Pursuing Manufacturing-Based Export-Led Growth: Are Developing Countries Increasingly Crowding Each Other Out?

by

Arslan Razmi[†]

June 2007

Abstract

This study empirically investigates the presence of "crowding out" effects emerging from intra-developing country competition in export markets for manufactured goods. Export equations are estimated for a panel consisting of twenty two major developing country exporters of manufactures, after constructing trade-weighted price and quantity indices based on their exports to thirteen major high-income countries. The results, which are robust to various price and expenditure measures, suggest the presence of significant demand-side constraints on export growth, and that rapid Chinese export growth has had a noticeable impact in this regard. The estimated effects vary across time periods, SITC categories, and export destinations.

JEL Codes: F10, F14, O14, F42

Keywords: Crowding out, export displacement, China effect, real exchange rates, intra-developing country competition, dynamic panel data techniques, generalized method of moments.

Acknowledgments: The author would like to thank, without implicating, Noah Enelow for his helpful research assistance and Michael Ash and two anonymous referees for their insightful comments. Thanks are also due to the Political Economy Research Institute (PERI) at the University of Massachusetts at Amherst for financial support for this project.

[†]**Contact Author:** Arslan Razmi, Department of Economics, University of Massachusetts, Amherst, MA 01003, Tel: (413) 577-0785, Fax: (413) 545-2921, E-mail: arazmi@econs.umass.edu.

1 Introduction and Background

Recent decades have seen major changes in the structure of the global economy. These changes that are typically discussed under the broad rubric of globalization, liberalization, and economic reforms have many aspects. This paper focuses on two: (1) after decades of relatively internally-focused development policies, many developing countries have come to depend on more outward-oriented policies, relying to a much greater degree on external sources of demand and technological change, and (2) much of the increase in exports has occurred in manufactures.

Turning first to (1), that is the shift towards more outward-oriented policies, according to the World Bank's *World Development Indicators*, the export share of GDP increased from 16 percent in 1984 to 33 percent in 2004 for low- and middle-income countries.[1] Figure 1(a) illustrates the other, perhaps even more important, shift – that in the composition of developing country exports.[2] Manufactures rose as a percentage of exports from about 20 percent in 1980 to more than 70 percent in 2003. For the countries in our sample,[3] the percentage rose from about 56 percent in 1984 to almost 85 percent in 2004.[4] Within manufactures, Figure 1(b) illustrates the rapid growth of SITC category 7 (machinery and transport equipment) exports from these countries.

While the relative importance of various factors in explaining the shift towards outward-orientation remains debatable, there is little doubt that the role of policy choices backed by professional economic advice has been significant. Trade-related advice typically derives from textbook models based on the small country case. An economically small country faces a perfectly elastic demand curve for its exports and acts as a price-taker in international markets. In such a world, demand-side constraints do not play a significant role in determining export success. Models taking a more developmental approach, on the other hand, emphasize the different characteristics of manufactures as compared to primary commodities. Graduating into

[1]The increased aggregate expenditures share of exports has partly been offset for many countries by the reduced share of domestic absorption (household consumption, gross capital formation, and government spending), and partly by the increased share of imported goods in domestic spending.

[2]As explained below, we employ standard usage in defining manufactures as consisting of SITC categories 5, 6, 7, and 8, but excluding subcategory 68. See Section 3.2 for SITC category definitions. SITC rev. 2 was used unless otherwise stated.

[3]See Section 3.2 for the list of the 22 countries in our sample and the basis for their inclusion.

[4]Unless otherwise stated, all reported statistics from this point onwards are based on the author's calculations from the United Nation's *Commodity Trade Statistics* (COMTRADE) database.

producing manufactured products potentially enables countries to escape the declining terms of trade typically associated with primary commodities, in addition to facilitating technological progress and enhanced efficiency in production. Moreover, if the developing world evolves in a manner consistent with the "flying geese" paradigm,[5] then countries that successfully export their way to growth climb up successive rungs of the "technological ladder," creating room for countries further down the ladder, and indeed becoming a source of demand for their exports. Countries thus scale the steps to industrial development in a more or less harmonious fashion, with the initially successful exporters "crowding in" the later followers.

Given these overlapping perspectives, it is not surprising that trade emerges as a win-win game, at least as long as we take countries as the unit of analysis.[6] However, there are reasons to believe that key assumptions underlying both perspectives may be increasingly open to question. Firstly, while a typical developing country may be reasonably analyzed as a small country, a group of developing countries exporting similar products may not. Indeed, in the latter scenario, "immiserizing growth" along the lines formally worked out by Bhagwati (1958) becomes a distinct possibility. Secondly, to the extent that a number of developing countries focus on meeting demand emanating from high-income markets in a similar range of manufactures, the very nature of manufactured exports may be undergoing changes that enhance price-based competition, a phenomenon referred to by Kaplinsky (1993) as the "commoditization" of manufactures. Both reasons for skepticism are valid only to the extent that developing country exports are relatively close substitutes for each other. In other words, if too many countries try to fly simultaneously, tiers of the flying geese formation may become too clogged for their own good. Insofar as export-led growth in a world of close substitutes depends heavily on cost competitiveness, a congested formation creates incentives for short-run measures such as wage suppression, as opposed to long-run policies aimed at increasing productivity.

A third reason for caution derives from a somewhat different source. Classical models of

[5]The flying geese concept probably originated with Akamatsu (1935), who used it as a metaphor for the industrial catch-up of less advanced economies. In broad terms, this concept envisions a multi-tiered formation of economies in which a dominant economy (for example, Japan in East Asia) acts as the growth pilot, followed by other economies at various levels of development; the formation is the widest at the less advanced end of the developmental spectrum. As the less developed countries industrialize, they graduate into the more advanced tiers of the formation, while the smaller number of countries in the lead continue to move further ahead.

[6]Changes in internal income distribution that create winners and losers is a separate matter, of course, and one that can in theory be addressed through national compensation schemes.

trade are typically based on the idea of "reciprocal demand." Exports from country A to country B provide the former with the purchasing power to import from the latter and results in mutual gains from (balanced) trade, the relative magnitude of gains being determined by the terms of trade.[7] However, if developing countries mainly target high-income markets, then the idea of reciprocal demand becomes less applicable, and the potential "crowding out" effect of competitor exports may lead developing countries to pursue price-based competition. The resulting decline in terms of trade (or alternatively, increase in price competitiveness) may, in turn, lead to increased high-income country protectionism in various forms such as quotas, anti-dumping legislation, and pressure to re-align exchange rates.[8] To the extent that developing countries hitch their growth to high-income country demand, this also places further demand-side constraints on countries pursuing the export-led growth paradigm.

Economists working from a Kaldorian and/or Post Keynesian perspective have emphasized the special role of exports in driving output growth.[9] This literature can broadly be divided into two strands: one emphasizes the crucial role of exports in relaxing the balance of payments constraint on aggregate demand and output growth, while the other emphasizes aspects of specialization, increasing returns, technological progress, cumulative causation and "Verdoorn's Law" that make the export sector special in that these create virtuous linkages between exports, productivity, and output growth.[10] However, critics of a universalized pursuit of export-led growth, such as Blecker (2002), have pointed out the possible existence of a "fallacy of composition." The intense competition created by such policies when pursued by a number of countries, they fear, may undermine the gains accruing from rapid export growth.

This paper seeks to empirically explore the presence of demand-side constraints in a world where many developing countries have made a major push for export-led growth based on manufactures. The term "demand-side constraints" in our context captures two effects: (1) the constraints imposed by the pace of growth of (high-income country) demand for developing country products, and (2) the constraints imposed by the presence of an increasing number of

[7] The terms of trade, in turn, being determined by relative demand.

[8] Think, for instance, US current account deficits with China.

[9] See Kaldor (1966) for pioneering work along these lines.

[10] See, for example, McCombie and Thirlwall (1994) and Setterfield (1997), respectively, for discussions of these two perspectives. See also Dalum *et al.* (1999) for an investigation of the relationship between sectoral specialization and growth in OECD countries along these lines.

developing countries attempting to sell internationally-substitutable products in high-income countries. The latter can be econometrically explored either directly through estimating the degree of substitution between developing country exports, or through testing for the presence of a quantitative crowding out effect. We pursue the latter approach in this study. In doing so, we seek to contribute to existing literature in several ways. Unlike some previous studies, we control for common income and relative price shocks. We base our study on a large sample of developing countries which mainly export manufactures. We focus entirely on manufactures, for which expenditure elasticity of demand is typically considered to be higher, thus stacking the decks against finding crowding out effects. We develop carefully designed expenditure and real exchange rate indices for each country to account for the relative importance of trading partners and changes in trade patterns over time. A dynamic panel data approach is pursued to take into account lagged effects while addressing potential endogeneity issues. Finally, we explore differences in behavior between the two decades covered by our sample period, between manufactured products at different levels of disaggregation, and between destination countries.

The rest of this paper is organized as follows. Section 2 presents a brief review of existing literature. Sections 3 and 4 discuss the empirical approach, the estimation methodology, and the results obtained. Section 5 then summarizes the conclusions.

2 Literature Review

The empirical studies most relevant to this paper can broadly be classified into three categories, (1) general equilibrium simulation studies, (2) studies of price-based competition, and (3) studies of quantitative crowding out effects. We briefly discuss the first two categories before moving to the third one, which is the most relevant to our study.

The ongoing Doha Round of trade negotiations and the entry of China into the World Trade Organization (WTO) have drawn some much-needed attention to the repercussions of intra-developing country competition. For example, Walmsley and Hertel (2000) explored the effects of China's accession to the WTO over the period 1995-2020 using the dynamic GTAP (Global Trade Analysis Project) model applied to 19 regions and 22 commodities. Most relevant to our study is the result derived from simulations that while the world as a whole would benefit, China's competitors in the labor-intensive apparel industry would experience significant losses in real income, partly due to declining terms of trade resulting from competitive pressures.

General equilibrium simulations, while useful for carrying out policy experiments, suffer from some serious limitations. Firstly, these impose restrictions on the data that may abstract away some of the most interesting aspects of the questions at hand.[11] Secondly, such studies assume the values of the parameters involved, unlike empirical studies where these are actually estimated. Thus, the results follow from the calibration of the parameters.

A few studies of the degree of substitutability between developing country products have appeared in recent years. Faini *et al.* (1992), Muscatelli *et al.* (1994), and Razmi and Blecker (2008) estimated export demand equations for several developing countries. The estimates tended to undermine the assumption implicit in many pro export-led growth arguments that developing country manufactures tend to face large relative price elasticities of export demand, and that, therefore, supply-side factors play the dominant role in determining export success.[12] Moreover, the estimates showed that, for most of the countries in the sample, competition with other developing country exporters was a more important consideration than that with high-income country exporters.[13] Razmi and Blecker (2008) further found that intra-developing country competition is significant only among countries exporting mainly low-technology products, while countries that export more high-technology products (mainly the more technologically advanced East and Southeast Asian countries) compete more with high-income country producers and also face higher income (expenditure) elasticities of demand for their exports. The general implication emerging from these studies is that if developing countries as a group embark on an export-oriented development strategy, the welfare gains are likely to be less than those estimated by studies which ignore intra-developing country competition.

While estimates of the extent of substitutability between developing country manufactured exports provide very useful information regarding the nature of international price competition, an alternative approach is to explore possible quantitative crowding out effects on individual

[11]For example, the GTAP model assumes full (or constant) utilization of resources and balanced trade (or constant trade imbalances).

[12]See Balassa (1988), for instance.

[13]As inferred from the higher price elasticities of individual countries with respect to other developing countries as a bloc than those with respect to the industrial countries as a bloc.

countries of changes in competitor export volumes. In the absence of demand-side constraints, a change in competitor exports would have little effect on individual country exports. However, if external demand grows at a pace that is insufficient to accommodate increases in developing countries' export supply, we would expect to see crowding out effects of competitors' export growth. While the crowding out angle, unlike the degree of substitution one, does not directly test underlying structural mechanisms, it does have the advantage that, insofar as disaggregated export prices for individual SITC categories are not available, testing for competitive displacement at disaggregated levels becomes feasible. We next turn to the limited number of studies that have explored quantitative crowding out effects.

Eichengreen *et al.* (2004) estimated the impact of Chinese export growth on other developing countries using a gravity model to estimate coefficients for the period 1990-2002. The study found that while Chinese exports of consumer goods crowd out exports from other Asian countries, those of capital goods do not. The implication is that Chinese export growth is likely to have negative consequences for less technologically advanced consumer goods-exporting Asian countries, but positive consequences for exporters of more sophisticated capital goods, who benefit from the high Chinese income elasticity of import demand for such products. While Eichengreen *et al.* (2004) is an important study, it limits its scope to analyzing China's export growth and the possible crowding out of Asian country exports by China. Moreover, the sample leaves out the early and mid-eighties, which span crucial years in the transformation of many countries into more outward-oriented economies.

Fernald *et al.* (2003) explored crowding out effects using data for the four Asian newly industrialized economies (NIEs) and four other emerging Asian economies (ASEAN-4) by adding China's real export growth as a regressor to an export equation that included trading partner income growth and real exchange rates as the other regressors. The study found that for the period 1981-2001 Chinese exports played a (statistically insignificant) complementary role to NIE plus ASEAN-4 exports, and that a major shifting of trade patterns has occurred consistent with a flying geese pattern in which China and the ASEAN-4 moved into the product space vacated by the NIEs. However, the non-econometric analysis of industry-wise disaggregated data did suggest some crowding out. While this study is a useful attempt at studying intra-developing country competition, it suffers from some limitations. Firstly, it only tested for displacement of NIE and ASEAN-4 exports by Chinese exports. While China's global presence has increased manifold in recent decades, other developing countries remain important. Moreover, China may be a more important competitor for some countries than for others. Secondly, the study estimated equations for aggregate exports only. Thirdly, the data included primary commodities and agricultural products, which may face a different kind of international environment than manufactures. Fourthly, by using fixed effects techniques, the methodology pursued did not take into account possible correlations between the regressors and the error terms, raising concerns that the estimates may be inconsistent. Fifthly, by using trading partner income growth, the study largely ignored the fact that imports into high-income countries grew much faster than their output. This would tend to overestimate the income elasticity of demand for developing country products, while underestimating any crowding out effects. Finally, in order to explain the observation that the NIE share of high-income markets has declined at the same time as their share of the Chinese market has increased, the authors hypothesized that both changes resulted partly from the movement of NIE producers into China, which then imports inputs from the NIEs while exporting final products to high-income markets. While this may explain shifts in the nature of NIE exports, it can hardly explain the more general case of other developing countries whose firms often do not have the capacity to migrate to other countries.

Palley (2003) analyzed the presence of crowding out effects in US imports from several countries. The study used growth rates of merchandise imports from various individual countries as the dependent variable while using growth rates of US merchandise imports and exports from various competing countries as regressors. A negative sign on the latter variable was interpreted as evidence of competitive crowding out of exports. The study found that over the period 1978-1999 exports from the NIEs were subject to crowding out from China, while Japanese exports were crowded out by Mexico. However, the study was limited to US imports. Moreover, the study ignored relative price effects which may be particularly important in the case of low-tech, labor-intensive manufactures. Furthermore, the study included merchandise in general, thus not limiting the data to manufactures. The data were analyzed at an aggregated level only. Finally, the use of several variables to capture exports from individual competitors (one regressor per competing country or region) is likely to have led to serious collinearity problems since many of these countries experienced similar growth trends over the period.[14]

3 Empirical Model, Methodology, and Data

This section develops the conceptual basis for our analysis before describing the data and the empirical methodology pursued.

3.1 A Brief Analytical Note

The main goal of our study is to investigate the presence of quantitative crowding out effects in high-income markets for developing country manufactures. In order to explore such effects we introduce to standard trade equations of the "imperfect substitutes" form, a term to capture competitor export volume for each country. A simple analytical framework will help illustrate the conceptual basis for this addition and our interpretation of the results. Consider Figure 2 which plots the high-income country community indifference curves in the $x_j^I - x_{com}^I$ space, where x_j^I and x_{com}^I denote developing country j's own and competitor exports to the high-income group I, respectively.[15] The degrees of substitutability are reflected in the shape of the community indifference curves, as shown in Figures 2(a) and 2(b). While the former illustrates the high substitutability case, the latter reflects the low substitutability one. Since we are considering mostly (economically) small developing countries – *which as a group act as a large country* – our exposition assumes the exogeneity of relative prices for each individual country.

Turning to the underlying export demand function, a general utility function of the form $U = U(x_j^I, x_{com}^I)$ subject to the constraint $M^I = P_j x_j^I + P_{com} x_{com}^I$, where M^I denotes high-income country expenditures on imports, while P_j and P_{com} denote own country and competitor export prices, respectively, yields the well-known cross-price Slutsky equation:

$$\varepsilon_{x,P_{com}} = \varepsilon^c_{x,P_{com}} - \theta_1 \varepsilon_{x,m} \tag{1}$$

where $\varepsilon_{x,P_{com}}$ and $\varepsilon^c_{x,P_{com}}$ denote the cross-price elasticity of *uncompensated* and *compensated*

[14]Indeed, the author explicitly recognizes collinearity-related concerns.

[15]The indifference curve apparatus is particularly useful to illustrate the use of the competitor export variable since the high-income country consumer faces a choice between two products neither of which (s)he produces. See Markusen *et al.* (1995) for the conditions under which community indifference curves can be constructed.

demand for developing country j's exports relative to its competitors' exports, respectively, $\varepsilon_{x,m}$ is the income (expenditure) elasticity of demand for developing country j's exports, and θ_1 denotes the share of competitor exports in total imports from developing countries. The sign of $\varepsilon^c_{x,P_{com}}$ is expected to be positive if country j's exports are gross-substitutes for other developing countries' exports, and negative if these are gross complements. The sign of $\varepsilon_{x,m}$ is expected to be positive unless the country exports *inferior* goods.

Turning to the graphical illustration, suppose A is the initial point of consumption. Suppose also that competitor countries increase their supply of exports, which leads to a decline in their export price. Following standard microeconomic theory, a decline in the relative export price of the competitor developing countries (rpx^l_{com}), which is depicted by the flatter dash line, leads to: (a) an income effect, captured by the term $\theta_1\varepsilon_{x,m}$ in equation (1), and shown by the movement from A to C, which translates into greater purchasing power for high-income country consumers, and thus greater potential spending on both developing country j's and its competitors' products, and (b) a substitution effect, captured by the term $\varepsilon^c_{x,P_{com}}$ in equation (1), and shown by the movement from A to B, that leads to substitution of competitor products for country j's products. If the substitution effect dominates, high-income country consumers end up consuming less of country j's exports, and more of its competitors' exports. If, on the other hand, substitution effects are sufficiently weak, both country j and its competitors would see their exports rise, with the former in a sense crowding in the latter's exports. These two cases are illustrated by Figures 2(a) and 2(b), respectively. Finally, an exogenous increase in high-income country expenditures will, *ceteris paribus*, shift the budget constraint schedule outwards, increase imports from both country j and its competitors at a given relative price, and thus universally relax demand side constraints on developing country export growth.

3.2 Sample and Data

Our sample spans the period 1984-2004. The high-income countries in our sample include 13 major importers of developing country manufactures, namely Austria, Belgium, Canada, France, Germany, Italy, Japan, Netherlands, Spain, Sweden, Switzerland, the United Kingdom (UK), and the United States (US). These countries purchased over half of all manufactured exports from the developing countries in our sample in 2004. The developing countries include Bangladesh, Brazil, China, Costa Rica, Hungary, India, Indonesia, Jordan, Korea (Rep.), Malaysia, Mauritius, Mexico, Morocco, Pakistan, the Philippines, Poland, South Africa, Sri Lanka, Taiwan, Thailand, Tunisia, and Turkey. All countries were included for which in 2004: (1) annual exports of manufactures were greater than one billion dollars, (2) the proportion of manufactures in total exports was greater than 50 percent, (3) annual per capita GDP was less than 6,000 in constant 2000 US dollars, and (4) data were available for most of the sample period.[16] All exports of manufactures falling under SITC categories 5-8 (excluding category 68) were included.[17] Given that export price data for most developing countries are available only for aggregate exports, condition (2) reflects our desire to only include countries for which changes in aggregate export prices are likely to be predominantly affected by changes in prices of manufactured exports. The average proportion of manufactured products in total exports from the developing countries in our sample was almost 85 percent in 2004.[18]

Table 1 presents the change in the composition of manufactured exports to high-income countries for the developing countries in our sample. For each country the largest SITC categories for the two years, 1984 and 2004, are highlighted. The table reveals some interesting changes. For example, while SITC 6 (manufactured goods classified chiefly by material) was the major category for the largest group of countries in 1984, the balance had tilted towards SITC 7 (machinery and transport equipment) by 2004. This reflects a shift from the textile sector to electronics, communications equipment, machinery, and the automotive sector, and seems to have occurred mostly in East and Southeast Asian countries, although some East European and Latin American countries also experienced this change. SITC 8 (miscellaneous manufactured

[16]Countries that met the first three criteria but had to be excluded due to unavailability of data for most of the sample period include Belarus, Bulgaria, Cambodia, Croatia, the Czech Republic, Estonia, Latvia, Lebanon, Lithuania, Romania, Slovakia, and Macedonia. Most of these were COMECON (Council for Mutual Economic Assistance) members during part of our sample period. Using PPP-based criteria would lead to a somewhat different sample. For example, using a threshold per capita GDP value of 10,000 constant PPP-adjusted 2000 US dollars would exclude Hungary, Poland, and (marginally) Mauritius. Given the emergence of these countries as major exporters of manufactures, it appears desirable to include these countries in our sample.

[17]The latter category, which includes non-ferrous metals, is often excluded from the category of manufactured products in empirical studies. See Sarkar and Singer (1993) for a discussion.

[18]Notice that by restricting the sample to countries that had a relatively large share of manufactured exports, these criteria leave open the possibility that some countries which couldn't successfully compete, and were thus "crowded out," from international markets are not part of our sample. This leads us to believe that our estimates of crowding out effects may be biased downwards. However, for the reasons stated above, it seems reasonable to include only countries whose relative prices mainly reflect manufactured products.

articles) also appears to have grown as a major category for some countries, reflecting mainly a shift from the relatively more capital-intensive textile sector to the clothing and apparel sectors. SITC 5 (chemicals and related products) continues to be a minor category for most countries.

3.3 Empirical Methodology and Time Series Properties

The most direct way to explore crowding out effects would be to look at correlations between individual country export volumes and those of its competitors. However, this approach does not control for shocks that raise exports from both the country under consideration and its competitors. For example, and as discussed in Section 3.1, a country's exports could rise due to a general increase in high-income country expenditures, even though nothing else has changed. Similarly, a country's exports could rise due to a real depreciation relative to high-income countries, without any change in its real exchange rate relative to other developing competitors. Since our focus is on crowding out effects due to intra-developing country competition, not controlling for these factors will tend to bias our estimates downwards. Following Fernald *et al.* (2003), therefore, our specification consists of an export equation of the imperfect substitutes form, with an added regressor that captures the effect of changes in competitors' exports. Unlike Fernald *et al.* (2003), however, we use a real effective exchange rate index specifically constructed to reflect relative prices between each developing country and the bloc of high-income countries only. This is done for two reasons: (1) several studies have shown that the elasticity of substitution between developing country products is different from that between high-income country and developing country products,[19] and (2) the crowding out hypothesis implicitly assumes that developing country products are to a significant degree substitutes for each other. Including a separate real effective exchange rate index relative to other developing countries will therefore introduce redundancy, with two variables capturing the same effect.[20] Our empirical specification for country j's exports (x_j^I) can be expressed as:

$$x_j^I = f(m^I, rpx_j^I, x_{com}^I); \qquad f_1, f_2 > 0, f_3 \lesseqgtr 0 \tag{2}$$

[19]See, for example, Spilimbergo and Vamvakidis (2003) and Razmi and Blecker (2008).

[20]In other words, a relatively high degree of substitution would show up both in the coefficient for the real effective exchange rate variable vis-à-vis other developing countries and the coefficient for quantitative displacement. This will create a (downward) redundant variable bias in the estimate of the crowding out effect.

where rpx_j^I denotes developing country j's real (effective) exchange rate relative to high-income countries, m^I represents high-income country real import expenditure, and f_i denotes the relevant partial derivatives. *A priori*, we would expect an increase in high-income country expenditures or a real devaluation to boost exports. The sign of f_3, however, is ambiguous. If manufactured exports from developing countries are relatively close substitutes for each other, we would expect to see crowding out appear in the form of a negative coefficient.[21] However, if developing country manufactures do not significantly compete with each other, we would expect to see either a null coefficient, or in the presence of strong income effects and/or complementarity, even a positive coefficient (see Section 3.1). Thus, our main test turns on the sign of f_3, which we henceforth refer to as the *crowding out* or *displacement* coefficient.[22]

Panel unit root tests indicated that all the variables used in our analysis are integrated of order one, i.e., I(1).[23] Previous empirical studies have found that export demand patterns exhibit persistence due to J-curve effects and different elasticities in the short-run versus the long-run. We, therefore, use an autoregressive distributed lag, ARDL(1,1) specification to capture lagged effects. However, the estimates are likely to be biased and inconsistent in the presence of a lagged dependent variable term on the right hand side. This is because this term is likely to be correlated with the unobserved heterogeneity component of the contemporaneous error term, raising potential endogeneity issues. We, therefore, use the augmented system Generalized Method of Moments (GMM) approach developed by Arellano and Bover (1995). This dynamic panel data approach uses orthogonal deviations to sweep out the individual country-specific intercepts. Our empirical specification can be expressed as:

[21]Note that this crowding out effect would capture both price- and quality-based competition.

[22]A qualification is in order here. At the broadest level, real exchange rate movements can be decomposed into two components: (1) nominal exchange rate movements, and (2) relative price movements. To the extent that a developing country's nominal exchange rate movements are largely identical relative to other countries irrespective of whether the latter are high-income or developing countries, component (1) would, therefore, capture changes in competitiveness relative to both groups of countries. Put differently, since, given the competitive nature of international markets, a nominal depreciation is relative to all currencies, and not just one set of currencies, it is likely that β_2 does not purely reflect changes in price competitiveness relative to high-income countries only, and that it picks up some of the effects that β_3 is supposed to capture. This has two implications. Firstly, the crowding out coefficient is likely to be under-estimated, and secondly, insofar as developing country products are closer substitutes for other developing country products, the elasticity of substitution with respect to high-income country products is likely to be over-estimated.

[23]We carried out several unit root tests including the Levin, Lin and Chu test, the Breitung test, the Im, Pesaran and Shin test, the ADF-Fisher test, the PP-Fisher test, and the Hadri test. While the first five tests have the presence of a unit root as the null hypothesis, the latter is based on the null hypothesis of stationarity. The results, although not reported here, are included in an unpublished appendix, which is available on request.

$$x^I_{j,t} = \sum_{h=0}^{1} \beta_{1h} m^I_{t-h} + \sum_{h=0}^{1} \beta_{2h} rpx^I_{j,t-h} + \sum_{h=0}^{1} \beta_{3h} x^I_{com,t-h} + \gamma_1 x^I_{j,t-1} \quad (3)$$

The second and further lags of real exports and the first and second lags of all other variables were used as the instruments. Period Seemingly Unrelated Regressions (SUR) weights were used to correct for period heteroscedasticity and general correlation of observations within cross-sections. White cross-section standard errors were used to allow for contemporaneous correlation between the cross-sectional residuals. The Sargan test for overidentifying restrictions was utilized to validate the appropriateness of the instruments used.[24]

3.4 Construction of Quantitative and Price Indices

The construction of aggregated indices in the presence of multiple countries raises several issues.[25] This section briefly explains our construction of each index.

$x^I_{j,t}$: This index consists, for a given time period t, of the total value of exports from developing country j to the 13 high-income countries ($i = 1, 2, \ldots, 13$) in our sample deflated by country j's export price. Or,

$$x^I_{j,t} = \frac{\sum_{i=1}^{13} X^i_{j,t}}{P_{j,t}} \quad (4)$$

m^I_t: Total expenditures by all 13 high-income countries on manufactured imports deflated by a weighted import price index. The inclusion of imports from the *entire* world is meant to ensure the exogeneity of this regressor.[26] In other words, an increase in exports of manufactures from Bangladesh is not likely to noticeably affect total US imports of manufactures from the entire world. The weights used represent the share of each high-income country in total imports of all such countries. The idea is to control for any increase in exports from developing country j that occurs simply due to increased high-income country spending on imports (due to cyclical upswings, greater openness, rise in income, or other reasons).[27] Mathematically,

[24] The null hypothesis being tested with the Sargan test is that the instrumental variables are uncorrelated with the errors. The test statistic has a $\chi^2(k-p)$ distribution, where k is the number of estimated coefficients and p is the instrument rank.

[25] See, for example, Maciejewski (1983) for a detailed discussion.

[26] Using *all* imports from the *entire* world does not significantly affect the results. See Section 4.6.

[27] One could construct this index using a weighted average of individual high-income country GDPs instead of expenditures on imports. However, such a measure would include expenditures on both tradables and non-tradables. Moreover, since high-income country imports grew much faster than high-income country GDPs

$$m_t^I = \frac{\sum_{i=1}^{13} M_t^i}{\sum_{i=1}^{13} \left(\frac{M_t^i}{\sum_{i=1}^{13} M_t^i} \right) P_t^{M,i}} \tag{5}$$

where $P_t^{M,i}$ denotes the import price of high-income country i.

$rpx_{j,t}^I$: The ratio of a weighted index of high-income country producer price indices (PPIs) to developing country j's own export price. The idea is to capture the competitiveness of country j's exporters relative to high-income country producers. The weights capture the importance of each high-income country for each developing country. For example, while the European Union (EU) is a more important market than the US for Tunisia, the reverse is true for Mexico. The EU should therefore, be assigned a greater weight while calculating the competitiveness of Tunisian exports, while the US should be assigned a greater weight for Mexico. This variable controls for any change in country j's exports due to relative price changes with respect to high-income countries that is independent of any crowding out effects. Mathematically,

$$rpx_{j,t}^I = \frac{\sum_{i=1}^{13} \left(\frac{X_{j,t}^i}{\sum_{i=1}^{13} X_{j,t}^i} \right) P_t^i}{P_{j,t}} \tag{6}$$

Notice the implicit assumption that developing country exporters compete mainly with high-income country domestic producers, and not high-income country exporters. As explained earlier, this is plausible since developing countries compete mainly with the domestic sector in high-income countries rather than with their exports (which are much more heavily dominated by intra-industry trade in research-intensive high-tech products). As a robustness test, however, we also carry out tests using high-income country export prices instead.

$x_{com,t}^I$: This is the variable most directly of interest. It is constructed for each developing country j by deflating the sum of all manufactured exports from all non-j developing countries to all high-income countries by a weighted export price index aggregated over all competing developing countries. The weight for each competitor ($l = 1, 2, \ldots L, l \neq j$) represents its importance in the group of all competitors, as measured by its share of exports. Mathematically,

$$x_{com,t}^I = \frac{\sum_{l \neq j}^{L} \sum_{i=1}^{13} X_{l,t}^i}{\sum_{l \neq j}^{L} \left(\frac{\sum_{i=1}^{13} X_{l,t}^i}{\sum_{l \neq j}^{L} \sum_{i=1}^{13} X_{l,t}^i} P_{l,t} \right)} \tag{7}$$

(partly due to lower trade barriers), using the latter would tend to underestimate expenditure coefficients.

4 Econometric Results

This section discusses the estimates derived for different samples and time periods, starting with the full sample of 22 developing countries and then narrowing the sample to investigate the existence of a "China effect," an "East Asia effect," and a "Central Europe effect" (see below for definitions). The panels include data at different levels of aggregation. The "ALL" panels include exports of all manufactured products. We also estimated equations for one-digit level SITC categories. Export values for the relevant SITC category products only were used for developing both individual country and competitor real export indices.[28] Furthermore, we selected a few major SITC categories at the two-digit level of disaggregation. These categories, which include SITC 65 (textile yarn, fabrics, made-up articles, and related products), 75 (office machines and automatic data-processing machines), 77 (electrical machinery, apparatus and appliances, and electrical parts thereof), 84 (articles of apparel and clothing accessories), and 85 (footwear), were selected for their importance. Almost half of all manufactured exports from our sample countries fell under these five sub-categories over the period 1984-2004.

In the interest of brevity, we will focus our discussion on the long-run estimates, which are presented in Tables 2-4.[29] Note that the term "statistically significant" will refer to the 10 percent level unless otherwise stated. Note also that since all variables are specified in natural logs, their coefficients represent elasticities. Finally, note that we use the term "crowding out" effect or coefficient when referring to the results based on aggregated data, and the term "displacement" effect or coefficient when discussing results at the one- or two-digit level of disaggregation. The logic underlying this distinction is that while it makes sense to use the term crowding out when referring to all manufactures, the interpretation of the coefficient is less straightforward when referring to disaggregated data since, for example, a negative sign may partly result from a country's graduation into a different SITC category.[30]

[28]In other words, SITC estimates are based on data for the same countries as in the corresponding ALL panels with the difference that the former are based on the relevant SITC categories only.

[29]The short-run estimates are incorporated in the unpublished appendix. The long-run coefficients, α_i were derived from the point estimates using the expression: $\alpha_i = \sum \beta_i/(1-\gamma_1)$, where β_i are the estimated coefficients for the level and lags of the relevant variable and γ_1 is the estimated coefficient of the lagged dependent variable.

[30]For example, as noted earlier, several countries such as Korea, Taiwan, and Hungary saw their largest export category change from SITC 6 or 8 to SITC 7. Such a structural shift may at least partly reflect technological advancement rather than crowding out.

4.1 Estimates Based on the Full Sample of Countries

Table 2 presents the "baseline" estimates for panels that include data for the entire sample period and for the sub-periods 1984-1994 and 1994-2004.

Sample period 1984-2004: The signs on the expenditure (m^I) and real exchange rate (rpx_j^I) coefficients are consistent with our expectations and precisely estimated, with the exception of the SITC 5, SITC 85, and SITC 8 panels.[31] The real exchange rate elasticities are generally higher at the two-digit level of disaggregation, which is in line with our expectations from economic theory.[32] Moreover, the short-run elasticities are consistently smaller in magnitude than the long-run ones, which again is in line with our expectations based on theory.[33] The Sargan test statistics validate the appropriateness of the instruments used.

At the highest level of aggregation, the expenditure elasticity is 2.38, while the real exchange rate elasticity is 1.77. Turning to the estimates for SITC categories disaggregated at the one-digit level, SITC 7 yields the highest long-run expenditure elasticity estimates, while when disaggregated at the two-digit level, SITC 75 yields the largest elasticity.

The estimates indicate a crowding out effect that is statistically significant for the ALL category. The estimated coefficient indicates that a one percent increase in competitor exports leads, on average, to a 0.7 percent decline in the average country's export volume.[34] The coefficients for all the categories at varying levels of disaggregation (except for SITC 5) indicate statistically significant displacement, with the magnitude of displacement being greatest for category 6 at the one-digit level and for category 85 at the two-digit level.

Next, in order to explore changes in behavior over time, we divided our sample into two periods, 1984-1994 and 1994-2004. We now turn to the estimates derived for the sub-periods.

Sample period 1984-1994: The expenditure and real exchange rate coefficients have the

[31]The expenditure coefficients for the former two are negative while that for the latter is not statistically significant at the 10 percent level.

[32]Since the higher the level of disaggregation, the higher the expected degree of substitutability between the products in a category.

[33]Since J-curve effects due to contractual obligations, production and supply bottlenecks, imperfect information, partial exchange rate pass-through, etc., imply that it often takes time for the full impact of expenditure and price changes to come into play.

[34]While interpreting these numbers, it is important to keep in mind the relative magnitudes. For example, since the 22 countries in our sample exported 890 billion dollars worth of manufactured goods in 2004, a one percent increase in competitor exports during that year would translate into an increase of approximately 8.6 billion dollars in competitor exports for the *average* developing country. The resulting 0.7 percent decline in the average developing country's exports, on the other hand, translates into 286 million dollars only.

expected signs and are statistically significant with a few exceptions, although some of the expenditure elasticities are implausibly high. The estimated crowding out coefficient is negative but not significant. The displacement coefficients too are negative with the exception of SITC 5, although except for SITC 7, these are statistically significant at the two-digit level only.

Sample period 1994-2004: Again, the expenditure and real exchange rate coefficients have the expected signs with the exception of SITC 5 and 85 panels. The crowding out coefficient has a magnitude of -1.67, and unlike the estimate for the first half of our period, is statistically significant, suggesting that the intensity of crowding out has grown over time. Except for SITC 5 and 77, the displacement coefficients are consistently negative, although these are not statistically significant for SITC 7, 8, and 75. Thus, while the estimated displacement coefficients for the first half of our sample period are statistically significant for SITC 7 and its subcategories, these become insignificant once we shift to the second half.

4.2 Estimates for the Full Sample Minus China

China's emergence as a major exporter of manufactured products has been one of the most important recent developments. Over our sample period, the proportion of total manufactured exports from our 22 developing countries that originated from China increased from about 4.9 percent to 31 percent. In order to explore a possible China effect, we re-estimated our coefficients after excluding China from the sample.[35] Table 3 presents the results. Again, the expenditure and real exchange rate elasticities yield the expected signs and are statistically significant with the exceptions of SITC 5, 8, and 85. The crowding out coefficient turns positive and statistically insignificant. The displacement coefficients also turn statistically insignificant or positive with the exception of SITC 6, 65, 84, and 85. The results suggest that the presence of China has had an important impact on other countries at the aggregate level. Moreover, the China effect for the disaggregated panels is most readily obvious for SITC category 7 and its sub-categories, for which the displacement coefficients are significant in the baseline estimates.

[35]Note that we removed China both as an exporter and as a competitor to other countries.

4.3 Estimates for the Full Sample Minus China, Korea, and Taiwan

Korea and Taiwan are the two East Asian "tigers" in our sample. In order to investigate a broader East Asia effect, therefore, we derived a new set of estimates after excluding these countries in addition to China (the EA-3). Over our sample period, the proportion of manufactured exports from our 22 developing countries that originated from these three countries changed from 56.7 percent to 49.3 percent. Table 3 presents the estimates. Several of the expenditure elasticity estimates now yield negative signs. Not surprisingly, the change in coefficients from the baseline regression is even more dramatic than when only China was excluded. The crowding out coefficient is positive and insignificant. The displacement coefficients are also positive, although statistically significant, suggesting the absence of displacement effects.

4.4 Estimates for the Full Sample Minus Hungary and Poland

Hungary and Poland (the CE-2) entered the global trading system in a major way in the middle of our sample period. Over this period, the proportion of manufactured exports from our 22 developing countries that originated from these two countries almost quadrupled from 2.4 percent to 8.7 percent. In order to explore a possible Central Europe effect, we derived a set of estimates after excluding these countries from the sample. Table 3 presents the results. The expenditure and real exchange rate elasticities have the expected signs except for SITC 5 and SITC 8. The crowding out coefficient is negative, although slightly lower in absolute magnitude than in the baseline case. With the exception of SITC 5, the displacement coefficients are consistently negative, although statistically insignificant for SITC 8 and SITC 77.

In sum, the crowding out coefficients do indicate the presence of a noticeable EA-3 effect and a China effect, but not a CE-2 effect.

4.5 Estimates for Individual High-Income Destinations/Regions

Finally, in order to explore possible differences in crowding out pressures across destination markets, we created separate indices for the US, EU, and Japan.[36] Table 4 presents the estimates

[36] Notice that this means that for the US, for example, equations (4)-(7) change to: $x_{j,t}^{US} = \frac{X_{j,t}^{US}}{P_{j,t}}$, $m_t^{US} = \frac{M_t^{US}}{P_t^{M,US}}$, $rpx_{j,t}^{US} = \frac{P_t^{US}}{P_{j,t}}$, and $x_{com,t}^{US} = \frac{\sum_{l \neq j}^{L} X_{l,t}^{US}}{\sum_{l \neq j}^{L} \left[\frac{X_{l,t}^{US}}{\sum_{l \neq j}^{L} X_{l,t}^{US}} P_t^l \right]}$, respectively.

based on this destination-wise disaggregation for the full panel of countries as well as for panels that exclude China, China and the two East Asian tigers, and the two Central European countries, respectively. Furthermore, estimates are also presented for the sub-periods. Turning first to the estimates for the entire sample period, the expenditure and relative price coefficients are generally of the expected sign and statistically significant. For the panel including all countries, the expenditure elasticity is highest for the US, which is in line with previous estimates of US expenditure elasticities relative to other high-income countries.[37] Most importantly, however, crowding out effects seem to be present in the US market only. The coefficients for the EU and Japan are either positive and/or statistically insignificant. Moreover, we do find a China effect and an EA-3 effect in the US market, although again, we are unable to detect a CE-2 effect. The sub-periods suggest a similar pattern, with significant crowding out effects only appearing in the latter half and only for the US. Moreover, the China and EA-3 effects too occur only in the latter sub-period.[38] These results are interesting since the US remains the primary destination for many developing countries, importing, on average, nearly half of the manufactures exported to the high-income countries in our sample over the period 1984-2004.

4.6 Robustness Tests

As a test of the sensitivity of our results to the assumption that developing countries compete mainly with high-income country domestic producers and not high-income country exporters, we re-created the real exchange rate indices using high-income country manufacturing export prices (instead of PPIs).[39] The results were qualitatively similar, albeit stronger in that the crowding out coefficients were statistically significant across the board, even when China and/or the East Asian tigers were excluded. Put differently, we detect much weaker China and EA-3 effects.[40] Moreover, as was the case when we used high-income country PPIs, the crowding out coefficient was significant only for the second half of our sample period.

As a further robustness test, we estimated the crowding out coefficients using total real high-

[37]See Houthakker and Magee (1969) for pioneering findings on this issue.

[38]Although surprisingly the crowding out coefficient does turn negative and significant for the earlier sub-period once we exclude China from the sample.

[39]The results of the robustness tests have been included in the unpublished appendix.

[40]The crowding out coefficients were smaller in absolute magnitude when we excluded China, and even smaller when we excluded China, Korea (Rep.), and Taiwan, but remained negative and statistically significant.

income country imports of *all* products from the entire world for the expenditures variable.[41] The results remained qualitatively the same, the only major difference being that the crowding out coefficient was significant for both sub-periods, not just for the second half of the sample.

5 Discussion of Results and Concluding Remarks

A number of developing countries have geared their developmental policies towards pursuing export-led growth in recent years. The implicit theoretical assumption underlying this strategy generally has been that developing country exporters do not face significant external demand-side constraints, at least as far as manufactures are concerned. Our study should be seen as an attempt to explore the validity of this assumption, using a relatively comprehensive dataset consisting of almost all major low- and middle-income exporters of manufactures.

In order to investigate our central question, we developed several weighted indices to better capture the relevant expenditure- and price-based relationships in addition to an individual developing country weighted index of the volume of competitor exports. We then estimated crowding out (at the aggregate level) and displacement effects (at more disaggregated levels) of competitor exports for the period 1984-2004 using the system GMM dynamic panel data approach. Unlike the few previous econometric studies that explore this question, we estimated effects both at the aggregated and disaggregated levels, the disaggregation being at the one and two-digit SITC levels. Our estimates suggest some interesting findings. Most importantly:

- We find evidence of crowding out at the aggregated level for the sample including all countries. However, splitting our sample period into two halves revealed that the crowding out coefficient was statistically significant for the period 1994-2004 only.
- Our results suggest the presence of a China effect in the sense that the crowding out coefficient becomes statistically insignificant once the effects of Chinese export competition are excluded from our sample. Since China emerged as a major presence on global markets in the early and mid-nineties, this is consistent with the finding that the crowding out effect turns significant only in the second half of our sample period.

[41] Instead of high-income country imports of *manufactures* from the entire world.

- We also detect an East Asia (EA-3) effect. However, we could not detect a Central Europe (CE-2) effect.
- At the SITC category-wise disaggregated levels, the displacement coefficient was negative almost across the board for the panels including all countries. However, this could partly be a structural shift phenomenon rather than a crowding out one.
- China seems to have exerted the most influence in SITC 7, where displacement effects become insignificant, both at the one- and two-digit levels, once China is excluded.
- Dividing the high-income markets for the developing countries in our sample into three blocs – the US, EU, and Japan – revealed that crowding out effects appear to be significant only in the US market, which is also the largest one. Moreover, crowding out appears to be limited to the second half of our sample period, as are the China and EA-3 effects.
- External demand, in the form of high-income country expenditures, remains an important determinant of developing country manufactured export growth.

Our estimates suggest that while displacement effects may have been stronger in SITC categories 6, 8, and associated sub-categories, these also appear in SITC category 7, which includes some of the products that, due to their relatively high-tech nature, have traditionally been considered to be relatively immune to cut-throat competition. This may be explained by two factors. Firstly, the term "high-tech" may be misleading since much of the production falling under these categories consists of labor-intensive assembly operations requiring relatively few skills and exhibiting relatively low barriers to entry.[42] Secondly, and on a related note, a number of developing countries have established a presence in the sectors classified under SITC 7, owing in no small measure to the vertical fragmentation of global production processes.[43] Combining these two observations suggests that some of the SITC categories traditionally seen as relatively high-tech may not be immune to what Kaplinsky (1993) has called the commoditization of manufactures,[44] in the sense that exporters of these products are subject to the kinds of competitive pressures that primary commodity exporters have typically faced. The implications are a cause for concern. A significant proportion of the increase in developing country

[42] See Lall (1998) and Lall (2000) for an insightful discussion.

[43] Notice that SITC 7 is also the category where the growth of global production networks and vertical intra-industry trade was the most rapid during this period. See, for example, Lall *et al.* (2004).

[44] See also UNCTAD (2004).

exports may have come at the expense of other developing countries, especially in the latter part of our sample period. More generally, in a world where a number of developing countries simultaneously pursue export-led growth directed at similar markets, success for some is likely to mean frustration for others. Moreover, this problem is likely to get worse as more developing countries enter the fray, and as the current account deficits run by the largest global importer (the US) begin to shrink (or at least grow less rapidly).

Finally, the results presented here should be treated with caution. Firstly, our sample does not include exports of services or processed food products. The latter, although not traditionally defined as manufactures, are a growing segment of exports for some developing countries.[45] Secondly, our results are likely to have been affected by the existence of the Multifibre Arrangement (MFA), and its later incarnation, the Agreement on Textiles and Clothing (ATC), that expired on January 1, 2005. To the extent that these agreements dampened competition in the textiles and clothing sectors, our crowding out and relevant displacement coefficients are likely to be underestimates. Our study also suffers from another major limitation that we plan to address in future work; we ignore developing country exports to other developing countries. Although high-income markets remain the main source of demand for developing country manufactures, one could argue that the growth of developing country export "poles," especially within East and Southeast Asia where a number of middle and upper middle-countries now export intermediate inputs and capital goods to China, may relieve some of the pressure resulting from crowding out effects in high-income markets.[46] We also plan to more specifically tackle supply-side issues such as factor endowments, productivity, wages, and capacity utilization. The lack of data on these factors hinders such work for most developing countries. As data constraints become less binding in the future, we hope to provide more comprehensive analysis of important (existing and potential) constraints on manufacturing-based export-led growth.

[45] See, for example, Athukorala (1998). Perhaps one reason empirical studies do not categorize these products as manufactures is that they are dispersed across SITC categories 0, 1, and 4. However, note that the share of all food items (SITC categories 1, 1, 22, and 4) in total exports from our sample developing countries actually declined from over 12 percent of total exports to just under 7 percent between 1990 and 2000.

[46] However, to the extent that China has emerged as a major importer of primary commodities from low-income developing countries, such relief may ironically be small comfort for the countries that have specialized mainly in labor-intensive consumer products.

A Appendix

Variable Definitions and Data Sources

M^i: Value of high-income country i's imports of manufactures from the entire world. Obtained from the United Nation's *COMTRADE* database. Due to missing data, the values for Belgium and Germany were obtained from the OECD's *SourceOECD* database.

$P^{M,i}$: High-income country i's unit import value. Obtained from the IMF's *International Financial Statistics* database. Due to missing data, the values for Austria, Belgium, France, and Switzerland were obtained from the OECD's *SourceOECD* database.

P^i: High-income country i's producer price index. Obtained from the IMF's *International Financial Statistics* database. For the robustness tests high-income country manufacturing export prices were obtained from the OECD's *SourceOECD* database were used instead.

P_j: Developing country j's unit export value. Obtained from the IMF's *International Financial Statistics* database. Due to missing data, the values for Bangladesh, Costa Rica, the Philippines, Tunisia, and Turkey were obtained from UNCTAD's *Handbook of International Trade and Development Statistics*. The series for China was obtained from the World Bank. PPI data for Mexico were obtained from the Bank of Mexico's website.[47] Data for Taiwan were obtained from the Directorate-General of Budget, Accounting, and Statistics.

X^I_j: Value of manufactured exports from developing country j to high-income countries. Obtained from the United Nation's *COMTRADE* database. Due to missing data, the values for South Africa and Taiwan were obtained from the OECD's *SourceOECD* database.

In addition, data on per capita GDP and expenditure components of national GDP for different countries were obtained from the World Bank's *World Development Indicators* database and the Taiwanese Directorate-General of Budget, Accounting, and Statistics.

References

Akamatsu, K. (1935). Wagakuni yomo kogyohin no susei [trend of Japanese trade in woolen goods]. *Shogyo Keizai Ronso [Journal of Nagoya Higher Commercial School]*, **13**, 129–212.

Arellano, M. and Bover, O. (1995). Another look at the instrumental variable estimation of error-component models. *Journal of Econometrics*, **68**, 29–51.

Athukorala, P.-C. (1998). Processed food exports from developing countries: patterns and determinants. *Food Policy*, **23**(1), 41–54.

[47] The Bank of Mexico reports an export price index, but this index has several problems. First, until the early nineties, oil was still Mexico's major export, suggesting that Mexico's export price index for the 1980s predominantly reflected changes in oil prices, rather than prices of manufactured products. Second, the Bank of Mexico's export price index exhibits an anomalous increase between 1994 and 1995, in spite of the sharp (roughly 40 percent) depreciation of the peso at that time. We, therefore, used the country's non-oil PPI as a proxy for the price of Mexican manufactured exports. This measure shows a large decline in 1995, reflecting the peso depreciation much more accurately than the officially reported export price index.

Balassa, B. (1988). The adding-up problem. Background paper for the World Development Report, The World Bank, Washington, DC.

Bhagwati, J. N. (1958). Immiserizing growth: A geometrical note. *Review of Economic Studies*, **25**(3), 201–205.

Blecker, R. (2002). The balance-of-payments-constrained growth model and the limits to export-led growth. In P. Davidson, editor, *A Post Keynesian Perspective on Twenty-First Century Economic Problems*. Edward Elgar.

Dalum, B., Laursen, K., and Verspagen, B. (1999). Does specialization matter for growth? *Industrial and Corporate Change*, **8**(2), 267–288.

Eichengreen, B., Rhee, Y., and Tong, H. (2004). The impact of China on the exports of other Asian countries. Working Paper 10768, National Bureau of Economic Research, Cambridge, MA.

Faini, R., Clavijo, F., and Senhadji-Semlali, A. (1992). The fallacy of composition argument: Is it relevant for LDCs' manufactures exports? *European Economic Review*, **36**(4), 865–82.

Fernald, J., Ahearne, A., Loungani, P., and Schindler, J. (2003). China and emerging Asia: Comrades or competitors? FRB International Working Paper 789, Federal Reserve Board, Chicago.

Houthakker, H. and Magee, S. (1969). Income and price elasticities in world trade. *Review of Economics and Statistics*, **51**, 111–125.

Kaldor, N. (1966). *Causes of the Slow Rate of Economic Growth of the United Kingdom: An Inaugural Lecture*. Cambridge University Press, Cambridge.

Kaplinsky, R. (1993). Export processing zones in the Dominican Republic: Transforming manufactures into commodities. *World Development*, **21**, 1851–65.

Lall, S. (1998). Exports of manufactures by developing countries: Emerging patterns of trade and location. *Oxford Review of Economic Policy*, **14**(2), 54–73.

Lall, S. (2000). The technological structure and performance of developing country manufactured exports, 1985-1998. Working Paper 44, Queen Elizabeth House, Oxford.

Lall, S., Albaladejo, M., and Zhang, J. (2004). Mapping fragmentation: Electronics and automobiles in East Asia and Latin America. *Oxford Development Studies*, **32**(3), 407–432.

Maciejewski, E. (1983). 'Real' effective exchange rate indices: A re-examination of the major conceptual and methodological issues. *International Monetary Fund Staff Papers*, **30**, 491–541.

Markusen, J., R., Melvin, J., R., Kaempfer, W., H., and Maskus, K., E. (1995). *International Trade: Theory and Evidence*. McGraw-Hill, Massachusetts.

McCombie, J. S. and Thirlwall, A. P. (1994). *Economic Growth and the Balance-of-Payments Constraint*. Macmillan, London.

Muscatelli, V. A., Stevenson, A. A., and Montagna, C. (1994). Intra-NIE competition in exports of manufactures. *Journal of International Economics*, **37**(1), 29–47.

Palley, T. (2003). Export-led growth: Evidence of developing country crowding-out. In P. Arestis, M. Baddeley, and J. McCombie, editors, *Globalization, Regionalism, and Economic Activity*. Edward Elgar, Northampton, MA.

Razmi, A. and Blecker, R. (2008). Developing country exports of manufactures: moving up the ladder to escape the fallacy of composition? *Journal of Development Studies*, **forthcoming**.

Sarkar, P. and Singer, H. (1993). Manufacture-manufacture terms of trade deterioration: A reply. *World Development*, **21**(10), 1617–20.

Setterfield, M. (1997). 'History versus equilibrium' and the theory of economic growth. *Cambridge Journal of Economics*, **21**(3), 365–378.

Spilimbergo, A. and Vamvakidis, A. (2003). Real effective exchange rate and the constant elasticity of substitution assumption. *Journal of International Economics*, **60**, 337–54.

UNCTAD (2004). Trade and Development Report. Technical report, United Nations Commission on Trade and Development, Geneva.

UNCTAD (2005). Trade and Development Report. Technical report, United Nations Commission on Trade and Development, Geneva.

Walmsley, T. and Hertel, T. (2000). China's accession to the WTO: Timing is everything. Working paper, Center for Global Trade Analysis, Purdue University.

Table 1: Evolution of SITC-Wise Shares in Total National Exports of Manufactures to High-Income Countries

	SITC5		SITC6		SITC7		SITC8	
	1984	2004	1984	2004	1984	2004	1984	2004
Bangladesh	0.002	0.001	**0.740**	0.066	0.004	0.003	0.255	**0.930**
Brazil	0.127	0.078	**0.391**	0.392	0.263	**0.419**	0.219	0.110
China	0.137	0.039	0.365	0.149	0.032	**0.499**	**0.466**	0.314
Costa Rica	0.016	0.009	**0.510**	0.106	0.129	**0.485**	0.345	0.401
Hungary	0.263	0.048	**0.333**	0.102	0.193	**0.734**	0.210	0.116
India	0.045	0.107	**0.629**	**0.462**	0.023	0.118	0.303	0.314
Indonesia	0.033	0.049	**0.718**	0.280	0.002	0.264	0.246	**0.407**
Jordan	0.263	0.020	0.014	0.012	**0.667**	0.010	0.056	**0.958**
Korea (Rep.)	0.017	0.048	0.220	0.126	0.354	**0.743**	**0.409**	0.083
Malaysia	0.027	0.034	0.204	0.070	**0.659**	**0.759**	0.110	0.138
Mauritius	0.000	0.010	0.075	0.062	0.003	0.021	**0.922**	**0.907**
Mexico	0.083	0.029	0.275	0.098	**0.527**	**0.704**	0.114	0.168
Morocco	0.274	0.079	0.264	0.093	0.035	0.239	**0.427**	**0.588**
Pakistan	0.002	0.018	**0.727**	**0.513**	0.012	0.013	0.259	0.456
Philippines	0.070	0.024	0.238	0.048	0.310	**0.787**	**0.382**	0.141
Poland	0.127	0.047	**0.467**	0.267	0.246	**0.494**	0.160	0.191
South Africa	0.206	0.121	**0.539**	**0.418**	0.039	0.370	0.217	0.091
Sri Lanka	0.013	0.005	0.105	0.128	0.026	0.055	**0.855**	**0.812**
Taiwan	0.018	0.032	0.170	0.140	0.328	**0.669**	**0.484**	0.159
Thailand	0.009	0.030	**0.430**	0.143	0.169	**0.561**	0.392	0.266
Tunisia	0.289	0.045	0.129	0.109	0.102	0.229	**0.480**	**0.618**
Turkey	0.032	0.026	0.407	0.274	0.081	**0.355**	**0.479**	0.346

SITC 5 includes chemicals and related products.
SITC 6 includes manufactured goods classified chiefly by material.
SITC 7 includes machinery and transport equipment.
SITC 8 includes miscellaneous manufactured articles.
For each year, the largest SITC category for each country is highlighted.

Table 2: (Long-Run) GMM Estimates of Export Equations for Sample Including All Countries

		ALL	SITC 5	SITC6	SITC 7	SITC 8	SITC65	SITC 75	SITC 77	SITC 84	SITC 85
	X-sections	22	22	22	22	22	22	22	22	22	22
Period											
84-04	Pooled obs.	390	390	390	390	390	390	388	390	390	390
	m^I	2.383	-0.755	2.841	3.887	0.677	1.244	5.240	3.412	3.219	-0.356
		(0.004)	(0.029)	(0.000)	(0.000)	(0.169)	(0.000)	(0.000)	(0.000)	(0.001)	(0.060)
	rpx_j^I	1.774	1.492	0.842	1.819	1.301	2.671	2.633	1.312	3.808	4.051
		(0.081)	(0.000)	(0.000)	(0.000)	(0.019)	(0.000)	(0.000)	(0.005)	(0.000)	(0.000)
	x_{com}^I	-0.699	1.257	-1.486	-0.791	-0.896	-1.657	-0.945	-0.561	-2.534	-3.174
		(0.081)	(0.000)	(0.000)	(0.001)	(0.040)	(0.000)	(0.014)	(0.060)	(0.003)	(0.000)
	Sargan test	0.759	0.497	0.545	0.367	0.610	0.561	0.525	0.357	0.737	0.784
84-94	Pooled obs.	176	172	176	176	176	176	174	176	176	176
	m^I	6.247	0.550	2.437	6.277	3.650	1.538	5.670	8.820	10.388	4.806
		(0.038)	(0.494)	(0.031)	(0.000)	(0.109)	(0.000)	(0.001)	(0.001)	(0.001)	(0.000)
	rpx_j^I	-0.573	1.609	1.579	-1.166	0.279	2.567	-0.520	3.196	4.167	4.987
		(0.592)	(0.011)	(0.002)	(0.219)	(0.854)	(0.006)	(0.756)	(0.000)	(0.002)	(0.000)
	x_{com}^I	-2.136	0.672	-0.754	-1.661	-1.118	-1.541	-1.202	-2.691	-4.545	-3.725
		(0.118)	(0.143)	(0.469)	(0.021)	(0.309)	(0.021)	(0.013)	(0.019)	(0.002)	(0.000)
	Sargan test	0.206	0.006	0.034	0.499	0.182	0.033	0.058	0.084	0.161	0.005
94-04	Pooled obs.	236	236	236	236	236	236	236	236	236	236
	m^I	3.848	-1.318	1.644	4.108	0.305	2.462	4.759	1.255	3.780	-0.726
		(0.000)	(0.038)	(0.000)	(0.005)	(0.744)	(0.005)	(0.127)	(0.073)	(0.074)	(0.004)
	rpx_j^I	2.062	1.496	1.131	2.023	2.572	5.332	2.568	0.510	7.550	4.000
		(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.061)	(0.245)	(0.008)	(0.000)
	x_{com}^I	-1.674	1.579	-0.653	-0.984	-0.343	-3.443	-0.669	0.499	-4.644	-2.499
		(0.003)	(0.000)	(0.012)	(0.120)	(0.686)	(0.004)	(0.613)	(0.160)	(0.069)	(0.003)
	Sargan test	0.589	0.413	0.211	0.481	0.423	0.450	0.248	0.443	0.684	0.701

Dependent variable: x_j^I
All variables in natural logs. p-values in parentheses. The Sargan test was used to verify the validity of the instruments.
SITC 65 includes textile yarn, fabrics, made-up articles and related products, SITC 75 includes office machines and automatic data-processing machines, SITC 77 includes electrical machinery, apparatus and appliances, SITC 84 includes articles of apparel and clothing accessories, SITC 85 includes footwear. See notes to Table 1 for definitions of one-digit SITC categories.

Table 3: (Long-Run) GMM Estimates of Export Equations Excluding Various Countries (1984-2004)

		ALL	SITC 5	SITC6	SITC 7	SITC 8	SITC65	SITC 75	SITC 77	SITC 84	SITC 85
Excluding China	X-sections	21	21	21	21	21	21	21	21	21	21
	Pooled obs.	372	372	372	372	372	372	370	372	372	372
	m^I	1.091	-0.532	2.714	2.672	-0.110	0.892	3.752	2.749	2.901	-2.124
		(0.075)	(0.176)	(0.000)	(0.000)	(0.831)	(0.000)	(0.000)	(0.000)	(0.000)	(0.226)
	rpx_j^I	1.682	1.609	0.777	1.398	1.213	2.544	1.471	0.800	4.499	2.164
		(0.000)	(0.000)	(0.000)	(0.000)	(0.042)	(0.000)	(0.019)	(0.034)	(0.000)	(0.000)
	x_{com}^I	0.063	1.273	-1.765	-0.215	-0.988	-1.494	-0.193	-0.297	-3.103	-1.444
		(0.867)	(0.000)	(0.000)	(0.243)	(0.330)	(0.000)	(0.615)	(0.185)	(0.000)	(0.001)
	Sargan test	0.644	0.622	0.812	0.315	0.447	0.698	0.617	0.415	0.746	0.820
Excluding EA-3	X-sections	19	19	19	19	19	19	19	19	19	19
	Pooled obs.	336	336	336	336	336	336	334	336	336	336
	m^I	1.378	-0.480	0.247	1.583	-0.825	-1.056	1.657	1.151	-0.988	-0.461
		(0.024)	(0.081)	(0.157)	(0.000)	(0.068)	(0.000)	(0.041)	(0.000)	(0.067)	(0.001)
	rpx_j^I	1.597	1.716	0.839	1.590	1.401	0.110	2.760	0.500	0.380	0.120
		(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.709)	(0.000)	(0.042)	(0.252)	(0.728)
	x_{com}^I	0.001	1.238	0.661	0.332	0.979	1.503	0.494	0.583	1.386	1.145
		(0.998)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.017)	(0.000)	(0.000)	(0.000)
	Sargan test	0.726	0.839	0.843	0.507	0.575	0.793	0.825	0.437	0.931	0.871
Excluding CE-2	X-sections	20	20	20	20	20	20	20	20	20	20
	Pooled obs.	354	354	354	354	354	354	352	354	354	354
	m^I	2.141	-0.341	2.605	3.931	-0.321	1.123	6.445	3.055	4.662	-0.619
		(0.002)	(0.368)	(0.000)	(0.000)	(0.608)	(0.000)	(0.000)	(0.000)	(0.000)	(0.002)
	rpx_j^I	1.825	1.679	0.900	1.779	1.508	2.554	4.037	1.160	5.588	4.179
		(0.000)	(0.000)	(0.000)	(0.000)	(0.001)	(0.000)	(0.000)	(0.010)	(0.000)	(0.000)
	x_{com}^I	-0.678	0.974	-1.420	-0.880	-0.017	-1.569	-1.556	-0.410	-4.042	-2.974
		(0.056)	(0.000)	(0.000)	(0.001)	(0.969)	(0.000)	(0.000)	(0.180)	(0.000)	(0.000)
	Sargan test	0.608	0.714	0.706	0.642	0.454	0.830	0.669	0.618	0.929	0.702

Dependent variable: x_j^I
All variables in natural logs. p-values in parentheses. The Sargan test was used to verify the validity of the instruments.
EA-3 includes China, Korea (Rep.), and Taiwan. CE-2 includes Hungary and Poland.
See notes for Tables 1 and 2 for definitions of SITC categories.

Table 4: (Long-Run) GMM Estimates of Export Equations For Individual High-Income Destinations

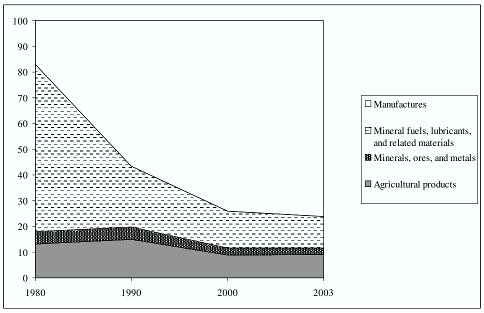
	Destination	**US**				**EU-10**				**Japan**			
		ALL	Excluding China	Excluding EA-3	Excluding CE-2	ALL	Excluding China	Excluding EA-3	Excluding CE-2	ALL	Excluding China	Excluding EA-3	Excluding CE-2
	X-sections	22	21	19	20	22	21	19	20	22	21	19	20
Period													
84-04	Pooled obs.	390	372	336	354	390	372	336	354	389	371	335	353
	m^I	3.867	0.592	0.212	4.553	0.634	0.545	1.906	38.203	1.004	1.495	0.766	1.202
		(0.000)	(0.001)	(0.316)	(0.000)	(0.001)	(0.001)	(0.001)	(0.000)	(0.055)	(0.001)	(0.120)	(0.004)
	rpx_j^I	1.839	0.002	1.669	1.691	0.841	0.859	1.132	-100.304	1.641	1.495	1.833	1.710
		(0.000)	(0.921)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.003)	(0.001)	(0.000)
	x_{com}^I	-1.431	-0.184	0.526	-1.844	0.590	0.645	-0.000	2.135	0.104	-0.283	0.219	-0.011
		(0.000)	(0.110)	(0.000)	(0.000)	(0.000)	(0.000)	(0.713)	(0.000)	(0.673)	(0.284)	(0.316)	(0.956)
	Sargan test	0.427	0.707	0.469	0.761	0.837	0.893	0.869	0.691	0.692	0.713	0.896	0.763
84-94	Pooled obs.	176	168	152	160	176	168	152	160	175	167	151	159
	m^I	4.035	0.963	0.786	5.103	1.070	1.188	0.898	44.663	2.360	1.689	0.786	2.188
		(0.164)	(0.017)	(0.523)	(0.100)	(0.001)	(0.007)	(0.016)	(0.000)	(0.084)	(0.147)	(0.363)	(0.117)
	rpx_j^I	1.012	0.002	0.176	1.000	1.594	2.315	1.587	-91.550	1.218	0.730	0.340	1.366
		(0.188)	(0.966)	(0.761)	(0.206)	(0.049)	(0.006)	(0.107)	(0.000)	(0.065)	(0.120)	(0.536)	(0.049)
	x_{com}^I	-0.709	-0.446	0.527	-1.178	0.813	0.728	0.000	8.322	0.607	-0.265	0.151	-0.355
		(0.468)	(0.017)	(0.071)	(0.255)	(0.000)	(0.010)	(0.457)	(0.000)	(0.426)	(0.751)	(0.768)	(0.612)
	Sargan test	0.038	0.334	0.087	0.058	0.069	0.196	0.106	0.099	0.004	0.011	0.016	0.011
94-04	Pooled obs.	236	225	203	214	236	225	203	214	236	225	203	214
	m^I	5.091	0.000	4.569	5.571	-0.267	-0.148	0.514	22.918	-0.460	0.470	0.117	-0.409
		(0.001)	(0.999)	(0.074)	(0.000)	(0.068)	(0.311)	(0.000)	(0.000)	(0.468)	(0.540)	(0.865)	(0.517)
	rpx_j^I	2.136	0.031	2.031	2.037	0.725	0.763	0.733	-94.566	1.115	1.459	1.532	1.462
		(0.000)	(0.284)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.032)	(0.008)	(0.010)	(0.001)
	x_{com}^I	-2.453	0.195	-2.137	-2.824	0.582	0.630	0.000	2.311	0.597	0.231	0.401	0.484
		(0.003)	(0.607)	(0.148)	(0.000)	(0.000)	(0.000)	(0.000)	(0.581)	(0.034)	(0.515)	(0.147)	(0.091)
	Sargan test	0.318	0.398	0.443	0.517	0.880	0.805	0.838	0.528	0.519	0.611	0.860	0.720

Dependent variable: x_j^I

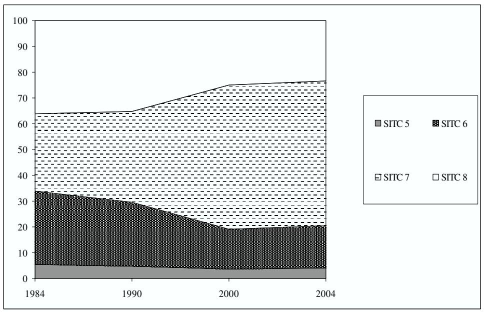
All variables in natural logs. p-values in parentheses. The Sargan test was used to verify the validity of the instruments.

EU-10 includes Austria, Belgium, France, Germany, Italy, the Netherlands, Spain, Sweden, and Switzerland, and UK.

EA-3 includes China, Korea (Rep.), and Taiwan. CE-2 includes Hungary and Poland.

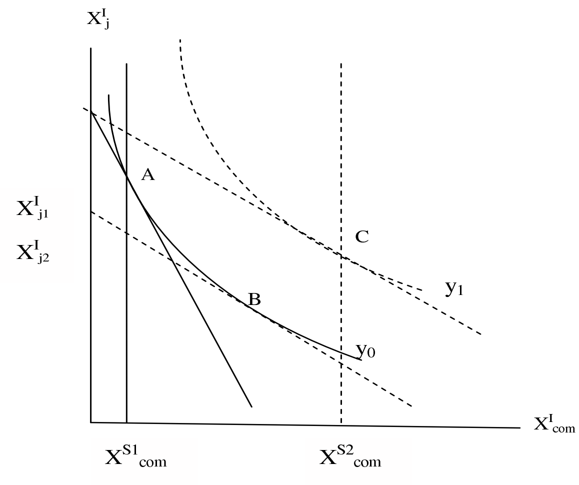


(a) Manufactured Exports As a Proportion of Total Exports. Source: UNCTAD (2005)

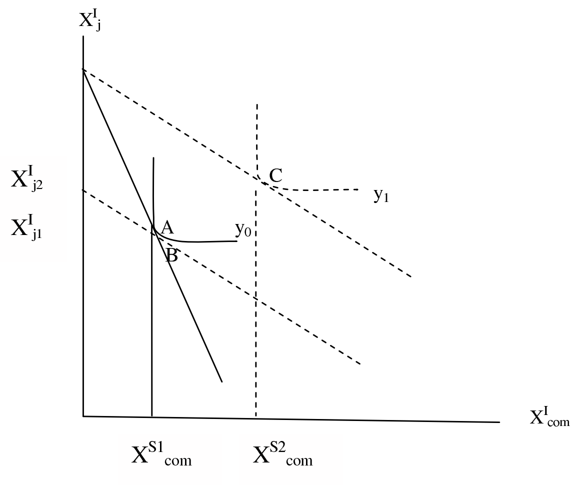


(b) SITC Category-Wise Percentage Composition of Exports. Source: Author's Calculations from the United Nation's *COMTRADE* database.

Figure 1: The Evolution of Manufactured Exports from Major Developing Country Exporters.



(a) High substitutability between developing country manufactured exports.



(b) Low substitutability between developing country manufactured exports.

Figure 2: Crowding-Out Versus Crowding-In of Individual Country Exports by Competitors.