Part 1. Growth Performance

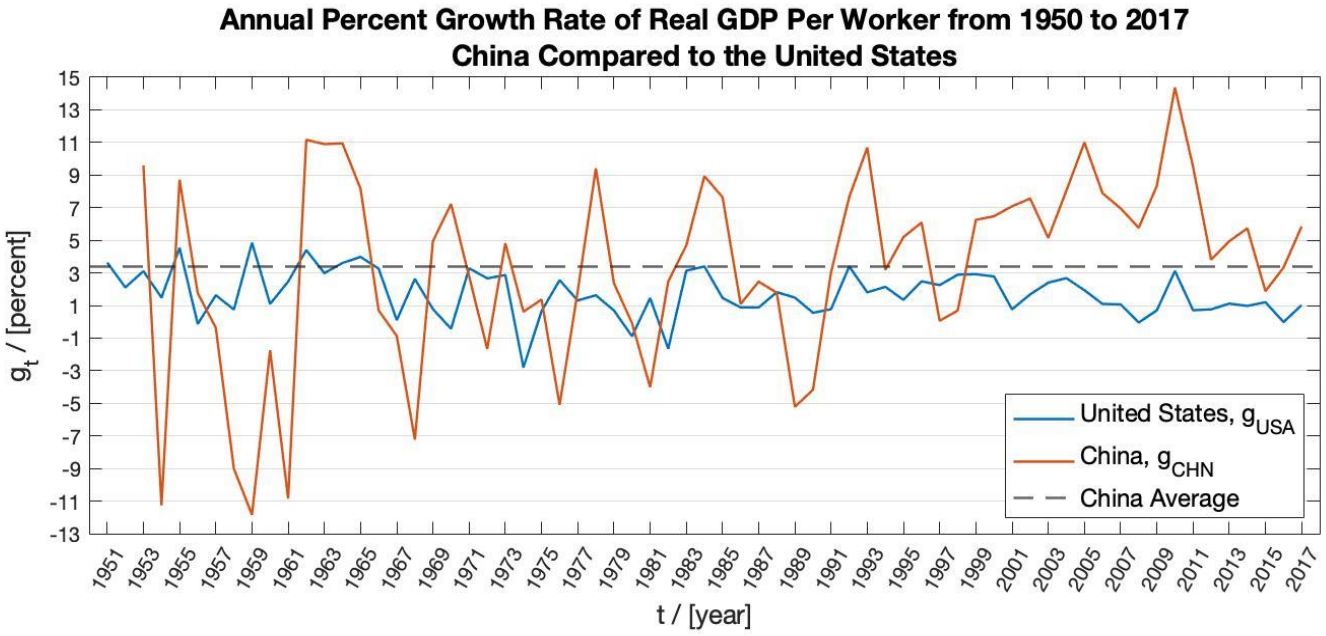
China and India are two noteworthy merging economies; both China and India went through major economic development in the past few decades, with GDP at purchasing power parity (PPP) ranked at 5th and 6th places respectively by 1950 and 1st and 3rd places by 2017. In 2017, China and India, in addition to being the 3rd and 7th largest land masses respectively and having two of the largest populations in the world, were also reported as being leaders in exportation, with China being first and India being thirteenth, and being two of the major oil importers in the world, with China coming in first place and India coming in third place. For convenience sake, this report will refer to China and India in prior and latter order when mentioned at the same time unless otherwise specified.

Several significant incidences directly contributed to the economic development trajectories of the two nations in the past few decades:

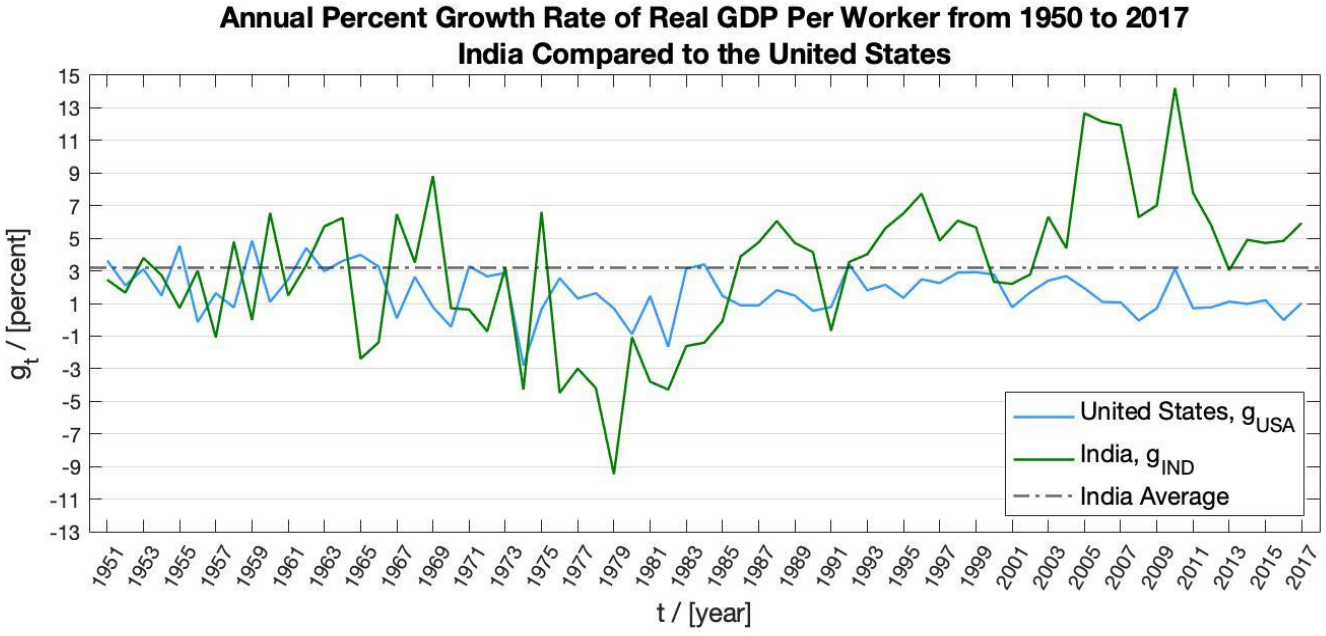
1. China's "Great Leap Forward" from 1958 to 1960.
2. India's economic bust in 1970-90 following the Nixon shock.
3. China's introduction of foreign direct investment (FDI) in the early 1990s.
4. India's "Economic Liberalization" capitalist boom in the 1990s and 2000s.

Figures 1a and 1b show China and India's annual growth rate of real output per worker 'g' from 1950 to 2017 in comparison with the US; the average was 3.37% for China and 3.21% for India. Both economies experienced sluggish growth before 1990 with China averaging a growth rate of 1.39% and India averaging a growth rate of 1.28% per year from 1950-1990. However, both economies experienced rapid growth after 1990 with China averaging growth at 6.16% and India averaging growth at 6.02% per year. The two nations' economic booms since

Name: Zhengpu Zhao Country: China & India (Honors Contract)



[Figure 1a]



[Figure 1b]

1990 were caused by similar reasons, namely, integration into the global economy and the growth of private sectors.

One notable period of Chinese economic development was the bust from 1958 to 1961. During this period, the economy experienced an average output per worker growth rate of -8% per year. Such a high level of negative growth was triggered by the 1958 Great Leap Forward, where the central government's decision to rapidly industrialize and boost productivity failed due to poorly planned economic strategies, which resulted in a turmoiled agricultural sector. In detail, the policy to increase capital and raise production involved farmers setting up backyard furnaces to make steel for machinery; however, the steel made was of low quality and required massive amounts of raw materials that were stripped from household and agricultural utensils. The nation was ultimately unable to feed itself and went through a major economic disaster as reflected by the detrimental annual growth rate of output per worker.

For the Indian economy, the years between 1975 and 1985 suffered an average negative output per worker growth of -2.4%. This period was caused by both the heavy regulation of foreign capital by the Indian government along with the aftermath of the "Nixon Shock," which included the US surcharging on its imports. The subsequent retrieval of formidable amounts of US-related foreign direct investment led to a shrink in the capital in the Indian economy and therefore, low productivity and an economic bust.

In the 1990s, both countries relished in their successful economic periods due to integration into the global economy and growth of private sectors. Specifically, China removed the many pre-existing trade barriers and experienced the consequent influx of foreign direct investment, whereas India received the World Bank structural adjustment loan and went through effective economic liberalization.

Part 2. Steady-State Analysis

Table 1. Analysis of Steady State										
	2017 Actual Values				Parameters of Steady State					
	y	k	A	y*	alpha	s	n	d	h	g
USA	115,120	364,003	14,152	124,788	0.40	0.20	0.01	0.05	3.74	0.01
China	23,221	119,875	2,799	33,122	0.42	0.50	0.01	0.05	2.57	0.06
Alt. Scenario	23,221	119,875	2,799	48,252	0.42	0.50	0.01	0.05	3.74	0.06
India	15,990	55,651	2,354	16,622	0.48	0.27	0.01	0.06	2.12	0.06
Alt. Scenario	15,990	55,651	2,354	298,28	0.48	0.50	0.01	0.06	2.12	0.06

Table 1 shows estimations of the Solow model steady-state parameters of China and India compared to the US. The US, China, and India have steady-state output per worker estimated at 124788, 33122, and 16622 USD respectively. Despite both being labeled as developing economies, the two nations are at dissimilar positions with respect to their current output per worker against the corresponding steady-state estimates. Compared to the US, which has the current output per worker to steady-state estimate ratio of 92.3%, China's ratio was measured to be 70.1%, indicating higher economic potential given current steady state parameters such as savings rate, depreciation rate, and so on. On the other hand, India's ratio was measured at 96.2%; such a high percentage indicates the proximity of the current economy to the steady-state which is developmentally pessimistic for an emerging nation.

Both China and India show higher savings rates in comparison to the US's 0.20, the former with a remarkable 0.50 and the latter with 0.27. The high investment rate demonstrates both nations as being future-oriented. Despite the high savings rate precluding high consumption and growth in the short run, it promotes steady-state capital stock and hence growth in the long run. The high savings rate of the two nations also partially explains their high output per worker growth rate since economic growth is driven partly by domestic investment, which in turn is financed mostly by household savings.

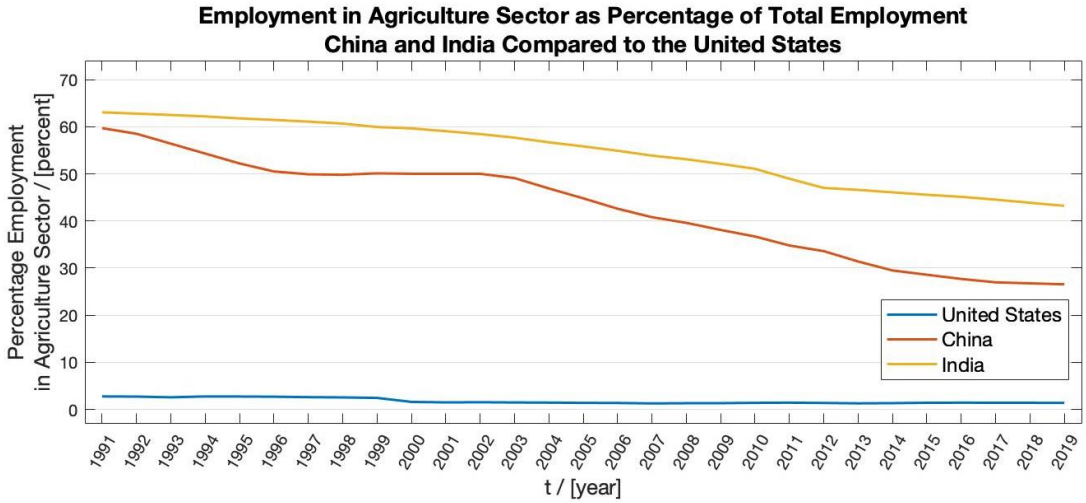
One major difference between the US and the Chinese economy is human capital, measured at 3.74 and 2.57 respectively. The difference suggests a lower-skilled and unproductive labor force in China due to less knowledge and skillsets compared to the US. "Alternative scenario 1" demonstrates the steady-state estimate where the Chinese economy boosts its human capital to match the US. Such adjustment could be achieved by improving education and training; a few viable directions include improving education in agriculture that is often neglected, promoting vocational training, etc. In this alternative scenario, the steady-state output is raised from 33122 to 48252 USD, which is a 45.7% increase which is characterized by increased productivity and technological advancement.

Despite having a higher rate than the US, India's savings rate of 27% is significantly lower than that of China's. As abovementioned, such a difference indicates lower long term economic potential and hence lower output per worker. "Alternative scenario 2" demonstrates the steady-state estimate where India's savings rate is increased to that of China's. There are several possible schemes to employ that will result in an increased saving rate, such as increasing consumption taxes, increasing interest rates, and improving financial markets. However, despite all of the policies, the goal of an 85.2% raise would still be hard to achieve even in the long run; besides, the consequent drop in consumption might be harmful to the economy as well. Nonetheless, such a hypothetical raise would boost the steady-state by 79.4% from 16622 to 29828 USD.

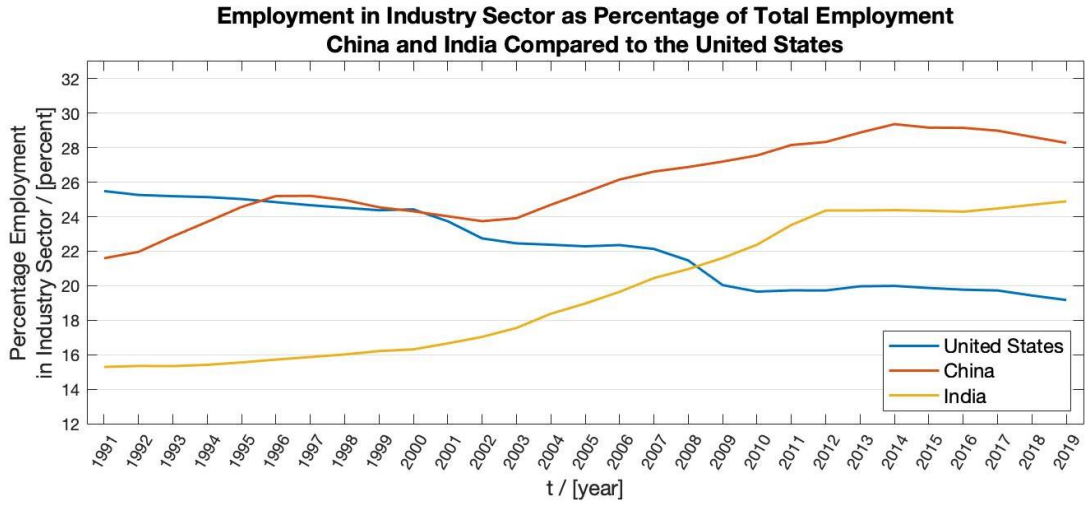
Part 3. Analysis of Structural Transformation

In the past few decades, both China and India have undergone a structural transformation from a heavily agriculture-based economy to an economy that's more focused on manufacturing and consumption. In the 1970s and 1980s, both nations reduced the percentage of agriculture employment, but China increased the absolute and relative size of its industrial sector much more than India. Consequently, the later exceptionally fast growth and rise in investment and production in China has mainly regarded the industrial sector driven by labor-intensive manufacturing. India went through less of a rapid transformation to industries, as stringent labor laws, as well as scale constraints of private firms, limited the presence of labor-intensive manufacturing.

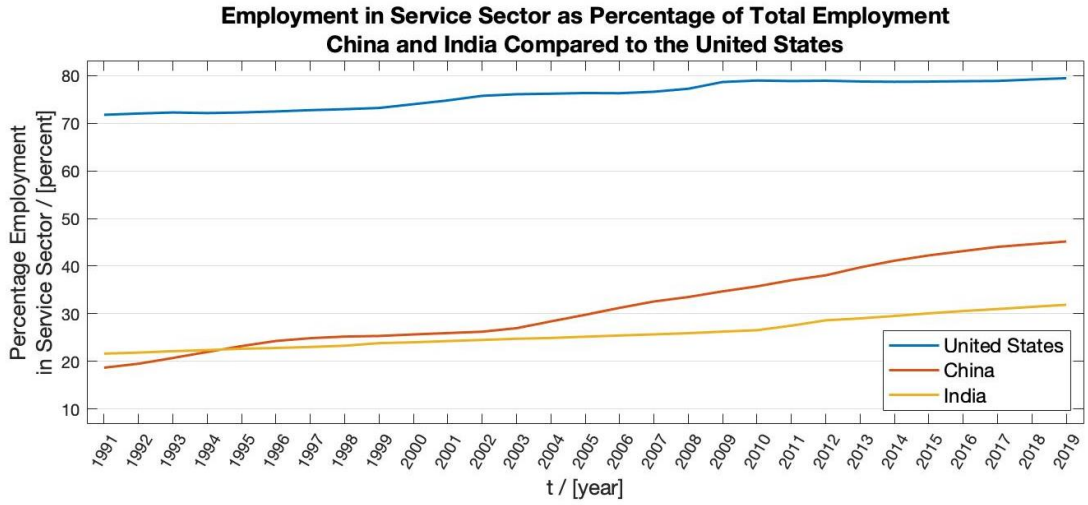
In the 1990s, the share of services in employment constantly grew for both nations, surpassing that of industry. Figures 2a, 2b, and 2c show, respectively, the share of employment in agriculture, industry, and the service sector for the US, China, and India from 1991 to 2019. Compared to the US, the two emerging nations started with a far greater ratio of agriculture along with a far less ratio of industry and service. Although still incomparable to the US's ratio, which is representative of that of a developed economy, the Chinese and Indian ratio of employment in industrial and service sectors has continuously risen in the 1990s and the 2000s, while the ratio in agriculture has continuously shrunk. China experienced a greater shift away from agriculture with a decrease of 33.1% and India experienced a decrease of 19.8%. Moreover, China's and India's employment ratios for industry grew from 21.6% to 28.3% and from 15.3% to 24.9% respectively; those ratios for service grew from 18.7% to 45.2% and from 21.7% to 31.9% respectively.



[Figure 2a]



[Figure 2b]



[Figure 2c]

In recent years, China's share of employment in industry has started to decrease while that of service has continued to rise; accompanying the decline is the shrinking trend in the growth of output per worker. Assuming the correlation between the two is causational, it could be argued that the reallocation of workers from the primary to the secondary and tertiary sector has had an overall positive effect on total productivity growth. Such growth was slowed down when the service sector started to detract an excessive number of workers from the industry sector. Moreover, such a decline in share in industry might further decrease due to an aging population and lead to a further decrease in growth. Since 2012, India's share of employment in industry has basically stagnated; along with stifling bureaucracy, many developmental tribulations have risen. The underemphasized industrial sector and corruption have led to an insufficient amount of infrastructure construction, such as road systems and electricity grids which have fueled India's current economic bust.

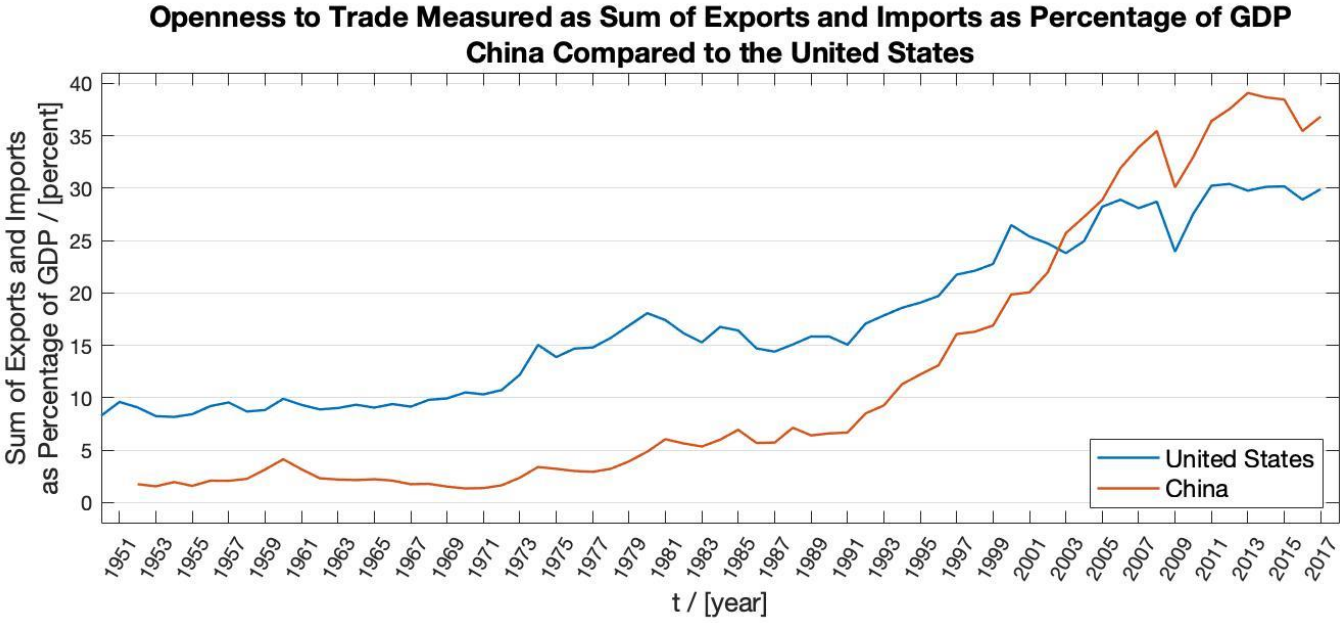
In conclusion, the structural transformations promoted the two developing nations' output significantly, inducing tremendous economic development. However, the accelerated reforms did cause problems such as inequality and pollution. In China, the process led to major increases in income and wealth inequalities, despite diminishing poverty. In India, the increase in inequality was less severe but the level of absolute and relative poverty remained significant. In China, such an accelerated process of industrialization and the lack of adequate environmental policies led to a massive amount of pollution. In India, pollution was also substantial but lower than the amount experienced in China.

Part 4. Trade Openness Analysis

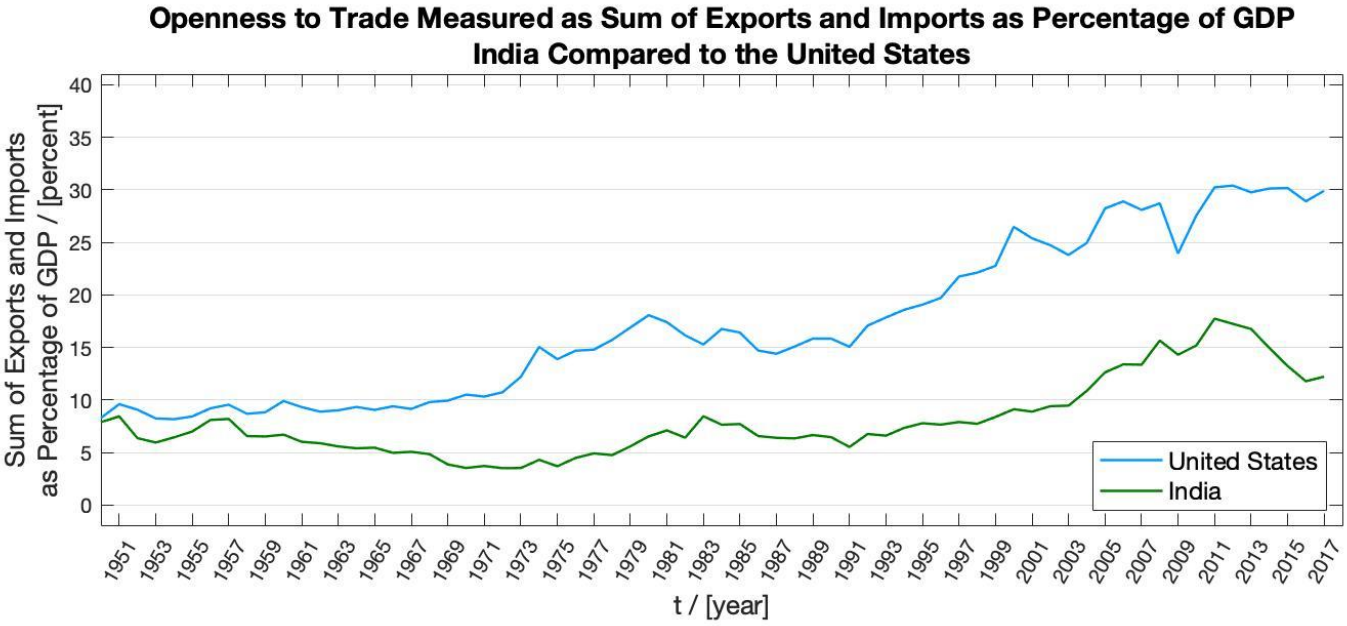
In addition to structural transformation, opening up the economies to international trade played a significant role in their development. Figures 3a and 3b show the sum of exports and imports as percentages of output for China and India respectively. Before the 1980s, the two nations had similar low involvement in international trade. Around 1980, China started to globalize and both nations followed "the second wave of globalization' in the 1990s. The two nations have been integrating more into the global market ever since.

China started to transform from a closed and protected economy to an open and global one since 1978 by introducing 'special economic zones' that attracted foreign direct investments. Joint ventures between foreign and Chinese firms were formed, which increased China's capital stock and technical knowledge. This also fueled China's rapid industrialization. On the other hand, India strictly constrained both foreign direct investment and international trade until 1991. In the early 1990s, both nations loosened restrictions on international trade; as a result, economic growth followed progressive globalization. In the late 1990s, both nations went through major economic liberalization, attracted more FDI inflow, and grew their exports.

India and China joined the WTO in 1995 and 2001 respectively. Due to lagging behind China in the economic opening process for approximately a decade, India had a less adequate infrastructure and industrial capital, which led to lower global competitiveness in manufacturing. In the 2000s, globalization continued as both nations increased their exports significantly. By 2000, China and India respectively had 3.9% and 0.7% of the world's total exports, and by 2010, the number was 10.3% and 1.5%. As mentioned, China and India are currently the 1st and 13th largest exporters. Such differences in globalization were another driving force for the difference in economic growth and development between the two nations.



[Figure 3a]



[Figure 3b]