AN ANALYSIS OF INDIA – CHINA TRADE AS A CASE STUDY FOR H-O THEOREM

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Abstract

This study looks at different factors to help explain why India's growth in total trade has been unimpressive relative to China's total trade output over the past twenty years since trade reforms began in both countries. A comparative analysis of both countries examines factors such as trade tariffs, labor laws, labor flexibility and labor productivity to understand whether India's meager contribution to global trade has been in conflict with H-O Theorem's proposition that even if the technology of production of a good is exactly the same across countries then gains from trade can still be realized due to factor abundance and factor intensities. The main findings of this paper are that:

- *i.* India's restrictive trade policies, rigid labor laws, encouragement of small scale companies, lower labor participation rate (a function of labor mobility, language and education) and lower labor productivity have all been key factors in explaining India's relative disadvantage to China in terms of its relative underperformance in the growth of total trade versus China.
- *ii.* China's composition of exports to India and imports from India shows that China is a labor abundant country relative to India. This supports H-O Theorem given that China and India's trade reflect their respective factor abundance with respect to their imports and exports.

I. INTRODUCTION

India and China have posted impressive rates of economic growth relative to the global economy over the past twenty years not withstanding significant external events including the Asian financial crisis in the 1990s, the bursting of the technology bubble in the US in 2000 and the most recent global financial crisis beginning with the collapse of the US mortgage market in 2008. In fact, the economies of India and China have grown at a 10 year real CAGR of at 7.8% and 10.7% respectively.

Most economists agree that much of this growth can be attributed to major policy reforms enacted by both countries beginning in the early 1980s, although many economists believe that India's economic reforms began in earnest only in

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the early 1990s with realy progress towards privatization and trade liberalization. Both India and China took steps to move away from centrally planned economic systems characterized by heavily regulated industries with significant government ownership and highly protective trade barriers designed to protect their respective domestic industries. In exchange, both India and China allowed for free market forces to more fully dictate their economic policies thereby opening their respective economies to the benefits of global trade.

These reforms had tangible results as witnessed by the fact that India's total trade has grown by a factor of ten fold since 1990 while its total trade as a percentage of its domestic GDP has increased from 13% in 1990 to 41% in 2008. China's performance has been even more impressive with its total trade growing twenty-one fold since 1990 while over the same time frame its total trade as a percentage of GDP has improved from 33% to 62%.

A bounty of literature has been written about China and India's successful transition toward more free market based economies and the consequential impact on economic growth in both countries. What is less well understood is that while China's share of global trade has ballooned from less than 0.50% of Global GDP in 1990 to 4.5% in 2008, India's share of global trade has only grown from 0.25% of Global GDP to 0.90% in 2008 despite the fact the both countries began 1980 with roughly similar shares of absolute trade relative to global GDP. This is confounding given the fact that India has one of the largest populations in the world in conjunction with one of the lowest labor rates in the world. According to the Economist magazine's yearly "Big Mac" Index, India's wage rates were 30% below that of China's in 2008 and one of the lowest in the world when adjusted for currencies and purchasing power. India's large and young workforce combined with its low wage



rates should have provided the perfect economic recipe to transform the country into a major hub for exports relative to the rest of the world and at the very least a challenger to China in terms of global trade. In fact, not only has India barely contributed to the significant growth in global trade over the past two decades, but China as a country now represents India's largest single source in terms of imports overtaking the United States and second only to the whole of the European Union. This study looks at the features of both China and India bilateral trade and total global trade while trying to understand the factors around both countries' trade development in the context of factor abundance and the Heckser-Ohlim Theorem.

III. HECKSHER – OHLIM THEOREM

Two Swedish economists named Eli Heckscher and Bertil Ohlim proposed the Hecksher-Ohlim model (H-O Theorem) in 1912. The H-O Theorem was effectively an extension to David Ricardo's Theory of Comparative Advantage in that H-O Theorem worked around Ricardo's assumption of unequal technological advantages. The H-O Theory proposed that even if the technology of production of a good is exactly the same across countries then gains from trade could still be realized due to factor abundance and factor intensities. The basic tenet of the Heckscher - Ohlin model (H-O model) is that a country will be better off choosing to export those goods which most intensively use factors of production in which that country is relatively factor abundant. The H-O model uses a 2 x 2 x 2 model system. This refers to a system in which there are two countries (country A & country B), two goods (good X & good Y) and two factors of production (capital K and Labor L). In understanding the H-O Theorem, we need to define factor abundance and factor intensity. Factor abundance always refers to a country not a good in that countries have factor abundances in labor or in capital whereas goods have factor intensities in labor or capital. Supposed two countries (Country A and Country B) have two factors of production in the form of labor (L) and capital (K). If (K/L) A equals the capital to labor ratio in country A and (K/L) B equals the capital to labor ratio in country B then by definition if:

then country A is capital (K) abundant relative to country B and therefore country B is automatically Labor (L) abundant.

Another way to look at factor abundance is by looking at the ratio of factor prices between two countries. Consider that the price of labor (L) is the wage rate (w) and the price of capital (K) is the rent rate (r). Then, if (W/R) A equals the rental ratio in country A and (W/R) B equals the rental ratio in country B then if:

(W/R) A > (W/R) B

then country A is capital abundant and by default country B is labor abundant.

Factor intensity of production, on the other hand, always refers to goods. Suppose two goods, X and Y, use two factors of production, namely K and L. If (K/L) X equals

the capital to labor ratio required to produce 1 unit of good X and (K/L) Y is the capital to labor ratio required to produce 1 unit of good Y. Then if:

(K/L) Y > (K/L) X

then good X is labor intensive and good y is capital intensive.

Given these parameters, if the production of good X requires a greater proportion of capital to labor than good Y and country A is relatively capital abundant relative to country B, then under the H-O theorem, country A is better off exporting good X to country B while importing good Y from country B which is by default labor abundant relative to country A. Therefore, country B is better off exporting good Y and importing good X from country A. Under the H-O theorem, even if technological advantages in production were equal across two countries, given differences in factor abundance between two countries and factor intensity between two goods, trade could still take place.

The H-O theorem requires several assumptions. First, as mentioned above, the system needs to be a 2 by 2 by 2 model. Second, free trade must exist between the two countries. In other words, there should be no impediments to trade such as tariffs, quotas or any other barriers that would add friction to the free flow of goods and services between two countries. Third, the technology of production must be the same for a good in both countries. Therefore, if good X requires 3 units of labor and 4 units of capital in country A then that same good X should require a similar ratio of labor to capital in country B. Fourth, both goods X and Y must be produced under increasing cost conditions or put differently; diminishing marginal productivity of resources must exist. Fifth, both goods are produced under perfect competition. This requires a large number of producers and sellers without either having the ability to dictate the market price of a good or goods. In addition, firms must be able to freely enter and exit the marketplace. Finally, H-O Theorem requires that the behavior of consumers is the same in both countries in terms of consumer tastes and likes. This requires that supply dictate trade rather than differences in tastes between two countries.

Aside from Heckscher and Ohlim themselves, Wesley Leontief was a major contributor to H-O Theorem. Leontief carried out the test of the H-O theorem in 1951 using data of US economy in 1947. Leontief tested the capital and labor intensities of US exports using input-output tables with capital and labor intensities of import substitutes in the US as proxies for actual imports into the US. He found that in 1947, US exports were 30% more labor intensive than US import substitutes. This today is called the Leontief Paradox as it seemingly violates the H-O Theorems proposition in that US exports should have been more labor intensive than its imports given the US was capital abundant at the time the studies were done.

There were several explanations for Leontief's paradox. First, Leontief himself argued that US labor productivity was three times larger than the rest of the world in 1947 and therefore US was actually a labor abundant country. However, US capital productivity was also three times higher than abroad, a realization that forced Leontief to later retract his argument for the US being labor abundant. The second explanation of Leontief's paradox is due to Factor Intensity Reversal (FIR). FIR refers to the fact that the same goods produced in a capital intensive way in one country may be produced in a labor-intensive way in another country. For example, shoes in the US are produced using factory automation equipment and therefore require large amounts of capital relative to labor whereas shoes in China are produced using unskilled labor and therefore require large amounts of labor relative to capital. Thus, Leontief's use of US import substitutes as a proxy for US imports was wrong. However, studies show that FIR is not very common and only takes place in 16% of all goods traded therefore FIR does not fully explain Leontief's paradox. The third explanation was that in 1947, the US imposed high import tariffs to protect labor-intensive jobs for WWII vets coming home and looking for work. However, economist Robert Stern and Robert Baldwin, repeated Leontief's study using more modern data and found that Leontief's paradox diminishes but doesn't disappear. A fourth explanation introduced by Stefan Linder in 1962 (known today as Linder's hypothesis) proposed that international trade is more governed by demand factors than supply factors. Therefore, tastes and preferences of consumers in 1947 were biased in favor of capital intensive goods especially imports including automobiles, telephones, home appliances, etc. Thus, the US imported more capital-intensive goods because consumers in the US preferred them. A final explanation for Leontief's paradox is that H-O Theorem makes the mistake of assuming only two factors of production. In reality, there can be several goods that are natural resource intensive especially agricultural or minerals goods and therefore factor abundance may be a function of geological endowment. This would include products such as coffee from Brazil, iron ore from Australia and copper in Peru just as examples. Economists Robert Sterns and Keith Maskus concluded that Leontief's paradox doesn't exist when three factors of production are recognized.

If we juxtapose the H-O Theorem to India and China, both countries have large populations earning wages that are low by global standards. In addition, both countries took steps in the early 1980s to reduce trade barriers and open up their respective economies to the global marketplace. Therefore, under H-O Theorem, India and China should have taken significant roles in global trade especially with respect to labor-intensive goods given both countries' labor abundance relative to the rest of the world.

IV. COUNTRY ANALYSIS - CHINA & INDIA TRADE

The trade data between India and China reveal a number of notable observations. First of all, not only has India run persistent trade deficits with China for the past 10 years but over the past 5 years these deficits have grown considerably from 6.5% of India's GDP to nearly 20% in 2008. This despite the fact that the Indian Rupee has fallen in value relative to the Chinese Yuan from 1990 to 2009 making Indian goods cheaper relative to Chinese goods purely from an exchange rate standpoint (Indian Rupee declined relative to the Chinese Yuan from Rs15/1Rmb

in 1990 to Rs53/1Rmb as of 2009). Figure 1 looks at the value of nominal Chinese exports and imports from India. As a side note, the table shows India's trade deficits with China including and excluding iron ore exports, India's largest export to China, given the fact that India's exports of iron ore to China has more to do with India's factor abundance of iron ore, due to geological endowments, rather than any comparative advantage in labor or capital with respect to the production of iron ore. Therefore, excluding exports of iron ore, India has been a net importer of goods from China. Importantly, even if we include iron ore exports, India has still run persistent trade deficits with China.

	China Exports India	% y/y growth to China Exports to India	0	China Iron Pre Imports from India	% y/y growth) fr J	Imports om India ess Iron Ore	% y/y growth China Imports From India ex Iron Ore	Cl	hina Trade arplus less Iron Ore	% y/y growth	1	India GDP	Trade Deficit as % of GDP (Annualized)
2005	\$ 8,9	35 na	s	5,230	na	s	4,548	na	s	4,387	na	s	810	6.50%
2006	\$ 14,5	83 63.2%	s	4,831	-7.6%	s	5,638	24.0%	,s	8,945	103.9%	s	915	11.73%
2007	\$ 24,0	33 64.8%	,s	7,864	62.8%	,s	6,794	20.5%	,s	17,239	92.7%	s	1,177	17.58%
2008	\$ 31,5	13 31.1%	s	13,440	70.9%	,s	6,900	1.6%	,s	24,613	42.8%	,s	1,217	24.27%
Jan-09	\$ 2,0	55 -17.6%	s	601	-54.5%	,s	260	-68.5%	,s	1,795	7.5%	\$	1,327	19.49%
Feb-09	\$ 1,7	51 -11.9%	ŝ	772	-44.3%	s	370	-43.3%	,s	1,381	3.4%	s	1,327	14.99%
Mar-09	\$ 2,2	24 -8.1%	ŝ	882	-37.4%	s	431	-42.2%	,s	1,793	7.2%	s	1,327	19.46%
Apr-09	\$ 2,3	90 -13.6%	ŝ	679	-67.0%	s	671	-10.1%	,s	1,719	-14.9%	s	1,327	18.66%
May-09	\$ 2,3	53 -20.0%	s	523	-69.8%	s	497	-28.0%	,s	1,856	-17.6%	s	1,327	20.15%
Jun-09	\$ 2,2	62 -25.4%	s	467	-64.1%	s	460	-11.5%	,s	1,802	-28.3%	s	1,327	19.56%
Jul-09	\$ 2,7	83 -3.8%	s	480	-54.3%	,s	499	-11.5%	,s	2,284	-2.0%	s	1,327	24.79%
Aug-09	\$ 2,6	90 -9.1%	s	382	-57.8%	,s	417	-16.3%	,s	2,273	-7.7%	s	1,327	24.67%
Sep-09	\$ 2,6	68 -8.2%	s	755	-6.4%	s	667	41.9%	,s	2,001	-17.8%	s	1,327	21.72%
Oct-09	\$ 2,4	37 - <i>3.9%</i>	s	447	-6.7%	s	488	6.3%	,s	1,949	-6.1%	s	1,327	21.16%
Nov-09	\$ 2,7	77 25.9%	s	681	108.3%	s	514	47.7%	,s	2,263	21.9%	s	1,327	24.57%
Dec-09	\$ 3,2	89 38.8%	,s	966	46.4%	s	815	114.5%	,s	2,474	24.4%	s	1,327	26.86%
2009	\$ 29,6	79 -5.8%	s	7,635	-43.2%	s	6,089	-11.8%	,s	23,590	-4.2%	s	1,327	21.34%
Jan-10	\$ 2,8	06 36.5%	s	915	52.2%	s	902	246.9%	,s	1,904	6.1%	s	1,426	19.23%
Feb-10	\$ 2,6	96 54.0%	s	1,024	32.6%	,s	658	77.8%	,s	2,038	47.6%	\$	1,426	20.58%
Mar-10	\$ 2,8	38 27.6%	ŝ	1,436	62.8%	s	884	105.1%	s	1,954	9.0%	s	1,426	19.73%

Figure 1: India and China Trade Data (SUSD MIns)

Source: Bloomberg

Source: China Customs Administration

On a more granular basis, figure 2 breaks apart India's global exports by end product. For the past five years, India's surge in exports in terms of value has come largely from the growth in either capital intense goods or goods where India has geological factor endowments such as petroleum products, iron and steel and chemicals. Even if we look at the explosive growth in software services exports and

Product label	J val	Exported ue in 2005	% of Total	I val	Exported lue in 2006	% of Total] val	Exported ue in 2007	% of Total	va	Exported lue in 2008	% of Total
All products	\$1	100,352,640	100%	\$1	21,200,608	100%	\$1	45,898,048	100%	S	181,860,896	100%
Mineral fuels, oils, distillation products, etc	s	10,498,489	10.5%	s	18,004,640	14.9%	s	23,622,376	16.2%	s	32,868,444	18.1%
Pearls, precious stones, metals, coins, etc	s	16,144,617	16.1%	s	15,787,463	13.0%	s	19,100,980	13.1%	s	20,175,390	11.1%
Iron and steel	s	4,333,672	4.3%	s	5,188,770	4.3%	s	5,983,152	4.1%	s	8,198,676	4.5%
Nuclear reactors, boilers, machinery, etc	s	4,061,576	4.0%	s	4,956,297	4.1%	s	6,115,705	4.2%	s	8,108,795	4.5%
Organic chemicals	S	4,442,587	4.4%	S	5,777,481	4.8%	S	6,515,983	4.5%	S	7,907,098	4.3%
Electrical, electronic equipment	s	2,639,347	2.6%	s	3,751,289	3.1%	s	4,704,936	3.2%	s	7,014,484	3.9%
Ores, slag and ash	s	4,851,112	4.8%	s	4,601,238	3.8%	s	5,858,378	4.0%	s	6,519,472	3.6%
Articles of iron or steel	s	2,748,111	2.7%	s	3,229,853	2.7%	s	4,455,594	3.1%	s	6,190,164	3.4%
Vehicles other than railway, tramway	s	3,204,943	3.2%	s	3,655,463	3.0%	s	4,077,858	2.8%	s	6,088,681	3.3%
Articles of apparel, accessories, not knit or crochet	s	5,075,899	5.1%	s	5,438,101	4.5%	s	5,243,923	3.6%	s	5,883,940	3.2%
Pharmaceutical products	s	2,345,727	2.3%	s	2,992,352	2.5%	s	3,833,764	2.6%	s	5,005,349	2.8%
Cotton	s	2,612,085	2.6%	s	3,510,154	2.9%	s	4,408,541	3.0%	s	4,548,480	2.5%
Articles of apparel, accessories, knit or crochet	s	3,124,754	3.1%	s	3,576,970	3.0%	s	4,129,437	2.8%	s	4,381,111	2.4%
Cereals	s	1,915,272	1.9%	s	1,588,583	1.3%	s	2,770,923	1.9%	s	3,912,219	2.2%
Plastics and articles thereof	s	2,222,790	2.2%	s	2,661,760	2.2%	s	2,689,966	1.8%	s	2,816,753	1.5%
Residues, wastes of food industry, animal fodder	s	807,067	0.8%	s	1,265,596	1.0%	s	1,619,340	1.1%	s	2,779,798	1.5%
Ships, boats and other floating structures	s	648,909	0.6%	s	782,638	0.6%	s	1,289,958	0.9%	s	2,618,988	1.4%
Other made textile articles, sets, worn clothing etc	s	2,381,251	2.4%	s	2,344,686	1.9%	s	2,329,821	1.6%	s	2,421,585	1.3%
Copper and articles thereof	s	1,318,922	1.3%	s	2,800,998	2.3%	s	2,901,348	2.0%	s	2,342,041	1.3%
Miscellaneous chemical products	s	1,055,098	1.1%	s	1,100,851	0.9%	s	1,342,670	0.9%	s	1,964,710	1.1%
Coffee, tea, mate and spices	s	898,456	0.9%	s	1,124,594	0.9%	s	1,386,684	1.0%	s	1,746,020	1.0%
Commodities not elsewhere specified	s	1,120,511	1.1%	s	1,267,088	1.0%	s	1,679,168	1.2%	s	1,681,170	0.9%

Figure 2: India's Global Export by Product (SUSD 000s)

Source: www.unctad.com

generic pharmaceuticals manufacturing, these two industries still only account for less than 10% of India's combined exports.

For example, as of 2008, India's software services exports alone accounted for roughly 5.8% of India's total exports while pharmaceutical products accounted for 2.8% of India's total exports. In addition, Figure 3 looks specifically at the bilateral trade between India and China broken down by product. From both Figures 2 and 3, one can see that India's imports from China largely take the form of labor intensive products including finished electrical and electronic equipment and general machinery, mostly in the form of assembled goods, while 58% of India's exports to China are in the form of unprocessed raw materials, largely iron ore which is both capital intensive and involves geological factor endowment rather than labor or capital abundance. In fact, China's export of electronic equipment to India alone is equal in absolute size to India's total global exports of electronic equipment. Furthermore, while China's share of global electronics and electronic equipment exports grew from 1.1% in 1990 to 15.2% in 2004. India's share declined from 0.8% to 0.6% during the same time frame. Similarly, in looking at finished textile and clothing, from 1991 to 2004, China's global exports of clothing has grown from \$15bln to \$60bln per year while India's global exports of clothing has grown from \$2bln to \$8bln during the same time period. To put this into perspective, in 1990 China's exports of clothing and textiles accounted for 15.8% of global textile and clothing exports while India accounted for 4.4%. By 2004, China's share of global textile and clothing exports had climbed to 31.2% whereas India's had only risen to 6.4%. In total, as Figure 4 shows, India's total merchandise trade as a percentage of global GDP increased from 0.19% in 1990 to 0.82% in 2008 while China's total merchandise trade as a share of global GDP increased from 0.53% to 4.40% during the same time period. A similar study conducted by Arvind Panagariya in 2005 found that the composition of China's exports tends to be in more unskilled or semi-skilled labor intense industries that appropriately adhere to the country's

	India's impor	ts from China			India's expo	orts to China	
Product label	Value in 2007	Value in 2008	% of Total	Product label	Value in 2007	Value in 2008	% of Total
All products	\$24,575,772	\$31,586,024	100.0%	All products	\$ 9,491,978	\$10,093,927	100.0%
Electrical, electronic equipment	\$ 7,025,673	\$ 8,477,315	26.8%	Ores, slag and ash	\$ 4,909,132	\$ 5,829,160	57.7%
Nuclear reactors, boilers, machinery, etc	\$ 4,122,975	\$ 6,075,822	19.2%	Cotton	\$ 935,689	\$ 779,630	7.7%
Organic chemicals	\$ 2,187,469	\$ 2,857,476	9.0%	Organic chemicals	\$ 611,300	\$ 456,051	4.5%
Iron and steel	\$ 1,464,749	\$ 1,741,572	5.5%	Salt, sulphur, earth, stone,	\$ 239,208	\$ 294,174	2.9%
Others	\$ 9,774,906	\$12,433,839	39.4%	Others	\$ 2,796,649	\$ 2,734,912	27.1%

Figure 3: India and China Bilateral Trade

Source: www.unctad.com

	,	1000	-	1005	,	1000	-	1005	,	2000	-	2005	-	2007	,		-	2000
(SUSD Mins)		1980		1985		1990		1995		2000		2005		2006		2007		2008
Indian GDP (SUSD Mlns) - Nominal	5	184	s	230	5	317	S	356	5	460	5	810	s	915	S	1,177	S	1,217
% y/y growth		na		9.5%		8.2%		9.9%		2.0%		15.5%		13.0%		28.6%		3.4%
Imports	S	14,822	s	16,329	S	23,991	S	34,490	s	50,336	s	134,690	s	186,681	S	249,317	S	304,166
% y/y growth		na		8.0%		24.3%		35.3%		5.1%		34.9%		38.6%		33.6%		22.0%
% of GDP		8.1%		7.1%		7.6%		9.7%		10.9%		16.6%		20.4%		21.2%		25.0%
Exports	\$	8,441	s	8,265	\$	17,813	s	30,539	s	42,627	\$	97,929	\$	122,698	s	153,672	s	191,926
% y/y growth		na		0.4%		12.5%		26.2%		18.7%		29.9%		25.3%		25.2%		24.9%
% of GDP		0.05		3.6%		5.6%		8.6%		9.3%		12.1%		13.4%		13.1%		15.8%
Trade Balance	s	(6,381)	s	(8,064)	\$	(6,178)	s	(3,951)	s	(7,709)	\$	(36,762)	s	(63,983)	s	(95,645)	s	(112,240)
% y/y growth		na		17.1%		78.6%		206.4%		-35.6%		50.3%		74.0%		49.5%		17.4%
% of GDP		(0.03)		-3.5%		-1.9%		-1.1%		-1.7%		-4.5%		-7.0%		-8.1%		-9.2%
Total Trade	S	23,263	s	24,594	\$	41,805	S	65,028	s	92,964	\$	232,619	s	309,379	s	402,989	s	496,092
% y/y growth		na		5.3%		19.0%		30.9%		10.9%		32.8%		33.0%		30.3%		23.1%
% of GDP		0.13		10.7%		13.2%		18.3%		20.2%		28.7%		33.8%		34.2%		40.8%
China (SUSD Mlns)	•	1980	•	1985	•	1990	•	1995	•	2000	•	2005	•	2006	•	2007	•	2008
China GDP (SUSD) - Nominal	s	189	s	307	s	357	s	728	s	1,198	s	2,236	s	2,658	s	3,382	s	4,326
% v/v growth		na		19.5%		3.8%		30.2%		10.6%		15.7%		18.9%		27.2%		27.9%
Imports	s	19,505	s	42,481	s	53,810	S	132,164	s	225,175	s	660,224	s	791,795	s	956.264	S	1,196,750
% v/v growth		na		63.7%		-9.0%		14.2%		35.9%		17.6%		19.9%		20.8%		25.1%
% of GDP		10.3%		13.8%		15.1%		18.2%		18.8%		29.5%		29.8%		28.3%		27.7%
Exports	s	18,139	s	27.333	s	62,760	s	148,965	s	249,223	s	762,648	s	969.803	S	1,218,700	s	1.469.280
% v/v growth	-	na	-	10.1%	-	18.6%	-	23.2%	-	27.8%	-	28.5%	-	27.2%	-	25.7%	-	20.6%
% of GDP		9.6%		8.9%		17.6%		20.5%		20.8%		34.1%		36.5%		36.0%		34.0%
Trade Balance	s	(1.366)	s	(15.148)	S	8,950	s	16.801	s	24.048	s	102.424	s	178.008	s	262.436	s	272.530
% v/v growth	-	na	-	1243.0%	-	-243.7%	-	225.3%	-	-17.7%	-	219.4%	-	73.8%	-	47.4%	-	3.8%
% of GDP		-0.7%		-4.0%		2.5%		2.3%		2.0%		4.6%		6.7%		7.8%		6.3%
Total Trade	s	37.644	s	69.813	s	116.570	S	281,129	s	474.398	s	1.422.872	s	1.761.598	S	2.174.964	S	2.666.030
% v/v growth		na	Ĩ	37.5%	Ť	4.0%	Ĩ	18.8%		31.5%		23.2%		23.8%		23.5%		22.6%
% of GDP		10.0%		22.7%		32.7%		38.6%		39.6%		63.6%		66.3%		64.3%		61.6%

Source: www.unctad.com

factor abundance of labor. On the other hand, India's export factor content tends to be highly capital intensive or specialized in industries requiring relatively skilled labor including petroleum, iron ore and steel, software and IT, jewelry, gemstones, textile varn and fabrics (Panagariya 2006). This also accounts for the significant growth seen out of the India's IT services and pharmaceutical industries given the level of highly skilled labor needed for both industries. According to Panagariya, "India has failed to fully exploit its huge comparative advantage in unskilled-labor intensive products." (Panagariya 2006) Furthermore, in a study conducted by Swapan Bhattacharya and Biswa Bhattacharyay in 2007, both economists studied the import and export intensities between the two countries relative to each country's share of global GDP. The study looked at the size of exports and imports between India and China given the size of their economies respectively in order to determine whether each country's bilateral trade reflected its true potential. The study concluded that India exports much less to China than what it should given India's labor abundance relative to the size of China's economy and total global trade (Bhattacharya and Bhattacharyay 2008).

What seems to be apparent from all of the empirical data and relevant studies is that China is a much more labor abundant country despite both countries having reasonably similar populations and despite India having a lower level of absolute wages relative to China. China has done a much better job at more fully utilizing its large unskilled labor force relative to India and therefore allowed the country to take a significant share of total trade at the expense of India. A number of factors help explain why India lagged China so significantly in terms of its total trade with the rest of the world.

India and China reforms took very different paths at their outset. China's liberalization policies began in 1978 when Deng Xiaoping began his reform movement known as Gaige Kaifang (literally translated means reforms and openness). These reforms were aimed at decentralizing China's planned economy while placing greater emphasis on free market forces in economic decision making in addition to integrating their economies into the world market. In most aspects, China acted swiftly and boldly. The country opened up to foreign investment by granting tax breaks and subsidies to foreign joint ventures within the country. In addition, China aggressively dropped import controls from 90% of merchandise goods subject to import tariffs to 40% in a span of five years and as a result China's share of world trade doubled from 1.4% to 2.5% between 1980 and 1990 which is a remarkable feat in such a relatively short period of time. In contrast, most economists agree that India's trade liberalization process was much more gradual in terms of both its policies and its tangible impact on the economy. India's reforms in the 1980s were much more of a piecemeal approach as Rajiv Ghandi had to compromise to leftist party agendas in order to pass through his reform policies. This led to more watered down attempts at removing trade barriers relative to that of China which pushed through reforms at will given the benefit of its central party system. According to Panagariya, "India's growth in the 1980s was fragile, highly variable from year to year and unsustainable. In contrast, once the 1991 reforms took root, growth became less variable and more sustainable with even a slight upward shift in the mean growth rate." (Panagariya 2007). Yet even with the more significant reforms in the early 1990s, India's trade policy remained relatively restrictive especially in comparison to that of China. As Figure 5 shows, while effective import tariffs in both China and India fell from 1990 to 2008, China's began at a much lower level in 1995 at 24% vs India's at 57%. In addition, China's effective tariffs rates remained well below India's until the mid to late 2000s as tariffs rates in both countries have now effectively converged. Therefore, despite India's progress toward reform, the country up until about 2005 held a very restrictive import tariff regime relative to China. While India's trade tariffs have come down significantly over the past 20 years, more recent data going back just 10 years shows that India has still meaningfully lagged China in terms of global trade. Therefore, high tariffs alone fail to explain the whole problem. Part of the issue had to do with India's labor laws from 1990 to 2003 that were very much pro-labor compared to China's labor laws that were largely pro-business. Even as the country lowered trade tariffs, India ruled out the firing of workers by a firm with 100 or more workers under any circumstances. According to Panagariya, "Even if a firm went bankrupt, that firm had to continue to pay the salaries of its workers for the life of that worker. In contrast, foreign JVs in China had full flexibility in terms of employment, wage and pricing policies. Employees were subject to warnings, wage cuts and dismissal."

China - Tariffs (Effective Rates)	1980	1985	1990	1995	2000	2005	2006	2007	2008
Manufactured goods, ores and metals	na	na	na	27.1%	15.7%	9.0%	8.6%	8.7%	8.4%
Ores and metals	na	na	na	11.7%	5.9%	3.8%	3.4%	3.5%	3.2%
Manufactured goods	na	na	na	27.9%	16.2%	9.3%	8.9%	8.9%	8.7%
Chemical products	na	na	na	20.2%	12.3%	7.4%	2.0%	7.0%	6.8%
Machinery and transport equipment	na	na	na	22.5%	15.0%	7.9%	7.4%	7.6%	7.0%
Other manufactured goods	na	na	na	33.6%	18.2%	10.6%	10.1%	10.1%	10.0%
Average	E1	na	E1	23.8%	13.9%	8.0%	7.6%	7.6%	7.3%
India - Tariffs (Effective Rates)	1980	1985	1990	1995	2000	2005	2006	2007	2008
Manufactured goods, ores and metals	na	eu	79.8%	57.4%	30.6%	14.7%	13.7%	12.7%	8.3%
Ores and metals	na	na	74.7%	52.9%	29.2%	14.9%	13.9%	12.9%	5.1%
Manufactured goods	na	na	80.1%	57.7%	30.7%	14.7%	13.7%	12.7%	8.4%
Chemical products	na	na	82.2%	61.9%	34.1%	15.7%	14.5%	13.4%	8.7%
Machinery and transport equipment	na	na	76.2%	52.4%	27.0%	13.8%	12.9%	12.0%	7.7%
Other manufactured goods	na	na	82.2%	59.4%	31.6%	14.8%	13.9%	12.9%	8.8%
Average	na	na	0.79	56.9%	30.5%	14.8%	13.8%	12.7%	7.8%

Figure 5: China and India Historic Tariff Data

Source: www.unctad.com

(Panagariya 2007) This was an important factor for investors, especially for multinational corporations, when deciding where to spend capital and build new factories and facilities. India's relative lack of labor flexibility deterred foreign investors from setting up manufacturing centers especially in more value added labor-intensive industries. This is evident from looking at foreign direct investment (FDI) data from 1990 to 2005. FDI into China increased from \$2bln in 1990 to \$55bln per year in 2005 while FDI into India increased from virtually zero in 1990 to \$6.5bln by 2005. Clearly, China has been a much more attractive destination for FDI relative to India during the past twenty years and relaxed labor laws has been an essential factor.

In addition to rigid labor laws, India's Small-Scale Industries (SSI) reservation policy, in place from the early 1980s until it was largely abolished in early 2000s, created a severe disadvantage relative to China in terms of promoting international trade. India restricted the manufacturing of labor-intensive industries, including those on which China built its export sector, to "small scale" units defined as industries with less than \$100,000 invested in plant and machinery. The limit on capital invested was later raised to \$1 million but remained in place until the end of the 1990s. These limitations created a major disadvantage relative to China in that India's labor-intensive industries never reached maximum economies of scale needed to minimize total unit production costs in order to effectively compete with similar industries in China. According to M.S. Ahluwalia, India's Deputy Planning Commissioner,

"The main area where action has been inadequate relates to the long-standing policy of reserving production of certain items for the small-scale sector. About 800 items were covered by this policy since the late 1970s, which meant that investment in plant and machinery in any individual unit producing these items could not exceed \$ 250,000. Many of the reserved items such as garments, shoes, and toys had high export potential and the failure to permit development of production units with more modern equipment and a larger scale of production severely restricted India's export competitiveness. The Report of the Committee on Small Scale Enterprises (1997) and the Report of the Prime Minister's Economic Advisory Council (2001) had both pointed to the remarkable success of China in penetrating world markets in these areas and stimulating rapid growth of employment in manufacturing. Both reports recommended that the policy of reservation should be abolished and other measures adopted to help small-scale industry. While such a radical change in policy was unacceptable, some policy changes have been made very recently: fourteen items were removed from the reserved list in 2001 and another 50 in 2002. The items include garments, shoes, toys and auto components, all of which are potentially important for exports. In addition, the investment ceiling for certain items was increased to \$1 million. However, these changes are very recent and it will take some years before they are reflected in economic performance." (Ahluwalia ???)

The point here is that like for like industries in China had a significant first mover advantage in terms of gaining economies of scale relative to India because Chinese industries could maximize profits by minimizing average costs down to the most optimal level. India, on other hand, had a gating factor in the form of the amount of capital a firm could acquire in order to expand and compete. Therefore, until SSI reservation policies were abolished in 2003, Indian companies could never achieve the economies of scale required to effectively compete with their Chinese counterparts.

Between 1980 and 2000, India's government worked more gradually relative to China's government in terms of fully embracing trade liberalization, slowly lowering import tariffs and leisurely eliminating restrictive labor policies. This gradualist approach explained why India's total trade lagged China between 1980 and 2000. Yet by the early 2000s, India's trade policies and labor laws more closely resembled China's than any time in the previous two decades. Yet China's gains in share of global trade continued to outpace India's through 2008. Therefore, a number of additional factors played important roles in continuing to hold back India's contribution to global trade relative to China from the early 2000s to today.

One major reason for India's relatively lackluster contributions to total global trade comes from differences in labor force participation between China and India. According to the World Bank, India's labor force participation, defined as the percentage of the population aged 15 years or older that is earning a salary, was 58% in 2009 versus China's workforce participation rate of 74%. These differences are important as it relates to the actual size of the workforce each country can utilize to produce common goods. At a 58% participation rate, India's workforce totals approximately 600 million workers versus China's workforce of close to 900 million workers. There are several reasons to help explain the difference in participation rates including the fact that China's labor force is highly flexible given its high level of labor mobility and homogeneity as it relates to education and cultural similarities including language. With respect to labor mobility, according to China's State Population and Family Planning commission, approximately 150mln workers or 11.5% of China's population and nearly 20% of China's labor force are considered migrant workers or workers that leave inland cities to look for better paying jobs in wealthier cities along the coast. This migrant labor force is critical as this gives the economy a high degree of flexibility as industries ebb and flow to changes in market demand. In contrast, India's labor mobility seems to be relatively benign by China's standards. According to studies of dispersions of state incomes across India, between 1961 and 1991, only 1.5% of the gap between rich and poor states was closed despite large deviations in relative wages between states. Net immigration across Indian states responded weakly to differentials in state per capita incomes, indicating formidable barriers to inter-state labor mobility. (????) Another important factor behind China's labor mobility is due to the fact that China's government actually encouraged labor migration by setting urbanization goals for the country. The central government set a target to reach an urbanization rate of 48% by 2010 and 65% by 2050 in an attempt to move China's labor force away from low value added agricultural employment into more value added yet largely unskilled or semi-skilled labor. In contrast, India indirectly supported rural employment by imposing pricing floors for certain agricultural products such as wheat and rice. This artificially subsidized farmer incomes and gave many would be migrant workers the economic incentive to continue farming. As a result, even today India's share of agricultural workers accounts for 70% of the total workforce versus China's agricultural share at 45%. This also has important implications for China and India's relative labor factor productivity. As India employs more of its workforce in labor-intensive agricultural activities, this pulls labor away from more value added labor-intensive manufactured goods industries. The latter can employ technology and capital to improve total factor productivity at a much faster pace than can agricultural industries. Therefore, without labor mobility, economic systems have a difficult time meeting the changing needs of an economy especially in terms of alleviating unskilled labor shortages in certain regions or industries. According to Ana Iregui, "Labor migration enhances efficiency by reallocating labor from low productivity to high productivity activities." (Iregui 2003).

Expanding on the topic of labor flexibility, language and cultural barriers can heavily influence labor mobility. For example, China benefits from the fact that the majority of its population, approximately 850 million people, speaks Mandarin as its primary language. On the other hand, India has 9 major languages including Hindi, Gujarati, Punjabi, Sindhi, Marathi, Tamil, Telugu, Bengali and Urdu. In fact, there are 22 languages in India spoken by more than 1 million people each. Language and cultural barriers can heavily influence labor mobility. Employers may be biased to look for workers from similar ethnic backgrounds or that speak the same language. In addition, employees may feel intimidated moving to states and regions that speak different languages or that have different cultural idiosyncrasies. Alongside a unification of languages, China's labor force tends to be relatively more educated. According to the United Nations' 2009 Development Report, China's literacy rate was 93% in 2009 vs. 66% in India. In addition, while primary school net enrollment in China was 94% in 2008 versus India at 90%, secondary school net enrollment falls to 57% for India while China's secondary school enrollment was 94% as of 2008 according World Bank statistics. This lack of education plays an important role in labor force participation. With greater education, India could meaningfully improve both labor mobility and labor force participation both of which could help improve the total labor available for unskilled labor-intensive industries.

One final point regarding differences in labor productivity rates between China and India has to do with China's investment in infrastructure relative to India. According to a study conducted in 2002 by William Shepherd, Boon Lee and Prasada Rao, China's total labor productivity when measured in constant currency has improved by 295% since 1990 to 2002 whereas India's total labor productivity has improved by 180%. A great deal of this difference can be attributed to differences in infrastructure spending between the two countries. According to China's National Bureau of Statistics, in 2009 China spent 50% of its GDP (approximately \$3.3trln) on fixed asset investments. Excluding real estate construction spending, total fixed asset investment on infrastructure totaled \$660bln or approximately 11% of the country's GDP. In contrast, according to the Reserve Bank of India, the country spent approximately 6.5% of its GDP on infrastructure investments or about \$98bln. China's emphasis on infrastructure spending has permitted its labor force to be much more productive. For example, China has the 2nd largest installed power per capita at 277 watts per capita vs. India at only 50 watts per capita according to the IEA. India spends \$17 per person per year on urban development of which the majority includes roads and power while China spends nearly \$110 per person per year. A typical Indian port spends 96 hours loading and unloading a container ship of cargo, nearly 10 times longer than in Hong Kong or Shenzhen. As a result, China's high level of investment in infrastructure has improved the productive capacity of its workforce relative to India's. The point here is that China's high level of labor productivity coupled with its higher labor participation rate has been an important factor in establishing China's labor abundance relative to India.

V. CONCLUSION

India's restrictive trade policies, rigid labor laws and promotion of subscale small companies over larger ones gave Chinese industries a head start in terms of reaching the economies of scale needed to out-compete their Indian rivals. In addition, a lack of labor flexibility in the form of immobility, high illiteracy rates and heterogeneous languages led to lower labor participation rates between the two countries. Finally, China's overinvestment in infrastructure relative to India gave China's labor pool a significant advantage in productivity such as to time to market, logistical advantages and access to consistent sources of electricity. This means that China's labor productivity and higher labor participation rate more than offsets its similar absolute population size and higher wage rates relative to India. The fact that China's exports to India are relatively labor-intensive fits with the fact that China is a labor abundant country relative to India and thus China and India's bilateral trade adheres to their respective factor abundances that is consistent with the propositions laid out by the H-O Theorem.

India has clearly lagged China in terms of total global trade and in terms of its potential exports to China given the size its labor force. Yet India has been making significant progress in terms of lowering trade tariffs as a mean of capturing a greater share of global trade. Since India's effective tariffs converged with that of China's from 2006 to today, India's total trade growth has accelerated to an average nominal rate of over 30% per annum. In fact, while it took 14 years for India's trade as a percentage of global GDP to double between 1991 to 2004 from 0.20% to 0.42%, India repeated this same feat in only 4 years as its trade as a percentage of global GDP to 0.80% by 2008 as the country halved its effective tariffs down from 15% in 2005 to 8% in 2008. In addition, India will naturally capture significant demographic dividends over the coming decades due to its young workforce relative to China's. In fact, China's aging labor force means that the country needs to improve labor productivity at a faster pace than it has in the past in order to offset the lack of growth in its labor force. India, on the other hand, should see its labor force swell as labor participation rates improve. Yet, in

order for the country to full reach its potential, India needs to focus on improving labor force participation through an emphasis on secondary education and labor mobility. In addition, the country should work to improve workforce productivity by focusing on infrastructure spending that is needed to handle a larger urban labor force. Such policies could allow India to become a much larger player in global trade over the coming decades while leading to higher incomes, standard of living and overall wealth for its people.

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