A STATISTICAL ANALYSIS MEASURING THE IMPACT OF THE U.S. ON INDIA'S ECONOMY

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Abstract

This paper briefly deals with political history of India and its independence from British government, and concentrate on the statistical data that report the economic and financial performance of India from 1980 to 2000. The statistical data presented are: GDP growth rate, unemployment and inflation rates, trade accounts, population size and growth rate, and other factors. While an attempt has been made to compare India with the United States, the authors, recognize the two countries are widely different in size, population and all the stages of the economic developments. Three recommendations have been provided to aid Indian government to deal with its economic difficulties.

Key words: The impact of US on India

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Historical Analysis

India has a history that goes back 5000 years. The Indus Valley civilization, as it is known, is one of the oldest civilizations in the world. During this long history, a lot of things took place in India, such as the invasion of the Aryan tribes from the northwest around 1500 B.C., the Arab invasion in the 8th century, the Turkish invasion in the 15th century, and the British control in the 19th century. Below is a list and brief description of the most important events in chronological order.

- ***Before 2500 B.C., Pre-historic:*** India-Paleolithic Age, Mesolithic Age and Chalcolithic Age.
- ***600 B.C. – 322 B.C., Hinduism and Transition:*** Rise of Magadha under Bimbisara and Ajatashatru, Nanda Dynasty, Alexander's invasion.
- ***185 B.C. – 320 A.D., The Invasions:*** Invasions from Bactrian Greeks, Parthians, Shakas and Kushans. Silk route opened. First gold coins issued. Schism of Buddhism into Hinayana and Mahayana was formed.
- **320 A.D. – 520 A.D., The Gupta Era:** Gupta power extends under Chandragupta I. Classical Age and Golden Age of North India. Mathematics reaches zenith with Aryabhatta's knowledge.
- ***1000 A.D. – 1206 A.D., The Turkish invasion:*** Mahmud of Ghazni raids North India. Delhi Sultanate came into prominence.
- ***1857 A.D. – 1858 A.D., The Independence Struggle:*** Growing resentment in Indian people. Mutiny started under the leadership of Mangal Pande. Bahadur Shah Zafar was proclaimed as new king. End of Company rule in India and the British Crown takes over.
- ***1905 A.D. – 1914 A.D., The Indian National Movement:*** Partition of Bengal sends a tremor to the entire sub-continent. Militant groups and Revolutionary leadership were formed against British. Swadeshi and Swaraj became the mantra of the common man.
- **15TH AUGUST 1947, Independence:** British foundation in India shaken by growing strong Anti-British feeling. Formation of Indian constitution started. On August 15 India gets its Independence resulting in Partition of the country. Pakistan was carved out of existing India.

The Indus Valley Civilization historically is placed in the Bronze Age, and during this time we have the introduction of tools made of bronze, and the people of the time exported copper, along with peacocks, ivory and cotton textiles, and in return, they were imported silver and other commodities. For the most part though, the inhabitants of the Indus Valley were farmers. The two most important cities of the Indus Valley were Harappa and Mohenjadaro, which both cities are now a part of Pakistan.

One of the most important era in India history was when India was under the British rule. The British control of India goes back to the 17th century, during which time the consolidation of British rule was the responsibility of Warren Hastings. One of his primary goals was to educate the British about the Indian history, culture and social customs. Even though there was a lot of opposition to British rule, it was still justified, because it was expected to civilize the Indians, as well as introduce a reliable system of justice, and the rule of law. During 1857–1858 we have the first signs of an Indian revolution against the British, and as a result a large territory in the Gangetic plains came under the control of the rebels. Eventually India became a Crown colony, and was governed by Parliament. After World War I, British took drastic measures to control political extremists and the disturbances of 1919. The outcome of the 1919 disturbances was Mahatma Gandhi, who became the leader of the Indian nationalist movement. After a number of years of negotiations and conferences, in August 15, 1947, India was given independence from British rule. Finally the Constitution of India was written, and just like any other constitution, it guarantees equal rights, and prohibits discrimination on the basis of race, ethnicity, gender and religion.

Current Literature

India since independence from British in 1947, started the process of rebuilding infrastructure and industrialization. The country adopted a mixed economic policy on the five-year plan basis, but along with the modern industries, we still find traditional village farming, as well as modern agriculture. From the economic point of view though, even though India has an average growth rate of about 6 percent during the 90's, it still faces the problem of overpopulation, and as a result, about 25 percent of the population cannot afford an adequate diet. In 2002 the inflation rate was 5.4 percent and the unemployment rate 8.8 percent. Both of these rates are relatively high and we are going to discuss them in much more detail in the next section. On the trade side, India exports textile goods, gems and jewelry, engineering goods, chemicals, leather etc, and imports crude oil, machinery, gems, fertilizer and chemicals. For

2001, India exported a total of $44.5 billion and imported a total of $53.8 billion. Thus, one may conclude that India is a force in the world trade.

Another topic that is of major interest in India now, is the Anti-Christian violence. Even though Anti-Christian violence was going on for years, it was first publicized by the media in 1997, during which time the United Christian Forum for Human Rights reported 24 incidents, and that number jumped to 90 in 1998. This is an issue that concerns all Christian organizations worldwide, but so far no solution has been found.

On the business, financial, and economic side, a lot of things are changing and taking place in India during the last few years, and our purpose here is to briefly discuss some of them. We all know that foreign direct investment is very important to any developing economy. As a result the government of India made the following changes to liberalize Foreign Direct Investment (FDI). The new regulations permit ownership of up to 100 percent, by local or foreign firms, in the following industries:

a. Drugs and pharmaceuticals
b. Constructions and airports facilities (requires governmental approval for investments exceeding
74 percent)
c. Defense industry, 100 percent is allowed for the Indian private sector, and up to 26 percent of
FDI with government approval
d. Housing developments, commercial premises, hotels, resorts, tourism, roads, bridges etc; FDI requires governmental approval.

The key major economic problem that India is facing is poverty. For this reason the World Bank has approved four loans totaling $913.8 million to help India fight economic deteriorations. All the four loans were for building infrastructure, such as water projects, education, road buildings and other necessary transitional economic projects. :

1. Karnataka Watershed Development Project, worth $100.4 million to finance improved services to poor communities.
2. Karnataka Economic Restructuring Project, worth $150 million to improve fiscal stability and government effectiveness.

3. Grand Trunk Road Improvement Project, $589 million for the expansion of India's national highway system.
4. Second Rajasthan District Primary Education Project, worth $74.4 million, to support the expansion of the nationwide District Primary Education Program.

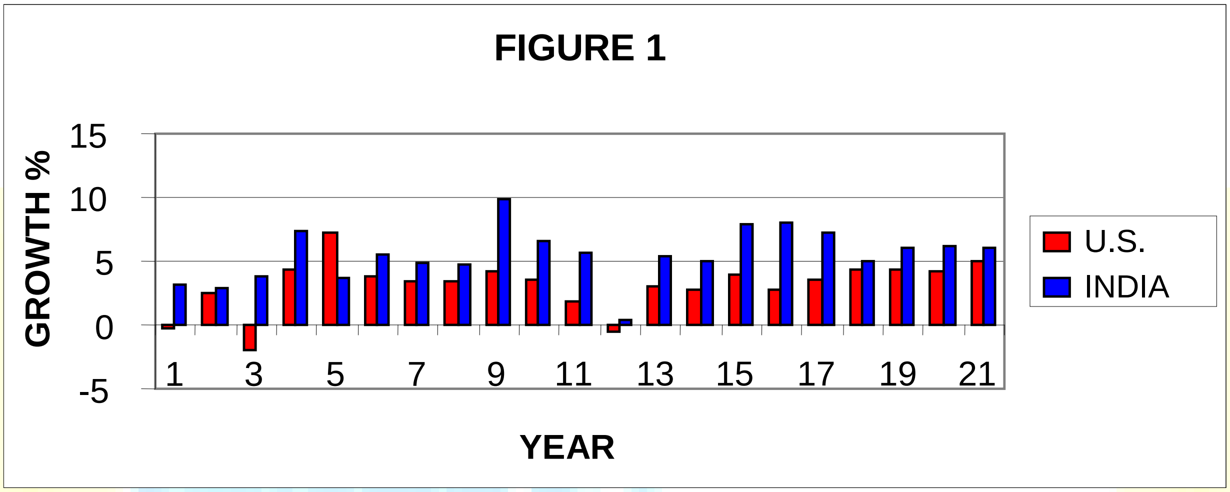
In the international arena, India has been active in joint ventures. For example, India and South Korea joined forces to increase investment, and participated .in a bilateral trade, so-called "Joint Investment Promotion Committee." The result is positive, and in 2002, bilateral trade between the two countries increased by 18.7 percent. The agreement was signed by the Commerce and Industry Minister of India, Murasoli Maran, and by Dr. Ki-ho Lee, who is a senior to the South Korean president. During the meeting, Maran emphasized to the Koreans that it will be to their benefit to buy things like chemicals, pharmaceuticals, dyes, steel and aluminum products, and other products, from India rather than other countries due to lower tariffs. He emphasized to the South Koreans that since India will concentrate on infrastructure, they are going to realize a much higher return on their investment.

Another thing that shows the importance of India is the fact that the World, through the International Institute of Management Development, keeps an eye on the competitiveness of India. For example in 1998 India was ranked 38th among the most competitive economies, whereas in 2002, the ranking dropped down to 42. These rankings are widely accepted and they are based on the following three criteria: economic performance, government and business efficiency, and progress in infrastructure.

Statistical Analysis

India is for the most part an agricultural economy, but it also has industry and services. It has a labor force of about 406 million, of which 60 percent are in agriculture, 23 percent in services, and 17 percent in industry. The agricultural production is composed of rice, wheat, oil seed, cotton, jute, tea, sugarcane, potatoes, cattle, water buffalo, sheep, goats, poultry and fish. On the other hand the industrial productions are consists of textiles, chemicals, food processing, steel, transportation equipment, cement, mining, petroleum, machinery and software. India most important trading partners are the U.S., U.K., Germany, Japan, and the Benelux countries.

Comparison of the United States and India . Table 1 and Figure 1 show the GDP's growth rates for the two countries from 1980 to 2000. During this time, India has been growing faster than the U.S. except in 1984.



Obviously a developing country must grow faster than a developed country in order to advance from transitional to a developed stage.

TABLE 1

GDP GROWTH RATES - US AND INDIA

(1980 – 2000)

YEAR	U.S.	INDIA
1980	-0.2	3.1
1981	2.5	2.9
1982	-2	3.8
1983	4.3	7.4
984	7.3	3.7
1985	3.8	5.5
1986	3.4	4.9
1987	3.4	4.8
1988	4.2	9.9
1989	3.5	6.6
1990	1.8	5.7
1991	-0.5	0.4
1992	3	5.4
1993	2.7	5
1994	4	7.9
1995	2.7	8
1996	3.6	7.3
1997	4.4	5
1998	4.4	6.1
1999	4.2	6.2
2000	5	6

SOURCE:

(USA)www.bea.doc.gov/bea/dn/gdpchg.x15

(INDIA) www.infoplease.com

TABLE 2

UNEMPLOYMENT RATES U.S. – INDIA (1980 – 2000)

YEAR	U.S.	INDIA
1980	7.1	17
1981	7.6	16
1982	9.7	18
1983	9.6	16.5
1984	7.5	16.1
1985	7.2	15
1986	7	17.1
1987	6.2	18.5
1988	5.5	18.2
1989	5.3	20
1990	5.6	20
1991	6.8	22
1992	7.5	22
1993	6.9	22.5
1994	6.1	22.5
1995	5.6	23.8
1996	5.4	22.5
1997	4.9	22.5
1998	4.5	22.8
1999	4.2	23.5
2000	4	24

SOURCE: U.S. Unemployment rates. http://data.bls.gov.servlet/ Surveyoutput Servlet?Series Retrieved April 14, 2002.

India Unemployment rates. http://www.nic.in/indiabudget/ ES99-2000/APP3.4.PDF Retrieved April 14, 2002.

FIGURE 2

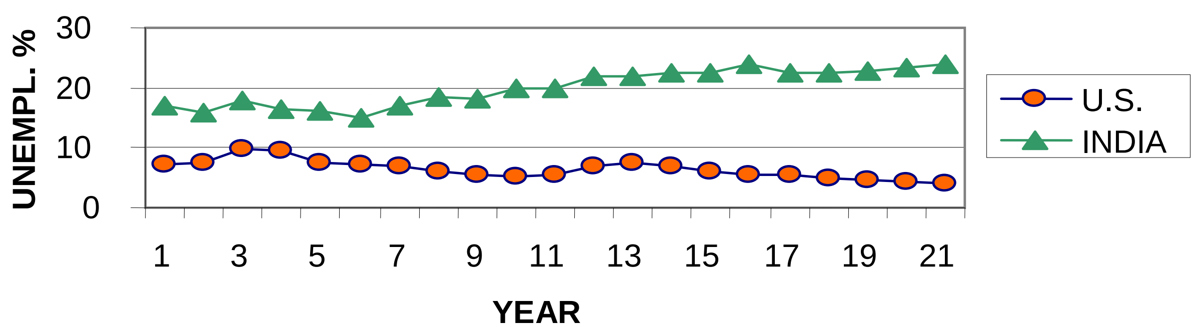


Table 2 and Figure 2 shed light on the unemployment rates and trend for both of the countries. It is specifically important for India, because unemployment is one of the key economic indicators that need the most improvement in India. Table 3 and Figure 3 show the inflation rates in both countries. For the most part India's inflation is very high, but we see a major improvement during the past 2 or 3 years.

TABLE 3

INFLATION RATES INDIA - U.S. 1980 - 2000

YEAR		U.S.		INDIA
1980		13.5		11.37
1981		10.38		13.12
1982		4.03		7.89
1983		5.27		11.87
1984		4.37		9.32
1985		3.53		5.56
1986		1.94		8.73
1987		3.67		8.8
1988		4.07		9.38
1989		4.8		6.16
1990		5.42		8.97
1991		4.22		13.87
1992		3.04		11.79
1993		2.96		6.36
1994		2.61		10.21
1995		2.81		10.22
1996		2.92		9.98
1997		2.34		7.16
1998		1.55		13.23
1999		2.18		4.67
2000		3.2		5.56

SOURCE: Inflation Rates for United States and India (1980 - 2000)

HTTP:WWW.IMF.ORG/EXTERNAL/PUBS/FT/WEO/2000/02/DATA/

Retrieved March 17, 2002.

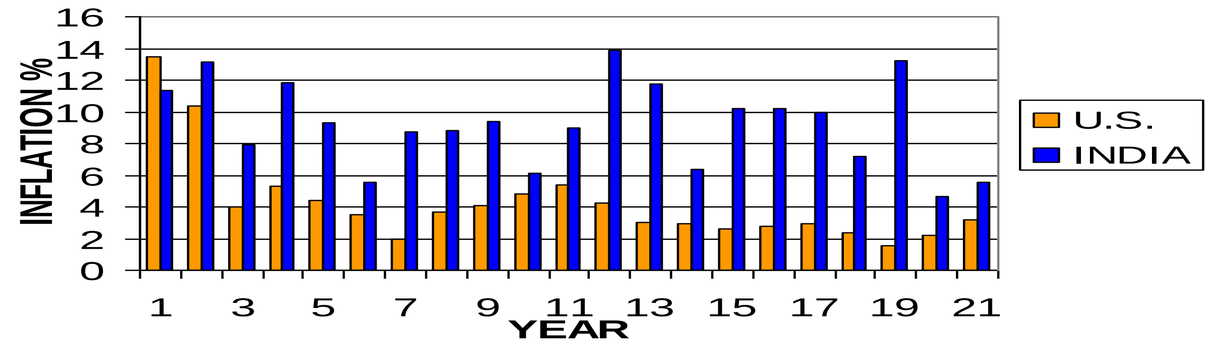


FIGURE 3

Table 4 and Figures 4 and 5 support what was said earlier, that India plays a major role in World Trade. Specifically Table 4 shows that the U.S. has a negative Balance of Trade with India, meaning that the U.S. imports more than exports to India.

TABLE 4

U. S. TRADE WITH INDIA 1980 - 2001

U. S. MILLIONS OF DOLLARS

YEAR		US EXP		US IMP		NET EX
1980		1689		1098		591
1981		1748		1202		546
1982		1599		1404		195
1983		1828		2191		-363
1984		1570		2552		-982
1985		1641		2294		-653
1986		1536		2283		-747
1987		1463		2528		-1065
1988		2500		2939		-439
1989		2457		3314		-857
1990		2486		3196		-710
1991		1999		3192		-1193

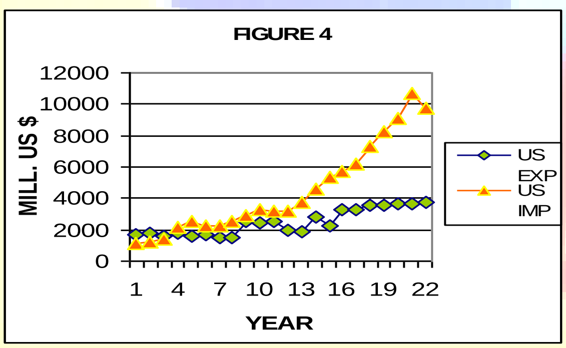
1992		1917		3779		-1862
1993		2778		4553		-1775
1994		2294		5309		-3015
1995		3295		5726		-2431
1996		3328		6169		-2841
1997		3607		7322		-3715
1998		3564		8237		-4673
1999		3687		9070		-5383
2000		3667		10686		-7019
2001		3764		9737		-5973

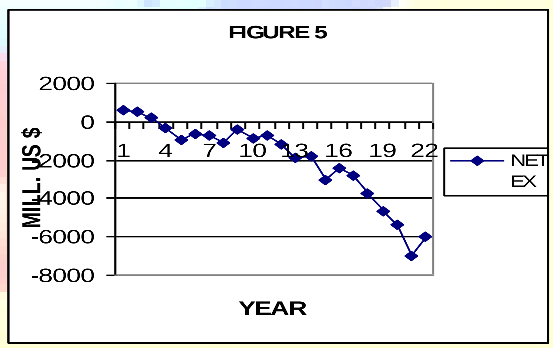
SOURCE: Embassy of India. India – U. S. Relations.

WWW.INDIANEMBASSY.ORG/

Retrieved April 23, 2002; U. S. Trade Balance with India.

WWW.CENSUS. GOV/FOREIGN-TRADE/BALANCE/ C5330.HTML Retrieved April 29, 2002.





Finally Table 5 shows the per capita GDP in both countries. Obviously, India's per capita income as expected is far lower than that of the U.S., for two reasons. The first one is that India is at a different level of development stage than the U.S., and second is that the country has a population near one billion, which makes a big difference on a per capita basis calculation.

TABLE 5

GDP PER CAPITA US – INDIA THOUSAND

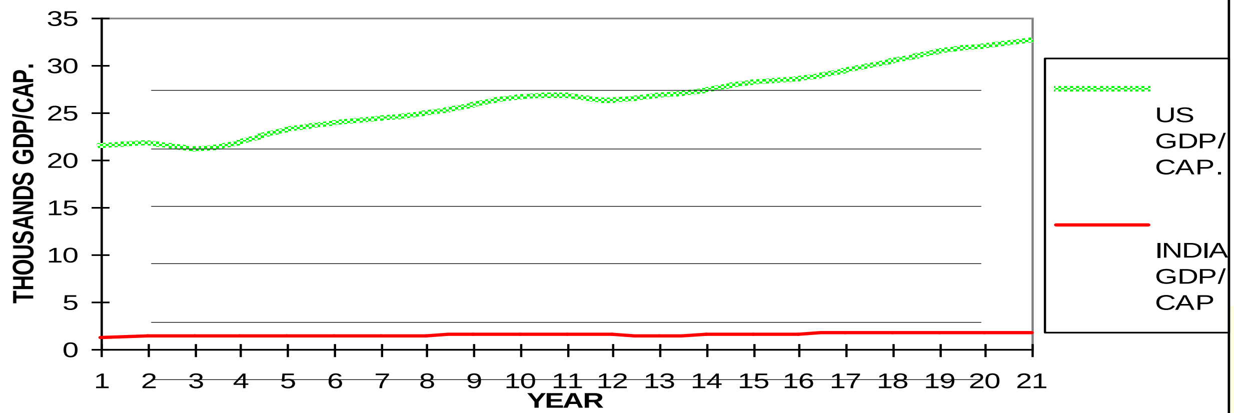
1996 CHAINED US $

		US		INDIA
YEAR		GDP/CAP.		GDP/CAP
1980		21.63371		1.28019
1981		21.81715		1.325161
1982		21.15646		1.330358
1983		21.85911		1.371177
1984		23.22771		1.371671
1985		23.89293		1.401532
1986		24.46882		1.423358
1987		25.06067		1.432891
1988		25.85522		1.509661
1989		26.65076		1.510722
1990		26.97077		1.515715
1991		26.42654		1.48235
1992		26.93708		1.451096
1993		27.36169		1.468155
1994		28.20289		1.527374
1995		28.67057		1.594896
1996		29.45265		1.661165
1997		30.48685		1.687483
1998		31.48063		1.712822
1999		32.14001		1.731989
2000		32.77663		1.728922

SOURCE: WWW.BEA.DOC.GOV/BEA/DN/GDPLEV.XLS

WWW.BIZED.AC.UK/VIRTUAL/DC/RESOURCE/DATA/REALGDP.HTM

FIGURE 6



In concluding this section, we can say with certainty that India has some major economic problems, specifically, in the areas of inflation, unemployment, and per capita GDP. Despite its push toward industrialization and progress in trade, India progress does not match industrialized nations.

Conclusion and Recommendations

As we discussed earlier the history of India goes back thousands and thousands of years, and during these years a number of conquerors went through India. Since independence from British in 1947, India started to rebuild the economy and renovate its industrial base. Today, it is considered to be one of the fastest growing developing economies in the world. India has a lot of modern industries but it also has a lot traditional farming. Despite the progress, nearly 60 percent of its labor force is involved in agriculture.

India also plays a very important role in World Trade. Having modern industry, it exports accelerated tremendously, including textiles, gems, jewelry, engineering goods, chemicals and leather. The key imports are crude oil, machinery, gems, fertilizers and chemicals.

During the last few year two major events are taking place in India. The first one has to do with Foreign Direct Investment (FDI). The Indian government has liberalized laws to allow and encourage foreign individuals and corporations to enter Indian market, especially in industries in which no FDI was allowed before. This is expected to attract more investment in India. The second event deals with the aid from the World Bank, and the huge loan the Bank approved for India. These loans totaling $913.8 million, would aid a number of new projects and complete and improve existing ones. All these projects are expected to improve the quality of life in India.

From the statistical data presented in a previous section, the authors drew the following conclusions and recommendations. Since agriculture is very strong in India, and out of 400 plus million labor force 60 percent are in agriculture, the Indian government should promote more agricultural products for trade, but at the same time, modernize agricultural related industries, as well as increase efficiency in this area. Hopefully, in the short-run it may help to reduce unemployment, improve the balance of payments, and at the same time provide more food for domestic consumption. However, over the long run, movement from agriculture to industry and service areas is necessary for increase in the standard of living and more sustain progress. Furthermore, since they have modern industry they should try to export even more of their industrial production, and this in turn will improve their balance of payments and the unemployment rate.

Another problem facing the Indian economy is inflation, but again if agriculture and industrial production improve, they will also lower the inflation rates, via market competition and decline in the price of finished and semi-finished goods. Finally another major problem in India is the growth rate of the population. Between 1980 and 2000, the population increased by 48 percent, and this obviously contributed to the 24 percent unemployment in 2000 as well as to the fact that 25 percent of the population does not have an adequate diet. The recommendation in this case is to control the population growth by law, until the situation improves, and the country can provide a better standard of living.

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Appendix

In this section of the paper, the authors ran several regressions in an attempt to measure the impact, if any, of the U.S. economy on India's. Data were used from both countries in the models presented, and this data comes from the tables presented earlier in the paper. The hypothesis for each test is presented along with the findings and a graph illustrating the regressions.

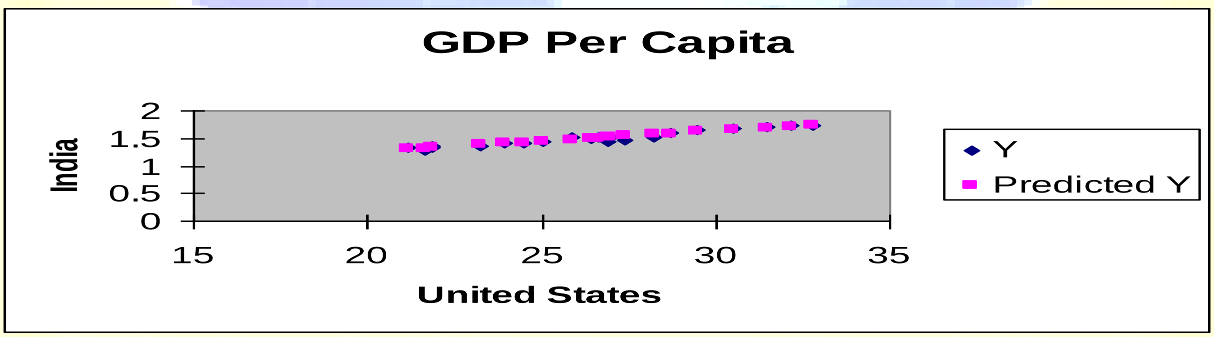
Model #1

The first model uses the US GDP per capita as independent and India's GDP as dependent. The hypothesis is that India's GDP per capita does not depend on the US GDP per capita. The significance level of this test is 5%.

The value of the R^2 is 0.946, so that 94.6% of India's GDP per capita is explained by the US GDP per capita. The P value for this hypothesis test is 1.6×10^{-13}; since this value is less than 0.05 the hypothesis is rejected. We are 95% confident that the slope of the regression line is between 0.034 and 0.043, so a $1000 increase in US GDP per capita produces a very small increase in India's GDP per capita.

These results are shown below in Figure 1.

FIGURE 1



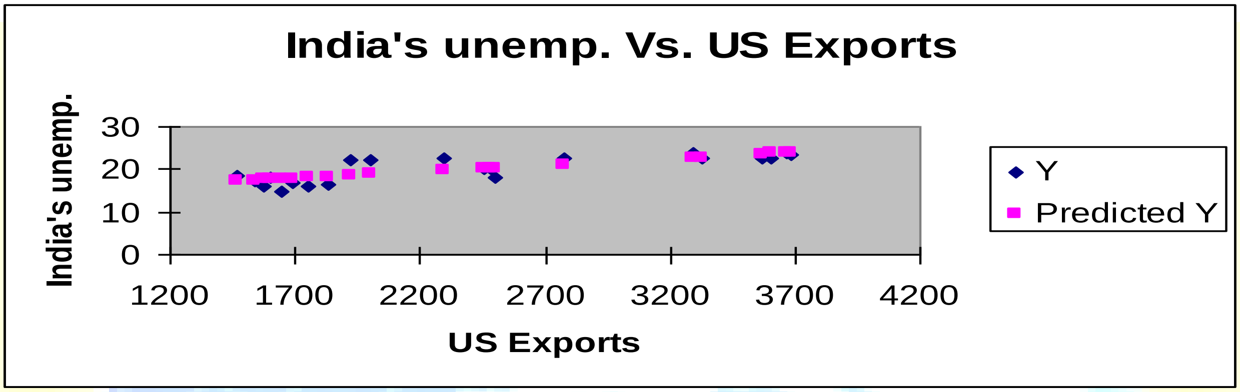
Model #2

The second model uses US exports to India as independent and India's unemployment rate as dependent. The hypothesis is that India's unemployment rate does not depend on US exports to India. The significance level of this test is 5%.

The value of the R^2 is 0.669, so that 66.9% of India's unemployment rate is explained by US exports to India. The P value for this hypothesis test is 5.9×10^{-6}; since this value is less than 0.05 the hypothesis is rejected. We are 95% confident that the slope of the regression line is between 0.002 and 0.004, so a 1 million dollar increase in US exports to India produces a very small increase in India's unemployment rate.

These results are shown in Figure 2 on the next page.

FIGURE 2



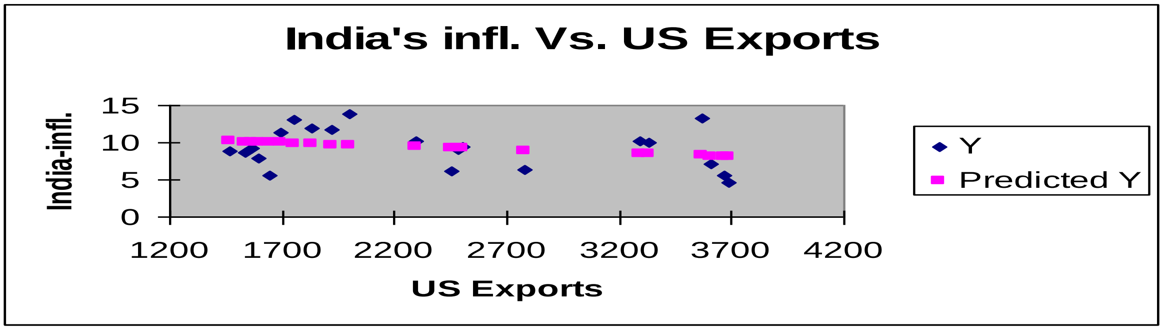
Model #3

The third model uses US exports to India as independent and India's inflation rate as dependent. The hypothesis is that India's inflation rate does not depend on US exports to India. The significance level of this test is 5%.

The value of the R^2 is 0.078, so that 7.8% of India's unemployment is explained by US exports to India. The P value for this hypothesis test is 0.219; since this value is greater than 0.05 the hypothesis is accepted. We are 95% confident that the slope of the regression line is between -0.002 and 0.0006, so a 1 million dollar increase in US exports to India has a negligible effect on India's unemployment rate.

These results are shown below in Figure 3.

FIGURE 3



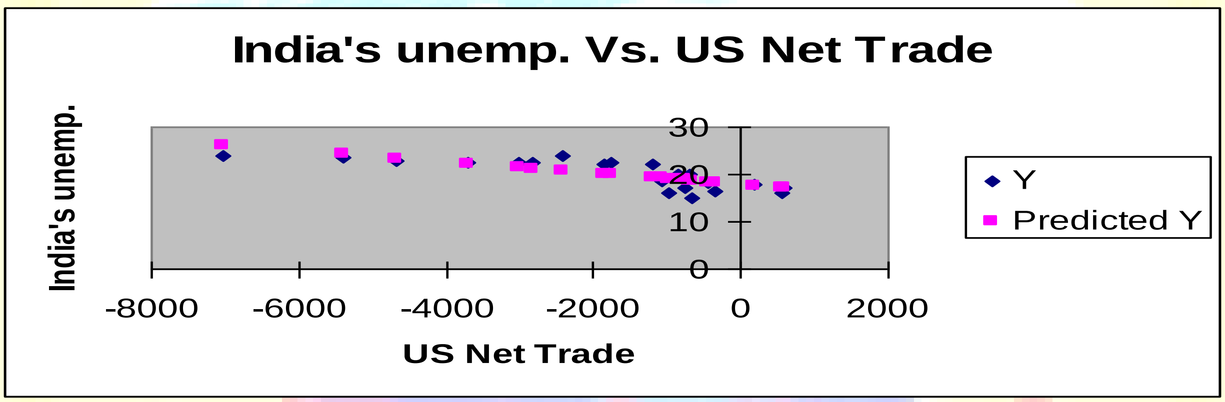
Model #4

The next model uses US net trade with India as independent and India's unemployment rate as dependent. The hypothesis is that India's unemployment does not depend on US net trade with India. The significance level of this test is 5%.

The value of the R^2 is 0.619, so that 61.9% of India's unemployment is explained by US net trade with India. The P value for this hypothesis test is 2.31×10^{-5}; since this value is less than 0.05 the hypothesis is rejected. We are 95% confident that the slope of the regression line is between -0.002 and -0.0007, so a 1 million dollar increase in US net trade with India produces a very small decrease in India's unemployment rate.

These results are shown below in Figure 4.

FIGURE 4



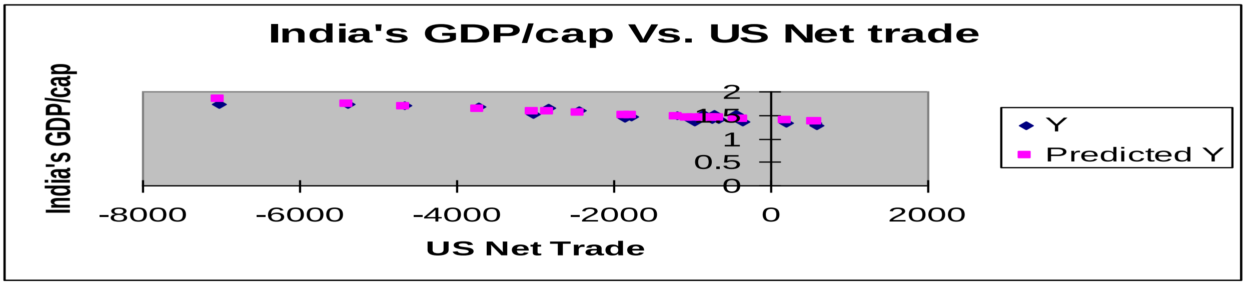
Model #5

Our final model uses US net trade with India as independent and India's GDP per capita as dependent. The hypothesis is that India's GDP per capita does not depend on US net trade with India. The significance level of this test is 5%.

The value of the R^2 is 0.816, so that 81.6% of India's GDP per capita is explained by US net trade with India. The P value for this hypothesis test is 2.08×10^{-8}; since this value is less than 0.05 the hypothesis is rejected. We are 95% confident that the slope of the regression line is between -7.7×10^{-5} and -4.8×10^{-5}, so a 1 million dollar increase in US net trade with India produces a very small decrease in India's GDP per capita.

These results are shown in Figure 5 on the next page.

FIGURE 5



Conclusions

The results of our regressions, especially models 4 and 5, are quite interesting, but they are definitely not conclusive by any means. It does appear the US Economy has an impact on aspects of India's, but the amount of the impact appears to be very small. Further study and research is needed before any conclusive results are drawn, especially for the inverse relationships between India's unemployment and US Net Trade with India, and between India's GDP per capita and US Net Trade with India. To that end, any recommendations or suggestions would be appreciated.