Indian Institute of Space Science and Technology

Thiruvananthapuram



B Tech Economics Project

A

Study Report on

Fiscal Responsibility Index

Submitted by

B Tech Electronics and Communication Engineering 2018 batch

Group Number

4

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29 April, 2020

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Declaration

This project report titled **"Fiscal Responsibility Index"** is a presentation of our original research work. Wherever contributions of others are involved, every effort is made to indicate this clearly, with due respect to the literature, and acknowledgement of collaborative research and discussions.

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Acknowledgement

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First and foremost, we would like to express our deep and sincere gratitude to **Dr**. **Shaijumon C.S.**, our Professor, for giving us the opportunity to work on this wonderful project. With the help of his constant guidance and support, we were able to go ahead during this project.

Besides our professor, we would also like to pay our special regards to **Mr. Rajkumar R**, PhD Research Scholar, our Project Advisor, without whose continuous motivation and directions we would not have been able to finish this project.

We also sincerely thank everyone else who helped us in realizing this project successfully.

Abstract

"The finance minister announced that India has gone for a fiscal deficit – GDP threshold of 3.5% (instead of 3%) for the next fiscal and that it is strictly within the purview of the new Fiscal Responsibility and Budget Management (FRBM) Act, incorporated in the Finance Bill 2018".[28] This statement may raise many questions on what factors the limit of fiscal deficit is decided ? What compelled the finance minister to go beyond the limit set by the FRMB act? Why do we need that limit and if required how strictly one has to follow that limit? (it is evident it could be changed under unsighted circumstances). Finally it boils down to what all responsibilities a government has fiscally.

India is the 5^{th} largest economy in the world[40] but as we are a developing nation, the indefinitely fluctuating growth rate and the so called "slowdown" of the economy in recent years has been a great concern for many. So, it is of paramount importance ,to know, how responsible the government is "fiscally", towards the nation in an economy. "Fiscal Responsibility" is an abstract concept and to understand its impacts, it is necessary to quantify its behaviour or express it physically. To do this a grading or indexing system is suitable. In this project, we tried to make an index for the same which will help us in determining how much a government is responsible and how it can be more responsible. Now, the problem (question) is "What are the factors that may affect this index?" The answer to this is quite simple: all the major factors affecting the economy will affect this index.

Fiscal Responsibility has been an evergreen issue of serious and sensitive debate, especially aggravated after the introduction of Fiscal Responsibility and Budget Management Act (FRBMA) in December 2000. Various views have been provided by various well-known economists regarding the issues related to fiscal responsibility, and how it can be achieved, supported by critical and comprehensive statistical and intuitional analysis.

The advantage of quantifying this "Fiscal Responsibility" as an Index is that it can act as a report card of the government's efficiency to handle its monetary resources. This is particularly important for a country such as India that is striving to become a developed nation and get rid of its many economic problems. The FR Index can help a government to use its monetary resources smartly, which is the need of the hour.

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Chapter 1 Introduction

"Fiscal responsibility and government reform are going to be good themes for governing, well at any time, but particularly coming out of a recovery."

- Bob McDonnell

T he rapid "slowdown" of the Indian Economy is something that has been in the news for quite sometime now and it is also a major issue of worry among various sections of economists, political leaders and social activists. And one of the factors responsible for this slowdown is fiscal irresponsibility, not only India, many other developing countries in the world also show the same kind of fiscal irresponsibility.

Fiscal responsibility practically means spending money responsibly i.e catering to the demands of the country even if it means spending more than the revenue. For a country, the final objective is to take down the deficit but not necessarily now. Fiscal responsibility is creating a better, stronger and prosperous nation for the next generation. Choices the government makes today or fails to make, will determine what kind of future the next generation will inherit.

A nominal fiscal deficit is considered normal for a developing economy, it becomes a worry when it shoots up beyond a threshold, which depends on different interpretations. One of the major problems with fiscal deficit is that the larger it is, the larger the market borrowing the government of the day resorts to, thereby crowding out private investment.

Achieving budget surplus could cause fall in Aggregate Demand (AD) and economic growth. The concern is that targeting a budget surplus could lead to an inappropriate tightening of fiscal policy. For example, if there was an unexpected downturn in some other country's economy, this would lead to lower export demand. If the government were committed to a budget surplus, it might need to increase taxes at a time when the economy was weakening, an economic downturn would lead to lower tax revenues and higher spending on benefits. Also a country cannot ignore the consequences of deficits much longer. Also a stagnant long-term economy cannot support retirement payments, medical care, and all the other benefits and services for the current generation and it cannot support economic opportunity for tomorrow's generation.

There is a tie between budget deficits today and what society can enjoy tomorrow. Eliminating the deficit is an important step, but not necessarily now. Facing up to both the short and long-term fiscal challenges will help put the nation on a path to lasting prosperity and a rising standard of living. Fiscal policy should be made with the primary aim of improving people's lives. Sometimes this necessarily involves reducing the deficit and debt, and sometimes it doesn't. Hence this question, whether there is a need for an act that makes it mandatory to have a fiscal deficit up to some numbers which might or might not be adequate to tackle the current situation, highlights. Thinking about the future while not being clear about the present shows ignorance/ inability to solve the current problem a country is facing which could lead up to a bigger problem in future. This can be minimized/reduced by always doing amendments in the fiscal and monetary policies. And managing the deficits, all the expenditures and revenues in a good manner which can help a government to be more fiscally responsible towards the nation. Finally it boils down to what all responsibilities a government has fiscally, so as to realize **SUSTAINABLE** growth of the country.

1.1 Research Problem

As per our topic of fiscal responsibility, we are going to define one Fiscal Responsibility Index that will give an idea of how the government was fiscally responsible in the particular year. We are also going to analyze the effect of different parameters on the index and how to manage a good FRI based on the limiting value of it's parameters.

As our topic suggests and from what we have discussed above, we can conclude that our country is in deficit and it is necessary to have a parameter to know exactly how much a government is responsible fiscally. So this FRI will help to judge the government for its fiscal responsibility against the nation and also it will help to analyze the parameters of it and its external limits to maintain the development of the country and to become more fiscally responsible.

1.2 Importance of the topic

Although many factors are responsible for this decaying growth rate, one of the factors that we can consider for unidimensional analysis is Fiscal Responsibility of the Government. The currently existing hazy and blurred definition of Fiscal Responsibility and optimal range of Fiscal Deficit ,and other deficits, for sustainable growth; makes it literally impossible for India to proceed in the right direction for achieving the long-anticipated "Developed Country" status.

Today, we as a nation are facing many problems. One of them is how to maintain the deficits, expenditures and revenues. We can see that the Government is borrowing money from outside. If they are using it for capital investment and development of the country in all the sectors rather than just for payment of interest or fulfill the revenue deficit which we already took, it's helpful for our nation. For the development also, we can't just borrow money and invest as much as we want, there should be some limit on it to control it further. Development of a nation doesn't just mean achieving high economic growth, but to maintain economic equity and planning for future generations while achieving optimal economic growth.

The following are some of the key aspects that highlight this topic's importance in the current situation :

- Get to know how much the Government is fiscally responsible.
- By the help of FRI, help the government to become more fiscally responsible in future years.
- To control the deficits in the country.
- To use the money borrowed for capital investment and development of the nation.
- To keep in check the Total Outstanding Liabilities.

1.3 Plan of Study

Some of the existing literature and research papers were reviewed to understand this topic and analyze it (The corresponding literature review is provided in the next chapter.

First, one plan was devised to analyze the topic, which included finding out the parameters which affect the Fiscal Responsibility . Second, the most appropriate parameters were chosen to mathematically model it and define the Fiscal Responsibilities Index.

1.4 Objectives

- To try and define what fiscal responsibility is in the modern sense and what are the different parameters that it may depend upon.
- To study the working of government in order to reduce fiscal and revenue deficit and thereby, define fiscal responsibility and form an empirical formula to indicate how responsible the government is in an economic cycle in order to reduce fiscal deficit and maintain adequate growth rate.
- To analyze the trend of the FRI curve and predict the fiscal responsibility Index for the future year.

1.5 Methodology

Using data from the RBI database[18] and World Bank data[49] try to model the different parameters affecting the fiscal responsibility. With the help of MATLAB software, try to get some models using the best fit curve method between different parameters by using different weights and try and derive a mathematical formula which will be helpful to analyze the parameters(like deficits, growth, GDP etc) and how it may affect the fiscal responsibility. Choose the best model and try to get composite indices for the different parameters.

Since, the plots of data for the parameters are not linear and the equations we got for the best fit curve are of the higher order of the polynomial (x^4 and x^5) and higher order complex mathematical function like Gaussian, Fourier Series, Exponential etc. So, we have considered the best fit linear polynomial for the equations for simplicity and accuracy of the index and we just analyze the trend of the change of those parameters.

By analysis of all the data and the equations all the non essential parameters were removed and then, finally, an index(Fiscal Responsibility Index) was made from all the other composite indices. Which was obtained by the statistical functions.

1.6 Hypothesis

The FR Index is supposed to indicate the expertise of the government in rightly and wisely allocating the financial resources so as to ensure all-round development of the country. For this, the approach considered is as described:

Considering FD as a whole doesn't give us much insight into the fraction of resources allocated for various aspects of the economy : Capital Investment, Revenue, Interest payments. So, the primary goal of the approach is to clearly distinguish the aforementioned aspects. This is followed by , clearly judging the type of impact of each of these aspects and then modelling them accordingly to get an estimate of the future development aspect as well as the deficit-curbing aspect of Fiscal Responsibility. Along with this, another estimate considered is the economic growth rate of the country which is the other side of the coin for economic development as Fiscal Responsibility. Both of these estimates serve as an input to the final FR index which now rightly indicates Fiscal Responsibility.

1.7 Possible limitation of the study

- The data of the parameters of deficit and growth that we are using are too non-linear. The actual modeling is difficult in that case. So, we have to take an approximate modeling curve which will have less deviation from the actual curve, which may affect the accuracy of the index.
- Due to time limitations of the project, various other aspects have not been taken into consideration. The most affecting variables are taken rather than all the parameters which are actually affecting it.
- We are just simply considering ideal conditions and finding the index rather than consideration of any crisis effect or any unexpected situation faced in any year.

Chapter 2 Literature Review

"Most of the succesful people I've known are the ones who do more listening than talking." - Bernard M. Baruch

F iscal Responsibility has been an evergreen issue of serious and sensitive debate, especially aggravated after the introduction of *Fiscal Responsibility and Budget Management Act (FRBMA)* in December 2000. Various views have been provided by various well-known economists regarding the issues related to *fiscal responsibility*, and how it can be achieved, supported by critical and comprehensive statistical and intuitional analysis. This section aims to capture the essence of their views, arguments, techniques and expectations along with their analytic thought processes.

Key Words

FD - Fiscal Deficit; GFD - Gross Fiscal Deficit; RD - Revenue Deficit; PD - Primary Deficit; GDP - Gross Domestic Product; GFC – Global Fiscal Crisis; ERD - Effective Revenue Deficit; FRBMA- Fiscal Responsibility and Budget Management Act; RR - Revenue Receipts; RE - Revenue Expenditure

2.1 Need For Transparency

For India, fiscal transparency would require greater clarity in the delineation of the public sector and its components, raise awareness about the cost of tax subsidies and other benefits which a person or a institution is entitled to get while operating the country.[10]

2.2 Design at National & Sub - National Level

One of the most important qualification for fiscal responsibility is that Fiscal correction is a must not only at the centre but also at the states.[5] This can be emphasized by looking at some history which describes us the need for implementation of Fiscal rules on state level : [17]

- State Electricity Boards, were incurring losses and showed negative returns on capital. Attracting private sector investment for power generation projects in the absence of tariff reform required granting of rate of return guarantees by many states.
- Trend of structure of expenditure was worsening.
- 22 states had passed the Fiscal Responsibility Legislation after FRMB Act. And the GDF/GDP target was bettered and the RD turned into revenue surplus. Thus, the situation of the states was similar to that of the centre.

There are two approaches to collaborative fiscal responsibilities i.e *Autonomous* and *Coordinated* .[10] Under the autonomous approach each subnational government seeks to gain credibility for its own fiscal policy, under the coordinated approach the goal is to establish collective credibility for macro economic policies that is, not only for fiscal policy, but also for the monetary stance of the federation.

India under the bill has adopted the autonomous approach.

2.3 FRBM Act & its Effects

The Act sets targets and suggests means of reducing fiscal and revenue deficits. The similar act is also implemented in other countries.

Year	Progress
2000-03	Introduction and Implementation of Act
2004-06	Target to achieve RD=0 & FD = 3% of GDP
2007-08	Not Achieved (because of GFC) so Temporary Postponed
2012	Introduced of Medium-Term Fiscal adjustment
2012-15	Amendments (Major- Introduce ERD)
2016	Review Committee
2018	Target to get RD=2% & FD = 3% of GDP in 3 years.

Figure 2.1: Timeline of the FRBM Act

Following are some of the conclusions about the effects of FRBM Act obtained by critical analysis : [48][6]

- India has a long-standing preference for running large deficits compared to not only the group of emerging economies but also globally. Over the last three decades, India has found it impossible to sustain an overall public sector deficit of less than 8% of GDP and the general government deficit to lower than 6% of GDP.
- The key fiscal indicator of Central Government is GFD decreased at high rate (Because of the GFC) Although RD and PD have declined marginally.
- The expenditure of Central Government, interest payments (as % of GDP), declined in post- FRBM period to 1.9%.
- Although Total Tax (% of GDP) is increased to 10%, non-tax revenue and capital receipts declined in Post-FRBM period. Interest payments as a ratio of Revenue Expenditure (RE) and Revenue Receipts (RR) though declined in the Post-FRBM period.
- After 2004/05, there has been no fiscal correction once off-budget items are included and moreover, the indicators mostly deteriorated.
- The off-budget expenditure clearly shows that the FRBMA transition targets towards 3% of GDP fiscal deficit and balance on revenue account by 2008/09 were exceeded before the onset of the 2008 Great Recession.
- The adverse evolution in the centre's fiscal balances was not on the account of the operation of automatic stabilizers during a cyclic slowdown; on the contrary, the Indian government revenues have been buoyant. The few stimulus packages by the government helped in the cause:
 - 1. Reduction in the indirect taxes
 - 2. Funding the loss-making public sector units
 - 3. Expanding rural income support scheme
 - 4. Increasing salaries and pensions of civil servants
 - 5. Huge agricultural loan waiver

- There has been a decline in the liabilities of central government over the period of five years of FRBMA's operation. The driver being India's unprecedented growth performance in these years.
- Fiscal consolidation by state government in the years of FRBMA operation has been commendable. They were able to maintain their deficit level within the 3% cut off.

Why are continued high Fiscal Deficits bad?

- 1. Disempower Government's fiscal stance by preempting a larger share of public resources for debt servicing thereby reducing desirable capital expenditure.
- 2. Incurring Fiscal deficits along with Revenue Deficits (as in India's case) means that we are using borrowed resources for current consumption yielding short term satisfaction but is spurious for future growth.
- 3. Crowding out of the Private sector.
- 4. If the Government borrows in domestic markets, it leads to increased pressure on interest rates whereas if it finances by creating high power money, it causes inflation.
- 5. Disrupt inter-temporal equity concerns as they give pleasure to present generations, causing debt pain to future generations.[5]

2.4 Shaping Fiscal Policies : Two Schools of thought

School-I : Support Fiscal Expansion			School-II : Support Fiscal Consolidation		
•	Analytic Perspective: If the Government relaxes FRBM targets, borrows aggressively and invests in social and physical infrastructure, then this will cause exponential growth and the higher revenues thereby generated will be more than sufficient to meet additional debt service. (BORROW AND INVEST)	•	<u>Analytic Perspective</u> : Fiscal expansion works only when $RD = 0$ and investments have high returns which are not met in India. Even if $RD = 0$, we cannot operate without a debt ceiling as returns are typically lower than borrowings.		
•	<i>Empirical Perspective :</i> Based on past Indian experience that during 1996/97 - 2001/02 even though FD was high, inflation and interest rates were minimal. Different economic dynamics in India where drastic fiscal adjustments threaten growth momentum.	•	<i>Empirical Perspective :</i> During the aforementioned period, no higher inflation/interest rates, because of fortuitous circumstances. Liberalisation in 1991 launched competitiveness which resulted in higher investment leading to increased production capacity. This excess capacity decreased private investments, thereby eliminating higher fiscal deficits, aided by softening of global interest rates.		

2.5 Defining "Fiscal Responsibility" in the new sense

- 1. Achieving FRBM conditions, is necessary but not sufficient for sustaining growth as quality adjustment through improved and efficient public expenditure has to be ensured. Levels of revenue to be taken into account.[6][5]
- 2. Policies need to be framed in such a way that there should be multiple checkpoints and continuous evaluation (made possible through proper media coverage and political debate that will lead to a broad legislative consensus) with a flexibility to make changes in the budget so as to achieve the target set before.[17][10]
- 3. Need to be more specific on 'exceptional circumstances' when 'pause' button can be used to stall the targets provided by FRBMA.[6]
- 4. Since FD is multivariate, debt dynamics like ratios of debt to GDP & interest payments to revenue to be properly simulated by finance committees. India can afford little higher FD due to higher savings among the public. [5]
- 5. There is no economic rationale for what in budgetary accounting is referred to as public investment. This should be fixed.[17]
- 6. Political opportunism in India calls for the postponement of expenditure cuts or tax increases and the prompt spending of revenue windfalls this will create an impact when office changes. Proper mechanism should be laid out to bind the governments to the FRLs and measures should be taken in terms of relaxations during economic crisis.[48]
- 7. There should be some penalty for not attaining the goal.

Unless India reverses the recent trend in its fiscal balances, its net public debt, GDP ratio will cross thresholds that could undermine its growth performance. Committing to fiscal responsibility will strengthen present growth momentum. The Golden Rule of fiscal discipline and fiscal responsibility should be clearly defined and strictly followed

Chapter 3

Our Initial Ineffective Attempt

"Success is stumbling from failure to failure with no loss of enthusiasm"

- Winston Churchill

Key Words

FD - Fiscal Deficit; PD - Primary Deficit; RD - Revenue Deficit; GDP - Gross Domestic Product; FR - Fiscal Responsibility

3.1 Basic Motivation & The Approach :

T he aim of this project is to capture the true of meaning of *"Fiscal Responsibility"* in the modern sense. To investigate this further, the assumed approach began by trying to understand the correlations of Fiscal Deficit, Revenue Deficit and Primary Deficit (expressed as a percentage of GDP) with its subparameters.



Figure 3.1: Basic Structure of the Approach

Then, the next stage was to rate the structure of {FD, RD, PD} corresponding to an year, based on the growth rate as a performance indicator (taking into account the lag effect), on a scale with highest value indicating high fiscal responsibility of the government, for a timeseries data. Also, by extending and further study of this proposed FR Index, ideal conditions for a government to be fiscally responsible were to be deduced. However, due to some issues and wrong considerations the results were not very promising. These issues will be discussed shortly.

3.2 Analysis

STAGE-I : Studying Correlations

The method considered for studying correlation of the variables (FD,PD & RD) was to perform a unidimensional analysis of these variables. This was done by taking each of these variables and plotting them w.r.t their subvariables, accounting for the lag effect.

Some of these plots are displayed below:

Fiscal Deficit^{*}





(b) FD vs Total Expenditure

^{*}Expressed as a % of GDP









 $^{^{\}dagger}$ Expressed as a % of GDP Please note that the subparameters were decided by survey of literature and elimination of less-dependent factors





(h) PD vs Inflation

RD vs Total Expenditure (as % of GDP)





(j) RD vs Total Expenditure

 $^{\ddagger}\mathrm{Expressed}$ as a % of GDP



STAGE-II : FR Index

Due to non-promising and irregular results in Stage-I, there were doubts on whether the approach were headed in the right direction or not. If not, it was necessary to look a little deeper into the analysis and find out what was going wrong. To make sure that this approach is not totally correct, only a part of Stage-II was carried out, which is shown as below.

Variation of GDP Growth Rate with FD over the years



3.3 Errata in the Approach

Now, the following are some of the reasons and inferences regarding the failure of this approach :

- 1. It is clear from observing the various graphs obtained in Stage-I, the variables selected (FD,PD & RD) have a highly non-linear relationship with its subparameters.
- 2. This indicates that we are looking the data in the wrong way and to truly define *Fiscal Responsibility*, we need to look at appropriate parameters[§].
- 3. This random and complex nature of relationship between them, makes it almost impossible to predict their future behaviour or to mathematically model it accurately, if looked in this perspective.
- 4. In Stage-II, the GDP growth rate (on yearly basis) was taken as the parameter for performance indication for Fiscal Responsibility of the Government. This is a wrong assumption.
- 5. The graph in Stage-II shows a very weak and unclear correlation of growth and FD.
- 6. The Fiscal Responsibility of the government cannot be just judged by looking at the growth rate only, as this does not give proper indication that the government is spending money on developmental aspects.

The *Fiscal Responsibility* of Government, can be quantified by carefully observing where the government is investing most of its income. If the Government is investing in capital or developmental assets rather than current consumption, the current growth rate may be lower, but this is considered to have a healthy impact in the long run, thus indicating a high fiscal responsibility. Thus, the essence of this idea could not be captured by this approach, leading to its failure. This methodology is tried to be incorporated in the approach mentioned in the next chapter.

[§]Correct Parameters to be looked at are mentioned in the next chapter

Chapter 4

Fiscal Responsibility Index (FRI)

"The country needs fiscal discipline to build a strong economy and for social justice" - Smriti Irani

F iscal Discipline refers to a state of an ideal balance between revenues and expenditure of government, in an economy. Revenue and expenditure are dependent on many other many other variables like income, inflation etc. From our common sense we can say that just having very high income or very low inflation we can't have a better economy, all the other parameters are also needed to be taken in consideration that's why a balance is required. And to know how much a government is fiscally disciplined an index was required which can act as a report card of the government's efficiency to handle its monetary resources and of the implementation of fiscal policies. The Fiscal Responsibility Index is modelled for

And while modelling the index many factors were taken into consideration such as how any different variables are dependent on each other and how they are going to affect the index, what is the best fit curve that can be used approximation, how the data can be normalised so to get a better result and so on.

Key Words

the same.

FD - Fiscal Deficit; RD - Revenue Deficit; PD - Primary Deficit; FD_{exp} - Fiscal Deficit expressed as a fraction of Total Expenditure; RD_{exp} - Revenue Deficit expressed as a fraction of Total Expenditure; PD_{exp} - Primary Deficit expressed as a fraction of Total Expenditure; FRI - Fiscal Responsibility Index; GR_{GDP} - GDP Growth rate; TOL_{exp} - Total Outstanding Liabilities expressed as a fraction of Total Expenditure

4.1 Enhancements

**

- 1. The appropriate parameters have been chosen to show meaningful trends.
- 2. The style of viewing the data has been made more convenient for drawing inferences.
- 3. FRI, in this case, is viewed as a multi-faceted quantity rather than considering the growth rate as the only performance indicator.
- 4. Many other aspects have been taken into account to make the FRI more sensitive to them.
- 5. The FRI is calculated as the arithmetic mean of three separate estimates which represent the various aspects of being "Fiscally Responsible".
- 6. In future according to the scenario of that time this index can be modified if at all required.

^{**}These enhancements are as compared to the approach considered in the previous chapter

4.2 Structure of Proceedings

The following is the brief chronological order of the various steps that we took in order to complete our project:

- The existing literature available on the given topic, "Fiscal Responsibility", was studied, understood and a problem statement* was finalized based on discussion.
- The main parameters influencing the our area of intersest were selected : FD,PD & RD.
- Then, the corresponding yearly data was collected from various sources.
- These parameters were taken as fraction of total expenditure to understand the weightages better[†].
- It was decided, with some help, that FD had to be partitioned into three separate parts, as follows, to understand the flow of monetary resources :
 - 1. Capital Investment Fraction (CIF) :

It gives us an idea regarding the portion of FD (expressed as a fraction of total expediture) utilized for capital investment. This part is considered to be developmental rather than for current consumption.

$$CIF = FD_{exp} - RD_{exp}$$

$$CIF \propto FRI$$

2. Interest Payments Fraction (IPF) :

It gives us an idea regarding the portion of FD (expressed as a fraction of total expediture) utilized for interest payments of the total outstanding debts taken till date.

$$IPF = FD_{exp} - PD_{exp}$$

$$IPF \propto \frac{1}{FRI}$$

3. Revenue Deficit Fraction (RDF) :

It gives us an idea regarding the portion of FD (expressed as a fraction of total expediture) utilized for current consumption. Interest Payments Fraction has been excluded for better analysis.

^{*}Please check out the Introduction chapter for details

 $^{^{\}dagger}\mathrm{As}$ expenditure reflects the action of the government, tied closely to fiscal responsibility

$$RDF = RD_{exp} - IPF$$

$$RDF \propto \frac{1}{FRI}$$

• Later in order get a combine these parameters into a single estimate, which indicates the developmental aspect of the FRI, the following empirical relation was used :

$$Estimate_{dev} = \frac{CIF}{\sqrt{1 + IPF * RDF}}$$

Please note that, in denominator the geometric mean of IPF and RDF was supposed to be taken, so that the effect

of CIF is not submerged, but since the product IPF * RDF can sometimes be negative the +1 term was added. (See Figure 4.1)

- The estimate calculated above, when observed carefully indicates the "Future Development" Aspect.
- It was realized that the FRI must be equally sensitive to present economic growth (short term benefits) along with the developmental aspect mentioned above(long term benefits). So, another estimate was considered which is the annual GDP growth rate.

$$GR_{GDP} \propto FRI$$

$$Estimate_{growth} = GR_{GDP}$$

- But to truly account for Fiscal Responsibility, it is also essential to account for the Total Outstanding Liabilities (TOL) as a high "FRI" value must also keep in check the existing debt.
- For above mentioned reasons, the TOL needs to be considered as a fraction of Total Expenditure.
- Also, after critical examination, it was decided that the rate of change of TOL_{exp} with respect to time, was a more practical and important parameter that can be considered to reflect the trend of the outstanding debt, at any point of time.

$$\frac{\mathrm{d}(TOL_{exp})}{\mathrm{d}t} \propto \frac{1}{FRI}$$

• To retain simplicity the following estimate was taken into consideration :

$$Estimate_{debt} = \frac{1}{\frac{d(TOL_{exp})}{dt}}$$

- Before, combining these estimates to make the FRI, it is an essential step to standardize these estimates each.
- The standardization scheme employed for standardizing these estimates is :

$$X_{i,std} = \frac{X_i - X_{min}}{X_{max} - X_{min}}$$

• This was followed by taking the arithmetic mean of all these three standardized estimates[‡], to obtain the FRI i.e. the *Fiscal Responsibility Index*.

$$FRI = \frac{(Estimate_{dev})_{std} + (Estimate_{growth})_{std} + (Estimate_{debt})_{std}}{3}$$

- The FRI for the data in future can be calculated by taking the obtaining these three estimates for that particular year and standardizing them, by taking the same $X_{min} \& X_{max}$ as taken for the previous data[§] for uniformity.
- The analysis of the obtained FRI and its trends along with justification, is discussed in the coming sections.
- Various limitations and possible improvements are mentioned at the end of this chapter.

^{\ddagger}Please note that these values lie between 0 and 1

[§]Note that the particular year for which these min. and max. values occur can be taken as base years respectively, for the estimates

4.3 Observations

The tabular representation of the calculated FRI and various estimates (yearwise) are as follows : **

Year	$Estimate_{dev}$	Estimate _{arowth}	$Estimate_{debt}$	FRI
2019	0.0927	0.3370	0.5438	0.3245
2018	0.1385	0.5435	0.5438	0.4086
2017	0.0569	0.6413	0.5458	0.4147
2016	0.2123	0.7826	0.4084	0.4678
2015	0.1932	0.7500	0.5665	0.5032
2014	0.1232	0.6848	0.4126	0.4069
2013	0.1453	0.5761	0.4019	0.3744
2012	0.1283	0.4783	0.3304	0.3123
2011	0.1407	0.5978	0.4212	0.3866
2010	0.1727	1.0000	0.4438	0.5388
2009	0.0837	0.8043	0.5361	0.4747
2008	0.1456	0.3043	0.5339	0.3279
2007	0.1918	0.9457	0.5084	0.5486
2006	0.1994	0.8913	0.5075	0.5327
2005	0.1980	0.8913	0.5432	0.5442
2004	0.1555	0.7283	0.4667	0.4502
2003	0.0000	0.7391	0.4583	0.3992
2002	0.1333	0.3043	0.5529	0.3302
2001	0.2152	0.4130	0.8656	0.4979
2000	0.1822	0.3152	0.4341	0.3105
1999	0.2625	0.8043	0.4149	0.4939
1998	0.4105	0.5543	0.4517	0.4722
1997	0.4770	0.3152	0.5311	0.4411
1996	0.4325	0.6957	0.8210	0.6497
1995	0.4360	0.7065	0.5618	0.5681
1994	0.4138	0.6087	0.1570	0.3932
1993	0.5117	0.4022	1.0000	0.6380
1992	0.4523	0.4783	0.0000	0.3102
1991	0.4655	0.0000	0.3890	0.2848
1990	0.7050	0.4783	0.4712	0.5515
1989	0.7359	0.5217	0.1660	0.4745
1988	0.7441	0.9239	0.2071	0.6250
1987	0.7582	0.3152	0.3291	0.4675
1986	0.8761	0.4022	0.4602	0.5795
1985	0.9062	0.4565	0.1776	0.5134
1984	0.9035	0.2935	0.3235	0.5068
1983	0.8794	0.6739	0.5678	0.7070
1982	0.9078	0.2609	0.7049	0.6245
1981	1.0000	0.5326	0.3546	0.6291
1980	0.8032	0.4565	0.4431	0.5676

^{**}Please note that the estimates are standardized







Figure 4.2: Growth Rate over the year







Figure 4.4: $(Estimate_{dev})_{std}$ over the year







Figure 4.6: $(Estimate_{debt})_{std}$ over the year







Figure 4.8: FRI (Best fit Curve) over the year

Chapter 5

Analysis

"Analysis is the critical starting point of Strategic Thinking"

- Kenichi Ohmae

I n this chapter, we would try to analyse the FRI we obtained by the mathematical modelling and the factors which affected the economy at that point and try to reason our trend. We would start by adding substantial events that happened after independence and find out their effect on the economy in the next section.

5.1 Timeline

- **
- 1. Prior to India's Independence, from the period of 1900 to 1947, per capita income in India had either declined or stagnated. Post-Independence, Jawaharal Nehru enacted an economic policy based on import substitution industrialization. The Nehru-Mahalanobis approach, often referred to as the Second Five Year Plan, emphasized the development of basic and heavy industries as a means of accelerating economic growth. These included steel, copper, petrochemicals, paper, coal, and oil. Mahalanobis strived for India to reach autonomy, ridding any outstanding debts. Critics disagreed with this approach, nonetheless, over 1950–1965, India's acceleration of per capita income growth had increased an average of 1.7 %, a value not exceeded since.[16]
- 2. On 6 June 1966, Indira Gandhi took the drastic step of devaluing the Indian rupee by a sharp 57 %. The rupee fell to 7.50 per US dollar from 4.76. This was done to counter India's significant balance of payments crisis. The country's apathy to foreign investments and neglect of the exports sector meant that it ran constant trade deficits.
- 3. The 1985-86 budget lowered direct taxes for companies and raised exemption limits for income tax.
- 4. 1989–90 when P V Narsinh Rao was the prime minister of India with Dr. Manmohan Singh as the Union Finance Minister. He introduced the liberalization and opened up the Indian economy.
- 5. 2000 was the year when Indian growth rate had a local minima. This time period made India realise that they were in dire need of a Fiscal responsibility bill thus **FRBM** act came into existence in 2003.
- 6. 2007-09 global recession, The Great Recession refers to the economic downturn from 2007 to 2009 after the bursting of the U.S. housing bubble and the global financial crisis.
- 7. eight months of taking over as Prime Minister on 25 May 2014, Narendra Modi replaced the Planning Commission with NITI Aayog (NITI stood for National Institute for Transforming India, in line with Modi's penchant for acronyms). The Planning Commission was a Soviet-style body that drew up five-year plans for the country and played an advisory role in formulating allocation of central funds to each state.

^{**}Please note that, we have included pre 1980 events but we were unable to find strong source of data for this time period. Hence we have omitted the FRI calculation and only done analysis part for this period.

8. Introduction of GST and demonetisation in 2016.

These events had profound impacts on the Indian economy. We as a country learned a lot from these events which led to many changes in the policies so as to maintain sustainable growth. In the next section we will discuss the effect of these events on the economy, some of them were good and some bad for the economy.

5.2 Repercussions on FRI

By the 1970s the international financial system had changed hugely from the previous decades. Surpluses from oil exporters benefiting from the oil shocks and capital accumulated from the pension funds servicing the post-war baby-boom generation were finding their way into financial markets in search of returns. Developing countries like India, which earlier did not have access to private financial capital, were now discovered as emerging markets and favoured with capital flows. to secure the benefits of this opportunity, India opened doors to this credits by initiating big-ticket economic reforms. The sixth five-year plan (1980-85), in essence, pledged to undertake a string of measures aimed at boosting the economy's competitiveness. This meant the removal of price controls, initiation of fiscal reforms, a revamp of the public sector, reductions in import duties, and delicensing of the domestic industry, or in other words ending the licence Raj. Thus, 80's marked the increase in the inflow of credit from the international sources like the commercial banking systems and non-residential Indian financial creditors. The access to this capital allowed the government to increase its debt financed expenditure. This increased public expenditure led to an increase in the GDP growth rate during the early years of this decade which majorly contributed to increase in the index value from 1980-81 to its highest value during the fiscal year 1983-84.[8][2]



Figure 5.1: Growth rate Analysis

A sudden dip in the growth rate contributed to a lower index value corresponding to the fiscal year 1984-85. The 1985-86 budget lowered direct taxes for companies and raised exemption limits for income tax. This brought about a small increase in the index value. The decade also brought in Maruti-Suzuki and introduced the country to the information technology and reformed telecom industry which was about to bring revolution in the country in the years to come. But the increase in the GDP growth rate was now being accompanied with increased debt and India began having balance of payments.

problems at the time when the government was running on large fiscal deficits. As a result of both the factors, the index hovered around 0.4-0.6 in the next five-six years. However, the rising import bills and current account balance soon started generating fears among the foreign lenders. Soon, the credit flow dried up, reserves collapsed.[32][34]



Figure 5.2: TOL Analysis

By the end of 1990, the situation became so serious that the Indian foreign exchange reserves could barely finance three weeks' worth of imports while the government came close to defaulting on its financial obligations. The country, for the first time, had to sell 20 tonnes of gold to investment bank UBS on 30 May that year to secure a \$240 million loan. It pledged gold three more times after that sale, shipping 46.8 million tonnes of the yellow metal to secure \$400 million in loans from Bank of England and Bank of Japan. By July that year, the low reserves had led to a sharp depreciation of the rupee, which in turn exacerbated the twin deficit problem. The government could not pass the budget in February 1991 as well as the floor test which eventually led to new general election. At a crucial time when Moody had downgraded India and it further went down after the budget was not passed and global credit-rating agencies further downgraded India from investment grade making it impossible to even get short term loans and the government was in no position to give any commitment to reform the economy. This crisis can be checked corresponding to the lowest FRI values in the years of 1990-1992.[4][35]

The crisis led to the liberalisation of the Indian economy, as one of the conditions stipulated in the World Bank loan (structural reform), requiring India to open itself up to participation from foreign entities in its industries, including state owned enterprises. The reforms formally began on 1 July 1991 with a new government coming into power when RBI devaluated Indian Rupee by 9% and by a further 11% on 3 July. It was done in two doses to test the reaction of the market first by making a smaller depreciation of 9%. The new liberalised policy became the new boon to the Indian economy. The growth reached new heights, the government focused towards mixed economy, reducing the liabilities and also maintaining a developmental expenditure pattern. This is well perceived by the index in its values from 1992-1996, except for the year 1994-95 where the fiscal policy was not much accountable towards reducing the liabilities.[36]



Figure 5.3: FD (as % of GDP)



Figure 5.4: FRI analysis

But these new heights of index were short lived. Soaring high fiscal deficits, drastic reduction in the percentage developmental expenditure led to lowering of the index and the percentage GDP growth rate also was not stable. The growth rate included large range of values within a short period from seeing the height of 8.5% and even 3.9%. This allowed the government to think of a new bill which was to be passed as The Fiscal Responsibility and Budget Management Act in the year 2003. The act focused on lowering the fiscal deficit to a value of 3% of the GDP. The index value there on again increased and stabilised for a period of 3 years along with higher growth rate and increased responsibility towards lowering the liabilities and the fiscal deficit. The deficit reached its one of the all-time lowest value in the year 2007 at 2.54% of the GDP.[9]

However, the economic crisis of 2008 led to the drastic drop in the economic growth of the world and India was not left behind in this matter. The index can be seen at a very low value compared to the years between 2003 and 2007. Indian market then took off in the coming two years even with the global slowdown and so did the FRI of the government. India also achieved the highest growth since independence in the year 2010. But this lift was short lived. India too fall into the slowdown and the government policies neither helped the cause.

The change in the government in 2014 and the introduction of promising schemes and project gave a new hope to the investments and the economy once again kicked up. The index too rose up for a few years only to be dampened by the demonetisation in November, 2016 and introduction of GST as new indirect tax system in 2017.

5.3 A Glance into the Future

[†] The graph shown above is the best fit version of the FRI. Observing the trend of FRI in present and near future, is a bit



Figure 5.5: Best Fit Curve of FRI

disappointing for India. The fit predicts a deteriorating FRI, which is an alarming situation to be taken care of. As per the current declining trend in FRI, in 2024 its value may reach below zero, which will be much worse than what the Index has anticipated. Nevertheless, the situation can be avoided by incorporating more *fiscal* reponsibility.

[†]Please note that this is just an extrapolation of the best fit FRI trends for showing future tendencies

The FRI^{\ddagger} value can be increased by increasing each of the estimates corresponding to the index. The future situation can be particularly made good by doing the following :

- $\rightarrow\,$ Giving more weightage to Developmental Capital Expenditure, as and when possible.
- $\rightarrow\,$ Trying the to reduce the Total Outstanding Liabilities as a whole.
- $\rightarrow\,$ Begin by trying to reduce the rate of increase of Liabilities.
- \rightarrow Trying to balance and maintain an optimal growth rate while following the above.

As per IMF data, predicted GDP Growth rate value may reach 7.4 in 2021. Assuming the same trend in other parameters, FRI value may increase and that point may be a tipping point for our economy.[13][11]

 $^{^{\}ddagger}{\rm that}$ we calculated in the previous chapter

Chapter 6

Inferences & Conclusion

"If all the economists were laid end to end, they'd never reach a conclusion" - George Bernard Shaw

6.1 Inferences

The following are some of the inferences that we could draw about \mathbf{FRI} based on our research and work :

- ✓ The FRI value can be greater than 1 or even less than 0, for any future input. Greater than indicates that for that particular year an excellent improvement of a magnitude that never occurred in the base time period had taken place, whereas less than 0 indicates a deterioration of a magnitude that never occurred in the base time period[†] had taken place.
- \checkmark Even though we have not included any parameters related to world affairs into the index explicitly, but inherently the FRI is influenced by them, Eg. Recessions, Economic slowdowns, pandemics etc.
- \checkmark There have been many instances (See Figure 4.7), in the past when a larger FD and debt, has boosted the FRI temporarily, but the the ill effects that appear due to their interest payments and related things are really *crumbling* for the economy. Eg: The 2008 2013 era.
- $\checkmark\,$ It has been sufficiently clear that the FRI tends to reach a higher value :
 - 1. Government concentrates on Developmental Capital Expenditure.
 - 2. There is a tendency to reduce the Total Outstanding Liabilities.
 - 3. GDP growth rate is high.
- \checkmark It is about time that the Government realizes that there has to be a new FRBM act that takes into account the recent developments in parameters and fixes an ideal limit on various deficits to avoid the expected deteriorating FRI.
- \checkmark It can be seen clearly from Figure 4.1, that we, as a country, have revenue surplus most of the times^{*}, most of the deficit is being utilized to pay off the interest payments, which is quite unfortunate and is situation we have to get rid off immediately. This can be done by judiciously accounting for all the debts that we take in the future.

[†]Here, Base Time period : 1980 to 2019

^{*}Except at the Great Recession Time

6.2 Possible Refinements

As no work is perfect, it is our responsibility to include the possible improvements that can be done to the FRI and its calculation method, as follows:

- We have considered and done the analysis using some of the most significant parameters, but the index can be designed to incorporate various other factors and parameters. Eg: World Affairs, Effect on social life etc
- The current FRI is prepared taking into consideration normal conditions. As currently we are going through a pandemic(COVID-19), the current economic situation of India and the world is not much stable, which may lead to our prediction going wrong.
- In the distant future, there definitely will be a change in the trend of parameters (parameters that we considered for the index), and according to the situation at that time we will have to change the definition of fiscal responsibility as well as per our index.

6.3 Conclusion

Through this project, we have collected data from various well known sources, followed by cleaning, observing and analysing the datasets. By analysis of this data and models we tried to eliminate the redundant parameters and finally were able to get an index called *Fiscal Responsibility Index (FRI)*. This index, in simple words, is a tangible version of the *Fiscal Responsibility* or its quantification, in the modern sense. Analysing and digging a bit deeper, the ramification is that for our economy to have a stable growth rate and for boosting of our economy a much more efficient better structure for expenditures and borrowing should be employed (as Benjamin Disraeli "*There can be economy only where there is efficiency*"). These are the necessary steps that have to be realized so that that we can lead the way towards a good growth and towards the much-awaited edge of developed country status.

Appendix A

Basic Terminologies

◆ Capital Receipts :

Capital receipts are receipts that create liabilities or reduce financial assets. They also refer to incoming cash flows. Capital receipts can be both non-debt and debt receipts. Loans from the general public, foreign governments and the Reserve Bank of India (RBI) form a crucial part of capital receipts. Capital receipts are loans taken by the government from the public, borrowings from foreign countries and institutes, and borrowings from the RBI. Recovery of loans given by the Centre to states and others is also included in capital receipts. In the balance sheet, capital receipts are mentioned in the liabilities section. The capital receipt has a nature of non-recurrence.

All capital receipts are tax-free, unless there is a proviso to tax it. Capital receipts can be both non-debt and debt receipts.[3][19]

◆ Corporation Tax :

A corporate tax, also called corporation tax or company tax, is a direct tax imposed by a jurisdiction on the income or capital of corporations or analogous legal entities. Many countries impose such taxes at the national level, and a similar tax may be imposed at state or local levels. The taxes may also be referred to as income tax or capital tax. Partnerships are generally not taxed at the entity level.[37] A country's corporate tax may apply to:

- 1. corporations incorporated in the country,
- 2. corporations doing business in the country on income from that country,
- 3. foreign corporations who have a permanent establishment in the country, or
- 4. corporations deemed to be resident for tax purposes in the country.

◆ Current Account Deficit :

Current account deficit is simply the difference between the value of the goods and services that a country imports and the value of the products it exports. It encompasses the trade deficit plus capital like net income and transfer payments. In other words, it can be measured with the difference between foreign exchange inflows and outflows.[20]

♦ Debt :

Debt refers to an amount of money that a company, a person or a gvernment i.e., an entity owes to another entity. It arises when a entity raises funds to finance its purchases and expenditures by borrowing from another entity. This debt is paid back at a future date along with an interest. It can be defined as type of liability.[33][31]

◆ Debt to GDP ratio :

the debt-to-GDP ratio is the ratio between a country's government debt (measured in units of currency) and its gross domestic product (GDP) (measured in units of currency per year). A low debt-to-GDP ratio indicates an economy that produces and sells goods and services sufficient to pay back debts without incurring further debt.[38]

♦ Direct Tax :

Direct tax is a form of collecting taxes applicable on the general public by the means of their personal income and wealth generated and is collected through formal channels and worthy government credentials such as Permanent account number (PAN) and bank account details.[39]

Section 2(c) of the Central Boards of Revenue Act, 1963 of India defines "direct tax" as follows:

- 1. Any duty leviable (or) tax chargeable under-
 - (i) The Estate Duty Act, 1953 (34 of 1953.);
 - (ii) The Wealth-tax Act, 1957 (27 of 1957.);
 - (iii) The Expenditure-tax Act, 1957 (29 of 1957.);
 - (iv) The Gift-tax Act, 1958 (18 of 1958.);
 - (v) The Income-tax Act, 1961 (43 of 1961.);
 - (vi) The Super Profits Tax Act, 1963 (14 of 1963.); and
- 2. Any other duty or tax which, having regard to its nature or incidence, may be declared by the Central Government, by notification in the Official Gazette, to be a direct tax.[39]

• Disinvestment :

Disinvestment refers to a reduction of stake by an entity (usually government) in any company or project. This can be done by selling a part of full stake to another party.

• Economic Depression :

Depression is defined as a severe and prolonged recession. A recession is a situation of declining economic activity. Declining economic activity is characterized by falling output and employment levels. Generally, when an economy continues to suffer recession for two or more quarters, it is called depression.[21]

• Excise :

An excise or excise tax is any duty on manufactured goods that is levied at the moment of manufacture rather than at sale within a country. Often, the burden of these taxes are borne by the consumers in the form of increased prices of the goods.[41]

• External Debt :

External loan (or foreign debt) is the total debt which the residents of a country owe to foreign creditors; its complement is internal debt which is owed to domestic lenders. The debtors can be the government, corporations or citizens of that country. The debt includes money owed to private commercial banks, foreign governments, or international financial institutions such as the International Monetary Fund (IMF) and World Bank.[42]

♦ Fiscal Deficit :

The difference between total revenue and total expenditure of the government is termed as fiscal deficit. It is an indication of the total borrowings needed by the government. While calculating the total revenue, borrowings are not included.

The gross fiscal deficit (GFD) is the excess of total expenditure including loans net of recovery over revenue receipts (including external grants) and non-debt capital receipts. The net fiscal deficit is the gross fiscal deficit less net lending of the Central government.

Generally fiscal deficit takes place either due to revenue deficit or a major hike in capital expenditure. Capital expenditure is incurred to create long-term assets such as factories, buildings and other development.

A deficit is usually financed through borrowing from either the central bank of the country or raising money from capital markets by issuing different instruments like treasury bills and bonds.[22][20]

♦ Goods and Services Tax :

Goods and Services Tax (GST) is an indirect tax (or consumption tax) used in India on the supply of goods and services. It is a comprehensive, multistage, destination-based tax: comprehensive because it has subsumed almost all the indirect taxes except a few state taxes. Being multi-staged, the GST is imposed at every step in the production process, but is meant to be refunded to all parties in the various stages of production other than the final consumer and as a destination-based tax, it is collected from point of consumption and not point of origin like previous taxes. The single GST subsumed several taxes and levies, which included central excise duty, services tax, additional customs duty, surcharges, state-level value added tax, etc . Other levies which were applicable on inter-state transportation of goods have also been done away with in GST regime. GST is levied on all transactions such as sale, transfer, purchase, barter, lease, or import of goods and/or services.[43]

◆ Government Budget :

A government budget is a document prepared by the government or other political entity presenting its anticipated revenues and proposed spending for the coming financial year. In most parliamentary systems, the budget is presented to the lower house of the legislature and often requires approval of the legislature. The budget in itself does not appropriate funds for government programs, which requires additional legislative measures.

♦ Gross vs Net :

Gross describes the total before expenses, taxes, and deductions. Net describes the total after all expenses, taxes, and deductions have been taken into account.

♦ Gross Domestic Product :

Gross Domestic Product (GDP) is the final value of the goods and services produced within the geographic boundaries of a country during a specified period of time, normally a year. GDP growth rate is an important indicator of the economic performance of a country.[23]

It can be measured by three methods, namely,

- 1. Output Method: This measures the monetary or market value of all the goods and services produced within the borders of the country. In order to avoid a distorted measure of GDP due to price level changes, GDP at constant prices or real GDP is computed. GDP (as per output method) = Real GDP (GDP at constant prices) Taxes + Subsidies.
- 2. Expenditure Method: This measures the total expenditure incurred by all entities on goods and services within the domestic boundaries of a country. GDP (as per expenditure method) = C + I + G + (X-IM) C: Consumption expenditure, I: Investment expenditure, G: Government spending and (X-IM): Exports minus imports, that is, net exports.
- 3. Income Method: It measures the total income earned by the factors of production, that is, labour and capital within the domestic boundaries of a country. GDP (as per income method) = GDP at factor cost + Taxes Subsidies. In India, contributions to GDP are mainly divided into 3 broad sectors agriculture and allied services, industry and service sector. In India, GDP is measured as market prices and the base year for computation is 2011-12. GDP at market prices = GDP at factor cost + Indirect Taxes Subsidies

◆ Human Development Index :

The Human Development Index (HDI) is a statistical tool used to measure a country's overall achievement in its social and economic dimensions. The social and economic dimensions of a country are based on the health of people, their level of education attainment and their standard of living.

Pakistani economist Mahbub ul Haq created HDI in 1990 which was further used to measure the country's development by the United Nations Development Program (UNDP). Calculation of the index combines four major indicators: life expectancy for health, expected years of schooling, mean of years of schooling for education and Gross National Income per capita for standard of living.

Every year UNDP ranks countries based on the HDI report released in their annual report. HDI is one of the best tools to keep track of the level of development of a country, as it combines all major social and economic indicators that are responsible for economic development.[24]

♦ Income Tax :

An income tax is a tax that governments impose on income generated by businesses and individuals within their jurisdiction. By law, taxpayers must file an income tax return annually to determine their tax obligations. Income taxes are a source of revenue for governments. They are used to fund public services, pay government obligations, and provide goods for citizens.[15]

♦ Indirect Tax :

An indirect tax is a tax collected by an intermediary (such as a retail store) from the person who bears the ultimate economic burden of the tax (such as the consumer). The intermediary later files a tax return and forwards the tax proceeds to government with the return. In this sense, the term indirect tax is contrasted with a direct tax, which is collected directly by government from the persons (legal or natural) on whom it is imposed. Some commentators have argued that "a direct tax is one that cannot be charged by the taxpayer to someone else, whereas an indirect tax can be."

In India, it includes goods and services tax (GST), excise, tariff, etc.[44]

◆ Internal Liability :

Internal Liability – All obligations which a business has to pay back to internal parties such as promoters (owners), employees etc. are termed as internal liabilities. Example – Capital, Salaries, Accumulated profits, etc.[1]

♦ Investment :

An investment is an asset or item acquired with the inherent goal of generating income or appreciation. In the economic sense, an investment is the purchase of goods that are not consumed today but are used in the future to create wealth.

◆ Liability :

A liability is something a person or company or a government owes, usually a sum of money or service. Liabilities are settled over time through the transfer of economic benefits including money, goods, or services. It arises for an entity due to its financial obligations that occur while conducting business.[14][33]

♦ Non-tax revenue :

Non-tax revenue or non-tax receipts are government revenue not generated from taxes. These may include [45]

- 1. aid from another level of government
- 2. aid from abroad (foreign aid)
- 3. Tribute or indemnities paid by a weaker state to a stronger state
- 4. Loans or other borrowings
- 5. Revenue from state-owned enterprises and investment funds
- 6. Fines collected and assets forfeitured as a penalty
- 7. Fees for granting or issuance licenses or permits
- 8. Donations and voluntary contributions to the state.

• Primary Deficit :

Gross Primary Deficit is Gross Fiscal Deficit less interest payments. Net Primary Deficit is Net Fiscal Deficit minus net interest payments. Net interest payment is interest paid minus interest receipt.

A shrinking primary deficit indicates progress towards fiscal health. The Budget document also mentions deficit as a percentage of GDP. This is to facilitate comparison and also get a proper perspective. Prudent fiscal management requires that the government does not borrow to consume in the normal course.[25][20]

♦ Privatisation :

The transfer of ownership, property or business from the government to the private sector is termed privatization. The government ceases to be the owner of the entity or business.

The process in which a publicly-traded company is taken over by a few people is also called privatization. The stock of the company is no longer traded in the stock market and the general public is barred from holding stake in such a company. The company gives up the name 'limited' and starts using 'private limited' in its last name.[27]

◆ Property Tax :

Property tax is the annual amount paid by a land owner to the local government or the municipal corporation of his area. The property includes all tangible real estate property, his house, office building and the property he has rented to others.

In India, the municipal corporation of a particular area assesses and imposes the property tax annually or semi annually. The tax amount is based on the area, construction, property size, building etc. The collected amount is mainly used for public services like repairing roads, construction schools, buildings, sanitation. Central government properties and vacant property are generally exempt. Property tax comprises taxes like lighting tax, water tax and drainage tax.[26]

• Public Debt :

Public debt is the total liabilities of the central government contracted against the Consolidated Fund of India. It is further classified into internal and external debt. Internal debt is categorised into marketable and non-marketable securities.[31]

• Economic Recession :

Recession is a slowdown or a massive contraction in economic activities. A significant fall in spending generally leads to a recession. Such a slowdown in economic activities may last for some quarters thereby completely hampering the growth of an economy. In such a situation, economic indicators such as GDP, corporate profits, employments, etc., fall. This creates a mess in the entire economy. To tackle the menace, economies generally react by loosening their monetary policies by infusing more money into the system, i.e., by increasing the money supply. This is done by reducing the interest rates. Increased spending by the government and decreased taxation are also considered good answers for this problem. The recession which hit the globe in 2008 is the most recent example of a recession.[29]

• Revenue Deficit :

Revenue Deficit is the excess of its total revenue expenditure to its total revenue receipts. Revenue Deficit is only related to revenue expenditure and revenue receipts of the government.

The difference between total revenue expenditure to the total revenue receipts is Revenue Deficit.

A revenue deficit indicates that the government doesn't have sufficient revenue for the normal functioning of the government departments. In other words when the government starts spending more than it earns it results in Revenue Deficit. Revenue Deficit forces the government to disinvest or cover the shortage by borrowing.[30][20]

◆ Revenue Receipts :

Revenue receipts refer to those receipts which neither create any liability nor cause any reduction in the assets of the government. They are regular and recurring in nature and government receives them in its normal course of activities.[19]

\bullet Tariff :

A tariff is a tax on imports or exports between sovereign states. It is a form of regulation of foreign trade and a policy that taxes foreign products to encourage or safeguard domestic industry.[46]

♦ Tax Revenue :

Tax revenue is the income that is gained by governments through taxation. Taxation is the primary source of income for a state. Revenue may be extracted from sources such as individuals, public enterprises, trade, royalties on natural resources and/or foreign aid. An inefficient collection of taxes is greater in countries characterized by poverty, a large agricultural sector and large amounts of foreign aid.[47]

Appendix B

**

MATLAB Code

YR=2019:-1:1980; %-----data extraction----int=FD-PD; cap=FD-RD; rev=RD-int; %-----as factor of Expenditure----intd_exp=int./Texp; capd_exp=cap./Texp; revd_exp=rev./Texp; %-----Plot of extracted data as factor of Expenditure-----Plot of extracted data as factor of Expenditure-----Plot figure(1) plot(YR,revd_exp,"b-o","MarkerFaceColor","b"); hold on plot(YR,revd_exp_p1*YR+revd_exp_p2,'b--'); plot(YR,capd_exp,"k-o","MarkerFaceColor","k"); plot(YR,capd_exp_p1*YR+capd_exp_p2,'k--'); plot(YR,intd_exp,"r-o","MarkerFaceColor","r"); plot(YR,intd_exp_p1*YR+intd_exp_p2,'r--'); hold off xlabel("Year"); ylabel("parts of deficit (As a factor of Total Expenditure)"); legend("Revenue (As Expenditure)", "Revenue-Best fit line", "Capital (As Expenditure)", "Capital-Best fit line","Interest (As Expenditure)","Interest-Best fit line"); grid on; title('3 parts of deficit (As a factor of Total Expenditure)'); %-----Composite Index-1-----_____ c_index=(capd_exp)./(sqrt(revd_exp.*intd_exp+1)); min_c_index=min(c_index); range_c_index=range(c_index); c_index_1=(c_index-min_c_index)/range_c_index; %-----plot of Composite Index-1-----

^{**}Please note that this code is just a representative of the entire code and is not directly executable

```
figure(2)
plot(YR,c_index_1,"k-o","MarkerFaceColor","k");
hold on
plot(YR,c_index_1_p1*YR+c_index_1_p2,"k--","MarkerFaceColor","k");
hold off
axis([1980 2020 0 1]);
xlabel('Year');
ylabel('Composite Index-1 (Factor of Deficit)');
title('Composite Index-1 vs Year');
legend('Actual Data','Best fit-line');
grid on
%-----Plot of Growth-Rate data-----
figure(3)
plot(YR,GDP_growth, 'b-o', "MarkerFaceColor", 'b');
hold on
plot(YR,GDP_growth_growth_p1*YR+GDP_growth_p2,'b--',"MarkerFaceColor",'b')
hold off
xlabel('Year');
ylabel('Growth Rate (Actual)');
title('Growth Rate-Year data');
legend('Actual Data', 'Best fit-line');
grid on
min_GDP_growth=min(GDP_growth);
range_GDP_growth=range(GDP_growth);
%-----Composite Index-2-----
c_index_2=(GDP_growth-min_GDP_growth)/range_GDP_growth;
%-----Plot of Composite Index-2-----
figure(4)
plot(YR,c_index_2,"k-o","MarkerFaceColor","k");
hold on
plot(YR,c_index_2_p1*YR+c_index_2_p2,"k--","MarkerFaceColor","k");
xlabel('Year');
ylabel('Composite Index-2 (Growth rate)');
title('Composite Index-2 vs Year');
legend('Actual Data', 'Best fit-line');
grid on
%-----Total OutStanding Liabilities-----
TOL_exp=TOL./Texp; %TOL as a factor of Total Expenditure
TOL_exp_d=diff(TOL_exp); %Rate of change of TOL
TOL_exp_d_1=[[0.1446],TOL_exp_d];
TOL_index=1./TOL_exp_d_1;
%-----Plot of TOL and rate of change of it-----
figure(5)
plot(YR,TOL_exp,"b-o","MarkerFaceColor","b");
hold on
plot(YR,TOL_exp_p1*YR+TOL_exp_p2,"b--","MarkerFaceColor","b");
plot(YR,TOL_exp_d_1,"r-o","MarkerFaceColor","r");
plot(YR,TOL_exp_d_1_p1*YR+TOL_exp_d_1_p2,"r--","MarkerFaceColor","r");
hold off
```

```
40
```

```
xlabel('Year');
ylabel('Total Outstanding Liabilities & rate of change of it');
title('Total Outstanding Liabilities vs Year');
legend('TOL (Actual Data)','TOL (Best fit-line)','rate of change of TOL (Actual)','rate of change of TOL
   (Best fit-line)');
grid on
min_TOL_index=min(TOL_index);
range_TOL_index=range(TOL_index);
%-----Composite Index-3-----
c_index_3=(TOL_index-min_TOL_index)/range_TOL_index;
%-----Plot of Composite Index-3-----
figure(6)
plot(YR,c_index_3,"k-o","MarkerFaceColor","k");
hold on
plot(YR,c_index_3_p1*YR+c_index_3_p2,"k--","MarkerFaceColor","k");
hold off
xlabel('Year');
ylabel('Composite Index-3 (rate of change of Total Outstanding Liabilities)');
title('Composite Index-3 vs Year');
legend('Actual Data','Best fit-line');
grid on
%------Indl FRI(Fiscal Resposibility Index)------
AM_index=(c_index_1+c_index_2+c_index_3)/3;
%-----Plot of FRI-----Plot of FRI------
figure(7)
plot(YR,FRI_index,"k-o","MarkerFaceColor","k");
hold on
plot(YR,FRI_index_p1*YR+FRI_index_p2,"k--","MarkerFaceColor","k");
hold off
axis([1980 2020 0 1]);
xlabel("Year");
ylabel("Fiscal Responsibility Index");
legend("Actual","best fit line");
grid on;
title('Fiscal Responsibility Index');
%-----Best fit Curve Of FRI-----
figure(13)
YR_e=2025:-1:1980; % prediction for the future-5 year
plot(YR_e,a1*sin(b1*YR_e+c1) + a2*sin(b2*YR_e+c2) + a3*sin(b3*YR_e+c3) + a4*sin(b4*YR_e+c4) +
   a5*sin(b5*YR_e+c5) + a6*sin(b6*YR_e+c6) + a7*sin(b7*YR_e+c7) + a8*sin(b8*YR_e+c8)
```

```
,"r-*","MarkerFaceColor","r");
```

Appendix C

Datasets

**Please note that we have tried to incorporate all the datasets that we ultilized from all the sources

Year	GDP growth (Annual percent change)
1980	5.3
1981	6
1982	3.5
1983	7.3
1984	3.8
1985	5.3
1986	4.8
1987	4
1988	9.6
1989	5.9
1990	5.5
1991	1.1
1992	5.5
1993	4.8
1994	6.7
1995	7.6
1996	7.5
1997	4
1998	6.2
1999	8.5
2000	4
2001	4.9
2002	3.9
2003	7.9
2004	7.8
2005	9.3
2006	9.3
2007	9.8
2008	3.9
2009	8.5
2010	10.3

2011	6.6
2012	5.5
2013	6.4
2014	7.4
2015	8
2016	8.3
2017	7
2018	6.1
2019	4.2

Table	C.1:	GDP	growth-rate	of	India	(As	annual	percent
change	e)[50][49]	9]						

Year	Gross Fiscal Deficit(in ₹ cr.)	Gross Primary Deficit(in ₹ cr.)	Revenue Deficit(in ₹ cr.)
1980	8299	5695	2037
1981	8666	5471	392
1982	10627	6689	1308
1983	13030	8235	2540
1984	17416	11442	4225
1985	21858	14346	5889
1986	26342	17096	7777
1987	27044	15793	9137
1988	30923	16645	10515
1989	35632	17875	11914
1990	44632	23134	18562
1991	36325	9729	16261
1992	40173	9098	18574
1993	60257	23516	32716
1994	57703	13644	31029
1995	60243	10198	29731
1996	66733	7255	32654
1997	88937	23300	46449
1998	113349	35466	66976
1999	104716	14467	67596
2000	118816	19502	85234
2001	140955	33495	100162
2002	145072	27268	107879
2003	123273	-815	98261
2004	125794	-1140	78338
2005	146435	13805	92300
2006	142573	-7699	80222
2007	126912	-44118	52569
2008	336992	144788	253539
2009	418482	205389	338998
2010	373591	139569	252252
2011	515990	242840	394348
2012	490190	177020	364282

2013	502858	128604	357048
2014	510725	108281	365519
2015	532791	91132	342736
2016	535618	54904	316381
2017	591062	62110	443600
2018	634398	46828	410930
2019	703760	43289	485019

Table C.2: Actu	al figure of o	deficits (in [‡]	₹ crore)	[18][7	J
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Year	Gross Fiscal Deficit(% of GDP)	Gross Primary Deficit(% of GDP)	Revenue Deficit(% of GDP)
1980	5.55	3.81	1.36
1981	4.93	3.11	0.22
1982	5.40	3.40	0.67
1983	5.69	3.60	1.11
1984	6.79	4.46	1.65
1985	7.55	4.96	2.03
1986	8.13	5.28	2.40
1987	7.34	4.29	2.48
1988	7.08	3.81	2.41
1989	7.10	3.56	2.37
1990	7.61	3.95	3.17
1991	5.39	1.44	2.41
1992	5.19	1.17	2.40
1993	6.76	2.64	3.67
1994	5.52	1.30	2.97
1995	4.91	0.83	2.42
1996	4.70	0.51	2.30
1997	5.66	1.48	2.95
1998	6.29	1.97	3.71
1999	5.18	0.72	3.34
2000	5.46	0.90	3.91
2001	5.98	1.42	4.25
2002	5.72	1.08	4.25
2003	4.34	-0.03	3.46
2004	3.88	-0.04	2.42
2005	3.96	0.37	2.50
2006	3.32	-0.18	1.87
2007	2.54	-0.88	1.05
2008	5.99	2.57	4.50
2009	6.46	3.17	5.23
2010	4.80	1.79	3.24
2011	5.91	2.78	4.51
2012	4.93	1.78	3.66
2013	4.48	1.14	3.18
2014	4.10	0.87	2.93
2015	3.87	0.66	2.49

2016	3.49	0.36	2.06
2017	3.46	0.36	2.59
2018	3.34	0.25	2.16
2019	3.34	0.21	2.30

 Table C.3:
 Deficits as a percentage of GDP[18][7]

Year	Total Receipts(in ₹ cr.)	Borrowing(in ₹ cr.)	Interest Payments(in ₹ cr.)	Expenditure(in ₹ cr.)
1980	5339	2679	1225	22768
1981	6372	2913	1440	25265
1982	6987	3771	1705	30791
1983	7890	4038	1963	35534
1984	9216	4095	2466	43632
1985	12013	4884	2940	52666
1986	13526	5532	4101	62916
1987	14573	5862	4898	68261
1988	17259	8418	5935	79111
1989	16529	7404	7186	92908
1990	20291	8001	8655	105298
1991	23873	7510	10944	111414
1992	29135	3676	13210	122618
1993	34117	28928	15801	141853
1994	39887	20326	19413	160739
1995	47350	34001	21839	178275
1996	54655	19093	25387	201007
1997	62445	32499	29799	232053
1998	73469	68988	35441	279340
1999	82316	62076	44641	298053
2000	93951	73431	50985	325592
2001	104558	90812	61596	362310
2002	110306	104126	69027	413248
2003	130893	88870	80396	471203
2004	159778	50939	86421	498252
2005	168468	106241	84024	505738
2006	187823	114801	93180	583387
2007	232963	130600	99831	712671
2008	279549	246975	102955	883956
2009	297189	394371	112807	1024487
2010	326789	326399	124820	1197328
2011	363806	484111	136817	1304365
2012	411365	507445	150472	1410372
2013	475146	475626	168897	1559447
2014	506382	457617	190415	1663673

2015	526626	414931	214247	1790783
2016	578869	338149	251303	1975194
2017	739842	450728	289564	2141973
2018	840122	422737	315926	2457235
2019	1025874	473122	350691	2786349

Table C.4: Total Income, Borrowing, Interest Payments and Expenditure of India(in ₹ crore)[18][7]

Year	r Total Outstanding Liabilities (in ₹ cr	
1980	61930	
1981	73435	
1982	91404	
1983	104145	
1984	123442	
1985	151643	
1986	182825	
1987	219176	
1988	258125	
1989	305866	
1990	349347	
1991	427391	
1992	480634	
1993	558421	
1994	630196	
1995	703381	
1996	771001	
1997	884380	
1998	1012486	
1999	1149383	
2000	1292586	
2001	1494501	
2002	1695656	
2003	1874731	
2004	2124726	
2005	2359972	
2006	2637079	
2007	2935480	
2008	3300108	
2009	3645165	
2010	4059590	
2011	4670054	
2012	5225307	
2013	5859332	
2014	6411200	
2015	7098298	
2016	7625078	
2017	8492354	
2018	9399161	
2019	10255099	

Year	Revenue Receipts(in ₹ cr.)	Revenue Expenditure(in ₹ cr.)
1980	12373	14808
1981	15024	17075
1982	17434	20238
1983	19711	23803
1984	23466	28349
1985	28035	32770
1986	33083	38057
1987	37037	45088
1988	43591	52228
1989	52296	60217
1990	54954	71776
1991	66030	86186
1992	74128	96205
1993	75453	108868
1994	91083	127009
1995	110130	143127
1996	126279	166919
1997	133886	184312
1998	149485	217249
1999	181482	257475
2000	192605	287825
2001	201306	309819
2002	230834	330853
2003	263813	372594
2004	305991	402670
2005	347077	438034
2006	434387	505699
2007	541864	580805
2008	540259	681985
2009	572811	799154
2010	788471	932297
2011	751437	1074571
2012	879232	1231702
2013	1014724	1379750
2014	1101381	1637288
2015	1195025	1838267
2016	1374203	2086892
2017	1435233	2300520
2018	1729682	2828243
2019	1962761	3093898

Table C.6:Revenue Receipts and Revenue Expenditure(in ₹
crore)[18][7]

Year	Inflation rate
1980	11.3
1981	12.7
1982	7.7
1983	12.6
1984	6.5
1985	6.3
1986	8.9
1987	9.1
1988	7.2
1989	4.6
1990	11.2
1991	13.5
1992	9.9
1993	7.3
1994	10.3
1995	10
1996	9.4
1997	6.8
1998	13.1
1999	5.7
2000	3.8
2001	4.3
2002	4
2003	3.9
2004	3.8
2005	4.4
2006	6.7
2007	6.2
2008	9.1
2009	12.3
2010	10.5
2011	9.5
2012	10
2013	9.4
2014	5.8
2015	4.9
2016	4.5
2017	3.6
2018	3.4
2019	4.5

 Table C.7:
 Inflation rate of India based on average consumer prices (Annual percent change)[11][12]

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