A STATISTICAL AND HISTORICAL ANALYSIS OF INDIA'S ECONOMY

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ABSTRACT

During the last several years, a country that has been making serious moves towards becoming an industrialized country and changing its status is India. The authors' purpose in this paper is to do an evaluation, historical, political and economic, to determine how successful India is, and where it is headed. In our attempt to do that we are going to start with an in depth economic analysis, which will give us the tools to derive conclusions.

The rest of the paper will concentrate on statistical analysis. In order to do that, we are going to present economic data for India for about 36 years, including the GDP, unemployment, inflation, exports, imports, net exports, the growth rate and population. After we analyze the data, we are going to run several regression models, to show us the impact that one indicator had on others, and at the same time determine which economic indicators are the most important for India's economy.

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HISTORICAL BACKGROUND

In this section we are going to do an in-depth research into India's history, to present to the reader a solid background of India. After all our history is the basis of our future.

India, as will be discussed later in a time line, has a history of more than 5000 years. Obviously we cannot discuss and present everything that took place over these years, but we are going to discuss some of the most important events that played a major role in India's development.

Geographically, India has always been very attractive to invaders, of which some were the Persians, the Greeks, the Chinese, the Arabs and the British, but even though all these invaders went through India, they were not able to stay very long or influence the culture of India.

India's history shows us that the first invaders were the Aryans, around 1500 BC. The Aryans that came from the North brought with them cultural traditions that we can find in India even today. The Aryans remained there for about 700 years and then moved on to occupy the Ganges Valley and built their kingdoms there.

The second major invasion, took place around 500 BC, when two Persian kings, Cyrus and Darius conquered the Indus Valley. The Persian occupation did not last very long since Alexander the Great and the Greeks invaded and occupied the region around 326 BC. The next major development in India was the dynasty of the Maurya, and their king was Ashoka. The Mauryas conquered almost the entire subcontinent. King Ashoka also introduced Buddhism to most of central Asia, but the Maurya Empire lasted only 100 years after his death.

The next invaders were the Muslims, under Mohammed of Ghor, during 1192. The Turkish kings that ruled the Muslims stayed there until 1397 when the Mongols invaded. In more recent years, India was under British control, and this lasted for about 300 years. India had some good years under British control, but they finally got their independence under their great leader Gandhi by 1947. When the British left though, they created two separate states, Pakistan and Bangladesh. When the British left, the first Prime minister of India was Jawaharlal Nehru, and

he kept that office until his death in 1964. Ever since then, India has been a parliamentary democracy.

As was mentioned earlier, India has a history of more than 5000 years, which of course cannot be discussed in a few pages. So below we are going to present a timeline of the most important years and events of India's history.

INDIA TIMELINE

2500 BC	Dravidian civilization
1500	Aryans invade India
518	Persians conquered Pakistan
326	Alexander the Great invaded India
322 – 182	Mauryan dynasty
320 AD	The Gupta Indian dynasty
700	Muslims invade India
1498	Vasco de Gama – the first European explorer
1526 – 1857	Mughal rule in India
1857	First war of independence
1858	India comes under direct rule of the British Crown
1905	British divided Bengal into Hindu and Muslim sections
1935	The Government of India Act and the creation of a new Constitution
1948	Mahatma Gandhi assassinated
1962	War with China
1964	Death of Prime Minister Nehru
1971	Third war with Pakistan
1984	Indira Gandhi assassinated and son Rajin becomes Prime Minister

Again this is not a complete timeline for India, as a history of thousands of years cannot be presented in just a few pages, but we presented some of the most important events and years.

CURRENT LITERATURE

This section will present the current economic situation in India. We all know what happened in the world economy since 2007; although India was affected, as the information will show below, it was not affected as much as the rest of the world.

India is a country with an abundance of natural resources, such as coal, iron ore, manganese, titanium ore, natural gas, diamonds and petroleum among others, and it is able to take advantage of all these resources and benefit out of them, but it also has a number of environmental issues, such as deforestation, soil erosion, air pollution, water pollution, and the fast growing population is using all these natural resources at a very fast rate.

On a different economic aspect, India is developing into an open market economy, where economic liberalization and industrial deregulation are obvious everywhere. As a result of this, India's average growth rate since 1997 is more than 7% per year, during 2016 and 2017 it is expected to grow at 7.00 – 7.75 per cent. Also India's GDP is projected to grow by 7.7% during 2016 and 2017 and then accelerate to 8% during 2018 and 2019 due to the implementation of structural reforms, higher disposable income as well as continuous increase in economic activity. India's economy is an agricultural one, since more than half of its labor force is in agriculture, but most of its growth is because of services which account for almost sixty seven percent of its output. In fact out of a GDP of $1.93 trillion during 2012, 17% was out of agriculture, 18% was out of industry, but the goal of the government is to reach 25% of the GDP with the help of newly implemented plans for investments. Another thing that is expected to help increase the percentage of industry is that the government is trying to improve its ease of doing business ranking from 130 during 2015 to within the top 100 by 2016 and eventually in the top 50 during late 2017. Finally 65% out of services. What makes this more interesting is that out of 498.4 million labor force (2012), 53% were in agriculture, 19% in industry, and only 28% in services. Even though India's economy was very strong for a number of years, it started slowing down around 2011 due to some tight monetary measures to fight rising inflation, which rose to 9.2% in 2012, up from 8.9% in 2011. As a result, its growth rate during 2012 dropped to 5.6%, down from 10.13% during 2010, and its unemployment rate rose to 3.6% up from 3.5% in 2011.

The overall production of India consists of agricultural products, such as rice, wheat, oilseed, cotton, tea sugarcane, onions, potatoes and dairy products. On the other hand the industrial production includes products such as textiles, chemicals, food processing, steal, transportation equipment, petroleum, machinery and pharmaceuticals. India's exports in 2012 totaled $463 billion and its imports $523. Obviously a trade deficit of around $60 billion.

Finally in the middle of all this world economic turmoil and slowdown, the International Monetary Fund, (IMF), projects that India will outpace China in growth with a 10.4% growth rate as opposed to 10.3% for China.

STATISTICAL ANALYSIS

In this next section, we are going to present India in numbers, in order to get a better picture about its economy during the last thirty years. Some of the data that will be presented include the Gross Domestic Product, Exports, Imports and Net Trade, Population, Inflation, just to name a few.

Table 1 that follows includes the GDP, Exports/Imports, Population and the GDP Growth Rate.

TABLE 1

YEAR	GDP BIL $ 2010=100	GROWTH RATE	X BIL $ 2010=100	M BIL $ 2010=100	NET EXPO. Xn bil.$	INFLATIO. %	UNEMPL. %	POPUL MIL.
1980	283.3	6.7	19	18.7	0.3	11.4		697.2
1981	300.3	6	18.9	20.6	-1.7	13.1		713.6
1982	310.7	3.5	20	21.3	-1.3	7.9		730.3
1983	333.4	7.3	19.8	25.9	-6.1	11.9		747.4
1984	346.1	3.8	21.3	22.2	-0.9	8.3		764.7
1985	364.3	5.3	19.9	25.3	-5.4	5.6		782.1
1986	381.7	4.8	21	29.6	-8.6	8.7		799.6
1987	396.8	3.9	23.7	29.1	-5.4	8.8		817.2
1988	435.1	9.6	25.5	31.8	-6.3	9.4		834.9

1989	460.9	5.9	28.5	32.5	-4	3.3		852.7
1990	486.4	5.5	31.7	33.6	-1.9	8.9		870.6
1991	491.6	1.1	34.8	33.6	1.2	13.9	4.3	888.5
1992	518.5	5.5	36.5	40.7	-4.2	11.8	4.2	906.5
1993	543.1	4.8	41.5	48.5	-7	6.4	4.3	924.5
1994	579.3	6.7	46.9	59.5	-12.6	10.2	3.7	942.6
1995	623.2	7.6	61.6	76.2	-14.6	10.2	4	960.9
1996	670.2	7.5	65.5	74.3	-8.8	8.9	4	979.3
1997	697.4	4.1	64	84.2	-20.2	7.2	4.2	997.8
1998	740.5	6.2	72.8	102	-29.2	13.2	4.1	1016.4
1999	806.1	8.8	85.9	109	-23.1	4.7	4.4	1034.9
2000	836.9	3.8	102	114	-12	4.1	4.3	1053.5
2001	877.3	4.8	106	117	-11	3.7	4	1071.9
2002	910.7	3.8	128	131	-3	4.4	4.3	1090.2
2003	982.3	7.9	141	149	-8	3.8	3.9	1108.4
2004	1060.1	7.9	179	183	-4	3.8	3.9	1126.4
2005	1158.6	9.3	225	242	-17	4.2	4.4	1144.3
2006	1265.9	9.3	271	294	-23	6.1	4.3	1162.1
2007	1374.9	8.6	287	324	-37	6.4	3.7	1179.7
2008	1428.4	3.9	329	398	-69	8.4	4.1	1197.1
2009	1549.5	8.5	314	389	-75	10.9	3.9	1214.2
2010	1708.5	10.3	375	450	-75	11.9	3.5	1230.9
2011	1821.9	6.6	434	545	-111	8.9	3.5	1247.4
2012	1924.2	5.6	463	523	-60	9.3	3.6	1263.6
2013	2051	6.6	499	530	-31	10.9	3.6	1271
2014	2200	7.2	508	534	-26	6.4	3.6	1300
2015	2370	7.6				5.9		1310

EXPORTS : World Bank national accounts data, and OECD National Accounts data files

IMPORTS: World Bank national accounts data, and OECD National Accounts data files

INFLATION: International Monetary fund, International Financial Statistics and data files.

UNEMPLOYMENT: International Labour Organization, Key Indicators of the Labour Market database

GROWTH RATE: World Bank national accounts data, and OECD National Accounts data files

GDP: World Bank national accounts data, and OECD National Accounts data files

POPULATION: United Nations Population Division. World Population Prospects

Data from database: World Development Indicators   Last Updated: 11/17/2016

This table gives us some very interesting conclusions. If we take a look at the GDP and the Population growth, we see that the GDP grew by more than 700% between 1980 and 2015, whereas the population grew by 88%, which means that India's growth of the GDP did not result out of the population growth but out of improved efficiency and better use of resources. Another interesting conclusion is that the trade deficit has been steadily decreasing. Even though it reached a high of $111 billion during 2011, it has been decreasing since then and during 2015 it was at $26 billion. This shows that India is getting to a point where even though its population is growing tremendously, it seems that it can meet most of the demands for goods and services domestically. The following pages present some figures which illustrate the data presented in Table 1.
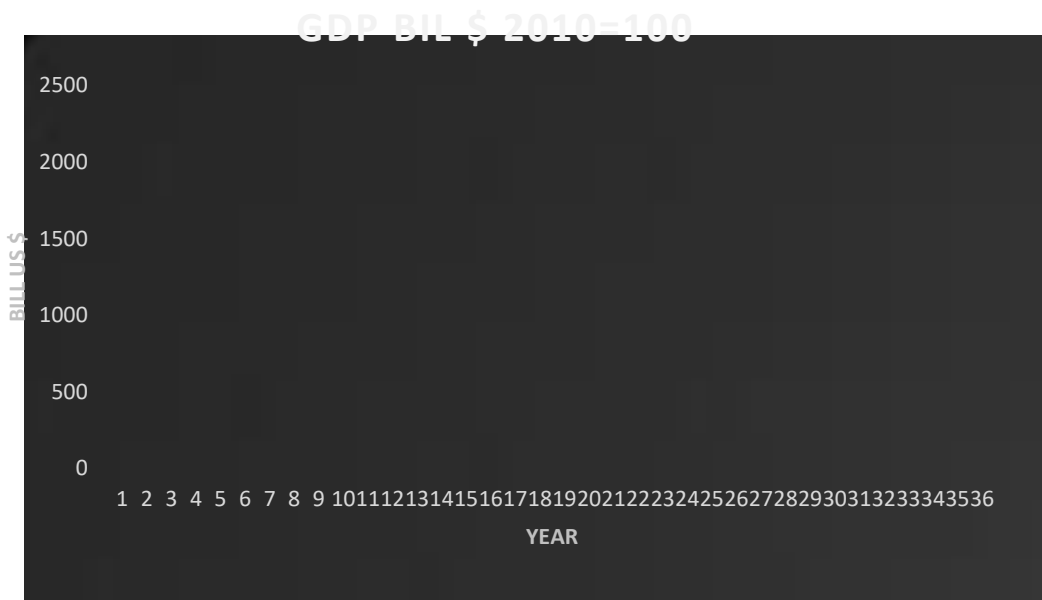
FIGURE 1

Figure 1 shows India's GDP in bill. of US $. Obviously the plotted data shows that during the last 36 years has been steadily increasing, with a pretty steep increase during the last 10 or so years.
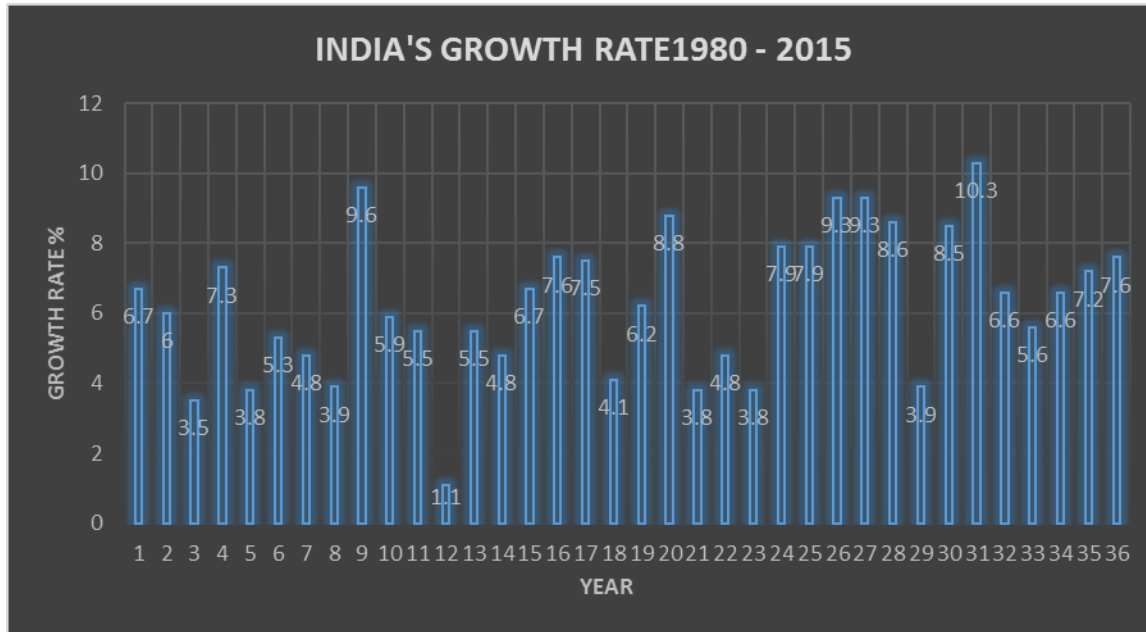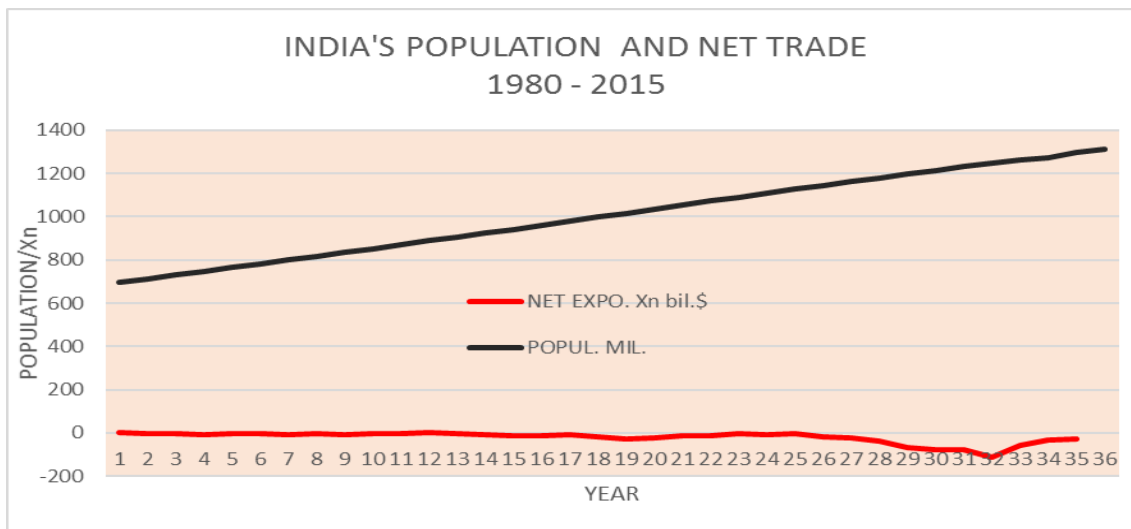
FIGURE 2

Figure 2 above shows India's growth rates during the last 36 years. As can be seen it has not been an easy and steady ride. India had some very good years and some that were not as good, but it is obvious that it had some growth every year.

FIGURE 3

The above figure also shows something we discussed above, that the increase in population has not created a big trade deficit. If anything from the data above we can clearly see that the trade deficit actually declined.

FIGURE 4
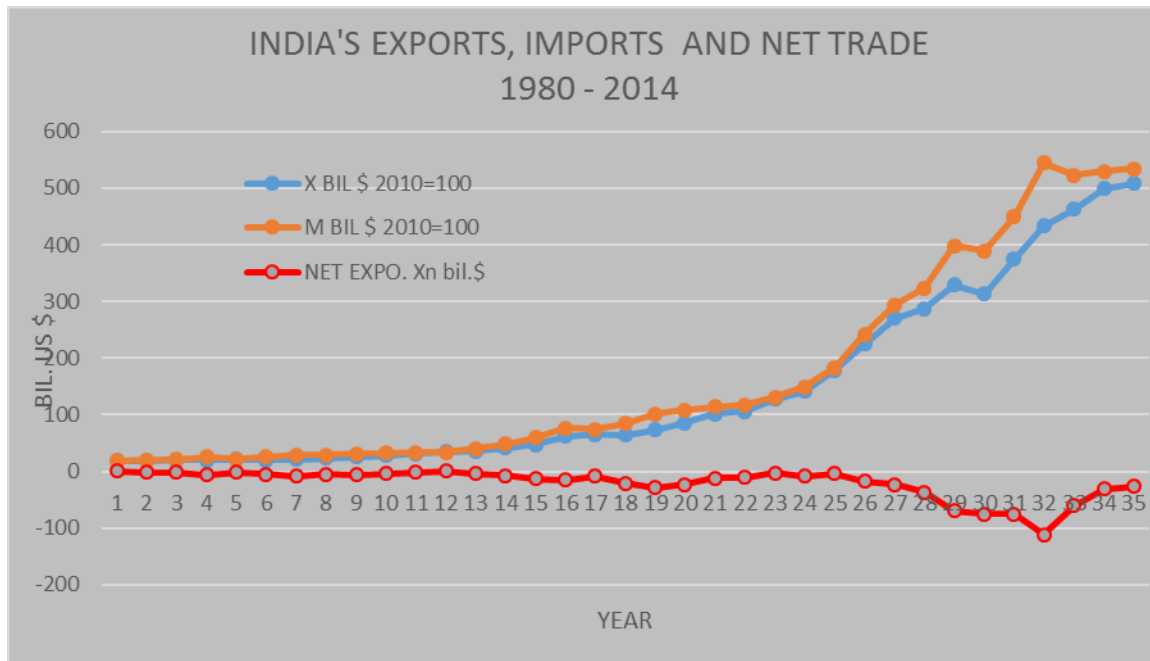
Figure 4, shows graphically the relationship between Exports and Imports, basically Net Trade. Looking at the export/import data they more or less go along with each other, and the gap between exports and imports closing down during most recent years.

CONCLUSION

Finally in the conclusion we are going to put everything together, and try to derive some projections and possibly some recommendations.

Although India is growing with fairly fast rates, and this was shown in Table 1 and the figures that followed, it has a long way before it becomes a superpower. Obviously it is much better today than it was 30 years ago, with an increase in its GDP by more than 700%, but there are other things that need improvement as well, such as education, infrastructure and standard of living.

At this point we can make a couple of recommendations that can ultimately help the economy of India. The first thing is that they should try to improve their productive efficiency. They have both the human resources as well as the natural resources to do that, it is a matter of finding methods to do that, starting with education. If this is accomplished, it will lead India to the second recommendation which is to reduce the trade deficit, as this is very costly. Even though it has been declining, they can do better.

Finally a third recommendation is for India to take advantage of its IT industry. It is well known that India has an advantage in this area over a lot of countries, labor cost and know how, they should invest heavily in this in order to bring more investments in India. Once more, the first thing that India can do here is investment and improvement in education.

In conclusion, this paper is not complete by any means. Any suggestions or recommendations to improve this paper will be appreciated.

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APPENDIX

In this section of the paper, the authors ran several regressions using the data presented earlier in the paper. The regressions are an attempt to measure aspects of India's economy. The hypothesis for each test is presented along with the findings and a graph illustrating the regressions. From these regressions, we should be able to make some recommendations.

Model #1

The first model uses population as independent and GDP as dependent. The hypothesis is that GDP does not depend on population. The value of the R^2 is 0.887, so roughly 89% of India's GDP depends on population. The P value for this hypothesis test is 3.69×10^{-17}. Since this value is smaller than 0.05, the hypothesis is rejected, meaning that the population has a huge positive impact on the GDP. The results are show in the figure below.
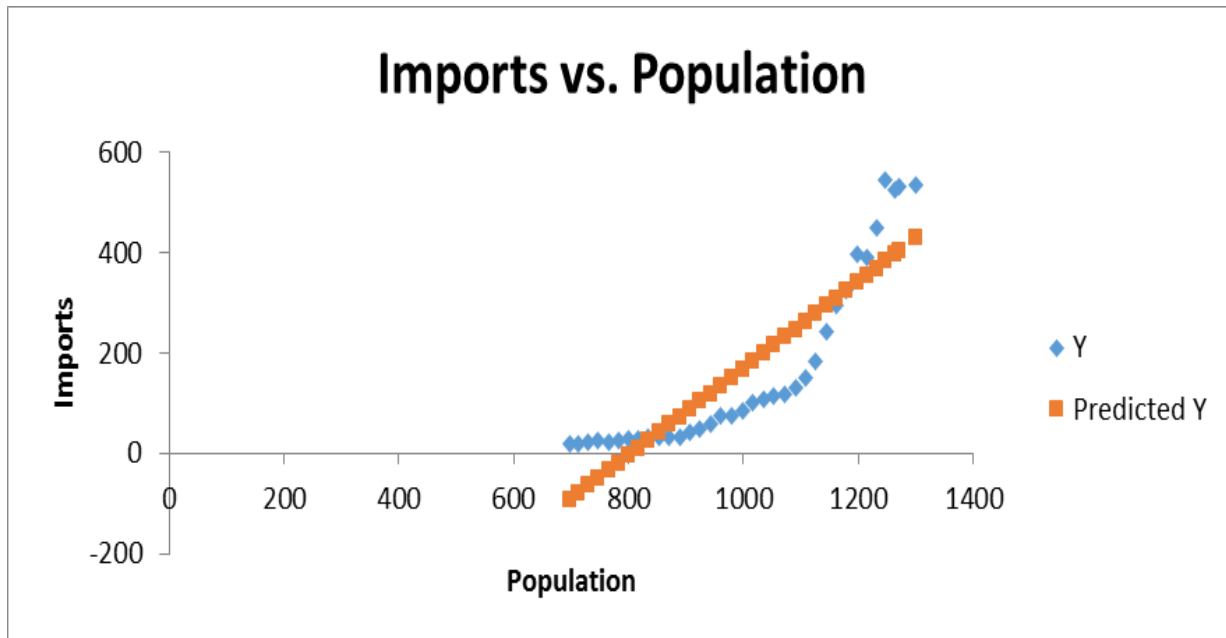
FIGURE
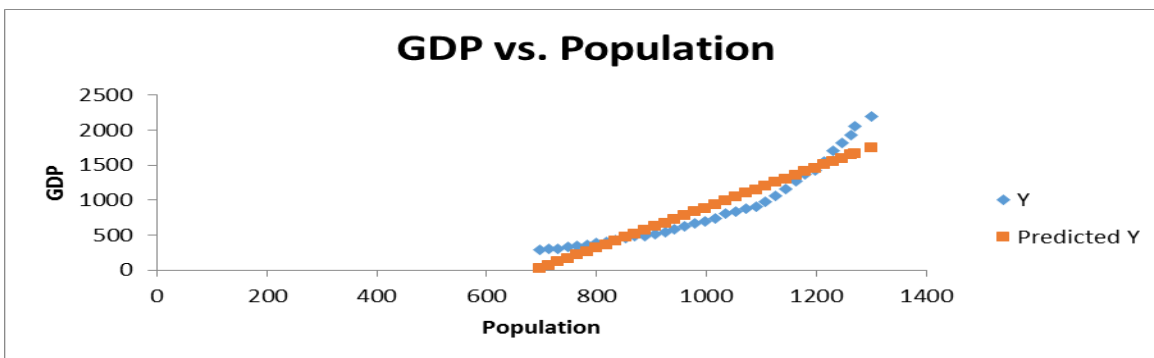
Model #2

The second model uses population as independent and imports as dependent. The hypothesis is that imports do not depend on population. The value of the R^2 is 0.791, so roughly 79% of India's imports depend on population. The P value for this hypothesis test is 9.62×10^{-13}. Since this value is smaller than 0.05, the hypothesis is rejected.
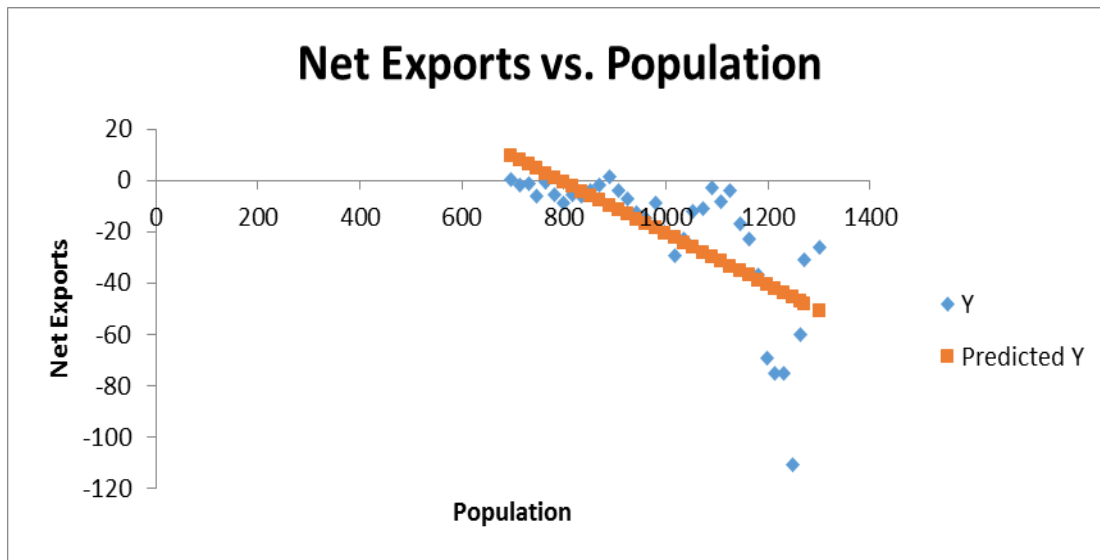
These results are shown below in Figure 2

FIGURE 2

Model #3

The third model uses population as independent and net exports as dependent. The hypothesis is that net exports do not depend on population. The value of the R^2 is 0.485, so roughly 49% of India's net exports depends on population. The P value for this hypothesis test is 3.4×10^{-6}. Since this value is smaller than 0.05, the hypothesis is rejected. The conclusion for this model is that the population is a major determinant of net trade. These results are shown in Figure 3 on the next page.

FIGURE 3

Model #4

The fourth model uses growth rate as independent and imports as dependent. The hypothesis is that imports do not depend on growth rate. The value of the R^2 is 0.117, so roughly 12% of India's imports depend on growth rate. The P value for this hypothesis test is 0.044. Since this value is smaller than 0.05, the hypothesis is rejected, but the impact is minimum. These results are shown below in Figure 4.

FIGURE 4
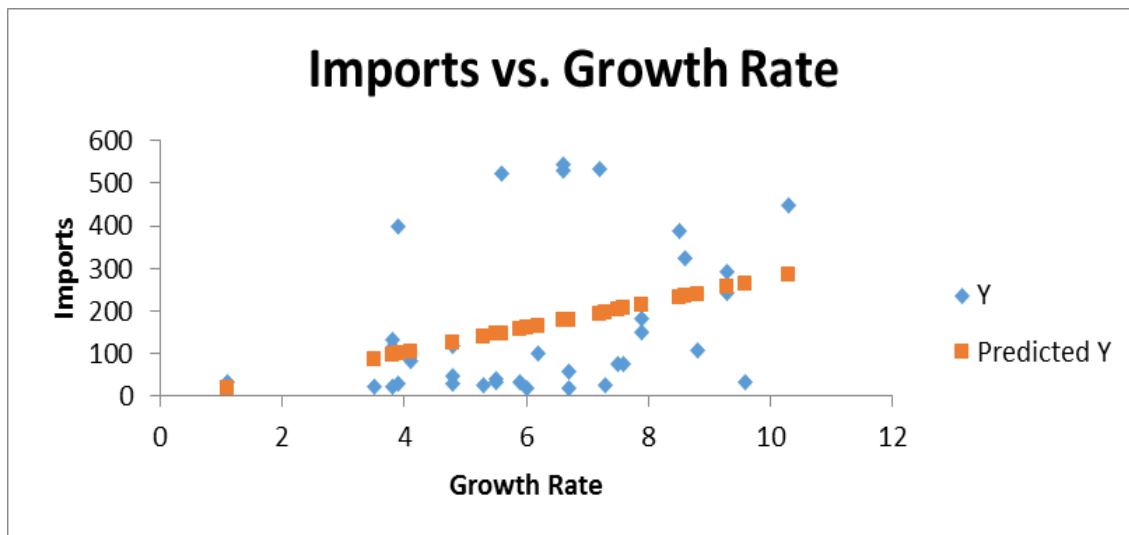
Model #5

The final model uses growth rate as independent and inflation as dependent. The hypothesis is that inflation does not depend on growth rate. The value of the R^2 is 0.004, so less than 1% of India's inflation depends on growth rate. The P value for this hypothesis test is 0.72. Since this value is larger than 0.05, the hypothesis is accepted, and here we can conclude that growth is not a thread, and should be promoted further.

These results are shown below in Figure 5.

FIGURE 5
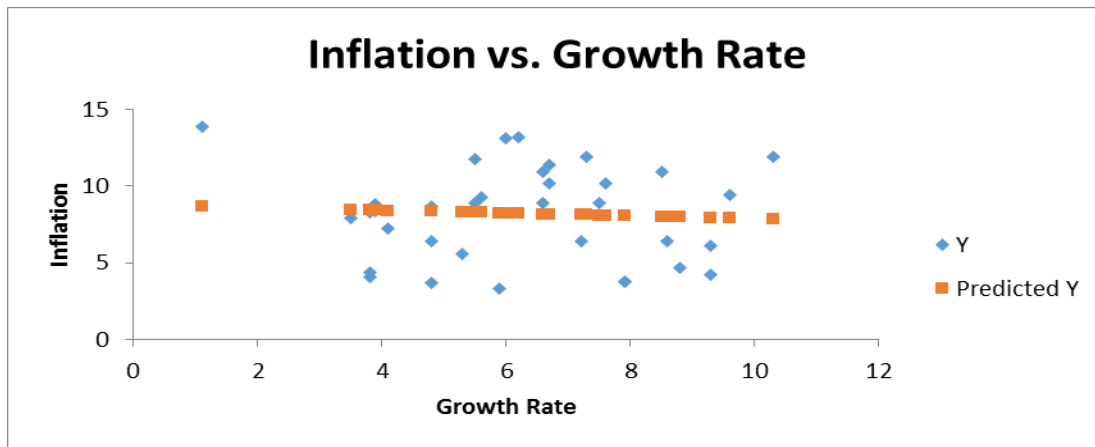
CONCLUSION

In concluding the appendix, the authors attempted to explain in more detail several aspects of India's economy. We believe this way we can get a much better picture of India's economy. . Even though the results are interesting, they are not 100% conclusive. More work is needed before we can say that the results are solid, but we can still make a couple of recommendations. India's population is very critical to its economy, as can be seen from the regressions, and so more should be invested, in the form of education and training, and this will cause an increase in growth, productivity and efficiency. The second recommendation is that since growth does not cause inflation, from model number 5, the government should promote growth, and this can be achieved by investing on the population, just like it was suggested above. To that end, any suggestions or recommendations that can improve and can take this paper a step further will be appreciated.