

## China and India: Implications for the EU Economy

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### Abstract

This paper provides background information on the likely challenges the rise of China and India will pose for the economy of the EU. The purpose is mainly descriptive, namely to spell out what kind of trading partner China and India will represent for the EU in the foreseeable future. A first observation is that India is several times smaller than China in economic terms. Moreover, because its investment rates in both human and physical capital are much lower than in China, its growth potential is likely to remain more limited.

China already now exports more manufacturing goods than all other emerging markets together. But its export structure is also evolving rapidly and has become rather similar to that of advanced economies like the EU. This 'convergence' is likely the result of a very rapid accumulation of human and especially physical capital. If current trends continue, China will have a capital/labour ratio similar to that of the EU by the end of the next decade. In terms of human capital, China has already caught up considerably, but further progress will be slowed down by its stable demographics and the still low enrolment ratio in tertiary education. In both areas, India lags China by several decades.

The rapid accumulation of capital suggests that the emergence of China will put adjustment pressures mainly on capital-intensive industries, not the traditional sectors, such as textiles. Another source of friction that is likely to emerge derives from the abundance of coal in China, resulting in a relatively carbon- and energy-intensive economy.

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# CHINA AND INDIA: IMPLICATIONS FOR THE EU ECONOMY

## CEPS WORKING DOCUMENT NO. 280/JANUARY 2008

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### 1. Introduction

China and India are often mentioned in one breath as representing similar challenges for the EU (and indeed all OECD countries). However, the scale of the challenge from each of these two economies is not comparable. In terms of the sheer size of the trade and investment flows the differences dwarf the similarities, as shown in Table 1 below. At current prices and exchange rates, the GDP of China is about twice that of India, and China exports 9 times as much goods and still almost twice as much services. In terms of inward FDI, China is more than ten times bigger than India.

Table 1. China and India: Comparing size (\$ billion)

	GDP		Trade (exports)		Inward
	Current	PPP	Goods	Services	FDI
China	2,600	5,000	970	92	78
India	850	2,500	120	56	7
EU 27	13,000	13,700	1330	192	

Sources: WEO database, Eurostat and International Comparison Programme (ICP) (2007) of the World Bank.

The raw data on the size of China and India in economic terms suggest that China on its own is large enough to have a strong impact on the global economy (and on the EU), whereas India might constitute an important actor in some niche sectors (services trade, especially software). Being an order of magnitude smaller than China in economic terms (especially overall trade), however, it is not large enough to have, on its own, a noticeable impact on the global or the EU economy. This paper will thus concentrate mainly on China.

We first provide some rough numbers on today's trade structure as well as the upgrading of the human and physical capital stock in China. These numbers suggest that the current differences in capital/labour ratios will disappear rapidly and that trade between the EU and China will thus become intra-industry in nature. Given that capital will most probably continue to be underpriced in China, it is even likely that future trade disputes will arise more frequently in those sectors characterised by both high capital intensity and economies of scale (steel, cars, ships, etc.), rather than in the 'old' labour-intensive sectors (textiles). Japan and Korea experienced similar shifts in their export structure earlier last century.

It is by now widely accepted that an expansion of trade among similar economies causes few problems because it is likely to be intra-industry in nature and thus does not displace entire industries or large groups of workers (e.g. the low-skilled). One of the key questions about the rapid rise of China as a trading economy is thus what kind of trade will expand between China

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and the EU: inter-industry (China exports textiles against machinery) or intra-industry (two-way exchange of highly differentiated varieties of machinery and other manufactured products)?

The available data suggest that China has already moved a long way towards the second paradigm, as can be seen from the evolution of the structure of Chinese exports reported in Table 2 below. The share of machinery (plus transport equipment) has more than doubled over the last decade, going from 21 to over 47% and is now already higher than that of the EU (44.4%).

*Table 2. A comparison of the structure of Chinese and Indian trade (exports) (%)*

SITC Category	China		EU
	1995	2006	2005
Food + beverages (0+1+4)	7.9	2.8	5.1
Minerals + fuels (2+3)	6.5	2.6	5.8
Chemicals (5)	6.1	4.5	14.7
Manufactures by material (6)	22.1	18.2	14.1
Machinery, transport (7)	21.0	47.2	44.4
Miscellaneous (8)	36.1	24.5	11.1

*Source:* UN trade statistics.

The composition of China's exports has thus changed rapidly over 10 years and is already now rather close to that of the EU. Since the structure of China's imports is also somewhat different however from that of the EU (more imports of machinery, for example), it remains true so far that China retains a comparative advantage in 'traditional' sectors, such as Textiles (contained in SITC (6)) and Miscellaneous (SITC (8) including toys, etc.), whereas the strongest sector for the EU is still machinery and transport equipment. A key question for the future is thus whether China will be able to continue the rapid shift away from traditional sectors. See also the annex, which compares China's and India's export structures.

This note does not deal with the frictions created by the large (and growing) trade surplus of China. There is an abundant literature on this issue and the longer-term considerations that follow will be relevant regardless of what happens to the overall Chinese trade surplus (or the bilateral one with the EU).

In assessing the likely future challenges of the rise of China for the EU, it might be useful to start from current perceived policy issues.

## **2. Yesterday's policy issues: Cheap labour?**

A first policy issue concerns the composition of Chinese exports. Policy-makers seem still to be under the impression (correct until recently) that imports from China are likely to threaten mainly labour-intensive industries, such as clothing. Given the extremely high investment rates in China, however, this is likely to change rather quickly. Some illustrative calculations suggest that within the next decade China could reduce the present difference in capital/labour ratios considerably, implying that the composition of Chinese exports should shift quickly as well.

The key fact that dominates the evolution of the capital/labour ratio in China is the very high Chinese investment rate. While there is some debate over the measurement of the denominator (GDP), it is generally agreed that China invests more than 40% of its GDP (against about 20% for the EU). This must be the starting point in any assessment of this issue. Recent results from the International Comparison Program of the World Bank has shown that China's GDP at PPP has previously been overestimated, but even the new results suggest that it is around 40% that of

the EU, if measured at PPP. (However, at current prices and exchange rates, the EU's GDP is five times larger.) Given the much higher investment ratio, the net result is that, if measured at PPP, total investment in China is similar in size to that of the EU. According to the World Bank's 2005 International Comparison Program (ICP) "Global Report":

The US accounts for the largest share of the world's expenditure for investment, but at 21 percent, it is closely followed by China with 18 percent. The 10 largest economies account for over more than two thirds of the world's investment. The share of investment in low and middle income economies is larger when world shares of investment are measured in PPP terms.<sup>1</sup>

FDI plays only a minor part in determining the overall resources devoted to investment since total FDI inflows represent around 10% of all investment in China. The importance of FDI for China is thus not the amount of capital invested, but the transfer of technology that it brings about.

Another reason why the capital stock is increasing much more quickly in China than in the EU is that the starting level of the capital stock in China is still much lower than in the EU. This implies that depreciation is much lower. In the EU, the (net) capital stock is increasing only slowly because most investment just makes up for depreciation, whereas the opposite is true in China.

Tables 3 and 4 below contain some of the basic data that allow one to calculate the evolution of the capital/labour ratios in Europe and China. The GDP of China is about 40% that of the EU if measured at PPP, but with the investment ratios at 20% and 44%, respectively, this means that in absolute terms (annual) investment in China is actually of a similar size as that of the EU.

One key question is the size of the labour force over which capital is spread in China. According to official statistics, total employment in China amounts to around 700 million, but only about one-half of this number is employed in the modern sector.<sup>2</sup> It is thus assumed here that the capital stock is used mainly in the modern sector, which employs about 350 million persons (against around 200 million for the EU).

Data on the capital stock in China are scarce. A recent study<sup>3</sup> uses a variety of different methods and comes to the conclusion that the capital/output ratio is around 3.5. This would imply that today's capital stock should be worth around \$20 thousand billion against somewhat more than \$60 thousand billion for the EU (always at PPP).

*Table 3. A comparison of Chinese and European capital stocks (\$ billion at ppp) (2006 data)*

	GDP at PPP	Investment as % of GDP	Total investment	Capital stock	Labour force (millions)	
					Present	Future
China	5,500	44	2,420	19,250	350	450
EU	13,000	20	2,600	52,000	200	220

*Source:* Own calculations based on WEO and World Bank data.

<sup>1</sup> See <http://web.worldbank.org/WBSITE/EXTERNAL/NEWS/0,,contentMDK:21589281~menuPK:34463~pagePK:34370~piPK:34424~theSitePK:4607,00.html>.

<sup>2</sup> This can be deduced both from the employment statistics by sectors (agriculture accounts for about 50% of employment) and the statistics by work place (about 50% are in rural regions).

<sup>3</sup> Kui-Wai Li (2003), "China's Capital and Productivity Measurement Using Financial Resources", Economic Growth Center Discussion Paper 851, Yale University, New Haven, CT.

Given these starting values for the major variables, one can calculate the evolution of the capital stock by making an additional assumption about the rate of depreciation (assumed here to be 0.04). The time horizon is 10 years over which it is also assumed that employment in the EU increases by about 10% (in line with the Lisbon objectives) and by 33% in China as the new generations coming into working age are assumed to be absorbed entirely by the modern sector. The ‘modern’ workforce of China would thus after ten years at 450 million persons be about twice as large as that of the EU.

Given these assumptions, Table 4 reports the resulting capital/labour ratios. That of the EU remains constant as the small increase in the capital stock is just sufficient to keep the capital/labour ratio constant with the small increase in the workforce (the additional capital is just enough to equip the additional employment with the same amount of capital). However, the capital/labour ratio rises rapidly in China, from around 20% of that of the EU to over 70%. If China continues to keep its present high investment rate, it could thus have within a decade a capital/labour ratio similar to that of the EU (and the Chinese capital stock would be of a more recent vintage). At that point China should no longer specialise in labour-intensive goods.

*Table 4. The Chinese capital/labour ratio in motion (thousands of USD/worker)*

	<b>Present</b>	<b>Future (2016)</b>
China	55	191
EU27	260	260
India	38	48

*Source:* Own calculations based on World Bank data.

A key factor transforming the Chinese economy, and its likely trade pattern, is thus the extraordinary investment rate, which is more than twice that of the EU (or other OECD countries) and higher even than those of Japan and Korea during their respective high-growth periods. This implies that by the end of the next decade China could already have essentially caught up with Europe in terms of its capital/labour ratio.

India by contrast has a much lower investment ratio. Using the same approach for that country yields the result reported in the last row of Table 4: India’s capital/labour ratio does not increase greatly because its investment rate is much lower and the employment in the modern sector will (hopefully) increase by much more.

### **3. Human capital: China a global player in R&D?**

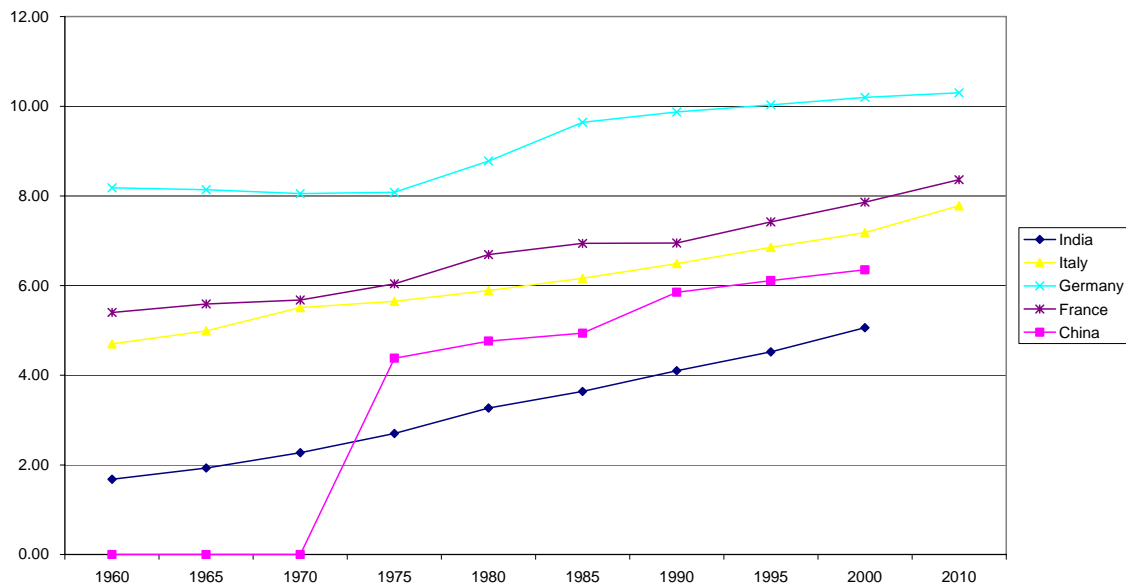
While the current policy concerns focus on cheap labour, there have been a number of press reports suggesting that China is rapidly catching up in terms of innovation activity. The raw data suggest, however, that concerns that China will take over the lead in innovation activity on a broad scale might be exaggerated. Moreover, in this area the speed at which China can close the gap with the EU is limited by demographic factors. With a roughly constant population, the average stock of human capital per worker can change only gradually as better educated new generations replace the older ones. This is by definition a slow process.

One can observe that the evolution in the stock of human capital in China seems to already have a strong basis, which is being reinforced quite rapidly, but it will take some time before the Chinese workforce will contain a similar percentage at the highest levels of education as that of the EU (or other OECD countries). However, given the size of its population, China is starting to count on the global scale – even at the tertiary level of education. This will now be illustrated from two different angles: the present situation and the future evolution as foreshadowed by enrolment ratios.

*Education in China today.* One useful gauge of the overall stock of human capital in the workforce is the average years of education attained by members of the adult cohorts. Measured in this way, China has reached a respectable level, close to some member countries (such as France and Italy) and not far below the EU average, but it remains behind.

The horizontal distance between two lines gives an idea of how much China is behind EU member countries. Between China and Italy the difference seems to be only about 10 years, but much more for France (and Germany). The data for 2010 provided for EU member countries are derived from Commission projections, which, in turn, are based on today's enrolment ratios. These projections, which are not available for China, indicate that the upgrading of the workforce will continue in the EU as well so that the difference between China and the EU will not diminish if the upgrading in China just continues at this historical pace. The next section provides some data that suggest that the speed of the catch up will indeed not increase radically in future as well.

*Figure 1. Basic human capital: Average years of schooling in Europe and China*



Source: Barro Lee dataset.

*Enrolment ratios.* An indispensable input for R&D is a workforce with the appropriate level of education. Research and development is mostly undertaken by personnel with tertiary (university level) education.

The available data indicate that the Chinese workforce will continue to lag behind that of the EU (and even more than that of the US) in terms of the percentage of the younger cohorts that have a tertiary education. In China the enrolment rate in tertiary education in 2005 was still only 20%, much lower than the 56% recorded for the EU (and even further from the US ratio of 83%). Over the last 20 years there has been a jump in tertiary education in China, with enrolment ratios increasing by a factor of 7. But the starting point was so low that even today enrolment rates are below one-half of the European level. It is interesting to note that despite its reputation, India has made much less progress than China (tertiary enrolment up only from 6 to 11%). The Indian software industry seems to constitute an exception that hides an average which has falling behind that of China.

The upgrading of the skills of the Chinese workforce is thus proceeding less quickly than is sometimes assumed. However, one needs to recall that the cohorts that are currently studying (and will soon enter the labour force) are also much larger in China (about 3 times larger) than in the EU. This implies that in absolute terms one should expect that China will produce the same number of university graduates (including engineers, which have been the focus of much attention) as the EU. Moreover, as enrolment rates are still increasing rapidly it is unavoidable that China will soon overtake the EU (and the US) in terms of the number of scientists that graduate each year.

Table 5. Enrolment ratios, 1985-2005

	Secondary education (Net)			Tertiary education (Gross)		
	1985	1995	2005	1985	1995	2005
China	39.7	65.8	74.3	2.9	5.3	20.3
United States	91.2	90	89	60.2	80.9	82.7
India	37.9	48.8	56.6	6	6.6	11.4
EU27 (average)	82.7	97.9	100.8	26.7	44.9	56.2
Turkey	36	51.3	66.8	8.9	19.5	31.2

Source: World Bank.

#### 4. Energy: China's carbon-rich economy

An additional area of friction that is likely to remain concerns energy. As shown in Table 6, China already now consumes almost as much energy as the EU (1,700 million tonnes of oil equivalent (mtoe)/year versus 1,780), implying that its energy intensity (energy consumption per unit of output) is only slightly higher than that of the EU, at least if GDP is measured at PPP. However, the composition of China's energy consumption is quite different from that of the EU (or the US): China consumes almost four times as much coal as the EU. Moreover, if current trends continue, China would in 10 years consume 50% more energy than the EU. Most of the increase in the energy demand is likely to continue to come from coal, which is relatively abundant in China.

Table 6. Energy consumption and composition (mtoe)

	Primary energy consumption			Major fuels (2006)	
	1996	Today (2006)	Projected (2016)	Oil (net imports)	Coal (consumption)
EU	1691	1782	1878	720 (560)	320
US	2190	2326	2471	940 (608)	567
China	965	1698	2987	350 (169)	1,191
India	271	423	680	120 (80)	240

Sources: BP (2007), World Energy Review.

China's self-sufficiency in coal has two implications:

i) China is already now the biggest source of CO<sub>2</sub> emissions (coal is much more intensive in CO<sub>2</sub> than the equivalent energy obtained through oil or gas). Hence considerable frictions will arise to the extent that limiting CO<sub>2</sub> emissions remains an objective of EU policy. China will not be willing to accept any CO<sub>2</sub> tax, but if it were introduced by the EU, or at least throughout the OECD, this would create an important competitive advantage for Chinese producers.



ii) China is much less dependent on hydrocarbon imports than either the EU or the US, and the price of coal has increased much less than that for either oil or gas. The price of coal at various international trading stations has roughly doubled between 1999 and 2007, whereas the price has increased by a factor of 4 for crude oil (and gas). This fall in the relative price of coal will give Chinese producers a further cost advantage in energy-intensive industries (e.g. again steel). India resembles China in that it also has abundant coal reserves, but in terms of overall size, they are again much smaller, about one-quarter those of China, with a total annual consumption of primary energy of about 400 mtoe.

## 5. The EU and the rise of China

For a European it is interesting to observe that the process going on in China today is in many respects almost exactly the mirror image of the convergence process experienced within the enlarged EU. The new member countries had a relatively well-educated population, with only a small proportion still in agriculture, but they lacked a modern capital stock and the associated market-relevant know-how. The new member countries thus became large importers of capital, mostly in the form of FDI. As a result, productivity is increasing rapidly, allowing wages to converge quickly to the EU average.

By contrast in China, only part of the population works in the modern sector and the supply of domestic savings is much larger. With a domestic investment rate of close to 50%, the contribution of capital deepening to growth is (at roughly 5 percentage points per annum) the dominant growth factor in China.<sup>4</sup> The role of FDI in China is thus ‘only’ to facilitate the transfer of know-how, not to provide funds for investment. Capital deepening is proceeding at such a rapid pace that on current trends China will have a capital/labour ratio close to that of the EU within the next decade, and even before the new member states.

These differences between the economies of the new member states and China imply that in future the brunt of the adjustment to the rise of China will have to be borne by the capital- (and energy-) intensive industries in the old member states. The workers in these industries are not necessarily low skilled; they tend to have the highly specialised skills necessary to operate the large capital employed in these industries. They are generally well paid and organised, thus constituting, together with the capital owners, a strong lobby for protectionism.

A further key difference between China and the new member countries concerns the role of financial markets: they were totally liberalised in the latter and the domestic banking systems were taken over by EU banks. This has permitted the financing of a consumption boom and thus large capital imports. By contrast in China, financial markets have not yet been liberalised, leading, in conjunction with the absence of a social security safety net, to extraordinarily high savings rates. China has thus become a large (net) capital exporter, with its net supply of savings to the rest of the world (its current account surplus) now close to 1% of world GDP.

What does the emergence of a large exporter of capital goods and an increase in the supply of global savings imply for the EU? The increased supply of savings should keep interest rates low, but this does not require any particular policy reaction assuming it is properly recognised by the ECB. The very large current account surplus of China is a relatively recent phenomenon, and it is not going to increase indefinitely. Once it stabilises, China’s imports will increase in line with exports, and the country will thus not have a deflationary impact on the global economy forever.

The ongoing shift from intra- to inter-industry trade that will result from the shift towards relatively capital-intensive products in China’s exports suggests that labour market flexibility

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<sup>4</sup> See European Commission (2005), “China and the World Economy: Growing in Harmony”, Brussels.

and constant re-training are more important than a special concern for unskilled workers in general. Another policy implication is that regional and industrial policies, which tend to support capital-intensive industries via investment subsidies are unlikely to work. As China becomes stronger and stronger in these sectors, these industries will not be able to survive without continuing support.

Taxing imports of capital-intensive products from China is not a policy option since China is a full member of the WTO. But even if it were possible, it would have an undesirable effect on income distribution since it would be favourable to capital owners, but have a negative impact on labour.

A key peculiarity of China's economy is its extraordinary degree of openness: exports amount to about 40% of GDP, a figure closer to the average of individual EU member countries, rather than the roughly 15% one observes for the EU and US and would thus expect from a continent-sized economy. Moreover, about 60% of these exports are generated by so-called 'foreign invested enterprises' (enterprises with a large foreign participation).<sup>5</sup> Over one-half of the Chinese 'export machine' is thus managed by foreigners. This suggests that while China is likely to remain stubborn in the pursuit of its perceived national interests, it is unlikely to become a disruptive element in the world economy. There is thus no reason why the EU should assume a confrontational stance vis-à-vis China.

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<sup>5</sup> See, for example, John Whalley and Xian Xin (2007), "China's FDI and Non-FDI Economies and the Sustainability of Future High Chinese Growth", NBER Working Paper No. 12249, National Bureau of Economic Research, Cambridge, MA.

## Annex

# A Comparison of Chinese and Indian export structures

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A simple way to document the evolution of the structure of Chinese trade is to look at the Balassa index, which shows to what extent a country's share in world exports of a certain category of goods is higher or lower than the share of the country in overall world exports. For example, if a country provides 15% of global exports of machinery, but its share in overall global exports is only 10%, the Balassa index will be equal to 1.5, indicating that the country has a revealed comparative advantage in this sector.

Table A1 below shows to what extent there is a similarity between the distribution of the Balassa index across the major SITC categories for China and for a group of other comparator countries. The crude measure used here is just the correlation coefficient of the Balassa index across 1-digit SITC categories (times 100). Given the small number of observations, individual results are not statistically significant, but the overall picture is clear: all correlation coefficients have changed sign over the last 20 years.

Twenty years ago the (distribution of sectoral export) specialisation of China seemed to be negatively correlated with that of major OECD countries and positively correlated with that of other emerging markets, such as Brazil and Indonesia.

Today (2005 data) the structure of Chinese exports is positively correlated with all OECD countries (the correlation is strongest with those countries (J, DE) specialised in heavy industry), but negatively correlated with other emerging market economies.

*Table A1. An evolving Chinese export structure*

	1986	2005
China*	-3	
US	-27	25
Japan	-49	62
Germany	-71	46
Brazil	25	-45
Indonesia	67	-38
Italy	-24	42

\* China 1986 versus 2005.

*Note:* Data represent correlation coefficients (\*100) between the Balassa index for China and the other countries listed in the first column.

*Source:* Own calculations based on UN Comtrade data.

It is interesting to note, as mentioned, that the correlation coefficient has turned negative for the pairs China-Brazil and China-Indonesia. One could thus argue that the challenge to the EU provided by China is the opposite of that coming from these two countries. Hence it is misleading to lump the so-called 'BRICs' (Brazil, Russia, India and China) together.

The first row of Table A1 shows that today's export structure of China has little to do with that of 20 years ago since the correlation coefficient is essentially zero.

Table A2 shows that the correlation coefficient between China and India has diminished over time and is now rather low (17). This suggests that the structure of the challenge to the EU provided by India is quite different from that coming from China (even apart from the difference in size mentioned above).

The first row of the table shows that India's export structure has changed little over the last 20 years, since the correlation coefficient is rather high (72%). This is another indication of the different dynamics of these two countries.

*Table A2. A stagnant Indian export structure?*

	<b>1986</b>	<b>2005</b>
India*		72
China	37	17
US	-13	32
Japan	-30	-14
Germany	-31	-24
Brazil	64	45
Indonesia	-22	-9
Italy	15	-24

\* India 1986 versus 2005.

*Note:* Data represent correlation coefficients (\*100) between the Balassa index for India and the other countries listed in the first column.

*Source:* Own calculations based on UN Comtrade data.

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