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China's Global Growth and Latin American Exports

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Abstract

China's global expansion has led to concerns amongst other developing country exporters that they will be displaced by Chinese competition in their export markets. The paper develops a new index to measure the extent of the competitive threat which countries face from China, which is then applied to empirical data on US imports from China and 18 Latin American countries. It also presents new estimates of the impact of China on the value of Latin American exports to the US over the past decade, using an extension of constant market share analysis. It finds that, contrary to many previous studies, China has had a significant impact on the exports of a number of Latin American countries and that this has increased since China joined the WTO in 2001.

Keywords: China, Latin America, US, exports, competitiveness

JEL classification: F14, O54

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1 Introduction

The spectacular growth of China and its increased openness since the beginning of the economic reforms in the late 1970s has led to it becoming a major player in the global economy. It is now the world's fourth largest economy in terms of GDP and the third largest in terms of merchandize trade. Between 1995 and 2005, real GDP grew at 9 per cent and the volume of exports increased by 19 per cent per annum (WTO 2007).

Although China's import growth (16 per cent per annum between 1995 and 2005) has lagged behind that of its exports, and it has run a large trade surplus in recent years, it has provided a growing market for exporters and contributed to a price boom for primary commodity exporters. This has helped boost growth in a number of developing countries in recent years.

However China's global expansion has also led to concerns amongst other developing country exporters that they will be displaced by Chinese competition in their export markets. These concerns were intensified by China's accession to the WTO in 2001 and subsequently with the phasing out, and final elimination on 1 January 2005, of import quotas for textiles and garments under the WTO Agreement on Textiles and Clothing. In Latin America reports from Mexico claimed that *maquiladoras* on the US-Mexican border were re-locating to China with significant negative effects on employment (Santos-Navarro 2005). In Central America textile mills and clothing factories were reported to be laying off workers and closing down as a result of Chinese competition in the US market according to the *New York Times* (Thompson 2005). Recently the *International Herald Tribune* reported that Colombian textile manufacturers have seen their exports drop as a result of stronger competition from China and the president of the National Foreign Trade Council in Washington is quoted as saying 'The least developed countries in Latin America are scared to death' (Murphy et al. 2007).

In contrast to the pessimistic view that pervades media and business discussion of the impacts of China on Latin America, the majority of academic studies and reports from international institutions, such as the World Bank, the Inter-American Development Bank and the OECD, see China much more as an opportunity than a threat for the region – an 'angel' not a 'devil' in the words of one much quoted paper (Blázquez-Lidoy et al. 2007). With the exception of Mexico, China is not a significant threat to Latin American countries' exports to third markets. The economies of the region are seen as being complementary to China in terms of their productive structure and there is a tendency for this to increase over time. They are therefore well placed to take advantage of the growing market that China represents and to benefit from expanding global production networks.

This paper considers these contrasting views. It focuses specifically on the impact of China on Latin American exports to third markets and sets out to answer three related questions.[1] First, to what extent do the Latin American countries face competition from China in their export markets and which countries within the region are most affected? Second, has the competition faced by the Latin American economies increased over time, particularly since China became a member of WTO or is the threat from China

[1] The growth of bilateral trade between China and Latin America has been discussed by the author in another paper (Jenkins et al. 2008)

receding? Finally, how large has the displacement effect of Chinese competition been for the exports of the various Latin American countries in recent years?

2 Previous studies of the impact of China on Latin American exports

This section considers the answers given to these three questions in the existing literature on the impact of China on Latin American exports. The focus here is on regional studies which identify individual Latin American countries and are based on disaggregated product data. There have been a number of global CGE modelling exercises which have generated predictions on the likely impact of China on Latin America as a whole and in some cases separate out the largest Latin American countries, but these are highly aggregated and will not be discussed here.[2] There are also a growing number of studies of individual Latin American countries, particularly of Mexico[3] and Brazil,[4] but these too will not be covered here since the emphasis is on the experience of the region as a whole.

2.1 The extent of competition from China

There is a widespread consensus in the literature that competition from China is not a major threat to Latin American exports. Several studies have found that the structure of Latin American exports is quite different from that of China suggesting that there is little competition between them (Blázquez-Lidoy et al. 2007; Schott 2004; Meller and Contreras 2003). Asian countries covered in these studies are found to have a much greater similarity of export structures to China's than does Latin America. Lall and Weiss (2005) analysed changes in the world and US market shares of China and the Latin American countries, coming to similar conclusions:

> The direct threat to exports to third country markets appears small: Latin America and the Caribbean's (LAC's) trade structure is largely complementary to that of China (p. 163).

At the level of individual nations there is general agreement that Mexico is the only country in the region which has a level of export similarity with China comparable to those found in a number of Asian countries. It is therefore seen as the only major Latin American country which could face a serious competitive threat from China. Argentina, Chile and the Andean Group countries are regarded as largely unaffected by Chinese competition, while Brazil may be partially affected. Some authors recognize a potential threat to the smaller Central American and Caribbean countries (López-Cordóva et al. 2007; Freund and Ozden 2006) although other studies do not show a great export similarity with China in terms of the conventional indices.[5]

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2 See for example Yang (2003); IMF (2004: Ch. 11); Ianchovichina and Martin (2004); Dimaranan et al. (2007).

3 Dussel (2005); Neme (2006); Hummels (2006).

4 Abreu (2004); Machado and Ferraz (2006).

5 There are two possible reasons for this. First, the conventional indicators of similarity tend to underestimate the extent of competition faced by a small country from a much larger exporter (see

2.2 Is Latin America facing increased competition from China over time?

The popular perception that Latin American countries are facing increasing competition from China in third markets is based on a number of factors. First the accession of China to the WTO in December 2001 improved its access to developed country markets. While China had been granted normal trade relations with the US even before it joined the WTO, this had to be renewed annually by Congress. Membership therefore gave China much greater security of market access (Rumbaugh and Blancher 2004: 10).

Second, the ending of the quota system, which had regulated textile and clothing trade since the 1950s, at the start of 2005 was also predicted to increase competition from China. In 2002, the US International Trade Commission estimated that the export tariff equivalent of the quota for Chinese apparel exports to the USA was 21 per cent (quoted in Lopez-Córdova et al. 2007: 122) so that the removal of quotas would lead to a significant increase in Chinese competitiveness in this sector. One estimate predicted a tripling of the Chinese share of the US apparel market from 16 per cent to 50 per cent following the elimination of quotas (Nordas 2004).

Third, low wage levels, massive scale of production and increasing productivity has led to falling prices and increased competition over time for many of the goods exported by China (Kaplinsky 2005: ch. 6). In contrast, productivity growth in Latin America has lagged behind (Lora 2007: table 1.1).

In the light of these trends, it is paradoxical to find that the dominant view in the literature on the impact of China on Latin America is that, far from facing increased competition in export markets from China, the Latin American economies are becoming more complementary to the Chinese economy and thus likely to benefit more over time from Chinese expansion. For example Lederman et al. (2006b: 16-17) conclude that:

> The specialization pattern of LAC economies – with the exception of Mexico – has been moving in opposite direction to the trade specialization pattern of China and India. This indicates that LAC's trade specialization pattern is becoming more complementary to the specialization pattern of China and India.

Evidence presented by Moreira (2007: figures 18 and 19) also shows a decline in the similarity of export structures between Latin American countries, apart from Mexico and, to a lesser extent, the Central American Common Market, and China between 1992 and 2004. Using their alternative methodology, Lall and Weiss (2005: tables 6 and 7) also find that the proportion of Latin American exports which face a competitive threat from China, both in the world market as a whole and in the US market, declined between 1990 and 2002.

A slightly different view is provided by the Inter-American Development Bank report which shows the export similarity between Latin America and Asia increasing over time both in the world and the US markets (2004: table 5.5 and figure 5.1). On closer inspection however it is clear that in the period from 1991-2001 this was driven largely

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Jenkins 2008). Second, some Central American countries do not include exports from export processing zones in their statistics for exports of goods and since these are predominantly of clothing which does compete with Chinese exports, this would create a further downward bias.

by a significant increase in the similarity between Mexican and Chinese exports to the world and the US market, while the Export Similarity Index between all the other Latin American countries (apart from Brazil) and China declined during the period (IDB 2004: table 5.6 and figure 5.1). Thus the consensus that emerges from the literature is that the Latin American economies (apart from Mexico) have over time become more complementary to China's in terms of their export structure.

2.3 The impact of China on Latin American exports to third markets

Much of the literature on China and Latin America has been concerned with identifying the *future* threat that China's growth might represent for Latin America. This reflects the fact that it was initially sparked off by concerns over the impact that China's WTO accession and the ending of textile quotas might have on the region. However a few studies have attempted to quantify the extent to which China's growth has negatively affected Latin American exports *in the past.*

These studies use a number of different methodologies including an extension of constant market share analysis, the gravity model of trade flows, and econometric estimation of elasticities of substitution. With one exception, they all find evidence of Chinese growth having had some negative impact on Latin American exports to third markets. The outlier is a study by Lederman et al. (2007) which finds that far from Chinese exports crowding out Latin American exports to third markets, they in fact tend to promote them, a result that is attributed to the creation of production networks.[6]

Although there is general agreement in the literature that China has had some negative effect on Latin American exports, the dominant view tends to downplay the severity of this impact. An overview of research by the World Bank concludes that:

> there is some evidence of substitutability between LAC exports and Chinese exports to third markets within industries, but these effects are limited to a few countries (mainly Mexico and, to a minor extent, Central America) and a few manufacturing sectors (Lederman et al. 2006a: 26).

The scale of the negative impact on Latin American exports found in most of the studies is relatively modest. Moreira (2007: 366) for instance estimates that the loss to China in world markets between 1990 and 2004 was only 1.7 per cent of the region's total exports at the end of the period. Hanson and Robertson (2006) have larger estimates for the four countries that they studied (Argentina, Brazil, Chile and Mexico) but still conclude that other factors are more important than Chinese competition in explaining the declining share of Latin American countries in world markets.

Although in aggregate terms a fairly consistent picture emerges from these studies, this is not as clear cut when looking at the results in terms of the countries or sub-regions which have been most severely affected or of the sectors which have suffered most. While Freund and Ozden (2006) and Hanson and Robertson (2006) both identify

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6 The study provides no evidence that production networks involving Latin American and Chinese exports to third countries are in fact significant and this in fact contradicts the evidence that in contrast to East Asia, Latin American countries have not been significantly integrated into global production networks.

Mexico as severely affected, Moreira (2007: figure 13) estimates that the largest losses of market share to China have been suffered by the Andean countries and Mercosur, while López-Córdova et al. (2007: table 4.1) see the South American countries and Mexico as facing similar impacts. In terms of sectors, while López-Córdova et al. (2007) identify traditional labour-intensive sectors as being particularly affected (textiles, clothing and leather), Freund and Ozden (2006) see the main threat from China in high wage industries, and Moreira (2007) emphasizes that Latin America is facing competition across a wide range of manufacturing sectors.[7]

3 The competitive threat from China to Latin America

3.1 Methodology

Two main approaches have been used in the literature discussed above to estimate the extent of the competitive threat which China poses for the Latin American countries' exports to third markets. The most common approach involves analysing the extent to which China and specific Latin American countries have a comparative advantage in the same products. The greater the similarity in their comparative advantage, the greater is likely to be the competition between two countries.

Within this approach, two types of methodologies have been used. The first uses specific indices of export similarity such as Finger and Kreinin's Export Similarity Index, the Coefficient of Conformity; and the Index of Export Competition.[8] These are all based on specific formulae which use the share of each product in the two country's exports to calculate an index of the extent to which their export structures overlap. Where there are no common products exported by the two countries, the value of the index is zero, while where they have identical export structures, the value is one. The absolute level of exports is irrelevant as is the share of each country's exports in world markets. All that matters in determining the extent of competition is the product structure of exports.

The second methodology derived from comparative advantage theory is based on estimating the correlation between the export structures of two countries. In some cases this involves correlating product export shares while others correlate an index of Revealed Comparative Advantage (RCA).[9] Again it is only the structure of each country's exports that matters, irrespective of their absolute level. Since, by definition, countries always have a comparative advantage in something, a fall in these indices is seen as reflecting less competition from China as Latin American countries' comparative advantage shifts over time. This is consistent with the Hecksher-Ohlin

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7 In an earlier version of the paper Moreira (2004) found that resource based manufactures were most severely affected group of products in the period 1990-2002.

8 The Export Similarity Index has been used by IDB (2004), Schott (2004), and Calderón (2006); the Coefficient of Conformity by Blázquez-Lidoy et al. (2007) and the Index of Trade Competition by Meller and Contreras (2003).

9 Correlations of export shares between China and Latin American economies have been presented in Lall and Weiss (2005), Moreira (2007) and Meller and Contreras (2003), while correlations of RCAs can be found in Lederman et al. (2006b).

model of trade where neither the size of new entrants nor the rate of export growth matter (Lall and Weiss 2005: 165).

The alternative approach adopted by Lall and Weiss (2005) explicitly rejects a neo-classical model of trade based on perfectly competitive markets. Recognizing the role of scale economies, differentiated products, market power, externalities and agglomeration effects, endogenous technical change and cumulative learning, among other factors, they argue that Krugman (1994: 44) was wrong to claim that 'competitiveness is a meaningless word when applied to national economies'. They therefore develop an alternative approach based on the business literature in which relative market shares are used as a common measure of competitive performance. Thus their approach emphasizes 'competitive advantage' as opposed to 'comparative advantage'.

In contrast to the latter approach, where the relative growth rates of two countries' exports has no bearing on the measure of competition between them, as long as the structure of exports remains unchanged, changing relative shares in world markets are a key measure of competitive threat in the Lall and Weiss (2005) approach. This involves classifying products according to the combination of changes in world market shares for China and the Latin American countries. Two categories of threat are identified. A 'direct threat' exists where China gains market share and the Latin American country is losing market share. There is also an 'indirect threat' in those products where, although Latin America is gaining market share, it is doing so less quickly than China. There is no threat to Latin American exports in products where its exports are increasing faster than China or in those products where China's share of the market is falling. They then calculate the share of each country's exports which are either directly or indirectly threatened.

Implicit in this approach is that there are two dimensions to the competitive threat faced by a country. One is the extent of the threat as represented by the share of a country's exports that fall into the threatened categories. The second is the intensity of that threat which is measured by the significance of the direct as opposed to the indirect threat.[10] This however is a very crude measure of the intensity of the threat since it only distinguishes between those products where Latin America's export share is falling and those where it is increasing.

A more comprehensive measure of the competitive threat from China should combine a measure of the extent of the threat and its intensity. One approach to this would be to weigh the share of each product in a country's exports by a measure of the intensity of Chinese competition in that product. The intensity of Chinese competition could reasonably be measured either by the share of China in world exports of a product or the increase in its share over time.

Thus a new index of the competitive threat which a country faces from China could be calculated in which:

$$ICT(1) = \Sigma x^{t}_{Hi} * k^{t}_{Ci} \qquad (1)$$

10 Lall and Weiss (2005: 178) point to the decline in the share of exports from Latin America under direct threat from 30 per cent in 1990 to 11 per cent in 2002 and comment that 'The *intensity of the Chinese threat decreases significantly over time*' (italics in the original).

where $x^t_{Hi} = X^t_{Hi}/M^t_H$ (the share of product *i* in total imports from country *H* by the destination market at time *t*, measuring the extent of competition faced by country *H*)

and $k^t_{Ci} = X^t_{Ci}/M^t_i$ (the share of China in total imports of product *i* by the destination market at time *t*, measuring the intensity of competition from China).

Alternatively the intensity of competition could be measured by the change in China's market share, so that Equation (1) would become

$$\text{ICT}(2) = \Sigma x^{t+1}_{Hi} * \Delta k_{Ci} \qquad (2)$$

The value of the index derived in Equation (1) could range from zero when a country has no exports of products which are exported by China, to 1 where the country's exports are made up entirely of products in which China's exports account for the entire market.[11] In practice the value of the index is unlikely to be anywhere approaching unity. Changes over time will however indicate whether competition from China is increasing or falling, and comparisons across countries will reveal which countries are most likely to be affected by Chinese competition.

Unlike ICT(1), ICT(2) can take negative values where a country specializes mainly in products in which China's market share is falling. Theoretically the limits are -1 and +1 with the former occurring where a country exports products where China was initially the sole supplier and where it has over the period withdrawn completely, while the latter would arise in the case where China has gone from not being a supplier to being the sole supplier. These are limiting cases and in practice values are likely to fall within a much narrower range around zero.

3.2 An empirical analysis of the Chinese competitive threat to Latin America in the US market

The analysis presented here focuses on the US since this has been the most significant market in terms of competition between China and Latin America.[12] The data comes from the US International Trade Commission (http://dataweb.usitc.gov/) and covers imports from 18 countries in the region and from China and Hong Kong. Since Hong Kong officially became part of China in 1997 and a significant part of Hong Kong's exports originate from China, a more complete picture of the competition between China and other countries can be obtained by including imports from Hong Kong.

Product data at the 5-digit level of the SITC (Rev.3) was used. It was important to have a high level of disaggregation in order to ensure that the products being compared were close substitutes for each other. For example, at the 3-digit level SITC 841 includes coats, jackets, suits, trousers, shirts and underwear for men and boys made from woven fabrics. At the 5-digit level, each of these products is treated separately and in the case

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11 This is of course a logical impossibility since if China accounted for the entire market for a product, no other country could also be an exporter.

12 An emerging issue is the increased competition with China in the Latin America market but this is relatively recent and will not be analysed here. For a discussion of Chinese competition with Brazil in the Argentine market, see Sica (2007).

of coats and suits, according to whether they are woollen or not. Clearly at the 3-digit level, there is a danger that a country exporting anoraks would be treated as though it competed with another country that might be exporting underwear.

The data was collected for four key years, 1996, 2001, 2004 and 2006. 1996 represents the situation some time before China became a member of the WTO. 2001 is immediately prior to WTO accession in December 2001. 2004 is the last year before the final removal of quotas on textiles and garments on 1 January 2005[13] and 2006 is the latest year for which data is available. The use of these four years makes it possible to analyse how competition between China and Latin America has evolved over time in response to these changes in the trade regime.

Table 1 presents the two indices of competitive threat, ICT(1) and ICT(2) for two years, 2001 and 2006. ICT(1) uses the share of China in US imports by product in 2001 and 2006 as the measure of the intensity of competition, while ICT(2) uses the increase in the share of Chinese imports between 1996-2001 and 2001-2006 for 2001 and 2006 respectively.

Table 1: Indices of competitive threat from China, 2001, 2006

	ICT(1)		ICT(2)	
	2001 (in %)	2006 (in %)	2001 (in %)	2006 (in %)
Argentina	3.7	7.0	1.3	3.6
Bolivia	11.2	11.3	4.2	-1.0
Brazil	8.0	9.9	2.0	4.6
Chile	2.6	4.1	1.1	1.4
Colombia	2.8	5.1	0.0	2.3
Costa Rica	7.9	10.5	0.1	4.7
Dominican Rep.	12.2	16.7	-1.6	6.4
Ecuador	2.1	1.5	0.6	0.6
El Salvador	12.3	17.0	-4.0	6.8
Guatemala	13.0	16.0	-3.8	5.3
Honduras	11.3	16.7	-2.9	5.9
Mexico	7.7	13.2	2.0	7.1
Nicaragua	9.7	13.4	-3.7	4.7
Panama	4.3	5.5	1.5	2.0
Paraguay	7.6	17.8	2.7	8.5
Peru	6.1	5.6	-0.6	1.0
Uruguay	6.6	4.2	1.5	2.3
Venezuela	0.7	0.6	0.0	0.2

Source: own elaboration from USITC data.

[13] Although it should be noted that subsequently the US imposed new restrictions on Chinese textile and clothing imports.

ICT(1) shows that 4 of the 5 top countries in terms of the competitive threat from China in both 2001 and 2006 were in Central America and the Caribbean (El Salvador, Guatemala, Honduras and the Dominican Republic). According to this index, these countries faced greater competition from China in both years than did Mexico which is normally regarded as the country facing the greatest threat. In 2006, the country most threatened by Chinese competition according to ICT(1) was Paraguay.[14] The Andean countries, apart from Boliva, face only limited competition from China, while Argentina, Brazil and Costa Rica occupy an intermediate position. Although it has not been possible to compare the degree of competition faced by the Latin American countries with other regions, the fact that several of the countries included in Table 1 rank above Mexico suggests that the problem of Chinese competition is more widespread in the region than has been recognized in the literature up to now.

Turning to the second index, ICT(2), the pattern in 2006 is broadly similar to that using ICT(1). Mexico rises from seventh to second place and Bolivia falls from eighth to eighteenth, but otherwise there is little difference to the broad pattern described above. However the ICT(2) for 2001 shows a completely different ranking from ICT(1) for the same year. Specifically the Central American countries (El Salvador, Guatemala, Honduras and Nicaragua) and the Dominican Republic have significant negative coefficients, indicating that they were specialized in products where China had been losing market share in the preceding five years (1996-2001). The fact that they ranked amongst the top countries in terms of ICT(1) shows that they were specialized in products in which China had a significant share of the US market in 2001. The data suggests that this result was driven by developments in textiles and clothing where the Chinese market share in the US fell in the period prior to WTO accession. These were precisely the sectors which Central America and the Dominican Republic were expanding through Export Processing Zones in the 1990s.

4 Changes in the competitive threat over time

The dominant view amongst researchers is that the Latin American economies (apart from Mexico) are evolving in different directions to become more complementary in terms of their trade structures, so that the competitive threat posed by China is decreasing. As mentioned earlier, this runs counter to the popular perception of increased Chinese competition following WTO accession, the phasing out of quotas on textiles and clothing, reflected in falling prices of goods produced in China and growing market penetration.

One explanation of the contrast between the findings of academic studies and this latter view can be found in the nature of the indices that have been used to measure the degree of competition from China. As was pointed out above, these are based solely on the composition of the exports of the two countries being compared. This is true both of the various export similarity measures and the use of correlation coefficients. They only

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14 Paraguay is usually regarded as one of the countries least affected by Chinese competition with the lowest export similarity of the Latin American countries considered by Blázquez-Lidoy et al. (2007: table 2.5) and by IDB (2004: table 5.6). However Lall and Weiss (2005: figure 2) also find that in 2002 Paraguay was the country with the highest proportion of its exports to the US market threatened by China.

measure the extent of competition from China and not its intensity within each product. They therefore miss a key dimension of what has been happening in global markets, namely the increased global share of China across a wide range of products. They assume that a decline in the share of a given product in China's total exports over time indicates a loss of comparative advantage in that product and if this is a product exported by Latin America, a decline in the competition that the latter faces. It ignores the fact that a decline in the share of a particular product in China's exports can be accompanied by an increase in China's share of the world market in that product since China's exports are growing so rapidly. This apparent loss of *comparative* advantage in fact hides an increase in China's *competitive* advantage in the product.

Since the new indices developed in the previous section measure both the extent and intensity of competition, they provide a better measure of what is happening to the threat faced by Latin American countries from China over time. Do these indicators support the view that Chinese competition has increased in recent years?

Table 2 shows that over the decade from 1996 to 2006 competition from China increased in all countries apart from Uruguay and Venezuela. In the case of the latter it was negligible throughout the period. Sub-dividing the period, several countries saw a decline in competition from China in the period before it joined the WTO. These were mainly Central American countries (Costa Rica, El Salvador and Honduras) and the Dominican Republic. However this trend was reversed after 2001 and particularly after the ending of the Agreement of Textiles and Clothing at the start of 2005. Ecuador, Peru, Uruguay and Venezuela were the only countries to face less competition from China in 2006 than they did in 2001.

Table 2: ICT(1) for total trade, 1996, 2001, 2004, 2006

	1996 (in %)	2001 (in %)	2004 (in %)	2006 (in %)
Argentina	3.1	3.7	4.8	7.0
Bolivia	9.5	11.2	11.7	11.3
Brazil	8.0	8.0	9.1	9.9
Chile	1.8	2.6	4.3	4.1
Colombia	2.9	2.8	4.2	5.1
Costa Rica	9.9	7.9	9.0	10.5
Dominican Rep.	13.7	12.2	14.7	16.7
Ecuador	1.3	2.1	1.7	1.5
El Salvador	15.2	12.3	14.1	17.0
Guatemala	11.4	13.0	13.4	16.0
Honduras	12.2	11.3	13.0	16.7
Mexico	5.4	7.7	11.0	13.2
Nicaragua	8.8	9.7	11.2	13.4
Panama	2.5	4.3	5.8	5.5
Paraguay	5.3	7.6	13.4	17.8
Peru	4.6	6.1	5.5	5.6
Uruguay	6.5	6.6	3.6	4.2
Venezuela	0.7	0.7	0.6	0.6

Source: own elaboration from USITC data.

Since China competes mainly in manufacturing, Table 3 calculates the same index of competitive threat but only includes manufactured goods. If anything the picture of increased competition is even clearer than in Table 2, with Uruguay being the only country facing less competition in 2006 than in 1996.[15]

It is worth noting that the reason why the present approach gives such different results from previous studies is that it takes into account not just the structure of China's exports, but also their share in world markets. Thus it captures the increased penetration of the US market by China in recent years which measures of export similarity fail to take into account. By incorporating the intensity of competition from China in this way, it presents a more realistic picture of the competitive threat faced by Latin American countries.

Table 3: ICT(1) for manufactured goods trade, 1996, 2001, 2004, 2006

	1996 (in %)	2001 (in %)	2004 (in %)	2006 (in %)
Argentina	1.3	2.0	3.0	3.9
Bolivia	5.3	6.1	9.2	8.5
Brazil	7.6	7.6	8.4	9.0
Chile	1.0	1.1	1.5	1.3
Colombia	2.3	2.1	3.3	4.0
Costa Rica	9.5	7.5	8.5	9.8
Dominican Rep.	13.5	12.0	14.4	16.4
Ecuador	0.5	0.8	0.6	0.6
El Salvador	15.0	12.2	13.9	16.6
Guatemala	11.0	12.7	13.0	15.5
Honduras	12.0	11.0	12.7	16.4
Mexico	5.1	7.4	10.6	12.7
Nicaragua	8.2	9.0	10.7	13.0
Panama	1.8	1.9	2.6	2.8
Paraguay	4.1	4.1	6.2	10.3
Peru	3.8	4.7	4.0	4.2
Uruguay	4.4	4.6	2.3	2.4
Venezuela	0.2	0.3	0.3	0.3

Note: Manufactured goods are defined as SITC 5-8 (excluding 68).

Source: own elaboration from USITC data.

15 The figure is lower for manufactures than for total trade since it is a subset of total trade. An alternative approach would be to calculate the shares of each product in manufactured exports rather than total exports which would give different results.

5 Estimating the loss of market share to China

This section estimates the extent to which Latin American countries have lost market share in the United States to China in recent years. This will throw further light on a number of key issues raised in the paper. First, how significant has the impact of Chinese competition been on Latin American exports? Second, which countries within the region have been most severely affected by Chinese competition? Finally, has the impact of China on the region's exports increased over time, particularly following China's accession to the WTO and the removal of quotas on textiles and garments?

5.1 Methodology

The methodology used to estimate the loss of market share to China is an extension of Constant Market Share (CMS) analysis developed by Chami Batista (2008). CMS decomposes the changes in the overall share of an exporting country in a particular market over a given time period into a competitiveness effect (i.e. changes in the share within each product category) and a product composition effect.

$$\Delta k_H = \Sigma X^t_{Hi} * \Delta m_i + \Sigma M_i^{t+1} * \Delta k_{Hi} \qquad (3)$$

where: k_H is the share of country H in total imports of the destination market

X_H is the total exports of country H to the destination market

m_i is the share of product i in the total imports of the destination market

M_i is the total imports of product i by the destination market

Superscripts t and t+1 represent the initial and final year of the period.

The first term on the right hand side of Equation (3) represents the product composition effect and the second term the competitiveness effect.

In a two country world, one country's gain in market share is the other country's loss. In reality however there are many countries exporting to a given market, some of whom will be gaining competitiveness and increasing their market shares, while others will be losing market share. The question then is how to distribute one country's loss of market share among those countries that are gaining market share? In other words, if Mexico is losing market share in the US, and China and some other countries are gaining market share, how much of the loss in Mexico's market share should be attributed to China and how much to other countries that are increasing their share of the US market?

One approach used in Moreira (2004) based on an earlier methodology developed by Chami Batista and Azevedo (2002) distributes a country's loss of market share between those countries which have gained market share in proportion to their share in the total gain in market share. More recently however Chami Batista (2008) has pointed out a limitation of this approach since it does not take into account the relative rates of growth of exports from different countries. He proposes an alternative formulation in which the gains (losses) of competitiveness between countries are related to their relative growth rates. In other words, countries gain from those countries whose exports are growing more slowly and lose to those that are growing faster than their own.

The loss of market share by a country (*H*) to China (*C*), in a particular product *i* is defined as:

$$\Delta k_{HCi} = \Delta k_{Hi} * k^t_{Ci} - \Delta k_{Ci} * k^t_{Hi} \quad (4)$$

Summing over all products gives the aggregate loss of market share to China:

$$\Sigma\Delta k_{HCi} = \Sigma\Delta k_{Hi} * k^t_{Ci} - \Sigma\Delta k_{Ci} * k^t_{Hi} \quad (5)$$

Summing over all exporters to the destination market gives the total competitiveness effect which is the same as the last term on the RHS of Equation (3). It can be shown that this formulation satisfies four desirable properties.[16] Country *H* cannot lose or gain from itself. A gain for exporter *H* from exporter *C* is equal to the loss of exporter *C* to exporter *H*. The sum of the gains and losses of any country to all its competitors is equal to the total gain or loss of market share by that country. Finally the gain (loss) of a country to another country is a function of, and has the same sign as, the difference between the growth rates of their exports.[17]

There is a close relationship between this measure of loss of exports to China and the Index of Competitive Threat, ICT(1), developed earlier in this paper. It is possible to rewrite Equation (4) as:

$$\Delta k_{HCi} = (\Delta k_{Hi}/k^t_{Hi} - \Delta k_{Ci}/k^t_{Ci}) * k^t_{Hi} * k^t_{Ci} \quad (6)$$

since $x^t_{Hi} = X^t_{Hi}/M^t_H$

and $k^t_{Hi} = X^t_{Hi}/M^t_i$

$$k^t_{Hi} = x^t_{Hi} * M^t_H/M^t_i \quad (7)$$

Substituting into (6):

$$\Delta k_{HCi} = (\Delta k_{Hi}/k^t_{Hi} - \Delta k_{Ci}/k^t_{Ci}) * k^t_{Ci} * x^t_{Hi} * M^t_H/M^t_i \quad (8)$$

and

$$(M^t_i/M^t_H) * \Delta k_{HCi} = (\Delta k_{Hi}/k^t_{Hi} - \Delta k_{Ci}/k^t_{Ci}) * k^t_{Ci} * x^t_{Hi} \quad (9)$$

Summing over all products *i* gives:

$$(1/M^t_H) * \Sigma M^t_i \Delta k_{HCi} = \Sigma(\Delta k_{Hi}/k^t_{Hi} - \Delta k_{Ci}/k^t_{Ci}) * k^t_{Ci} * x^t_{Hi} \quad (10)$$

The LHS of Equation (10) gives the loss of market to China by country *H* as a share of its initial exports to the destination market. On the RHS, the term within the brackets is the difference between the proportionate changes in the market share of Country *H* and of China over the period. This is negative when China's market share is increasing

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16 See Chami Batista (2008) for the mathematical proof that Equation (5) satisfies these requirements.

17 One should note however that the decomposition is based on accounting identities and should therefore be careful in making any causal inferences from it.

faster than that of country *H*.[18] The term outside the bracket on the RHS is the index of competitive threat, ICT(1). Thus the scale of the loss of exports as a result of competition from China is positively related to the index that was developed earlier to measure the competitive threat from China. The actual impact on the exports of a given country will however vary, depending on the relative growth rates of exports in different industries.

5.2 Empirical estimation of the impact of China on Latin American exports

The loss of market share to China is estimated with the same data set of US imports that was used in the previous section. Three periods will be analysed: pre-WTO accession (1996-2001), post-WTO accession (2001-2006) and post-ATC (2004-2006).

Table 4: Loss of exports in the US to China, 1996-2001, 2001-06, 2004-06
(as % of country's total exports to the US)

	1996-2001 (in %)	2001-06 (in %)	2004-06 (in %)
Argentina	-1.8	-5.1	-1.6
Bolivia	-10.4	1.6	-1.3
Brazil	-4.1	-7.7	-3.3
Chile	-1.3	-3.0	-1.3
Colombia	-0.5	-2.3	-1.7
Costa Rica	-1.3	-7.8	-1.6
Dominican Rep.	-2.4	-13.0	-6.1
Ecuador	-1.0	-1.1	0.0
El Salvador	6.5	-12.3	-10.5
Guatemala	6.2	-10.5	-8.7
Honduras	3.8	-7.7	-6.0
Mexico	-1.1	-11.4	-4.5
Nicaragua	6.4	2.3	-0.8
Panama	-2.4	-2.4	-1.1
Paraguay	-6.9	-5.7	-5.5
Peru	2.0	0.5	-1.4
Uruguay	-5.8	-9.3	-1.6
Venezuela	0.0	-0.7	-0.5
Latin America	-1.0	-9.3	-3.8

Source: own elaboration from USITC data.

The first point that stands out from Table 4 is the sharply increased impact of China on Latin American exports to the US in the period since it became a WTO member. Whereas between 1996 and 2001 the aggregate effect on the region as a whole amounted to US$1.3 billion (1 per cent of 1996 exports), over the next five years, the

18 This is similar to the criteria used by Lall and Weiss (2005) to classify what proportion of a country's exports are under threat from China.

impact came to over US$18 billion (9.3 per cent of exports in 2001). This is further evidence to support the view that far from decreasing over time, the impact of Chinese competition on Latin America has been on the increase.

Looking at the experience of individual countries, it can be seen that only two countries (Nicaragua and Peru) have not lost exports in the US to Chinese competition over the whole period 1996-2006. As well as Nicaragua, several other Central American countries (El Salvador, Guatemala and Honduras) were able to gain market share from China in the period before the latter became a WTO member. However in all three countries, the gains were more than offset by losses after China joined WTO. These losses were particularly concentrated in the period after 2004 when even Nicaragua lost exports to China.

In the period from 1996-2001, the countries most severely affected were Bolivia, Paraguay, and Uruguay whose estimated losses to China represented more than 5 per cent of their total exports to the US. Between 2001 and 2006, those worst hit were the Dominican Republic, El Salvador, Mexico and Guatemala, all of which lost over 10 per cent. As might be expected, between 2004 and 2006, the countries which lost most in the aftermath of the phasing out of the ATC were the Dominican Republic and the Central American countries which rely heavily on textile and clothing exports to the US. The countries which have been least affected in the post 2001 period have been the Andean group countries whose exports to the US are mainly of minerals and oil and have therefore not faced significant Chinese competition.

Since Chinese competition is particularly centred on manufactured goods, it is also worth considering the extent to which exports of manufactures to the US have been affected. Indeed one of the concerns raised by the global expansion of China is that it will make it increasingly difficult for other countries to diversify into manufactures and upgrade the technological content of their exports.

Table 5 presents the impact of loss of market share to China on the exports of manufactured goods to the US for the 18 Latin American countries. As might be expected, the impact on manufactures is even more severe than on total exports. Again the overall impact was relatively small between 1996 and 2001, but increased markedly to 13 per cent in 2001-2006 with almost half of that impact being felt in the past two years. Some countries lost over 15 per cent of their manufactured exports in the five years from 2001 to 2006, and three countries lost over 10 per cent in just two years from 2004 to 2006. Andean countries such as Chile, Colombia, Ecuador and Venezuela, who have not suffered much in overall terms, saw a significant loss of market share in manufactures to China. Thus while they are protected from serious losses in their overall export earnings by their specialization in minerals and oil, they may find it more difficult to diversity into exports of manufactured goods as a result of Chinese competition.

6 Summary and conclusion

The paper has developed new measures of competitive threat which it is claimed gives a more realistic indication of the extent of competition which countries face from China than any of the indices used in previous studies. It explicitly takes into account the intensity of Chinese competition in different products, as well as the share of a

country's exports that compete with Chinese goods. As a result it is better able to capture the effect of increased penetration of world markets by China than the measures based on comparative advantage, particularly when making comparisons over time.

Table 5: Loss of manufactured exports in the US to China, 1996-2001, 2001-06, 2004-06
(as % of country's manufactured exports to the US)

	1996-2001 (in %)	2001-06 (in %)	2004-06 (in %)
Argentina	-4.7	-8.7	-4.5
Bolivia	-9.7	-4.4	-5.6
Brazil	-6.0	-10.7	-4.5
Chile	-9.8	-6.7	-3.6
Colombia	-3.4	-8.4	-9.0
Costa Rica	-2.0	-12.0	-2.3
Dominican Rep.	-3.0	-15.0	-7.3
Ecuador	-6.0	-20.0	-11.8
El Salvador	8.0	-13.3	-11.7
Guatemala	12.2	-15.3	-13.2
Honduras	5.4	-9.4	-7.4
Mexico	-1.5	-13.6	-5.8
Nicaragua	13.4	3.8	-1.3
Panama	-9.2	-13.2	-5.2
Paraguay	-8.1	-13.6	-9.3
Peru	5.2	-1.0	-6.0
Uruguay	-9.8	-13.3	-6.2
Venezuela	-1.6	-6.3	-3.8
Latin America	-1.6	-13.0	-5.8

Note: Manufactured goods are defined as SITC 5-8 (excluding 68).

Source: own elaboration from USITC data.

The two indices, ICT(1) and ICT(2), were applied to data for US imports from 18 Latin American countries. The results were more supportive of the popular perception of a Chinese threat to Latin American exports than the more sanguine view propagated by the international institutions and previous academic studies. First, the competitive threat in Latin America is not confined to Mexico. On this evidence, it is even more severe for Central America and the Dominican Republic. This is not that surprising since one of the arguments used to garner support for the Dominican Republic-Central American Free Trade Agreement (DR-CAFTA) was that it would give countries a critical advantage in competing with Asia, particularly China (USTR 2005). It was also shown to be a problem for some South American countries, particularly Bolivia, Brazil and Paraguay. Second, the competitive threat increased quite sharply over time with China's accession to the WTO and the phasing out of the Agreement on Textiles and Clothing. There is no evidence to support the view that Chinese competition is becoming less of a problem for Latin America.

The paper also presented new estimates of the impact of China on the value of Latin American exports to the US over the past decade, using an extension of Constant Market Share analysis. While needing to be cautious about assuming a direct causal relationship between the growth of Chinese exports and the loss of market share, the results are broadly in line with those from the competitive threat analysis. First, most Latin American countries have lost significant market share to China since 2001. Second, the trend has been for losses to increase over time. Third, losses, as would be expected, have been particularly severe in markets for manufactured goods.

The paper has only presented a partial analysis of the impact of China on Latin America since it has been confined to a study of exports to the US. It is true that for some countries China has been a significant and growing market for exports and this has offset the negative impacts on exports to third markets. However the evidence presented here shows that the Latin American countries need to take seriously the challenge posed by increasing Chinese competition in the US market. The observed changes in market shares reflect a loss of competitiveness vis-à-vis China in a number of manufacturing industries and should not be dismissed as simply being a result of shifts in comparative advantage.

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