our dataset, which may reflect the increasing importance of intra-regional trade which has coincided with the major upturn in global trade volumes since the mide-1990s. Small island countries had export/import levels comparable to other countries prior to 1995, but after that year small island status was associated with a statistically significant propensity to export (but not to import). This may suggest that small island countries have experienced a disproportionate increase in their exports since the mid-1990s. A country's landlocked status, in contrast, was associated with significantly lower levels of exports after 1995, which suggests landlocked countries may have been left out of the surge in global trade relative to countries with access to the sea. Estimation coefficients for the variables capturing past colonial ties displayed some evidence that such ties may be declining in relative importance over time.

Appendix Table 1. Descriptive statistics from the dataset used in the estimates

Variable	Units	No. of observations				Mean	Std.Dev.	Min.	Max.	Sources
Year	n.a.	overall	N	=	443,682	1994	5	1985	2002	
		between	n	=	24,649					
		within	T	=	18					
Country-pair	n.a.	overall	N	=	443,682	12,325	7,116	1	24,649	
		between	n	=	24,649					
		within	T	=	18					
Exports	constant	overall	N	=	443,682	0.185	2.317	0.000	250	1
	(yr. 2000)	between	n	=	24,649					
	US$ (Mn.)	within	T	=	18					
D_{ij}	km	overall	N	=	443,682	8,056	4,478	1	19,951	2
		between	n	=	24,649					
		within	T	=	18					
GDP_i	constant	overall	N	=	375,073	191	805	0.028	10,000	3,4
	(yr. 2000)	between	n	=	21,195					
	US$ (Bn.)	within	T-bar	=	17.70					
Pop_i	persons	overall	N	=	416,521	35	125	0.053	1,280	3,4
	(Mn.)	between	n	=	23,236					
		within	T-bar	=	17.93					
$Area_i$		overall	N	=	443,682	0.713	1.642	7	9.976	3,4
	km^2 (Mn.)	between	n	=	24,649					
		within	T	=	18					

Sources:
1) *Trade Analyzer*, Statistics Canada (2005).
2) Centre d'Etudes Prospectives et d'Informations Internationales,CEPII (2005)
3) *World Development Indicators*, World Bank (2005).
4) *Key Indicators*, Asian Development Bank (2005).

Appendix Table 1. Descriptive statistics from the dataset used in estimates (concluded)

Variable	Units	No. of observations				Mean	Std.Dev.	Min.	Max.	Sources
Smctry	(0/1)	overall	N	=	443,682	0.008	0.087	0	1	2
		between	n	=	24,649					
		within	T	=	18					
$Landl_i$	(0/1)	overall	N	=	443,682	0.140	0.347	0	1	2
		between	n	=	24,649					
		within	T	=	18					
$Island_i$	(0/1)	overall	N	=	443,682	0.233	0.423	0	1	2
		between	n	=	24,649					
		within	T	=	18					
Contig	(0/1)	overall	N	=	443,682	0.017	0.131	0	1	2
		between	n	=	24,649					
		within	T	=	18					
Colony	(0/1)	overall	N	=	443,682	0.008	0.088	0	1	2
		between	n	=	24,649					
		within	T	=	18					
Comcol	(0/1)	overall	N	=	443,682	0.122	0.327	0	1	2
		between	n	=	24,649					
		within	T	=	18					
Comlanguage official	(0/1)	overall	N	=	443,682	0.175	0.380	0	1	2
		between	n	=	24,649					
		within	T	=	18					

Sources: 1) *Trade Analyzer*, Statistics Canada (2005).
2) Centre d'Etudes Prospectives et d'Informations Internationales,CEPII (2005)
3) *World Development Indicators*, World Bank (2005).
4) *Key Indicators*, Asian Development Bank (2005).

Appendix Table 2. Panel Estimates of Total Exports (random-effects GLS regression)

Coefficient Estimate
Estimated Standard Error

Model	(1)	(2)	(3)	(4)
Intercept	-23.735 ***	-23.918 ***	-24.800 ***	-24.685 ***
	0.259	0.267	0.274	0.273
$Ln(D_{ij})$	-1.180 ***	-1.160 ***	-1.107 ***	-1.089 ***
	0.019	0.021	0.021	0.020
$Ln(Y_{i, t-1})$	1.060 ***	1.054 ***	1.061 ***	1.062 ***
	0.008	0.008	0.008	0.008
$Ln(Y_{j, t-1})$	0.793 ***	0.768 ***	0.777 ***	0.778 ***
	0.008	0.008	0.008	0.008
$Ln(Pop_i)$	-0.050 ***	-0.041 ***	-0.045 ***	-0.047 ***
	0.014	0.014	0.014	0.014
$Ln(Pop_j)$	0.046 ***	0.061 ***	0.055 ***	0.053 ***
	0.014	0.014	0.014	0.014
$Ln(Area_i)$	-0.096 ***	-0.083 ***	-0.079 ***	-0.090 ***
	0.009	0.010	0.010	0.009
$Ln(Area_j)$	-0.113 ***	-0.095 ***	-0.092 ***	-0.099 ***
	0.009	0.010	0.010	0.009
$Smctry_{ij}$	1.474 ***	1.096 ***	0.796 ***	0.798 ***
	0.141	0.146	0.146	0.146
$Landl_i$		-0.152 ***	-0.148 ***	-0.174 ***
		0.044	0.044	0.043
$Landl_j$		-0.526 ***	-0.524 ***	-0.540 ***
		0.044	0.044	0.043
$Cont_{ij}$		0.957 ***	0.897 ***	0.910 ***
		0.109	0.108	0.108
$Islandl_i$		0.208 ***	0.143 ***	
		0.040	0.040	
$Islandl_j$		0.161 ***	0.094 ***	
		0.041	0.040	
$Lang_{ij}$			0.458 ***	0.465 ***
			0.041	0.041
$Colony_{ij}$			0.898 ***	0.904 ***
			0.175	0.175
$ComCol_{ij}$			0.260 ***	0.268 ***
			0.052	0.052
$Col45_{ij}$			1.023 ***	1.060 ***
			0.220	0.220

Note: * denotes significant at a 90% confidence level, ** denotes signif. at a 95% confidence level, *** denotes significant at a 99% confidence level.

Source: Authors' estimates using data from sources documented in Appendix Table 1.

Appendix Table 2. Panel Estimates of Total Exports (concluded)

Coefficient Estimate
Estimated Standard Error

Model	(1)	(2)	(3)	(4)
other paramters of the estimation model				
sigma_u	1.720	1.707	1.677	1.678
sigma_e	1.124	1.124	1.124	1.124
rho	0.701	0.698	0.690	0.690
Theta (minimum)	0.453	0.450	0.443	0.443
Theta (median)	0.828	0.827	0.824	0.824
Theta (maximum)	0.848	0.847	0.844	0.844
No.obs. (N)	180,275	180,275	180,275	180,275
No. country-pairs	15,355	15,355	15,355	15,355
Ave.yrs./country-pair	12	12	12	12
R^2 [/1]	0.653	0.657	0.667	0.667
Breusch-Pagan LM Test [1]	490,000 ***	480,000 ***	450,000 ***	450,000 ***
Wald Chi^2	52,629 ***	53,517 ***	55,378 ***	55,322 ***
Degree of freedom	8	13	17	15

Notes: * denotes significant at a 90% confidence level, ** denotes signif. at a 95% confidence level, *** denotes significant at a 99% confidence level.

[/1] This R^2 statistic differs from the standard OLS R^2 and has slightly different properties, but its interpretation is equivalent (see Stata Corp. (2003), p.194-5 for details).

Source: Authors' estimates using data from sources documented in Appendix Table 1.

Appendix Table 3: Linear regression estimates of Exports (selected years)

Coefficient Estimate
Estimated Standard Error

Year	1985	1990	1995	1997	1998	2000	2001	2002
Intercept	-25.981 ***	-27.926 ***	-29.728 ***	-28.877 ***	-28.201 ***	-28.603 ***	-28.326 ***	-28.199 ***
	0.496	0.453	0.426	0.400	0.394	0.388	0.387	0.395
$Ln(D_{ij})$	-0.988 ***	-1.035 ***	-1.033 ***	-1.073 ***	-1.139 ***	-1.169 ***	-1.137 ***	-1.197 ***
	0.031	0.029	0.027	0.026	0.026	0.025	0.025	0.026
$Ln(Y_{i,t-1})$	1.060 ***	1.101 ***	1.109 ***	1.088 ***	1.094 ***	1.080 ***	1.091 ***	1.100 ***
	0.015	0.014	0.012	0.012	0.012	0.012	0.011	0.012
$Ln(Y_{j,t-1})$	0.828 ***	0.888 ***	0.876 ***	0.861 ***	0.889 ***	0.886 ***	0.847 ***	0.847 ***
	0.015	0.013	0.012	0.012	0.012	0.011	0.011	0.011
$Ln(Pop_i)$	-0.060 ***	-0.032	0.050 **	0.074 ***	0.066 ***	0.124 ***	0.091 ***	0.074 ***
	0.022	0.021	0.020	0.019	0.019	0.019	0.019	0.019
$Ln(Pop_j)$	0.075 ***	0.052 **	0.113 **	0.082 ***	0.007	0.042 **	0.083 ***	0.081 ***
	0.023	0.021	0.020	0.020	0.019	0.019	0.019	0.019
$Ln(Area_i)$	-0.104 ***	-0.119 ***	-0.139 ***	-0.132 ***	-0.130 ***	-0.154 ***	-0.147 ***	-0.121 ***
	0.015	0.014	0.013	0.013	0.013	0.013	0.013	0.013
$Ln(Area_j)$	-0.120 ***	-0.130 ***	-0.152 ***	-0.125 ***	-0.103 ***	-0.121 ***	-0.133 ***	-0.121 ***
	0.015	0.014	0.013	0.013	0.013	0.013	0.013	0.013
$Island_i$	0.068	0.042	0.142 ***	0.133 ***	0.179 ***	0.190 ***	0.223 ***	0.238 ***
	0.059	0.055	0.051	0.051	0.050	0.050	0.049	0.050
$Island_j$	-0.024	0.104 *	0.003	0.038	0.016	0.028	-0.022	-0.008
	0.060	0.055	0.052	0.052	0.051	0.051	0.050	0.050

Note: * denotes significant at a 90% confidence level, ** denotes significant at a 95% confidence level, *** denotes significant at a 99% confidence level.

Source: Statistics Canada *Trade Analyzer* (2005).

Appendix Table 3: Regular OLS estimates of Exports (concluded)

Coefficient Estimate
Estimated Standard Error

Year	1985	1990	1995	1997	1998	2000	2001	2002
$Landl_i$	0.093	0.035	-0.075	-0.216 ***	-0.039	-0.330 ***	-0.287 ***	-0.199 ***
	0.072	0.067	0.062	0.061	0.061	0.059	0.059	0.058
$Landl_j$	-0.574 ***	-0.522 ***	-0.475 ***	-0.504 ***	-0.439 ***	-0.547 ***	-0.620 ***	-0.611 ***
	0.071	0.065	0.060	0.059	0.058	0.057	0.056	0.057
$Cont_{ij}$	0.433	0.690 ***	0.906 ***	0.849 ***	0.689 ***	0.980 ***	0.837 ***	0.793 ***
	0.157	0.151	0.140	0.134	0.130	0.126	0.126	0.128
$Lang_{ij}$	0.364 ***	0.424 ***	0.592 ***	0.645 ***	0.634 ***	0.492 ***	0.613 ***	0.499 ***
	0.063	0.058	0.054	0.053	0.052	0.051	0.051	0.051
$Colony_{ij}$	0.683 ***	0.502 **	0.554 ***	0.554 ***	0.658 ***	0.531 ***	0.398 **	0.511 **
	0.213	0.204	0.198	0.197	0.198	0.199	0.197	0.198
$ComCol_{ij}$	0.505 ***	0.717 ***	0.302 ***	0.311 ***	0.416 ***	0.542 ***	0.358 ***	0.493 ***
	0.091	0.083	0.076	0.072	0.071	0.070	0.068	0.069
$Col45_{ij}$	1.174 ***	1.241 ***	0.840 ***	0.759 ***	0.685 ***	0.809 ***	0.823 ***	0.729 ***
	0.267	0.255	0.249	0.247	0.248	0.250	0.248	0.249
$Smctry_{ij}$	1.002 ***	0.797 ***	0.890 ***	0.916 ***	0.821 ***	0.851 ***	0.995 ***	0.758 ***
	0.227	0.217	0.212	0.185	0.179	0.171	0.170	0.178
No.obs. (N)	8,150	9,160	10,413	11,000	11,212	11,638	11,832	11,481
Adjusted R^2	0.618	0.658	0.685	0.686	0.683	0.690	0.694	0.696
F Statistic	778 ***	1,036 ***	1,331 ***	1,411 ***	1,422 ***	1,525 ***	1,576 ***	1,546 ***

Note: * denotes significant at a 90% confidence level, ** denotes significant at a 95% confidence level,
*** denotes significant at a 99% confidence level.

Source: Statistics Canada *Trade Analyzer* (2005).