Assessing India's Competitive Exposure in U.S. Import Markets

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Abstract

This paper examines the evolution of India's competitive exposure to other nations on its sales into U.S. import goods markets over the 1996 to 2006 time frame. We show that the methodology employed, the Market Overlap Measure statistic, is superior for this type of competitive exposure analysis to statistics based on similarities in export profiles across nations. These export similarity profile measures have been used in prior research on India's competitive trade exposures by the IMF. Hence, this study provides a deeper understanding of how shifting U.S. import market shares in the decade preceding the sharp economic contraction in the United States has altered India's competitive exposure in U.S. import markets. The findings quantify the extent to which India's market exposures to higher income nations is rising, or falling, and provide some evidence on the extent to which India's sales into U.S. import goods markets are becoming more sophisticated and higher value added.

Keywords: Competitive Exposure, U.S. Imports, India Export Competitiveness

Introduction

This paper contributes to the research literature on understanding India's export competitiveness by utilizing a relatively new methodology for assessing a nation's competitive exposure with other nations and regions. We analyze the patterns of U.S. imports from India, and all other nations, to assess India's evolving exposure to competition in the U.S. import market from China, Canada, Mexico, EU nations, Latin American nations, and other nations of the world. Shifting U.S. import market shares are analyzed at the six-digit Harmonized Trade Schedule (HTS) level, across all nations from which the United States imported between 1996 and 2006 using annual data. For each year, there are more than 200 nations represented in the data file along with more than 5400 different six-digit HTS product groups. This is the most detailed analysis ever done, to the knowledge of the authors, examining India's sales into the United States which quantifies the degree of exposure India has to other nations also selling into U.S. import markets.[1]

The analysis utilizes a recently developed analytic method for quantifying a nation's competitive exposure to other nations or regions in some specified market (the U.S. import market in this study), the Market Overlap Measure (MOM) introduced by Sawchuk and Yerger (2006a, 2006b). They demonstrate the superiority of MOM for assessing competitive exposure over ad-hoc comparisons across product sectors, comparisons based on revealed comparative advantage, and similarity indices such as that of Finger and Kreinen (1979). The methodology and findings will be of interest to those researching India's trade competitiveness, and more broadly, to those interested in using this paper's research design as a template for investigating other nations' competitive exposures in important global destination markets such as the United States or the European Union.

The MOM analysis answers multiple questions on India's export performance in U.S. markets. What are the key nations/regions that compete with India in U.S. import markets? Has the relative importance of particular nations/regions been changing over time? Which product groups are most responsible for the

competitive exposure facing India? Do the most significant product groups driving India's competitive exposure to different nations vary significantly across those nations? Is India's changing competitive exposure in U.S. import markets consistent with a movement towards the production of more sophisticated and higher value added products?

Literature Review

One aspect of the trade literature involving India-U.S. trade relations has been the interplay between India, China, and the U.S. in each other's markets. Greene (2006) investigated U.S.- China competition in the Indian market and documented China's rapid growth in Indian market since 1999. Greene identifies the most intense competition between the U.S. and China arising in high value-added technology markets such as the machinery, electrical machinery, computers, and telecommunications equipment sectors. Cerra et al. (2005) examine the consequences for India from China's entry into the WTO in part by examining India-China competition in the U.S. market. Using a Herfindahl Index measure of the concentration of exports with regards to product group diversification, they show that India's exports have been much more concentrated than for China as India's Herfindahl measure is approximately 7-8 times China's value over their 1992-2001 sample. They also estimate an Index of Trade Competition, based upon export similarity profiles, between India and China on sales in U.S. markets and find minimal change in this index over the sample period. As noted in the methodology section of this paper, however, there are serious weaknesses in using similarity-of-export-profile measures as the basis of inferring changes in competitive exposure between two nations. In this paper, we much more directly assess India's changing competitive exposure to China in U.S. markets.

Since India's export competitiveness inevitably will be impacted by the overall cost competitiveness of India's economy, the findings in this paper can be compared against other research related to India's cost competitiveness. Ark et al (2008) directly compare the cost competitiveness of manufacturing in India and China at both the national and sub national levels over the 1990-2004 period[ii]. In the latter years of their sample period, they find that while China's labor productivity level was slightly higher than India's productivity in many industries, China's higher compensation level compared to India left China slightly disadvantaged relative to India in terms of unit labor costs. Less reassuring for India, however, has been the trend on its unit labor costs relative to China. China's labor productivity growth substantially outpaced its compensation growth, leading to declines of 20 to 80 percent in its unit labor costs across manufacturing sectors over the sample period. In contrast, India's labor productivity growth lagged its compensation growth resulting in increases of 10 to 100 percent in its unit labor costs across manufacturing sectors. In this paper, we can compare the shifts over time in product groups most responsible for India's exposure to China in U.S. markets to see if it is consistent with the findings of Ark et al (2008).

Another area of policy research related to India's cost competitiveness has focused on constraints on the growth of Indian manufacturing, which one would expect to impact the growth patterns of India's exports to the U.S. market and its competitive exposure on sales in U.S. markets. Gupta et.al., (2008) examine data on Indian registered manufacturing from 1973-2003[iii]. Their results run counter to expectations that low skilled labor intensive manufacturing sectors would have better performing growth than other manufacturing sectors following industrial delicensing given India's abundance of low skilled labor. Instead, they find that in the post-delicensing period that industries with above median labor intensity grew 19 percent less than the below median intensity industries. They also found that industries with above median infrastructure-intensive grew 10 percent less than below median industries; and, industries with above median financial dependence grew 19 percent less than below median industries.

In this paper, we compare those sectors most responsible for India's exposure to key nations and regions on sales in U.S. markets against Gupta et al's (2008) list of labor intensive and infrastructure intensive industries whose growth has lagged relative to other manufacturing sectors.

In addition to the focus on India's competitive exposure, this paper adds to the literature on methods used to assess a nation's competitive exposure. One common approach for assessing the degree of market exposure between two nations has been to do somewhat ad-hoc comparisons across nations of the relative importance in total exports of various industry sectors[iv]. These ad-hoc industry comparisons, however, cannot assess the relative importance of the market share changes in one product group versus another product group. Nor do they provide any type of summative statistic capturing the effects across all product groups of the market interactions between two nations.

Analysts in recent years have been using indices designed to assess the degree of similarity in export profiles between two nations as a summative measure of the degree of market competition or market interaction between two nations in a specified market area. One frequently used similarity measure has been the export similarity measure of Finger and Kreinin (1979). The measure is defined as follows:

$$F\text{-}K = (\sum^{n}_{i=1} \min[a_i; b_i]).100 \quad \ldots\ldots\ldots\ldots (1)$$

where a_i (b_i) is the share of nation A's (B's) total sales or exports to the designated market of analysis accounted for by industry sector i. Hence, $0 \leq F\text{-}K \leq 100$ and increases in F-K are is associated with increases in the similarity of the two nations' export profiles[v].

Researchers have been using the F-K index, or similar measures, to indicate the degree of competitiveness between two nations in sales to the defined market area. Rises in the similarity index between two nations is taken as evidence of growing competition between the two nations or, if the similarity index between nations A and B is larger than between nations A and C, then nation B is said to be a greater source of competition for nation A than is nation C. For example, the degree of competition between India and China in world markets has been analyzed using an export similarity index that "indicates the extent to which two countries compete in world markets based on the similarity of the composition of their trade." (Cerra et. al.,2005, p.8).

Weaknesses of Export Similarity Profiles as Measures of Competitive Exposure[vi]

Although the F-K export similarity index and the related similarity indices are useful for comparing profiles across nations, these indices suffer a potentially damaging shortcoming if used to infer one nation's exposure to another nation in its sales to a specified market. Namely, these indices make no adjustment for the absolute size of the nations being compared. Consider the hypothetical data contained in Table 1 where three nations (A, B, and C) sell goods across three industry sectors (X, Y, and Z) to some designated market. The computed F-K export similarity index value from Equation (1) between nations A and B is $F\text{-}K_{AB} = 100$ since B's sales are 1/25 A's sales in every sector, while $F\text{-}K_{AC} = 62.2$. So, by the rationales used in the papers cited above, one should conclude that nation A experiences approximately 60% more competition from nation B than it does from nation C [i.e., (100-62.2)/62.2]. Such a conclusion clearly would be misleading, because it ignores the reality of nation C's much larger market share than nation B in every industry sector for which nation A has sales.

Using MOM to Measure Competitive Exposure

With the Market Overlap Measure, MOM, nation B's measured market overlap with A can be large relative to nation A's market overlap with other nations if nation B is present in many of the industry sectors in which nation A sells; or, if nation B has a relatively large market share in industry sectors that are important to nation A. A

Table 1: MOM Example

Dollar Sales by Sector and Resultant Similarity Index Values vs. MOM Values

	Sector	X	Y	Z	Sum
Nation	A	150	100	50	300
	B	6	4	2	12
	C	200	50	300	550
	Sum	356	154	352	862

$F\text{-}K_{AA}$ = [min(150/300,6/12) + min(100/300,4/12) + min(50/300,2/12)] * 100 = 100
$F\text{-}K_{AC}$ = [min(150/300,200/550) + min(100/300,50/550) + min(50/300,300/550)] * 100 = 62.2

Sij values for A: Six = 150/500 = 0.5; Siy = 100/300 = 0.33; Siz = 50/300 = 0.17

MOM_{AA} = [0.50 * (150/356) + 0.33 * (100/154) + 0.17 * (50/352)] * 100 =	44.9
MOM_{AB} = [0.50 * (6/356) + 0.33 * (4/154) + 0.17 * (2/352)] * 100 =	1.8
MOM_{AC} = [0.50 * (200/356) + 0.33 * (50/154) + 0.17 * (300/352)] * 100 =	53.3
$MOM_{AA} + MOM_{AB} + MOM_{AC}$ =	100.0

complete derivation of the MOM, along with an explanation of its several useful properties, can be found in Yerger and Sawchuk (2006a). Here, we show its construction and highlight some of its more useful properties.

First specify some market area with multiple industry or product group sectors within the market area, and multiple nations supplying goods to that market area (U.S. import market in this paper). Next, designate one of the supplying nations for MOM analysis and label it 'A' ('A' is India in this paper). If there are j = 1, ... ,n nations producing goods for sale in the specified market area, and there are i = 1, ..., m different industry or product group sectors, then the MOM measure between nation A and any other nation j will be:

$$MOM_{Aj} = [\sum^{m}_{i=1} s_{iA} \cdot ms_{ij}] \cdot 100 \quad \ldots\ldots (2)$$

Where s_{iA} is the percent share of nation A's sales in the market area accounted for by sector i so $\sum^{m}_{i=1} s_{iA} = 1.0$; ms_{ij} is the percentage market share of sector i in the market area held by nation j so, $\sum^{n}_{j=1} ms_{ij} = 1.0$.

For the case where j=A, $MOM_{AA} = \sum^{m}_{i=1} s_{iA} \cdot ms_{iA}$ so MOM_{AA} is simply the weighted average market share for nation A across all i industry sectors in the specified market area. The weights on each industry sector i reflect the importance of sector i to nation A's sales in the market area as measured by i's percentage share of nation A's total sales in the market area.

Next, consider the case for $j \neq A$ and label the other nation B so $MOM_{AB} = [\sum^{m}_{i=1} s_{iA} \cdot ms_{iB}] \cdot 100$. MOM_{AB} measures the degree of nation B's market overlap across all i industry sectors with A in the specified market area. MOM_{AB} is a weighted average measure of nation B's market share across all i sectors in which nation A sells in the specified market area. As with MOM_{AA}, however, the weights on each industry sector i reflect the importance of sector i to nation A's sales in the market area. By summing $s_{iA} \cdot ms_{iB}$ across all i sectors, MOM_{AB} captures both the breadth of market interactions across all industry sectors between nations A and B as well as the depth of market interactions in sectors most important to nation A. We illustrate the MOM computations by solving the MOM values for nation A in the earlier example data as shown above in Table 1 and find that MOM_{AA} = 44.9, MOM_{AB} = 1.8, and MOM_{AC} = 53.3.

These example MOM values clearly identifies that nation A has much greater market overlap exposure with nation C than B due to nation C's much larger absolute size, even though nations A and B have more similar profiles than do nations A and C. Nations A, B, and C have a 44.9%, 1.8%, and 53.3% average market shares in the industry sectors for which nation A has sales when

each sector is weighted by the sector's share of nation A's total sales. Based on the MOM values, one concludes nation A's exposure to nation C is nearly 30 times larger (53.3/1.8) than its exposure to nation B, a much more accurate assessment than one based on the F-K values.

Moreover, the additive nature of the MOM computations leads to several useful properties of the measure that aid in analyzing the degree of market overlap between nations. First, for any Aj nation pairing the value of MOM_{Aj} will be bounded by:

$$0 \leq MOM_{Aj} < 100 \quad \ldots\ldots (3)$$

A zero value for MOM_{Aj} will occur if in every sector i for which nation A has sales, nation j has zero sales. The upper bound for MOM_{Aj} can approach 100 when nation A's sales are extremely small in every sector i for which it has sales, and nation j has all the market share in these i sectors, except for nation A's extremely small sales. Also, meaningful comparisons across nations are possible with the MOM since:[vii]

$$\sum_{j=1}^{n} MOM_{Aj} = 100 \quad \ldots\ldots (4)$$

Consequently, one can directly compare the MOM_{Aj} value for two different j nations and accurately infer that if $MOM_{Aj1} > MOM_{Aj2}$, then nation A has a larger cumulative market overlap across all i sectors with nation j1 than with nation j2 (as seen by MOM_{AB} and MOM_{AC} in Table 1). If one wishes to more deeply understand the sectors most responsible for the MOM value estimated between two nations, any estimated MOM_{Aj} can be decomposed into its contributions by industry sector as follows:

$$\text{sector i's contribution to } MOM_{Aj} = [(s_{iA} \cdot ms_{ij}) / (\sum_{i=1}^{m} s_{iA} \cdot ms_{ij})] \cdot 100 \quad \ldots\ldots (5)$$

Again from the example in Table 1, we calculate that nation A's market overlap with Nation C comes: 52.7%% from sector X ([0.5*(200/356)]/0.533); 20.1% from sector Y ([0.33*(50/154)]/0.533); and, 27.2% from sector Z ([0.17*(300/352)]/0.533).

MOM Analysis of India's Competitive Exposure

Annual MOM values for 1996-2006 between India and every one of the 200+ nations selling into the U.S. import market were computed based on the dividing of the U.S. import market into more than 5400 mutually exclusive six-digit HTS product groups. Conceptually, it is an extension of demonstration Table 1 into more than 5400 product sectors columns and more than 200 nation rows with the analysis repeated for each year. Space constraints preclude presenting data for all years and nations. Instead, Table 2 contains the computed MOM values, as shown in Equation (2), for 1996, 2001, and 2006 for each nation representing one percent or more of India's 2006 competitive exposure in U.S. import markets. In addition, the EU nations' MOM values are summed into EU-27 which gives India's cumulative competitive exposure to EU nations.

By far the most substantial change in the pattern of India's competitive exposure over this period is the near doubling of India's exposure to China as the China MOM rises from 9.74 to 17.44 by 2006, indicating that China's weighted average market share in U.S. import markets important to India was 17.44% by 2006. India's cumulative exposure to the EU nations declines slightly from 1996-2006, and by the end of the period China has surpassed the cumulative EU nations to become the largest source of competitive exposure faced by India in U.S. import markets. India's competitive exposure to Israel is the third most important after China and EU-27, although there is a clear downward trend over the period in this exposure. The NAFTA (North American Free Trade Agreement) nations of Canada and Mexico both show rising, and nearly identical, MOM values over the period, indicating that India's exposure to these nations is increasing.

Summing the MOM values for EU-27, China, Israel, Canada, and Mexico reveals the extent to which India's competitive exposure in U.S. import markets comes from

Table 2: MOM Values for India

	1996	2001	2006		1996	2001	2006
EU 27	17.11	17.84	16.36				
China	9.74	11.88	17.44	Pakistan	1.90	1.85	1.81
India	17.50	15.17	16.10	Indonesia	2.21	1.96	1.80
Israel	9.29	9.83	8.08	U.K.	1.56	2.12	1.78
Canada	3.43	4.57	5.19	Hong Kong	4.35	2.89	1.65
Mexico	3.45	4.73	5.17	Taiwan	2.77	2.10	1.64
Italy	4.46	4.33	3.27	France	1.24	1.60	1.58
Japan	3.29	2.89	3.18	Korea	1.83	1.99	1.33
Thailand	3.10	3.15	2.79	Vietnam	0.17	0.64	1.30
Belgium	5.23	4.08	2.75	Turkey	0.87	1.09	1.20
Germany	1.98	2.20	2.64	Bangladesh	1.20	1.34	1.00
Brazil	2.07	1.64	1.97				

this subset of nations. For 2006, this summed MOM value is 52.2 indicating that in U.S. import markets important to India the average market share held by these nations was 52.2%. In order to better understand the key product groups driving India's competitive exposure to these nations, the 1996 and 2006 MOM values are broken down into their contribution by product group for EU-27, China, Israel, Canada, and Mexico as shown in Equation 5 and related discussion.

Table 3 contains the contributions by product group to the 1996 MOM values for the EU, China, Israel, Canada, and Mexico. The product group contributions to MOM values were estimated using the HTS 6-digit level data as shown by Equation 5. The 6-digit data was then summed into its 2-digit groups for ease of presentation and for each nation in Table 3 every 2-digit group accounting for two percent or more of the MOM value is shown. For example, the EU MOM value in 1996 of 17.11 from Table 2 indicates that the weighted average market share for EU nations in import product group markets important to India was 17.11%; and, from Table 3 we see that 43.0% of this weighted average market share was accounted for by 6-digit product groups within HTS 71, Precious Metal Clad Metals, Articles Thereof. The decompositions in Table 3 reveal the wide range of product groups driving India's competitive exposure to the different nations. Continuing with HTS 71, note it accounts for almost all of India's exposure to Israel, but less than 5% of India's exposure to China, Canada, and Mexico. Examining the top five product groups for EU, China, Canada, and

Table 3: Contribution by Product Groups to 1996 MOM Values

EU-27 MOM96 = 17.11		China MOM96= 9.74		Canada MOM96= 3.43		Israel MOM96= 9.29		Mexico MOM96= 3.45	
HTS2 Group	% of MOM	HTS2 Group	% of MOM	HTS2 Group	% of MOM	HTS2 Group	% of MOM	HTS2 Group	% of MOM
71	43.0%	62	26.6%	87	9.8%	71	96.4%	62	19.9%
29	5.1%	42	17.4%	73	9.2%			61	9.1%
62	4.2%	63	6.7%	40	6.5%			3	7.2%
84	3.9%	57	6.7%	84	5.9%			52	6.4%
64	3.7%	64	4.3%	85	5.2%			85	5.9%
42	3.2%	73	3.9%	62	5.2%			9	5.7%
73	2.9%	94	3.6%	71	4.9%			63	4.4%
32	2.8%	61	3.0%	98	4.6%			73	3.8%
63	2.3%	29	2.6%	39	3.8%			71	3.8%
68	2.1%	52	2.2%	27	3.8%			84	3.3%
				61	3.4%			94	2.8%
				52	3.2%			87	2.6%
				94	2.3%			42	2.1%
				68	2.2%			64	2.0%

Mexico, those appearing more than once are:

- HTS 62 (3 Times)- Apparel and Clothing, Not Knitted
- HTS 64 (2 Times)- Footwear
- HTS 71 (2 Times)- Precious Metal Clad Metals
- HTS 85 (2 Times)- Electrical Machinery & Equipment

Note that of the four product groups on the above list, only HTS 85 is not consistent with the view that India's 1996 competitive advantage in U.S. import markets was more oriented towards low skill labor intensive product groups. The changes from 1996 to 2006 in product groups accounting for India's MOM exposure is examined by replicating Table 3 for 2006 MOM values, shown in Table 4, and comparing the patterns.

As seen in Table 4, the HTS 71 product groups decline substantially in importance as causes of India's competitive exposure to the EU and Israel, while increasing modestly in importance as drivers of India's exposure to China, Canada, and Mexico. Before examining the Table 4 nations in more detail, an overview of shifts in key product groups is obtained by reviewing the different product groups represented in the top five for EU, China, Israel, Canada, and Mexico. Those product groups appearing more than once are:

- HTS 71 (4 times)- Precious Metal Clad Metals
- HTS 62 (3 times)- Apparel and Clothing, Not Knitted
- HTS 84 (3 times)- Nuclear Machinery & Mechanical Appliances
- HTS 85 (3 times)- Electrical Machinery & Equipment
- HTS 63 (2 times)- Textile Articles; Rags
- HTS 72 (2 times)- Iron and Steel
- HTS 87 (2 times)- Vehicles and Parts, Other Than Railway

Table 4: Contribution by Product Groups to 1996 MOM Values

EU MOM06 = 17.11		China MOM06= 17.44		Canada MOM06= 5.19		Israel MOM06= 8.08		Mexico MOM06= 5.17	
HTS2 Group	% of MOM	HTS2 Group	% of MOM	HTS2 Group	% of MOM	HTS2 Group	% of MOM	HTS2 Group	% of MOM
71	25.6%	62	19.1%	84	9.7%	71	35.6%	85	22.4%
29	11.7%	63	10.3%	72	8.8%	62	8.7%	62	9.9%
84	7.8%	71	8.3%	87	8.8%	57	8.7%	84	9.8%
85	7.7%	85	6.8%	39	7.7%	63	7.0%	71	9.4%
30	6.3%	94	5.8%	73	6.6%	72	5.2%	87	5.5%
62	2.9%	73	5.7%	71	5.9%	13	3.2%	61	4.8%
73	2.8%	61	4.8%	30	5.6%	29	2.9%	39	4.0%
87	2.6%	42	4.5%	85	4.2%	61	2.8%	73	3.6%
68	2.3%	72	3.7%	98	3.9%	8	2.5%	63	3.5%
72	2.3%	84	3.2%	27	3.3%	73	2.4%	98	2.1%
63	2.0%	57	2.5%	99	2.5%	68	2.3%	3	2.1%
97	2.0%	64	2.4%	79	2.4%	85	2.0%	72	2.0%
		68	2.2%	62	2.1%				
		29	2.0%	40	2.1%				
				76	2.0%				

Compared to the top five listings for 1996, there is evidence of increasing importance of more skill intensive product groups in explaining India's competitive exposure as seen by the increased frequency of HTS 84 and HTS 85 in the top five, along with the emergence of HTS 72 and HTS 87.

Focusing upon the EU contributions by product group, the declining importance of HTS 71 is replaced by the rising share of India's competitive exposure accounted for by HTS 29 (Organic Chemicals), HTS 84, HTS 85, and HTS 30 (Pharmaceutical Products) product groups. Other product groups declining in importance include HTS 62, HTS 64, and HTS 42 (Articles of Leather). Thus, while the MOM values from Table 2 indicate that there has been minimal change in India's competitive exposure to EU on sales in U.S. import markets, the results in Tables 3 and 4 reveal that there has been a clear shifting of the competitive exposure dynamic away from lower skill intensity products towards higher skill intensity products.

The shifts in product group contributions for China is less clear cut than for the EU, but the evidence still does support the view that India's competitive exposure in U.S. import markets is shifting towards higher value added products. From 1996 to 2006, the contribution from key clothing and textile product groups HTS 62, 63, 64, and 57 declined by 10.0% from 44.3% to 34.3% while the contribution from more skill intensive higher value added sectors HTS 73 (Articles Iron and Steel), 85, and 94 (Furniture) all rose.

For Canada, the most significant shift in product groups driving India's exposure to Canada is the rise in importance of HTS 72 (iron and steel) while motor vehicles and parts (HTS 87), and machinery-related (HTS 84, 85) product groups retained their importance as contributors to India's Canadian exposure. The shifts in key product groups driving India's exposure to Mexico provides further support for the view that India has been moving into higher skilled product groups in the U.S. import markets. The contribution of clothing related product groups (HTS 61, 62) to India's competitive exposure to Mexico fell by 14.3% from 29.0% in 1996 to 14.7% in 2006. This decline was replaced by a gain in contribution of 16.5% from HTS 85 and a gain of 6.5% from HTS 84.

Overall, the results presented in Tables 3 and 4 show that the sources of India's competitive exposure in U.S. import markets varies significantly across nations, and that there have been some notable shifts in the product groups most responsible for India's competitive exposure. The data is quite consistent with the contention that India is successfully moving away from relatively low skilled product groups and into higher skilled and higher value added product groups in its sales in U.S. import markets.

Conclusion

This paper's analysis of India's competitive position in U.S. import markets is much more complete than prior work such as that done by Cerra et al (2005) who only estimated India's competitive exposure to China in U.S. import markets. By using a superior analytic measure, and by estimating the measure for all nations selling in U.S. import markets, this paper documents the sharp rise in China's importance as a competitor to India in U.S. import markets and China's dominant position as a source of competitive exposure for India compared to any other single nation selling in U.S. import markets. The analysis summarized in Table 2 shows that the other primary nations accounting for India's competitive exposure in U.S. import markets are Israel, Canada, and Mexico; but, by 2006 India's exposure to Israel is less than half its exposure to China and its exposure to either

Canada or Mexico is less than a third its exposure to China.

The near doubling in importance of China as a competitor in U.S. import markets important to India is consistent with the findings by Ark et al (2008) of a declining trend line for the ratio of China's unit labor costs to India's unit labor costs over much of this study's sample period. Shifts in the importance of the product groups driving India's competitive exposure to China, Israel, Canada, and Mexico also support the findings of Gupta et al (2008). They find that despite India's relative abundance of low skill labor, since industrial delicensing India's more labor intensive industries have grown less than Indian industries with below median labor intensity. Similarly, this paper finds a declining relative importance for commodity products, such as diamonds, and labor intensive products, such as clothing and footwear and textiles, as the sources of India's competitive exposure to other nations in U.S. import markets. The shifts in product groups driving India's competitive exposure in U.S. import markets is consistent with India's production advantage moving into higher skilled and higher value added products in the mechanical appliances, electrical machinery, iron and steel, motor vehicle, and pharmaceutical product groups. This paper's findings suggest that continued growth in U.S. import markets for India will come not from utilizing its abundant low skilled labor supply, but by continuing to upgrade both the skill set of its workforce and the capital intensity of its production.

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Endnotes

(i) Availability of consistently defined data places the study's start date at 1996 and a 2006 end date is used to prevent short-run effects from the severe U.S. recession distorting the trend line developments over the prior decade. As adequate data becomes available, future work will investigate how the U.S. Great Recession impacted India's competitive position in U.S. import markets.

(ii) Other productivity studies for China and India relative to the United States Lee et al (2007), Szirmai and Ren (2000), Szirmai et al (2005), Ark (1993), and Timmer (2000)

(iii) Related papers investigating the impact of infrastructure constraints, financing constraints, and regulatory constraints includes Banerjee and Duflo (2004), Nagaraj (2005), McKinsey (2006), Aghion et al (2006) and Mitra and Ural (2007).

(iv) Adams, Gangnes, and Shachmurove (2004) investigate China's export competitiveness from 1995-2002. Ahearne et al. (2003) examinedefined export competition in US markets in terms ofas "shifts in market share" across China and other East Asian nations. Greene (2006) examines China, India, and the U.S.'s export profiles to the world and to India.

(v) Krugman (1991) defines a similar measure where it $SPEC = \sum^{n}_{i=1} |a_i - b_i|$ with variables as defined for the F-K export similarity index. See Kim (1999), and Clark and WinCoop (2001) for applications using SPEC.

(vi) See Sissoko and Yerger (2010) for more detailed examples of MOM applications

(vii) See Sawchuk and Yerger (2006a,b) for complete derivation of all results in this section, Table 1B contains computation example.

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