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Publication of Artha Beekshan, the quarterly referred journal of Bangiya Arthaniti Parishad, that is, the Bengal Economic Association, is one of the most important academic activities of the Association. The present volume, **Volume 31, No.3** of the Journal, contains the papers contributed by scholars . We are thankful to the authors and members who have helped in one way or other in the preparation of this volume. Because of the difficulties and disruptions caused by the intervention of the Pandemic in between, we have been compelled to bring out the combined issue.

I would like to extend my whole-hearted thanks to the Editorial team, the Publisher, and all who have helped in the publication process, and especially the office bearers of Bangiya Arthaniti Parishad for their kind endeavours to make this issue of **Artha Beekshan** viable and **Kolkata** Mudran for bringing out the present issue. The publication of this issue of Artha Beekshan is helped by grant from ICSSR.

Editor in Chief

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Economics of Bank Frauds in India

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Abstract

Bank frauds are rising of late at an alarming rate in India. These frauds are confined mainly to the public sector banks (PSBs). The frauds illegally diverted a large part of the PSB loans from the creation of the targeted assets to the purchase of other domestic or foreign assets. This paper using a macro-theoretic model suitable for India shows that if the illegally diverted part of the PSB loans is used to purchase foreign assets, the GDP will contract substantially causing immense misery to the workers and the small and medium producers. This paper also considers another issue. The stock of nonperforming assets (NPAs) as a fraction of bank advances started rising in the PSBs since the onset of recession since 2011-12 . However, Indian private banks did not face this problem. Initially, the RBI allowed the PSBs to hide a large part of these NPAs. However, when these hidden NPAs assumed a substantial value, the RBI tightened the norms for defining NPAs and forced the PSBs to disclose all their NPAs. As a result, PSBs' NPAs increased sharply in 2015. The RBI adopted punitive measures against the PSBs, raised the bogey of PSBs becoming insolvent and made the people apprehensive of losing all their savings parked with the PSBs. In this scenario, our study in this paper shows, there will take place a large contraction in GDP; PSBs' business, profit and equity prices will fall significantly giving the government an excuse to sell them off to the capitalists at throwaway prices. Carefully scrutinizing all evidences, our study concludes that in all likelihood, the scenario delineated above is a conspiracy hatched by the capitalists to monopolize the banking sector giving hefty donations to the government officials.

Key Words: Bank Fraud, Recession, Public Sector Banks

JEL Classification: E11, E12, G21

I. Introduction

Bank frauds are rising at an alarming rate in India. Apart from the dramatic episodes of Vijay Mallya and Nirav Modi who defrauded the public sector banks (PSBs) of Rs.9000 crore and Rs.11,500 crore and left India in 2016 and 2018 respectively, evidences that

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have come up recently suggest that bank frauds are quite widespread in the banking sector in India and these frauds are concentrated principally in the PSBs. The Annual Report 2018-19 of RBI (2018-19, pp.122-123) states than the number of cases of frauds reported by banks increased by 15 percent in 2018-19 on a year-on-year basis, with the amount involved rising by 73 percent from Rs.382608.7 million to Rs.645094.3 million. More than 90 percent of the defrauded amount related to the PSBs and more than 53 percent of the defrauded amount was related to bank advances. According to RBI's Financial Stability Report 2018 (RBI (2018)), large borrowers accounted for 58.8 percent of gross advances and 85.6 percent of the gross non-performing assets of banks. Thus, it seems reasonable to assume that bank frauds were principally perpetrated by the large borrowers. It is quite sensible to argue that only the richest of the rich and the most powerful of the people can perpetrate bank frauds and get away with them. Therefore, bank frauds on such a wide scale principally by large borrowers strongly suggest corruption on the part of the high level bank officials and politicians in power. The defrauded part of the advances instead of creating the targeted assets was used illegally for other purposes. They might have been utilized to purchase (i) domestic assets such as land or (ii) foreign produced goods such as precious metals, gems jewelry etc. or (iii) foreign non-reproducible assets such as land or financial assets. One of the major objectives of this paper is to examine how corruption driven illegal diversion of bank advances to purchase goods and assets noted in (ii) and (iii) is likely to affect macroeconomic performance of India.

This paper has another objective. It may be delineated as follows. PSBs were afflicted with the problem of non-performing assets for long due principally to the recession that started in 2011-12 (see Tables 1 and 2). The corruption driven bank fraud also seems to have started since then. However, the real magnitude of the problem came to light only in 2015-16. Chandrasekhar and Ghosh(2018) points out that the RBI gave some leeway to banks in classifying assets. This allowed banks to conceal at least in part actual and potential non-performing assets (NPAs). After a significant period of time, when the gap between declared NPAs and stressed assets widened significantly, RBI decided in the second half of 2015 to undertake an asset quality review and to impose stricter guidelines for bad loan recognition. This led to a sharp spiral in the ratio of gross NPAs to gross advances in PSBs. Provisioning for these bad assets led to large fall (rise) in PSB profit (losses). To arrest the growth of non-performing assets in PSBs, RBI put some of the PSBs under a category that required Prompt Corrective Action (PCA), which put stringent restrictions on their lending. In June 2017, Government of India (GoI) approved Financial Regulation and Deposit Insurance (FRDI) Bill, which proposed to empower troubled banks to use depositors' money to remain solvent. All these measures on the part of the RBI and GoI made the bank customers scared and their faith in the PSBs was badly shaken. Another major objective of this paper is to examine the macroeconomic implications of this kind of measures in India.

Theoretical literature on macroeconomic implications of bank fraud is virtually non-existent in Indian context. Hence, this work fills up an important gap in the literature.

To accomplish the objectives noted above, we will develop models that, we hope, capture all the relevant salient features of India.

II. The Model

As we have pointed out above, bank frauds are rising at an alarming rate especially in public sector banks(PSBs) in India in recent years. From evidences it seems that these frauds are taking place in connivance with corrupt officials in high places. Data reveal that these frauds are concentrated principally in bank advances. This means that a part of the loans instead of being utilized for the creation of the targeted asset is diverted to other uses. The diverted part of the loan may be used to buy foreign physical assets such as gold, gems and jewelry etc. or for the purchase of foreign financial assets. In this section, we will develop a macro model suitable for India to examine the macroeconomic implications of these phenomena.

The model we use here is a modified version of the one developed in Ghosh and Ghosh (2019). We divide the economy into two sectors: the real sector and the financial sector. Let us focus on the real sector first. It consists of the goods market. Following the tradition set by Keynes(1936) and Kalecki(1954), we assume that aggregate output of goods and services or real GDP is determined by aggregate final demand for goods and services and prices are set on a cost-plus basis. Hence, the equilibrium condition of the real sectoris given by

$$Y = c_w(1-t)\left(\frac{wlY}{p}+\frac{Br_0}{p}\right)+c_c(1-t)\left(Y-\left(\frac{wlY}{p}+\frac{Br_0}{p}\right)\right)+I(\bar{r})+tY+NX\left(\frac{P^*e}{p},c_c.(1-t)\left\{Y-\frac{wlY}{p}-\frac{Br_0}{p}\right\},I(\bar{r}),G\right) \quad (1)$$

In (1), Y denotes real GDP. People are divided into two classes: workers and capitalists. Their fixed marginal and average consumption propensities are denoted by c_w and c_c , respectively and t denotes the tax rate that applies to incomes of both the workers and the capitalists. To produce one unit of Y, a fixed l amount of labour is required. w is the fixed money wage rate and P denotes the domestic price level. Workers save in the form of bank deposits and the total amount of bank deposits held by the workers at the beginning of the given period is denoted by B. These deposits were made in the past at interest rates

prevailing in the past and r_0 is the given interest rate applicable to *B*. Total interest income earned by the workers in the given period under consideration is Br_0. The excess of *Y* over wage and interest incomes of workers is, therefore, capitalists' income. Investment is assumed to be a decreasing function of the interest rate denoted *r*. The RBI through its monetary policy regulates the interest rate and seeks to keep it at a target level. Hence, we regard the interest rate to be a policy variable of the RBI and take it as given at $\bar{r}$. Given the stringent restriction Government of India puts on fiscal deficit, we assume the fiscal deficit to be zero. Hence, government consumption, *G*, is taken to be equal to the total tax revenue *tY*. Net export is denoted by *NX*. It is taken to be an increasing function of the real exchange rate $\frac{P^* e}{P}$, where P^* denotes the price of foreign goods in foreign currency and *e* denotes the exchange rate. Aggregate consumption demand represents demand for both domestic and foreign consumption goods. This is true of both *G* and *I*. However, import intensity of workers' consumption demand is likely to be relatively insignificant. Therefore, we have made net export a decreasing function of capitalists' consumption, *G* and *I*.

India is a small open economy. Hence, P^* and Y^* are given to India. We also assume following Kalecki (1954) that P is set by applying a mark-up to the average variable cost of production, which in the present case consists only of unit wage cost. We assume that *w* and *l* are both fixed in the short run. Hence, P is also fixed. The data on exchange rate given in Table 3 show that the exchange rate varies quite widely even in short periods. This indicates that India has more or less a flexible exchange rate. We further assume that the net capital inflow is autonomous and it is exogenously given at $\bar{K}$. From the above it follows that the BOP is in equilibrium when the following condition is satisfied:

$$NX\left(\frac{P^* e}{P}, c_c.(1-t)\left\{Y-\frac{wlY}{P}-\frac{Br_0}{P}\right\}, I(\bar{r}), G\right)+\bar{K}=NX\left(\frac{P^* e}{P}, c_c.(1-t)\left\{Y-\frac{wlY}{P}-\frac{Br_0}{P}\right\}, I(\bar{r}), tY\right)+\bar{K}=0 \quad (2)$$

The Financial Sector

Let us now focus on the financial sector. We assume that it consists only of the central bank and the commercial banks. We will henceforth refer to the latter as simply banks. In India, banks are of two types: public sector banks (PSBs) and private banks. PSBs have branches even in the remotest areas and ordinary people have access to them. We assume

here that only workers hold their savings with the PSBs and the capitalists hold their saving in the form of deposits of the private banks. We consider here a given economy in a given period and the total amount of new loans the PSBs plan to supply in the given period is given by the following equation:

$$L^{sg} = (1-\rho)\left((1-c_w).(1-t).\left(\frac{wlY}{p}+\frac{Br_0}{p}\right)\right) \quad (3)$$

In (3), L^{sg} denotes supply of new loans of PSBs, ρ denotes the cash-reserve ratio of the PSBs, which we assume to be fixed for simplicity. The coefficient of $(1-\rho)$ in the expression on the RHS of (3) is the workers' saving. The planned supply of new loans of private sector banks denoted L^{sp} is given by the following equation:

$$L^{sp} = (1-\rho)\left((1-c_c).(1-t).\left(Y-\left[\frac{wlY}{p}+\frac{Br_0}{p}\right]\right)\right) \quad (4)$$

In (4) the cash-reserve ratio of the private banks is taken to be fixed and equal to that of PSBs for simplicity. Note that the capitalists are likely to use a part of their saving to finance their investment directly. Similarly, the workers may also hold a part of their saving with the private banks. However, we disregard these here for simplicity. Even if we had incorporated these points, all our results would have remained unaffected.

Demand for banks' new loans comes from the investors only. They finance their entire investment with new bank loans. Some of the investors are also bank frauds. We also pointed out that the large borrowers are principally responsible for bank frauds. They secure loans from the PSBs to make some specific investment. However, instead of making the stated investment, they use it illegally in the cases we consider here to purchase foreign physical or financial assets. The modus operandi of these fraud investors may be the following. The frauds give donations to highly placed government officials and overstate their planned investment. They use the loans secured to finance the overstated part of their investment to buy illegally domestic or foreign assets. These loans are never repaid. The government officials receiving the donations make sure that the PSBs accept the excuses of the defaulters for not being able to repay the loans and write-off the loans. Let us illustrate this point with an example. Suppose an investor plans to set up an enterprise worth Rs.20,000 crore. However, he overstates its value by Rs.20,000 crore and secures a loan of Rs.40,000 crore from a PSB and pledges the enterprise as the collateral. Given the donations given to the government officials, the PSB turns a blind eye to this overstatement of the value of the enterprise. After running the enterprise for a few years, the borrower declares it bankrupt. Usually, it seems, these fraud investors take these loans in times of boom and declare their enterprises bankrupt when recession starts. At least that is

what seems to have happened in India in the period we consider here. The bank takes possession of the enterprise and the obligation of the borrower ends there. The bank sells off the enterprise and writes off the rest of the loan. All this happens smoothly because of the donations. This is corroborated by the following quote from Chandrasekhar and Ghosh (2018): "Evidences regarding recovery of NPAs of PSBs also suggest that the problem of corruption is quite widespread. NPAs are reduced in three ways: actual recoveries, upgradation or conversion of NPAs into paying assets through restructuring and compromises and, finally, write offs. Share of write offs in PSBs rose from an already high 41 percent in 2014-15 to 46 percent in 2015-16. In 10 cases of resolution under Insolvency and Bankruptcy Code (IBC) reported in Economic Survey 2017-18, the claims of financial creditors were met in full only in one (Prowess International), where the claim was quite small. For the rest, the extent of recovery varied from 6 percent to 58 percent, with only two recovering more than 50 percent." Note that the corporate investors started defaulting on their loans and the stock of nonperforming assets of the PSBs as a fraction of their total advances started increasing since the onset of recession in 2011-12 (see Tables 1 and 2). The loans the corporate investors started defaulting on were taken during the period of boom 2003-04 – 2010-11. We assume that the frauds plan to fraudulently secure α fraction of L^{sg}. Thus, their demand for bank loans is given by αL^{sg}.

Hence, demand for new bank loans denoted L^D is given by

$$L^D = I(\bar{r}) + \alpha . L^{sg} \tag{5}$$

The RBI seeks to keep r at $\bar{r}$. Hence, it lends to the banks as much as the banks want to meet the credit demand that comes forth at $\bar{r}$. Similarly, in case there is an excess supply of bank loans at $\bar{r}$, the banks lend out this excess supply of loans to the RBI at $\bar{r}$. Hence, the equilibrium in the financial sector is given by the following equation

(6)

$$I(\bar{r}) = (1-\rho)\left((1-c_c).(1-t).\left(Y - \left[\frac{wlY}{P} + \frac{Br_0}{P}\right]\right)\right) + (1-\alpha)(1-\rho)\left((1-c_w).(1-t).\left(\frac{wlY}{P} + \frac{Br_0}{P}\right)\right) + b$$

In (6), b denotes banks' borrowing from the RBI. It may be positive or negative depending on whether there is excess demand for or excess supply of bank loans at $\bar{r}$. We make α an increasing function of D, which denotes the donations given to the government officials. They can use $\alpha(D)L^{sg}$ for three purposes: purchasing domestic assets, purchasing imported produced physical assets such as precious metals, gems, jewelry, houses etc. and for purchasing foreign non-reproducible physical assets such as land or financial assets. We consider the implications of the latter two cases here. In the first of these two cases, $\alpha(D)L^{sg}$ is a part of C or I and a part of import of produced goods and services. In the second of these two cases, it is a part only of capital outflow and not of any component of final demand for Y. In what follows, we will refer to the first case and the second case as Case 1 and Case 2, respectively. The BOP equilibrium condition in these two cases may be written as follows:

$$NX\left(\frac{P^{*e}}{p}, c_c.(1-t)\left\{Y-\frac{wlY}{p}-\frac{Br_0}{p}\right\}, I(\bar{r}), tY\right)+\bar{K}-\alpha(D)L^{sg}=0 \quad (7)$$

The goods market equilibrium condition in Case 1 and Case 2 are written as follows:

Case 1

$$Y=c_w(1-t)\left(\frac{wlY}{p}+\frac{Br_0}{p}\right)+c_c(1-t)\left(Y-\left(\frac{wlY}{p}+\frac{Br_0}{p}\right)\right)+\alpha(D)L^{sg}+I(\bar{r})+tY+NX\left(\frac{P^{*e}}{p}, c_c.(1-t)\left\{Y-\frac{wlY}{p}-\frac{Br_0}{p}\right\}, I(\bar{r}), G\right)-\alpha(D)L^{sg} \quad (8)$$

Case 2

$$c_w(1-t)\left(\frac{wlY}{p}+\frac{Br_0}{p}\right)+c_c(1-t)\left(Y-\left(\frac{wlY}{p}+\frac{Br_0}{p}\right)\right)+I(\bar{r})+tY+NX\left(\frac{P^{*e}}{p}, c_c.(1-t)\left\{Y-\frac{Br_0}{p}\right\}, I(\bar{r}), G\right) \quad (9)$$

Substituting (7) into (8) and (9), we get the following equation:

$$Y=c_w(1-t)\left(\frac{wlY}{p}+\frac{Br_0}{p}\right)+c_c(1-t)\left(Y-\left(\frac{wlY}{p}+\frac{Br_0}{p}\right)\right)+\alpha(D)L^{sg}+I(\bar{r})+tY-\bar{K} \quad (10)$$

Note that even though $\alpha(D)$ fraction of L^{sg} is not used for purposes of financing the planned investment $I(\bar{r})$, the whole of the planned investment $I(\bar{r})$ is fully met through adjustments in b.

We can solve (10) for the equilibrium value of *Y* in both Case 1 and Case 2, respectively. We are now in a position to examine the impact of an autonomous increase in D in these two cases:

Taking total differential of (10) treating all exogenous variables other than *D* as fixed and solving for *dY*, we get

Case 1

$$dY = \frac{\alpha' L^{sg}}{1-\left[\left\{c_w.\frac{wl}{p}+c_c.\left(1-\frac{wlY}{p}\right)\right\}(1-t)+t\right]}dD \tag{11}$$

Let us explain (11) in both Case 1 and Case 2. In Case 1, following an autonomous increase in D by dD, both capitalists' consumption or investment and import of produced goods and services increase by $\alpha' L^{sg} dD$. Hence, aggregate planned demand for domestic goods remains unaffected at the initial equilibrium *Y* and *e*. However, the BOP deficit that is created at the initial equilibrium (Y, e) sends the exchange rate soaring. The rise in the exchange rate removes the BOP deficit by raising net export by $\alpha' L^{sg} dD$. This creates an excess demand for Y of $\alpha' L^{sg} dD$ at the initial equilibrium *Y*. Producers, therefore, increase Y to meet this excess demand. Per unit increase in Y, aggregate demand for Y goes up by

$$\left[\left\{c_w.\frac{wl}{p}+c_c.\left(1-\frac{wlY}{p}\right)\right\}(1-t)+t\right].$$

Therefore, excess demand for Y falls by

$$1-\left[\left\{c_w.\frac{wl}{p}+c_c.\left(1-\frac{wlY}{p}\right)\right\}(1-t)+t\right]$$

per unit increase in Y. Hence, to remove the excess demand of

$\alpha' L^{sg} dD$,

Y has to rise by the amount given by the expression on the RHS of (11).

In Case 2, following the diversion of the loan, aggregate demand for Y remains unaffected at the initial equilibrium (Y, e), but net inflow of capital falls by $\alpha' L^{sg} dD$ creating a BOP deficit of the same amount. Exchange rate will therefore, rise and restore BOP equilibrium by raising net export by $\alpha' L^{sg}$. Hence, at the initial equilibrium Y, there will emerge an excess demand for Y of $\alpha' L^{sg}$. The rest of the explanation is the same as that of Case 1.

The above analysis yields the following proposition:

Proposition 1:

If by giving donations to government officials it becomes possible for the capitalists to divert illegally a part of the new PSB loans from the creation of the assets for which the loans are taken to the purchase of foreign goods or assets, it will lead to an expansion of GDP and employment in the short run.

The result reported above will, however, be reversed if we incorporate into (7), (8) and (9) all the relevant salient features of the Indian economy. Note first that India's production is highly import intensive. Imported intermediate inputs such as petroleum and petroleum products, fertilizer, components and chemicals constitute essential ingredients of India's production. The production sector in India is an oligopoly as production of most of the goods and services are carried out by just a few producers. It is, therefore, reasonable to assume a la Kalecki (1954) that the producers set the prices of their products by applying a mark-up to the average variable cost of production. The two components of the average variable cost of production are the unit wage cost and the unit intermediate input cost. The former may reasonably be regarded as fixed in the short run. Let us now focus on the latter. India is a small open economy. It is, therefore, a price taker in the world market. Thus, even though the unit imported intermediate input cost of production is fixed in foreign currency, it is highly variable in terms of domestic currency because of the variability of the exchange rate. Hence, in India P is an increasing function of e. We further assume that, given everything else, P is a decreasing function of Y. The reason may be stated as follows: When Y falls, the producers have to raise the mark up over the average variable cost of production to cover the overhead. Another reason why P rises with a fall in Y in India is that the government, to make up at least in part for the shortfall in revenue, raises indirect tax rates. However, we have not explicitly brought in indirect tax rates here for simplicity. Formally,

$$P = P(e, Y); \quad \frac{\partial P}{\partial e} > 0 \text{ and } \frac{\partial P}{\partial Y} < 0 \tag{12}$$

Investment in India is also highly import-intensive. Let us substantiate this claim using the example of teaching and learning economics in India. All the text books and journals teachers refer to are foreign. All the computers and software needed for empirical analysis are imported. Thus, to teach economics in India, all the knowledge inputs and all the hi-tech inputs have to be imported. This is true not only of economics but also of all other subjects. Thus, to set up a college or university, all the knowledge inputs and hi-tech inputs have to be imported. Again, take the case of banks. All the computers and software they use are imported. All the high-tech machines such as the ATM machines, passbook printing machines etc. have to be imported. To set up a bank, therefore, all the hi-tech

inputs have to be imported. This is true of all the modern production facilities. Hence, an increase in the exchange rate ceteris paribus makes imported capital goods costlier raising substantially the cost of investment in India. This, given investors' expectations, lowers investment in India. We, therefore, make investment a decreasing function of *e*. We re-write the investment function as follows:

$$I = I(\bar{r}, e); \frac{\partial I}{\partial e} < 0 \tag{13}$$

Using (12), the real exchange rate is to be written as $\frac{P^* e}{P(e,Y)}$. An increase in *e* raises *P* substantially and, thereby, produces insignificant impact on the real exchange rate. We will, therefore, regard the real exchange rate to be independent of *e* and an increasing function of Y, given the exogenous variables. Denoting the real exchange rate by *p*, we have

$$p = p(Y)\ ; \quad \frac{dP}{dY} > 0 \tag{14}$$

One important feature of India's net export should be considered here. We have already noted that India does not have any knowledge or technology of its own. Obviously, it is not possible to compete in the world market with imported knowledge and technology, which are never state of the art. Close substitutes of almost all the goods and services that India can produce are available everywhere else. Hence, India's net export is likely to be highly price elastic even though it is insensitive to exchange rate changes.

Substituting (13) and (14) into (7), (8) and (9), we rewrite them as follows:

$$NX\left(p(Y), c_c.(1-t)\left\{Y - \frac{wlY}{P(e,Y)} - \frac{Br_0}{P(e,Y)}\right\}, I(\bar{r}, e), tY\right) + \bar{K} - \alpha(D)L^{sg} = 0 \tag{15}$$

$$Y = c_w(1-t)\left(\frac{wlY}{P(e,Y)} + \frac{Br_0}{P(e,Y)}\right) + c_c(1-t)\left(Y - \left(\frac{wlY}{P(e,Y)} + \frac{Br_0}{P(e,Y)}\right)\right) + \alpha(D)L^{sg} + I(\bar{r}, e) + tY + NX\left(p(Y), c_c.(1-t)\left\{Y - \frac{wlY}{P(e,Y)} - \frac{Br_0}{P(e,Y)}\right\}, I(\bar{r}, e), tY\right) - \alpha(D)L^{sg} \tag{16}$$

$$Y = c_w(1-t)\left(\frac{wlY}{P(e)} + \frac{Br_0}{P(e)}\right) + c_c(1-t)\left(Y - \left(\frac{wlY}{P(e)} + \frac{Br_0}{P(e)}\right)\right) + I(\bar{r}, e) + tY + NX\left(p(P^*), c_c.(1-t)\left\{Y - \frac{wlY}{P(e)} - \frac{Br_0}{P(e)}\right\}, I(\bar{r}, e), tY\right) \tag{17}$$

Substituting (15) into (16) and (17), we get the same equation. We write it as follows:

$$Y = c_w(1-t)\left(\frac{wlY}{P(e,Y)} + \frac{Br_0}{P(e,Y)}\right) + c_c(1-t)\left(Y - \left(\frac{wlY}{P(e,Y)} + \frac{Br_0}{P(e,Y)}\right)\right) + I(\bar{r}, e) + tY + \alpha(D)L^{sg} - \bar{K} \tag{18}$$

We can solve (15) and (18) for the equilibrium values of *Y* and *e*. We are now in a position to examine the impact of a given increase in D on *Y* and *e*.

Let us first focus on (15). We can solve it for *e* as a function of *Y* and *D*, given the other exogenous variables. This is written as follows.

$$e = e(Y, D)\ ;\ \frac{\partial e}{\partial Y} < 0 \text{ and } \frac{\partial e}{\partial D} > 0 \tag{19}$$

Let us derive the signs of the partial derivatives of (19).

Taking total differential of (15), treating all variables other than *e* and *Y* as fixed and, then, solving for $\frac{de}{dY}$, we get

$$e_Y\left(\equiv \frac{de}{dY}\right) = -\frac{\left[NX_p p_Y + (-NX_c)c_c\left(\frac{wlY + Br_0}{P^2}\right)(-P_Y)\right] - \left[(-NX_c c_c)(1-t)\left(1 - \frac{wl}{P}\right) + (-NX_G)t\right]}{NX_I I_e - \left[(-NX_c)c_c(1-t)\frac{wlY}{P^2}P_Y\right]} < 0 \tag{20}$$

Let us explain the sign of (20). Following a unit increase in *Y*, both capitalists' income and government's income rise. This leads to an increase in import demand lowering net export. The absolute value of this fall in net export is given by the second term within third brackets in the numerator of of the expression on the RHS of (20). However, a unit rise in *Y* ceteris paribus also produces an opposite effect on the net export through its impact on *P*. It lowers *P*. Since, as noted already, net export in India is highly price elastic, net export will rise substantially in response to even a slight fall in *P*. Again, a fall in *P* redistributes income in favour of workers at the expense of the capitalists. This will lower capitalists' consumption demand for import raising net export. The rise in net export following a ceteris paribus unit increase in Y due to the factors mentioned above is given by the first term within third brackets of the numerator in the expression on the RHS of (20). Given the very high price elasticity of India's net exports, the first term is highly likely to be larger. We consider it reasonable to consider only this case here. Thus, following a

ceteris paribus unit increase in *Y*, BOP will go into a surplus and *e* will fall to restore net export to its initial value. Note that the denominator of the expression on the RHS of (20) gives the increase in net export per unit rise in e. This has to be positive for reasons of stability. This explains the sign of (20).

Again, taking total differential of (15) treating all variables other than *e* and *D* as fixed and, then, solving for (*de*/*dD*), we get

$$e_D\left(\equiv\frac{de}{dD}\right)=\frac{\alpha' L_g^S dD}{NX_I I_e-\left[(-NX_c)c_c(1-t)\frac{wlY}{P^2}P_e\right]}>0 \tag{21}$$

Let us explain (21). Following a given increase in *D* by *dD*, a larger amount of the PSB loan is diverted to purchase foreign goods or assets creating a BOP deficit at the initial equilibrium (Y, e). The amount of this BOP deficit is given by the numerator of the expression on the RHS of (20). Hence, *e* rises to remove it. The denominator gives the amount of fall in the BOP deficit per unit increase in *e*. This explains (20).

Substituting (19) into (12), we write it as follows:

$$P=P(e(Y,D),Y)\equiv\bar{P}(Y,D);\quad \frac{\partial\bar{P}}{\partial Y}<0 \text{ and} \frac{\partial\bar{P}}{\partial D}>0 \tag{22}$$

The signs of the partial derivatives of (22) follow straightway from the signs of the partial derivatives of (12) and (19).

We are now in a position to examine how an exogenous increase in *D* is likely to affect *Y*. For this purpose, we first substitute (19) and (22) into (18) and rewrite it as

$$Y=c_w(1-t)\left(\frac{wlY}{\bar{P}(Y,D)}+\frac{Br_0}{\bar{P}(Y,D)}\right)+c_c(1-t)\left(Y-\left(\frac{wlY}{\bar{P}(Y,D)}+\frac{Br_0}{\bar{P}(Y,D)}\right)\right)+I\left(\bar{r},e(Y,D)\right)+tY+\alpha(D)L^{sg}-\bar{K} \tag{23}$$

(23) contains only one unknown *Y* . Taking total differential of (23) treating all variables other than Y and D as fixed and, then, solving for *dY*, we get

$$dY=\frac{\left\{-\left[(c_w-c_c)(1-t)\frac{wlY+Br_0}{P^2}\bar{P}_D+(-I_e)e_D\right]+\alpha' L^{sg}\right\}dD}{1-\left[c(1-t)+t+\left[(c_w-c_c)(1-t)\frac{wlY+Br_0}{P^2}(-\bar{P}_Y)+(-I_e)e_Y\right]\right]}<0 \tag{24}$$

where $C \equiv c_w \frac{wl}{p} + c_c\left(1 - \frac{wl}{p}\right)$.

Let us now explain the sign of (24). From (21) it follows that

$$(-I_e)e_D > (-I_e)\frac{\alpha' L^{sg}}{(-NX_I)(-I_e)} > \alpha' L^{sg}$$

since $0 < (-NX_I) < 1$ (25)

From (25) it is clear that the numerator of the expression on the RHS of (24) is negative. The denominator has to be positive for reasons of stability. This explains the sign of (24).

Let us explain this process of contraction. First, consider the case where the capitalists use a part of the loan taken from the PSBs for purchasing foreign produced goods. Following an increase in D, the capitalists spend an additional $\alpha' L^{sg} dD$ on foreign produced goods. This, at the initial equilibrium (Y, e), leaves aggregate demand for domestic goods unaffected but creates a balance of payments deficit of $\alpha' L^{sg} dD$. Hence, exchange rate will rise to raise net export by $\alpha' L^{sg} dD$. Per unit increase in e, NX rises by $(-NX_I)(-I_e) - (-NX_c)c_c(1-t)\left(\frac{WlY + Br_0}{P^2}\right)P_e$. Therefore, to raise net export by 1 unit, *e* has to increase by $\frac{1}{(-NX_I)(-I_e)-(-NX_c)c_c(1-t)\left(\frac{WlY+Br_0}{P^2}\right)}$. This will lower I by $\frac{1}{(-NX_I)(-I_e)-(-NX_c)c_c(1-t)\left(\frac{WlY+Br_0}{P^2}\right)}(-I_e) > \frac{1}{(-NX_I)(-I_e)}.(-I_e) = \frac{1}{(-NX_I)} > 1$. From this it follows that, when *e* rises by $\frac{\alpha' L^{sg}}{(-NX_I)(-I_e)-(-NX_c)c_c(1-t)\left(\frac{WlY+Br_0}{P^2}\right)}$ and raises net export by $\alpha' L^{sg} dD$, I falls by a larger amount. Moreover, the increase in *P* brought about by the increase in *e* redistributes income in favour of the capitalists at the expense of the workers reducing aggregate consumption demand by .

Thus, at the initial equilibrium *Y*, net export remains the same as before at zero. Initially, C or I increased by $\alpha^{/} L^{sg}\, dD$, but the rise in e brought about a larger fall in C plus I. Hence, at the initial equilibrium *Y*, there emerges an excess supply of *Y* given by the absolute value of the numerator of the expression on the RHS of (24). We denote it by *N*. Thus, Y in the first round falls by $dY_1 = N$. This will reduce personal and public consumption demand by $[C.(1-t)+t]dY_1$, with *e* remaining unchanged. However, the fall in *Y* will, as we have already explained, create a BOP deficit and *e* will rise by $e_Y dY_1$. This will directly lower *I* by $I_e e_Y dY_1$. It will also raise *P* and, thereby, will lower aggregate personal

$$(c_w - c_c)(1-t)\frac{wlY + Br_0}{P^2}.P_e \frac{\alpha^{/} L^{sg}\, dD}{(-NX_I)(-I_e) - (-NX_c)c_c(1-t)\left(\frac{WlY + Br_0}{P^2}\right)}$$

consumption demand by . Therefore, the fall in *Y* by dY_1 in the first round lowers aggregate demand by $\left[C(1-t)+t+\left[(c_w - c_c)(1-t)\frac{wlY+Br_0}{P^2}(-\overline{P}_Y)+(-I_e)e_Y\right]\right]dY_1 \equiv \alpha dY_1$. Hence, *Y* in the second round will go down by $dY_2 = \alpha dY_1$. Similarly, *Y* in the third round will fall by $dY_3 = \alpha dY_2 = \alpha^2 dY_1$. This process of contraction will continue until the fall in Y that takes place in each successive round eventually falls to zero. Once that happens, the economy achieves a new equilibrium. Thus the total fall in Y is given by

$$dY = -dY_1 - dY_2 - dY_3 - \cdots \ldots\ldots\ldots = -\frac{1}{1-\alpha}dY_1 \qquad (26)$$

One can easily check that (26) tallies with (24). This explains (24). The explanation of

Case 2 where $\alpha' L^{sg} dD$ is spent on foreign financial assets can be done on lines chalked out above. The above analysis yields the following proposition:

Proposition 2:

*Unlike what happens in the standard case, if the fraction of PSB loan illegally used to purchase foreign produced goods or assets increases, in all likelihood there will take place a large and cumulative decline in the domestic real GDP in India bringing about a sha*rp fall in the growth rate from the previous period to the given period.

III. Bank Frauds, Tightening of Norms Defining Nonperforming Assets and PSBs

Non-performing Assets (NPA), as we have pointed out above, started rising at a fast rate in the PSBs since 2011-12 (see Tables 1 and 2). However, RBI & GOI through measures such as restructuring of loans etc. kept NPAs hidden until 2015. In 2015, suddenly RBI tightened norms for defining non-performing assets and forced the PSBs to disclose all their NPAs. As a result, stock of NPAs in PSBs jumped up substantially (see Table 1). Fear of PSBs becoming insolvent began to haunt people. The question that emerges is why the rise in the stock of non-performing assets and bank frauds were confined to the PSBs only. Why did the rise in the default rate induced by recession, which was unforeseen by all the national and international forecasting agencies such as the RBI, IMF etc., hurt only the PSBs? The increase in the default rate, if it were induced only by recession, should have hurt the domestic private banks as well. As we have already stated, evidences point to the fact that the large borrowers, whom we will refer to as the capitalists, are responsible in the main for the growth in the nonperforming assets of the PSBs. Therefore, the only plausible explanation of the growth in the stock of non-performing assets of the PSBs may be the following. The capitalists, as they own the private banks, do not default on loans taken from them. However, they give donations to the highly placed officials to default on loans taken from the PSBs and also to defraud the PSBs through strategies such as the one delineated in the previous section. Through these activities, they also seek to bring disrepute to the PSBs so that the government gets an excuse to sell them off to the capitalists at throwaway prices. Using a model that we hope captures all the relevant salient features of India, we will seek to examine the implications of these loan defaults and frauds for the PSBs, private banks and the economy. To accomplish this purpose, we modify (3) and (4) as follows:

$$L^{sg} = (1-\rho)\left(1-\theta(N)-\bar{\theta}(N)\right)\left((1-c_w).\left(\frac{wlY}{p}+\frac{Br_0}{p}\right)\right) \tag{27}$$

$$L^{sp} = (1-\rho)\left[(1-c_c).\left(Y-\left(\frac{wlY}{p}+\frac{Br_0}{p}\right)\right)+\bar{\theta}(N)\left((1-c_w).\left(\frac{wlY}{p}+\frac{Br_0}{p}\right)\right)\right] \tag{28}$$

In (27) and (28), θ and $\bar{\theta}$ denote respectively the fractions of savings workers plan to hold in the form of deposits of private banks and currency. We make them increasing functions of the stocks of nonperforming assets (confined to the PSBs in India), which we denote by *N*. Let us explain this point a little. As non-performing assets of PSBs rise and along with it the fear of the PSBs becoming insolvent begins to haunt, the well-to-do workers living in cities may shift a part of their savings to private banks. Note that workers are heterogeneous. Access and response to information may vary across workers. They may not be equally alarmed. As a result, it may be reasonable to assume that only a part of the PSB deposits of well-to-do workers get shifted to the private banks with an increase in *N* and the larger the increase in *N* the greater is the fraction of PSB deposits that get shifted to private banks. For simplicity, here we have considered only the new deposits of the PSBs. This will not scuttle the generality of our results. The other workers may shift their savings from the PSBs to currency or to physical assets. The problem with the physical assets is that they are highly illiquid. It may be very difficult to sell them at the right price in times of need. Hence, with a rise in *N*, some of the workers may choose to hold a part of their savings in the form of currency. Of course, some of the workers may choose to hold a part of their savings in the form of physical assets also. However, to keep our analysis simple, we have not considered that case here. For reasons similar to the one delineated above, it may be reasonable to assume that the fraction of PSB deposits shifted to currency rises with an increase in the stock of nonperforming assets.

We have also ignored tax and government expenditure for simplicity.

We assume as before that demand for loans comes only from the investors and the whole of the investment is financed with credit. We distinguish between two types of investors here: the corporate investors and the others, whom we will refer to as the small and medium producers. We will denote the investment demands of the former and the latter by I^0 and I^s respectively. These investment functions are written as follows:

$$I^0 = I^0(\bar{r},e)I^0 = I^0(\bar{r},e) \tag{29}$$

$$I^s = I^s(\bar{r})I^s = I^s(\bar{r}) \tag{30}$$

For simplicity, we have assumed that the small investors' investment is not import intensive and, therefore, made I^sa decreasing function of r alone. PSBs have their branches all across the country, while private banks' branches are concentrated principally in metropolitan cities. Private banks are owned by the capitalists and they cater principally to them. Hence, it may be reasonable to assume that small and medium producers have access only to the PSBs. Neither the private banks nor the PSBs ration the corporate borrowers. The PSBs meet all the credit demand that comes from the corporate investors and

uses the rest of their loanable fund for giving loans to the small and medium producers. If they lend to the small and medium producers, their expected income goes up. However, at the same time, in their perception, the amount of risk associated with lending rises too. Accordingly, depending on their tastes and preferences over return and risk, they decide what fraction of their loanable fund available for lending to the small and medium producers is to be lent out to them. We denote this fraction by β. In the PSBs' perception, the risk of lending to the small and medium producers rises with an increase in their stock of non-performing assets. Hence, we make β a decreasing function of the stock of nonperforming assets of banks, which we denote by N. Hence,

$$\beta = \beta(N); \beta' > 0 \tag{31}$$

The private banks use the whole of their planned loan supply to meet the credit demand of the corporate investors. The PSBs meet the remaining part of the credit demand of the corporate investors. They supply β fraction of the rest of their loanable fund to the small and medium producers. Denoting supply of new loans to the small and medium producers by L^{ss}, we get

$$L^{ss} = \beta(N)\left[(1-\rho)\left(1-\theta(N)-\bar{\theta}(N)\right)\left((1-c_w).\left(\frac{wlY}{p}+\frac{Br_0}{p}\right)\right)-\left\{I^0(\bar{r},e)-(1-\rho)\left[(1-c_c).\left(Y-\left(\frac{wlY}{p}+\frac{Br_0}{p}\right)\right)+\bar{\theta}(N)\left((1-c_w).\left(\frac{wlY}{p}+\frac{Br_0}{p}\right)\right)\right]\right\}\right] = \beta(N)\left[(1-\rho)(1-\theta(N))\left((1-c_w).\left(\frac{wlY}{p}+\frac{Br_0}{p}\right)\right)-\left\{I^0(\bar{r},e)-(1-\rho)\left[(1-c_c).\left(Y-\left(\frac{wlY}{p}+\frac{Br_0}{p}\right)\right)\right]\right\}\right] \tag{32}$$

From (32) it follows that the aggregate investment demand of the small and medium producers that actually materializes (which we denote by I^{as}) is given by

The hypothesis that we offer to explain the sudden substantial jump in the stock of nonperforming assets of the PSBs is the following: The capitalists want to expand their business empire in the banking sector dominated by the PSBs. They want to buy up the PSBs to monopolize the banking sector. The strategy they adopt may be the following. They give donations to the government officials so that the powers that be overlook their misdeeds and cooperate with their plans. With the onset of recession, the corporate borrowers begin to default on their loans taken from the PSBs on a very large scale giving the excuse of recession. The central bank initially allows the PSBs to hide quite a large part

$$I^{as} = \beta(N)\left[(1-\rho)(1-\theta(N))\left((1-c_w).\left(\frac{wlY}{P}+\frac{Br_0}{P}\right)\right)-\left\{I^0(\bar{r},e)-(1-\rho)\left[(1-c_c).\left(Y-\left(\frac{wlY}{P}+\frac{Br_0}{P}\right)\right)\right]\right\}\right] \tag{33}$$

of their NPAs. Then, when the hidden NPAs assume a substantial value, the central bank, to produce a dramatic impact, suddenly forces the PSBs to declare all their NPAs so that it can adopt punitive measures against the PSBs and, thereby, scare the savers away from the PSBs. People, therefore, shift their savings from the PSBs to the private banks. Those who do not have access to private banks shift their savings from the PSBs to currency. As we have already mentioned, they may also shift to domestic or foreign physical assets. However, for simplicity, we do not consider those cases here. Even if we had considered those cases, our results would have remained unaffected. From the above it follows that the stock of nonperforming assets of the PSBs rises on account of both recession (which makes many small and medium producers genuinely bankrupt) and donations given to government officials. We, therefore, make N an increasing function of both Y and D. Thus,

$$N = N(Y, D);\ N_Y < 0,\ N_D > 0 \tag{34}$$

Substituting (34) into (33) and adding I^0 to it, we get the planned aggregate investment demand of the economy. Denoting it by I, we write it as follows:

$$I(\bar{r}) = (1-\rho)\left((1-c_c).(1-t).\left(Y - \left[\frac{wlY}{P} + \frac{Br_0}{P}\right]\right)\right) + (1-\alpha)(1-\rho)\left((1-c_w).(1-t).\left(\frac{wlY}{P} + \frac{Br_0}{P}\right)\right) \tag{35}$$

Modifying (2) to accommodate the absence of government expenditure and taxes and zero import intensity of I^s and incorporating (12) and (14) into it, we write the BOP equilibrium condition in the present case as follows:

$$NX\left(p(Y), c_c.\left\{Y - \frac{wlY}{P(e,Y)} - \frac{Br_0}{P(e,Y)}\right\}, I^0(\bar{r}, e)\right) + \bar{K} = 0 \tag{36}$$

We can solve (36) for e as a function of Y, given the exogenous variables. We write it as follows:

$$e = e(Y) \tag{37}$$

Let us derive the value of $\frac{de}{dY}$. Taking total differential of (36) treating all variables other than *e* and *Y* as fixed and, then, solving for *de*, we get

$$\frac{de}{dY} = -\frac{NX_p(p_Y)+\left[(-NX_c)c_c\frac{wlY+Br_0}{p^2}(-P_Y)\right]-\left[(-NX_c)c_c\frac{wl}{P}\right]}{(-NX_{I^0})(-I_e^0)-(-NX_c)c_c\frac{wl+Br_0}{p^2}} < 0 \quad (38)$$

Let us explain (38). A ceteris paribus unit increase in *Y* produces two opposite effects on BOP. On the one hand, *P* falls. This raises real exchange rate and, thereby, brings about a very large increase in net export. This is given by $NX_p(p_Y)$. Again, the fall in *P* redistributes income from the capitalists to the workers. Hence, capitalists' consumption demand for imported consumption goods goes down raising net export. This is given by $\left[(-NX_c)c_c\frac{wlY+Br_0}{p^2}(-P_Y)\right]$. On the other hand, capitalists' income and, therefore, their demand for imported consumption goods goes up lowering net export by $\left[(-NX_c)c_c\frac{wl}{p}\right]$. Since, net export in India is likely to be highly price elastic, the expansionary effect on net export is likely to dominate the contractionary effect creating a BOP surplus at the initial equilibrium *e*. This is given by the absolute value of the numerator of the expression on the RHS of (38). To remove this BOP surplus, *e* falls. A unit decline in *e* produces two opposite effects on net export. It lowers net export by raising I^0. Per unit fall in *e* net export decreases by $(-NX_{I^0})(-I_e^o)$. On the other hand, the decrease in *P* that occurs per unit fall in *e* redistributes income from the capitalists to the workers reducing the demand for imported consumption goods. This raises net export by $(-NX_c)c_c\frac{wl+Br_0}{p^2}$. In the net, net export falls by the denominator of the expression on the RHS of (38). It has to be positive, that is, a fall in *e* has to lower net export, for reasons of stability. This explains (38).

Substituting (37) into (12), we get

$$P = P(e(Y), Y) \equiv \bar{P}(Y); \;\; \bar{P}^{/} < 0 \tag{39}$$

The sign of the derivative of (39) follows straightway from (38) and (12).

Eliminating from (1) government expenditure and taxes and substituting into it (39) and the net export function (36), we rewrite the goods market equilibrium condition in the present case as follows:

$$Y = c_w.\left(\frac{wlY}{\bar{P}(Y)} + \frac{Br_0}{\bar{P}(Y)}\right) + c_c.\left(Y - \left(\frac{wlY}{\bar{P}(Y)} + \frac{Br_0}{\bar{P}(Y)}\right)\right) + I^0(\bar{r}, e) + I^s(\bar{r}) + NX\left(p(Y), c_c.\left\{Y - \frac{wlY}{\bar{P}(Y)} - \frac{Br_0}{\bar{P}(Y)}\right\}, I^0(\bar{r}, e)\right) \tag{40}$$

Incorporating (35), (36), (37) and (39) into (40), we rewrite it as follows:

$$Y = c_w.\left(\frac{wlY}{\bar{P}(Y)} + \frac{Br_0}{\bar{P}(Y)}\right) + c_c.\left(Y - \left(\frac{wlY}{\bar{P}(Y)} + \frac{Br_0}{\bar{P}(Y)}\right)\right) + I^0(\bar{r}, e(Y)) + \beta(N(Y,D))\left[(1-\rho)\left(1 - \theta(N(Y,D))\right)\left((1-c_w).\left(\frac{wlY}{\bar{P}(Y)} + \frac{Br_0}{\bar{P}(Y)}\right)\right) - \left\{I^0(\bar{r}, e(Y)) - (1-\rho)\left[(1-c_c).\left(Y - \left(\frac{wlY}{\bar{P}(Y)} + \frac{Br_0}{\bar{P}(Y)}\right)\right)\right]\right\}\right] - \bar{K} \tag{41}$$

We are now in a position to examine the effect of an increase in D on Y. Taking total differential of (36) treating all exogenous variables other than D as fixed and, then, solving for dY, we get

$$dY = \frac{-\left[(-\beta_N)N_D L^{BS} + \beta.(1-\rho)\theta_N N_D S_w\right]}{1-\alpha} < 0 \tag{42}$$

In (42),

$$\alpha \equiv \left[C + \beta(1-\rho)\left\{(1-\theta)(1-c_w)\frac{wl}{p} + (1-c_c)\left(1 - \frac{wl}{p}\right)\right\} + \beta_N N_Y L^{BS} + \beta(1-\rho)\theta_N(-N_Y)S_W + (1-\beta)I_e^0 e_Y + \left(1-\beta(1-\rho)\right)(c_w - c_c)\left\{\frac{wlY + Br_0}{p^2}(-\bar{P}_Y)\right\}\right] \tag{43}$$

$$L^{BS} \equiv \left[(1-\rho)\left(1 - \theta(N(Y,D))\right)\left((1-c_w).\left(\frac{wlY}{P(e)} + \frac{Br_0}{P(e)}\right)\right) - \left\{I^0(\bar{r}, e(Y)) - (1-\rho)\left[(1-c_c).\left(Y - \left(\frac{wlY}{P(e)} + \frac{Br_0}{P(e)}\right)\right)\right]\right\}\right] \tag{44}$$

$$S_w \equiv (1-c_w).\left(\frac{wlY}{P(e)} + \frac{Br_0}{P(e)}\right) S_w \equiv (1-c_w).\left(\frac{wlY}{P(e)} + \frac{Br_0}{P(e)}\right) \tag{45}$$

Let us explain (42). Following an increase in *D* and the consequent rise in *N*, β goes down and the fraction of saving held in the form of currency also rises. For both these reasons, at the initial equilibrium (Y, e), the amount of loan given to the small and medium producers falls. Hence, their investment goes down. The numerator of the expression on the RHS of (42) gives the decline in investment demand of the small and medium producers at the initial equilibrium (Y, e). We denote it by dI^{so}. Thus, in the first round, *Y* will fall by $dY_1 = dI^{so}$. This fall in *Y* will reduce both workers' and capitalists' incomes. Their consumption demand will, therefore, fall by $C.dY_1$. Their saving will go down too. This will lower PSBs' lending to the small and medium producers. Hence, their investment demand will fall by $.(1-\rho)\left\{(1-\theta)(1-c_w)\frac{wl}{p}+(1-c_c)\left(1-\frac{wl}{p}\right)\right\}dY_1$. The fall in Y will raise the stock of nonperforming assets of banks. This will induce the banks to lower β. The savers will also hold a larger fraction of their saving in the form of currency. For both these reasons, banks' supply of new loans to the small and medium producers and, therefore, their investment will go down by $[\beta_N N_Y L^{BS} + \beta(1-\rho)\theta_N(-N_Y)S_W]dY_1$. Thus, the fall in Y, with e remaining unchanged, will reduce aggregate demand for domestic goods by

$$\Big[C + \beta(1-\rho)\left\{(1-\theta)(1-c_w)\frac{wl}{p}+(1-c_c)\left(1-\frac{wl}{p}\right)\right\} + \beta_N N_Y L^{BS} + \beta(1-\rho)\theta_N(-N_Y)S_W \Big]dY_1 \equiv \gamma dY_1$$

The fall in *Y* by dY_1 will, for reasons we have already explained, create a BOP deficit and *e* will rise by $-e_Y dY_1$. This will lower corporate investment by $I_e^0 e_Y dY_1$. The fall in corporate investment will enable the PSBs to raise their lending to small and medium producers by $\beta I_e^0 e_Y dY_1$. Hence, aggregate investment will fall by $(1-\beta)I_e^0 e_Y dY_1$. The fall in Y and the rise in *e* will also raise *P* bringing about a redistribution of

income from the workers to the capitalists. This will produce two opposite effects on aggregate demand. On the one hand aggregate consumption demand will fall by $(c_w - c_c)\frac{wlY+Br_0}{p^2}\overline{P}_Y dY$. On the other hand, aggregate saving will increase by the same amount. This will raise PSBs' lending to small and medium producers and their investment demand will go up by $\beta(1-\rho)(c_w - c_c)\frac{wlY+Br_0}{p^2}(-\overline{P}_Y)dY_1$. In the net, therefore, aggregate demand will fall by $(c_w - c_c)\left(1-\beta(1-\rho)\right)\left\{\frac{wlY+Br_0}{p^2}(-\overline{P}_Y)\right\}dY_1$ due to the rise in *P* by $(-\overline{P}_Y)dY_1$.Thus, aggregate demand for domestic goods will fall by αdY_1. In the second round, therefore, *Y* will go down by $dY_2 = \alpha dY_1$. Similarly, in the third round, *Y* will fall by $dY_3 = \alpha dY_2 = \alpha^2 dY_1$. This process of contraction will continue until the fall in demand that takes place in each successive round eventually falls to zero. Thus, the total decline in Y is given by

$$dY = dY_1 + \alpha dY_1 + \alpha^2 dY_1 + \cdots \ldots \ldots = \frac{dY_1}{1-\alpha} \tag{46}$$

This tallies with (42). The above analysis yields the following proposition:

Proposition 3 :

If being bribed by the capitalists, the government officials through the RBI force the public sector banks to disclose all the non-performing assets which they were initially allowed to hide, there will take place a very large and cumulative contraction in GDP causing immense suffering to the workers and small and medium producers.

Impact on PSBs

Let us now examine what happens to the PSBs following the donation induced rise in *N*. Substituting (39) and (34) into (27), we rewrite it as follows:

$$L^{sg} = (1-\rho)\left(1-\theta\left(N(Y,D)\right)-\bar{\theta}\left(N(Y,D)\right)\right)\left((1-c_w).\left(\frac{wlY}{P(Y)}+\frac{Br_0}{P(Y)}\right)\right) \tag{47}$$

Note that PSBs' profit and the price of their equities depend crucially on how much they are able to lend and their stock of nonperforming assets. Denoting PSBs' equity price by ϵ, we get

$$\epsilon = \epsilon(L^{sg}, N)\ ; \frac{\partial \epsilon}{\partial L^{sg}} > 0 \text{ and } \frac{\partial \epsilon}{\partial N} < 0 \tag{48}$$

In what follows, we will examine how L^{sg}, N and ϵ are affected following a given increase in D. Let us first focus on N. Taking total differential of (34) and substituting (42) into it, we get

$$dN = N_D dD + N_Y \left[\frac{-[(-\beta_N)N_D L^{BS} + \beta.(1-\rho)\theta_N N_D S_w]}{1-\alpha}\right] > 0 \tag{49}$$

From (49) it follows that both the increase in D and the very large fall in Y that it brings about will lead to a substantial increase in N.

Again, taking total differential of (47) treating all variables other than Y and D as fixed, we get

$$\begin{aligned} dL^{sg} = -(1-\rho)S_w(\theta_N + \bar{\theta}_N)\left[N_D dD + N_Y\left[\frac{-[(-\beta_N)N_D L^{BS} + \beta.(1-\rho)\theta_N N_D S_w]}{1-\alpha}\right]\right] \\ -(1-\rho)(1-\theta \\ -\bar{\theta})\left((1-c_w).\left(\frac{wl}{\bar{P}(Y)}\right.\right. \\ \left.\left.+\left(\frac{wl+Br_0}{P^2}\right)(-\bar{P}_Y)\right)\right)\left[\frac{[(-\beta_N)N_D L^{BS} + \beta.(1-\rho)\theta_N N_D S_w]}{1-\alpha}\right] < 0 \end{aligned} \tag{50}$$

Let us explain (50). Following a given increase in D by dD, and the consequent substantial fall in Y, L^{sg} falls for two reasons. First, the fraction of saving workers' hold in the form of currency and private banks' deposit rises by a large amount. Hence, PSBs' deposits fall drastically lowering L^{sg}. This is given by the first term on the RHS of (50). The decline in Y and the rise in P that it causes lowers workers' income and, thereby, their saving on a large scale. This also reduces L^{sg}. This is given by the second term on the RHS of (50).

From (48), (49) and (50) it is clear that, following a given increase in D, there will be a drastic decline in the equity price of the PSBs and the capitalists can buy them up at throwaway prices. We now summarize our finding below:

With the onset of a recession, the capitalists can adopt the following strategy for buying up the PSBs. By bribing the government officials they can willfully default on their PSB loans giving the excuse of recession and make the central bank allow the PSBs to hide a part of their non-performing assets and, when the hidden nonperforming assets assume a substantial volume, force the PSBs to declare their hidden non-performing assets. This will lead to a severe deepening of recession, the nonperforming assets of the PSBs will spiral and the PSBs' equity prices will crash. The government will, thereby, get an excuse to declare the PSBs inefficient and sell them off to the capitalists at throwaway prices. Even if the capitalists suffer losses due to the fall in Y, their losses are only temporary for very large long term gains that the acquisition of the PSBs will engender.

IV. Conclusion

After carefully studying the available evidences, we argue in this paper that the capitalists, who own and control India's corporate sector, devised a strategy to monopolize the banking sector, which is now dominated by the PSBs. They paid hefty donations to highly placed government officials and borrowed heavily in times of booms (covering the period 2003-04 – 2010-11) from the PSBs to set up specific production units. However, they overstated substantially the values of the specific firms that were set up and, thereby, borrowed much more than what was needed to set up the targeted firms. They illegally diverted the excess PSB loans from the creation of the targeted firms to the purchase of other domestic and foreign assets. We have shown here that, if a part of the PSB loans instead of being used to build the targeted firm is used to purchase foreign assets, there will take place a large contraction in GDP drastically reducing India's growth rate. This will heap immense suffering on the workers and small and medium producers. We assume that donations given by the capitalists to the highly placed government officials make this illegal diversion of PSB loans possible.

The strategy, as we have argued, did not end with the illegal diversion of funds. The capitalists ran the firms set up with the PSB loans for some years. Then, when the recession set in since 2011-12, declared their firms, which were pledged as collateral to the PSBs, bankrupt giving the excuse of recession . The PSBs took over the bankrupt firms. However, by selling them, they could recover only a small part of their dues. They had to write off the rest of the dues. To produce a dramatic effect on the public, the capitalists gave donations to the government officials to make the RBI adopt the following strategy. It initially allowed the PSBs to hide a large part of their nonperforming assets

(NPAs) and when the hidden NPAs assumed a substantial volume, tightened the norms for defining NPAs and forced the PSBs to suddenly declare their NPAs. As the NPAs of the PSBs increased steeply, the RBI adopted punitive measures against them and made such comments and observations that the people became very much apprehensive about losing their savings parked with the PSBs. Our analysis in this paper shows that in such a scenario, there will be a cumulative contraction in GDP, PSBs' business will contract sharply and their profit and equity prices will plummet precipitously. This will give the government an excuse to sell off the PSBs to the capitalists at throw away prices on grounds of efficiency.

The increase in NPAs in the PSBs cannot be attributed to their inefficiency relative to that of the Indian private banks. The reason may be briefly stated as follows: Datagiven in Tables 1 and 2 show that the stock of nonperforming assets as a percentage of total advances started rising in the PSBs since the onset of recession in 2011-12, even though domestic private banks remained free of this problem. This calls for an explanation. The recession caught Indian firms, PSBs and Indian private banks completely unawares. No national or international forecasting agencies such as the RBI or IMF made any prediction about the impending recession. The recession, as should normally be the case, led to an increase in the loan default rate. However, surprisingly, the increase in the default rate was confined to the PSB loans in the main. This cannot be explained on grounds of efficiency. Neither the PSBs nor the Indian private banks could predict the recession. They were equally inefficient in this respect. Since these two types of banks could not predict the recession, it was not possible for them to predict what form it would take, that is, how it would affect different sectors and firms of the economy. Therefore, it is not possible to attribute Indian private banks' success in withstanding the onslaught of recession to their efficiency relative to those of the PSBs. One should also note in this context that most of the banks and financial institutes of the US, which were all private, were either bankrupt or on the verge of bankruptcy following the collapse of the house price bubble in 2007. Moreover, in recent years, bank frauds are rising at an alarming rate and these frauds are, again, confined principally to the PSBs. Finally, the large increase in the stock of nonperforming assets of the PSBs is principally due to loan defaults by large or corporate borrowers. All this suggests that the plight of the PSBs is due to a conspiracy hatched by the capitalists to discredit them and, thereby, to take them over at throw away prices.

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Table 1

Non-Performing Asset in Absolute Terms and as Percentage of Total Advances in Four Bank-Groups

	GNPA(as % of total advances)			
Year	Scheduled	Public	Private	Foreign
1996	15.7	17.8	2.6	4.3
1997	14.4	16.0	3.5	6.4
1998	14.7	15.9	6.2	7.6
1999	12.7	14.0	4.1	7.0
2000	11.4	12.4	5.1	6.8
2001	10.4	11.1	8.9	5.4
2002	8.8	9.4	7.6	5.3
2003	7.2	7.8	5.0	4.6
2004	5.2	5.4	3.6	2.8
2005	3.3	3.6	1.7	1.9
2006	2.5	2.7	1.9	1.8
2007	2.3	2.2	2.5	1.8
2008	2.3	2.0	3.1	3.8
2009	2.4	2.2	2.9	4.3
2010	2.5	2.4	2.7	2.5

2011	3.1	3.3	2.2	2.8
2012	3.2	3.6	1.8	3.1
2013	3.8	4.4	1.8	3.9
2014	4.3	5.0	2.1	3.2
2015	7.5	9.3	2.8	4.2

Source:Database on Indian Economy, India

Table 2
Annual Growth Rate of GDP at Constant Prices

Year	Growth Rate Of GDP At Factor Prices (Base Year 2004-05)	Growth Rate of GVA at Basic Prices Base Year 2011-12 New Series
1990-91	5.3	
1991-92	1.4	
1992-93	5.4	
1993-94	5.7	
1994-95	6.4	
1995-96	7.3	
1996-97	8.0	
1997-98	4.3	
1998-99	6.7	
1999-00	8.0	
2000-01	4.1	
2001-02	5.4	
2002-03	3.9	

2003-04	8.0	
2004-05	7.1	
2005-06	9.5	
2006-07	9.6	
2007-08	9.3	
2008-09	6.7	
2009-10	8.6	
2010-11	8.9	
2011-12	6.7	
2012-13	4.5	5.4
2013-14	4.8	6.1
2014-15		7.2
2015-16		7.9
2016-17		6.6

Source: RBI

Table 3

Exchange Rate of the Indian Rupee vis-a-vis the US Dollar (Monthly average)

Year/ Month	**US $ Average**	**Year/ Month**	**US $ Average**	**Year/ Month**	**US $ Average**	**Year/ Month**	**US $ Average**
2008		**Oct**	**46.7211**	**Jul**	**44.4174**	**Apr**	**54.4971**
Jan	**39.3737**	**Nov**	**46.5673**	**Aug**	**45.2788**	**May**	**55.1156**

Feb	**39.7326**	**Dec**	**46.6288**	**Sep**	**47.6320**	**Jun**	**58.5059**
Mar	**40.3561**	**2010**		**Oct**	**49.2579**	**Jul**	**60.0412**
Apr	**40.0224**	**Jan**	**45.9598**	**Nov**	**50.8564**	**Aug**	**64.5517**
May	**42.1250**	**Feb**	**46.3279**	**Dec**	**52.6769**	**Sep**	**64.3885**
June	**42.8202**	**Mar**	**45.4965**	**2012**		**Oct**	**61.7563**
Jul	**42.8380**	**Apr**	**44.4995**	**Jan**	**51.3992**	**Nov**	**62.7221**
Aug	**42.9374**	**May**	**45.8115**	**Feb**	**49.1671**	**Dec**	**61.7793**
Sep	**45.5635**	**June**	**46.5670**	**Mar**	**50.3213**	**2014**	
Oct	**48.6555**	**Jul**	**46.8373**	**Apr**	**51.8029**	**Jan**	**62.1708**
Nov	**48.9994**	**Aug**	**46.5679**	**May**	**54.4735**	**Feb**	**62.3136**
Dec	**48.6345**	**Sep**	**46.0616**	**June**	**56.0302**	**Mar**	**61.0021**
2009		**Oct**	**46.7211**	**Jul**	**55.4948**	**Apr**	**60.3813**
Jan	**48.8338**	**Nov**	**46.5673**	**Aug**	**48.3350**	**May**	**59.3255**
Feb	**49.2611**	**Dec**	**46.6288**	**Sep**	**54.3353**	**June**	**59.7143**
Mar	**51.2287**	**2011**		**Oct**	**52.8917**	**Jul**	**60.0263**
Apr	**50.0619**	**Jan**	**45.3934**	**Nov**	**54.6845**	**Aug**	**60.9923**
May	**48.5330**	**Feb**	**45.4358**	**Dec**	**54.6439**		
June	**47.7714**	**Mar**	**44.9914**	**2013**			
Jul	**48.4783**	**Apr**	**44.3700**	**Jan**	**54.3084**		
Aug	**48.3350**	**May**	**44.9045**	**Feb**	**53.7265**		
Sep	**48.4389**	**June**	**44.8536**	**Mar**	**54.5754**		

Source: RBI

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Global Uncertainties and Fiscal Risks

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Abstract

Globally several central banks have begun monetary policy normalisation, by reducing their balance sheets by ending asset purchases and also through an "earlier than expected" hikes in policy rates. The Reserve Bank of India (RBI)in the Monetary Policy Committee (MPC) deliberations during February 8-10, 2022 has delayed normalisation procedure by maintaining a status quo policy rate at 4 per cent as they focus on growth recovery first (RBI, 2022). However, when inflation is rising, a slower policy tightening by the central bank could accelerate the de-anchoring of inflation expectations, further exacerbating stagflation (Roubini, 2022; Chakraborty, 2021). Given the mounting pressures of inflation, if central banks "bite the bullet and become hawkish" by hiking rates, the growth recovery process will be severely dampened. Given these constraints on monetary policy stance, can we rely on "fiscal dominance" to counter the adverse impacts on growth recovery of exogenous supply shocks? If the path to fiscal consolidation is through expenditure compression rather than increased tax buoyancy, the quality of fiscal consolidation gets affected (Chakraborty, 2021). High deficit has no fiscal costs if it can be substantiated with increased public investment or "output gap" reduction. The present paper addresses these ticklish issues in designing the appropriate mix of monetary and fiscal policies, particularly when climate change has affected the risks of macroeconomic consolidation and fiscal normalisation.

Key Words : Monetary Policy, Fiscal Risks, Union Budget,Financial Stability, Climate Change

JEL Classification Codes : E 52, E 63, O29.

I. Introduction

Globally several central banks have begun monetary policy normalisation, by reducing their balance sheets by ending asset purchases and also through an "earlier than expected" hikes in policy rates. The financial markets in emerging economies have turned volatile indicating strong capital flight, with mounting uncertainty on the potential rate hikes by US Federal Reserve. The Union Budget 2022 was presented in the Parliament prior to the mounting geopolitical risks of war in Ukraine. How these global macroeconomic uncertainties impact the fiscal arithmetic in India depend on the fiscal-monetary policy inter-

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face to respond to the crisis. The Omicron wave was also a reminder that ever-mutating coronavirus would continue as a determinant of macroeconomic uncertainties.

The Reserve Bank of India (RBI)in the Monetary Policy Committee (MPC) deliberations during February 8-10, 2022 has delayed normalisation procedure by maintaining a status quo policy rate at 4 per cent as they focus on growth recovery first (RBI, 2022). However, when inflation is rising, a slower policy tightening by the central bank could accelerate the de-anchoring of inflation expectations, further exacerbating stagflation (Roubini, 2022; Chakraborty, 2021). Given the mounting pressures of inflation, if central banks "bite the bullet and become hawkish" by hiking rates, the growth recovery process will be severely dampened. Given these constraints on monetary policy stance, can we rely on "fiscal dominance" to counter the adverse impacts on growth recovery of exogenous supply shocks? Globally, fiscal authorities have increasingly accommodated high fiscal deficits to support growth recovery, and servicing these debts will become much more expensive if there is hike in interest rates.

There is an increasing recognition for accommodative fiscal space in the times of pandemic crisis. The efficacy of "fiscal rules"—whether adhering to numeric threshold ratios of deficit is growth-enhancing- needs a recalibration in the times of pandemic . If the path to fiscal consolidation is through expenditure compression rather than increased tax buoyancy, the quality of fiscal consolidation gets affected (Chakraborty, 2021). High deficit has no fiscal costs if it can be substantiated with increased public investment or "output gap" reduction (Blanchard, 2019).

Climate change risks further accentuate the macroeconomic uncertainties. How well monetary policy stance can incorporate such risks and uncertainties, within the available toolkit, is questioned by many economists. There is a broad consensus among economists that fiscal policy is capable to deal with the climate crisis, and national budgets have become an important tool to addressclimate change commitments. The Union Budget 2022 has announced green bonds for the first time ever in India.

Against this backdrop, this paper analyses the global uncertainties and monetary-fiscal interface. The paper is organised into 5 sections. Section 1 analyses the global uncertainties and the monetary policy stance. Section 2 analyses the fiscal dominance and section 3 analyses the sectoral creditstimulus and financial stability. Section 4 analyses the monetary-fiscal interface of climate change commitments. Section 5 concludes.

II.The Global Uncertainties and theMonetary Policy Stance

The International Monetary Fund (IMF) revised global output and trade growth projections for 2022 downward to 4.4 per cent and 6.0 per cent from its earlier forecasts of

4.9 per cent and 6.7 per cent, respectively , in its January 2022 update of the World Economic Outlook. These revisions in global growth is due to the hardening of commodity prices and mounting inflationary pressures. The war in Ukraine will accentuate the global stagflationary recession when inflationary expectations are becoming unanchored and the massive negative supply shock in the global economy will reduce growth further (Roubini, 2022). The volatility in energy prices – the spike in oil prices to well above $100 per barrel; along with hardening of global commodity prices – will add to the uncertainties. Roubini (2022) highlighted that a deep stagflationary shock is also a nightmare scenario for central banks, which will be damned if they react, and damned if they don't.

Against the backdrop of mounting macroeconomic uncertainties, the real GDP growth for 2022-23 is projected by Monetary Policy Committee (MPC) at 7.8 per cent with Q1:2022-23 at 17.2 per cent; Q2 at 7.0 per cent; Q3 at 4.3 per cent; and Q4:2022-23 at 4.5 per cent (RBI, 2022). The thirty third meeting of the Monetary Policy Committee (MPC) - constituted under section 45ZB of the Reserve Bank of India Act, 1934 - was held from February 8 to 10, 2022. The MPC retained the status quo on repo rate at 4 percent. The reverse repo rate under the Liquidity Adjustment Facility (LAF) also remained at its status quo rate of 3.35 percent. There is no formal normalisation process yet, though the cut-off yield rate of variable reverse repo rate (VRRR) has risen to 3.99 per cent. The marginal standing facility (MSF) rate and the Bank Rate stood at 4.25 percent. The MPC had decided to retain the 'accommodative stance' to revive economic growth on a sustained manner and mitigate the impact of COVID-19 on the macro economy. These decisions are in consonance with the objective of achieving the medium-term target for consumer price index (CPI) inflation of 4 percent within a band of +/- 2 percent, while supporting the growth momentum.

The normalisation procedure for the monetary policy stance is crucial for the effective functioning of the term structure of interest. The term structure of interest rate refers to the link between short term and long term rates of interest. For instance, the call money market rates are below the repo rate in India. As per the RBI data published on March 4th 2022, the weighted average call money rate is 3.530 percent. The Treasury-Bill cut off price of 91days is 3.70 per cent. The Treasury Bill cut off price for 182 days and 364 days was 4.19 per cent and 4.52 per cent respectively, as per March 4th, 2022. On the long term rate of interest, the average yield on 10-year government bond increased to 6.76 percent in March 4th, 2022.

There is mounting pressure on RBI to increase the policy rates due to inflationary pressures and the instability in global financial markets (due to impending taper tantrums and the plausible rise in the policy rates by US Federal Reserve) which can trigger capital flight. In India, the foreign exchange reserves increased by US$ 55 billion in 2021-22 (up to February 4, 2022) to US$ 632 billion. Correspondingly, the reserve money (adjusted

for the first-round impact of the change in the cash reserve ratio) expanded by 8.4 per cent (y-o-y) on February 4, 2022. In 2022 February, the growth rate of reserve money was 13.7 per cent. The net Foreign Exchange Reserves (66.80 per cent) constitutes the major source of reserve money while the other components of the reserve money are the net RBI credit to government (34.77 per cent), and government's currency liabilities with the public (0.22 per cent) . The change in net RBI credit to the government to GDP is termed as seigniorage. In India, over the years, the seigniorage financing of deficit has been controlled due to inflationary pressures. In the next section, the levels and financing of deficit in India against the backdrop of Union Budget 2022 are discussed.

III. Fiscal Dominance : The Macro-fiscal Framework of Union Budget 2022-23

While monetary policy has limitations to trigger the economy, fiscal dominance is crucial for economic growth recovery. The Union Budget 2022-23 has predominantly focussed on the public infrastructure investment for the sustained growth recovery, through crowding-in of private corporate investment. The taxonomy of crowding out—real and financial—has been treated in detail in theoretical literature (Chakraborty, 2016). The *real* (direct) crowding out occurs when the increase in public investment displaces private capital formation broadly on a *dollar-for-dollar* basis, irrespective of the mode of financing the fiscal deficit. The *financial crowding out* is the phenomenon of partial loss of private capital formation, due to the increase in the interest rates emanating from the preemption of real and financial resources by the government through bond financing of fiscal deficit. The Finance Minister, from a position of strength, refuted these neoclassical arguments of crowding –out and she emphasized the significance of "crowding-in" effects of public investment on private corporate investment in the context of emerging economies like India. The empirical evidence also supports crowding –in rather than crowding-out effects of public investment in the context of India (Chakraborty, 2016; Vinod, Karun and Chakraborty, 2020). The mechanism through which public investment crowds-in private investment is through the multipliers related to capital infrastructure, and the Union Budget 2022-23 has given emphasis to this narrative.

In Union Budget 2022-23, the Government has increased the capital spending to a record high of 2.9 per cent of GDP. However, the fiscal deficit to GDP is 6.9 per cent in 2021-22 RE as compared to the pegged 6.8 per cent in 2021-22 BE. The fiscal deficit-GDP ratio was 9.2 per cent in 2020-21. High fiscal deficit-GDP ratio of 9.5 per cent of GDP in the RE of 2021-22 against the pegged 3.5 per cent in 2021-22 BE was announced against the backdrop of macroeconomic uncertainty due to covid-19 pandemic. However, an excessive deficit procedure roadmap has also been announced to bring down the fiscal deficit to GDP ratio to 4.5 per cent by financial year (FY) 2025-26. The revenue deficit GDP ratio is 3.8 per cent in 2022-23 BE, as against 4.7 per cent in 2021-22 RE (Table

1). In 2020-21 Actuals, revenue deficit to GDP ratio was 7.3 per cent. In the times of pandemic, the high revenue deficit is crucial for economic growth recovery. The "golden rule" of Fiscal Responsibility and Budget Management (FRBM) was to phase out the revenue deficit. However, this rule was eliminated in the 2018 Amendment of FRBM and the clauses relate to this is included in the Finance Bill of 2018. Making revenue deficit to zero in the time of pandemic is not feasible, as compression in revenue expenditure can affect economic recovery (Chakraborty, 2022).

Table 1: Levels of Deficit (Rs crores)

	2020-21 Actuals	2021-22 BE	2021-22 RE	2022-23 BE
1. Fiscal Deficit	1818291 (9.2)	1506812 (6.8)	1591089 (6.9)	1661196 (6.4)
2. Revenue Deficit	1449599 (7.3)	1140576 (5.1)	1088352 (4.7)	990241 (3.8)
3. Effective Revenue Deficit	1218734 (6.2)	921464 (4.1)	850667 (3.7)	672598 (2.6)
4. Primary Deficit	1138422 (5.8)	697111 (3.1)	777298 (3.3)	720545 (2.8)
Revenue Deficit to Fiscal Deficit Ratio (%)	**79.72**	**76.00**	**68.40**	**59.61**

Source: Government of India (2022), Union Budget documents

The revenue deficit to fiscal deficit ratio is 59.61 per cent in 2022-23 BE. This ratio was 79.72 per cent in 2021-22 Actuals (Table 1). The primary deficit, which is difference between fiscal deficit and interest payments, is pegged at 2.8 per cent in 2022-23 BE. The primary deficit to GDP has reduced from 5.8 per cent in 2021-22 (actuals) to 3.3 per cent in 2021-22 (RE). The primary deficit reflects the current fiscal policy stance of the government, without the legacy of past interest liabilities. The Union Budget 2022-23 needs to be co-read with the FRBM Act, which includes the statements of the macro-economic framework and medium term fiscal policy cum strategy to reduce the current general government debt to GDP of 90.6 per cent (Singh, 2022). However, the efficacy of "cyclically neutral fiscal deficit" needs to be threaded with caution, because if the fall in GDP is a permanent drop from the trend growth rather than atransient deviation, it is incorrect to assume that an upturn in business cycle can eliminate the cyclical part of deficit (Chakraborty, 2021).

The fiscal rules at the State level has been revised and borrowing limit of 4 per cent than the 3 per cent in the state FRBM with 0.5 per cent is efficiency parameter-linked to power sector reforms. In addition to this, a capital outlay of Rs one lakh crore is transferred to the States for strengthening their infrastructure development through state highways, Pradhan Mantri Gram Sadak Yojana and other related capital projects. This focus on infrastructure projects to the states is against the backdrop of State elections. However, the Union Budget 2022-23 has not engaged in populist policy announcements to incentivize the "calculus of consent" of voters.

A threshold-ratio of debt and deficit and the fiscal rules might prove detrimental in the time of pandemic as it constraints the fiscal space. High public debt has no fiscal costs if real rate of interest (.r) is not greater than real rate of growth (g) of economy. In the Union Budget 2022-23 BE, the fiscal deficit to GDP ratio is pegged to be 6.4 per cent. In the last Union Budget, budget transparency was given an emphasis, by incorporating a portion of off-budget borrowings – for instance, The Food Corporation of India's borrowings from the National Small Savings Fund (NSSF) was stopped. Therefore, the fiscal deficit of 9.2 per cent of GDP in 2021-22 was inclusive of budget transparency as well, along with new expenditure priorities. The sources of financing the fiscal deficit show that there is a deviation between BE and RE for the gross market borrowing in 2021-22, from Rs 9,74,708 crores to Rs 8,75,771 crores.

Table 2: Sources of Financing Fiscal Deficit (Rs crores)

	2020-21 Actuals	**2021-22 BE**	**2021-22 RE**	**2022-23 BE**	**Composition**			
1. Debt Receipts (Net)	**1825479**	**1435428**	**1416902**	**1660444**	**2020-21 Actuals**	**2021-22 BE**	**2021-22 RE**	**2022-23 BE**
2. Market Borrowings(G-sec +T Bills) Borrowings(G-sec +T Bills)	1239737	974708	875771	1158719	68.18	64.69	55.04	69.75
3. Securities against Small Savings	483733	391927	591524	425449	26.60	26.01	37.18	25.61

4. State Provident Funds	18514	20000	20000	20000	1.02	1.33	1.26	1.20
5. Other Receipts (Internal Debts and Public Account)	13314	54279	(-)90140	37025	0.73	3.60		2.23
6. External Debt	70181	1514	19746	19251	3.86	0.10	1.24	1.16
7. Draw Down of Cash Balance	(-)7187	71383	174187	752	-0.40	4.74	10.95	0.05
8. Grand Total (1+7)	**1818291**	**1506812**	**1591089**	**1661196**	100	100	100	100

Source: Government of India (2022), Union Budget documents

In the Union Budget 2022-23(BE), gross market borrowings is Rs 16,60,444 crores, around 69.75 per cent of total debt. There is a deviation between BE and RE for the securities against Small Savings in the year 2021-22, it has increased from Rs 3,91,524 crores (BE) to Rs 5,91,524 crores. The securities against Small Savings constitute 25.61 per cent of total debt in 2022-23 (BE) (Table 2). The State Provident Fund constitutes 1.20 per cent of total public debt in FY23. The deficit incurred through off-budget borrowings (OBB) through public sector enterprises is not the part of fiscal deficit; it can be captured better through the construction of "Public Sector Borrowing Requirement" (PSBR) data. The coverage of PSBR is the general government deficit plus borrowing through public sector enterprises. However, India has not yet constructed a time series on PSBR.

In the Union Budget 2021-22, in the revenue account, the revised estimates (RE) was higher than budget estimates (BE) for the tax and nontax revenue buoyancy. However, the non-debt creating capital receipts, particularly the disinvestment/privatisation proceeds, showed a fiscal slippage. With a disinvestment target of Rs 1.75 lakh crore, government has received only Rs 78,000 crores in 2021-22. In 2020-21, the proceeds from disinvestment was only Rs 37,897 crores as against the target of Rs 2.1 lakh crores.

In 2022-23 BE, government has provided very conservative estimate targeting only Rs 65,000 crores (Table 3).

Table 3: Union Budget 2022-23: Disaggregated Revenue and Expenditure

	2020-21 Actuals	2021-22 BE	2021-22 RE	2022-23 BE	(2021-22) RE/BE Ratio
1. Revenue Receipts	**1633920**	**1788424**	**2078936**	**2204422**	**1.16**
2. Tax Revenue (Net to Centre)	1426287	1545396	1765145	1934771	1.14
3. Non Tax Revenue	207633	243028	313791	269651	1.29
4. Capital Receipts	**1875916**	**1694812**	**1691064**	**1740487**	
5. Recovery of Loans	19729	13000	21975	14291	1.69
6. Other Receipts (Disinvestment/Privatisation proceeds)	37897	175000	78000	65000	0.45
7. Borrowings and Other Liabilities (fiscal deficit)	1818291	1506812	1591089	1661196	1.06
9. Total Expenditure (10+13)	**3509836**	**3483236**	**3770000**	**3944909**	**1.08**
10. On Revenue Expenditure, of which	3083519	2929000	3167289	3194663	1.08
11. Interest Payments	679869	809701	813791	940651	1.01
12. Grants in Aid for creation of capital assets	230865	219112	237685	317643	1.08
13. On Capital Expenditure	426317	554236	602711	750246	1.09
14. Effective Capital Expenditure (12+13)	**657182**	**773348**	**840396**	**1067889**	**1.09**
Interest Payments/Revenue Receipts	**41.61**	**45.27**	**39.14**	**42.67**	

Source: Government of India (2022), (Basic Data), Union Budget documents

The public expenditure is pegged at Rs 39 lakh crore in 2022-23 (BE) , which is higher than the 2021-22 (RE) at Rs 37 lakh crore. The revenue and capital expenditure constitute respectively 81 and 19 per cent of the total expenditure. The effective capital expenditure is inclusive of grants-in-aid for creation of capital assets within the revenue expenditure.

Over the years, the effective capital expenditure has increased from around Rs 6 lakh crore in 2020-21 (actuals) to around Rs 8 lakh crore in 2021-22 (RE), and it is pegged at around Rs 10 lakh crore in 2022-23 (BE). There is a huge deviation between BE and RE in both revenue and capital expenditure in India for the year 2021-22. The fiscal slippage in revenue expenditure in 2021-22 was from around Rs 29 lakh crore in BE to Rs 31 lakh crore in RE. The revenue and capital expenditure are pegged at a higher amount in 2022-23 (BE) than 2021-22 (RE).The interest payments as per cent of revenue receipts is as high as 42.67 per cent in 2022-23 (BE) is a matter of concern.

There is an increasing recognition of the fact that public investment has suffered from fiscal consolidation when the national and subnational governments have over-adjusted to the fiscal rules by capital expenditure compression (Chakraborty, 2021). Therefore, the emphasis on the public infrastructure investment in the Union Budget 2022-23 is crucial for strengthening the gross capital formation. This is especially when the credit infusion, the predominant component of economic stimulus package has limited impact. The next section deals with the analysis of credit stimulus and the financial stability.

IV. Analysing the Financial Stability

Credit infusion into the economy has been the predominant narrative of pandemic economic stimulus programmes in India. The RBI has done a heavy-lifting to support the economic growth recovery through liquidity infusion strategies. The Operation Twist – simultaneous buying (long term) and selling (short term) of bonds has led to elongation of maturity structure of bond markets, by postponing the refinancing risks to engage in economic growth revival process. The RBI has also engaged in targeted repo operations to provide liquidity to the stressed sectors of the economy. Has the credit infusion into the economy been an effective strategy for economic recovery? Stiglitz and Rasheed (2020) highlighted in their paper titled “Which Economic Stimulus Works?” that the credit-related economic stimulus has limited multiplier effects. It is also cautioned that the credit infusion might also lead to mounting non-performing assets if there is no corresponding growth of credit growth in the economy.

The data on credit deployment for the month of January 2022 was published by RBI (collected from select 39 scheduled commercial banks, accounting for about 92 per cent of the total non-food credit deployed by all scheduled commercial banks) on February 28th 2022 showed that the non-food bank credit growth stood at 8.3 percent in January 2022 as compared to 5.9 percent in January 2021, on a year-on-year (YoY) basis (Table4).

Table 4: Sectoral Deployment of Bank Credit , January 2022

Sector	Outstanding as on (Rs crores)	Variation (Year-on-Year)		Composition
	28.Jan2022	29.Jan,2021 / 31.Jan,2020	28.Jan,2022 / 29.Jan,2021	28.Jan,2022
		%	%	
I. Gross Bank Credit (II + III)	**11582442**	**5.9**	**8.2**	
II. Food Credit	**82390**	**10.4**	**-5.4**	**0.7**
III. Non-food Credit	**11500052**	**5.9**	**8.3**	**99.3**
				0.0
1. Agriculture and Allied Activities	**1432743**	**8.5**	**10.4**	**12.4**
2. Industry (Micro and Small, Medium and Large)	**3046833**	**0.7**	**6.4**	**26.3**
2.1. Micro and Small	464420	0.5	19.7	4.0
2.2. Medium	223376	21.8	74.7	1.9
2.3. Large	2359037	-0.2	0.5	20.4
3. **Services**	**2904619**	**8.1**	**7.3**	**25.1**
4. **Personal Loans**	**3180477**	**8.7**	**11.6**	**27.5**
5. **Priority Sector (Memo)**	**4345054**			**37.5**

Source : RBI (2022): Sectoral Deployment of Bank Credit – January 2022 , published on February 28, 2022.

The composition of outstanding credit showed that credit deployment to agriculture (12.4 per cent) was relatively smaller than the credit to industrial sector (26.3 per cent) and service sector (25.1 per cent) as per the outstanding credit figures in January 2022. The large industries received 20.4 per cent of total credit deployment, while micro industries and medium industries received 4 per cent and 1.9 per cent of total credit. The personal loans constitute 27.5 per cent of total credit deployment , where housing loan constitute (13.4 per cent of total credit deployment) the major component. The non-food credit at the aggregate level constitutes 99.3 per cent of total credit deployment. The broad infer-

ence from the credit deployment statistics from RBI is an uneven access to credit when large industries accessed credit significantly higher than the small and medium industries.

The credit growth to agriculture and allied activities grew to 10.4 percent in January 2022 as compared to 8.5 percent in January 2021. The credit to industry improved to 6.4 per cent in January 2022 from 0.7 per cent in January 2021. The credit growth to services sector registered 7.3 per cent in January 2022 as compared to 8.1 per cent in January 2021. Within the service sector, the credit growth is registered in 'NBFCs', 'transport operators' and 'tourism, hotels and restaurants'. The "Personal loans" has noted a robust growth rate by 11.6 per cent in January 2022 from 8.7 per cent in January 2021.

The priority lending is given as memo in credit deployment statistics, which constitute around 40 per cent. Within the priority lending, agriculture, micro and small enterprises, medium enterprise, housing, educational loans, renewable energy, social infrastructure, export credit and credit to weaker sections are included (Table 5).

Table 5: Priority Sector Lending, as on January 2022

Sector		Variation (Year-on-Year)		Composition
	28.Jan,2022	29.Jan,2021 / 31.Jan,2020	28.Jan,2022 / 29.Jan,2021	28.Jan,2022
	(Rs crores)	%	%	
Priority Sector	4345054			37.5
Agriculture and Allied Activities	1354691	8.9	8.2	11.7
Micro and Small Enterprises	1244132	6.8	4.8	10.7
Medium Enterprises	275363	42.2	42.1	2.4
Housing	480738	1.8	-1.6	4.2
Educational Loans	46303	-6.4	-7.2	0.4
Renewable Energy	1965	48.5	42.7	0.0
Social Infrastructure	2447	99.8	-0.9	0.0
Export Credit	24418	5.3	22.4	0.2

Others	39788	-8.3	115.4	0.3
Weaker Sections including net PSLC- SF/ MF	875210	6.1	6.9	7.6

Source : RBI (2022): Sectoral Deployment of Bank Credit – January 2022 , published on February 28, 2022.

The Financial Stability Report published by RBI in December 2021 showed that macro stress tests for credit risk indicate that the gross non-performing asset (GNPA) ratio of Scheduled Commercial Banks may increase from 6.9 per cent in September 2021 to 8.1 per cent by September 2022 under the baseline scenario and to 9.5 per cent under a severe stress scenario. The Report further clarified that the scheduled commercial banks would, however, have sufficient capital, both at the aggregate and individual levels, even under stress conditions . The capital to risk-weighted assets ratio (CRAR) of scheduled commercial banks (SCBs) rose to a new peak of 16.6 per cent in September 2021. As per Basel III stipulated the norm of CRAR at 8 per cent. CRAR is also called Capital Adequacy Ratio (CAR) , which is bank's capital by its risk-weighted assets. The provisioning coverage ratio (PCR) (the percentage of funds that a bank sets aside for losses due to bad debts) was 68.1 per cent in September 2021.

V. Analysing monetary – fiscal policy responses to climate change

Green bond announced in Union Budget 2022-23 reflects India's commitment to decarbonisation against the backdrop of Glasgow deliberations. Green bond is an onshore rupee denominated sovereign bond. This is a debt-instrument is to strengthen green infrastructure projects. The sovereign green bonds will be the part of government's gross market borrowing in 2022-23. Integratingclimate change criterion in fiscal policy in India has not begun with green bonds announcement this year. India was the first ever to integrate climate change criterion in the inter-governmental fiscal transfers in 2014. The green bond is a policy strategy to finance "just transition" towards a sustainable climate-resilient economy. The Fourteenth Finance Commission was the first ever in the world to integrate climate change criteria in the intergovernmental fiscal transfers. This was when the 14th FC integrated climate change as one of the criteria to determine the intergovernmental fiscal transfers to the 29 states. The Fifteenth FC has retained the criterion.

On the monetary policy front, integrating climate change is a matter of debate. Economists have highlighted that monetary policy does not have sufficient toolkits to integrate climate change criterion. Hansen (2021) analysed the ways to examine the toolkits of central bank policy to combat climate change and warned that "*hastily devised*

policy rules unsupported by empirically grounded quantitative modelling could backfire if or when climate policy targets are missed, harming reputations of central banks and weakening their ability to act in the future on a variety of fronts; and could compromise central bank independence in the longer run". Hansen (2021) also highlighted that "*climate change mitigation targets added to currently well-defined mandates may generate excessive expectations and unwarranted confidence in the abilities of central banks to address this important social and economic problem while diverting the attention away from fiscal policy*".

Hansen (2021) explained the significance of modeling systemic risk and climate change in support of rules-based policy for financial stability; and how to quantify the exposure of financial institutions and businesses that receive their loans to uncertain climate change. The climate-focused stress test conducted by the Central Banks is an upcoming policy tool to address long term possibilities of climate change and slanting central bank portfolios towards green technologies. Such green stress test is to assess how the banking system is exposed to climate risks and uncertainties. Such test was first conducted by the Bank of England. Christine Lagarde of the European Central Bank (ECB) is very supportive of greening monetary policy and the ECB will conduct such tests of risk exposure of top banks in European Commission in 2022. The US Federal Reserve Chair Jay Powell also explained that the Fed has asked the lenders to articulate their risk exposure and how they can mitigate such risks. The Reserve Bank of India has published a chapter on greening monetary policy, however there is no further communication of toolkits.

Raghuram Rajan, former RBI Governor, mentioned that central banks should turn their focus to the financial stability of the green investments instead of asking whether to buy only green bonds, not brown bonds, which is primarily "fiscal" decisions. The broad consensus is that central banks should focus on price stability and financial stability. However, this can be refuted by the concern that climate change is a crucial determinant of financial stability and it is significant to integrate such climate related risks and uncertainties in financing investment decisions (Chakraborty, 2021a). In general, economists are apprehensive about the efficacy of central banks in dichotomizing green bonds and brown bonds in their asset portfolio and moving towards a low carbon-emission enterprise.

Within the environmental federalism frameworks, the "principle of subsidiarity" demands that the responsibility for providing a particular service should be assigned to the level of government closest to the people. Chakraborty (2021a) argued that this unconditional tax transfer through Finance Commissions is to compensate for the cost disabilities of the subnational governments for revenue foregone and other opportunity costs of protected areas in their path towards economic growth. However, ecological fiscal transfer is only one among many fiscal policy tools to ensure the climate change commitments.

In addition to these fiscal transfers, the long term Public Financial Management (PFM) tool like climate responsive budgeting at national and subnational levels is crucial to address climate change commitments. This PFM tool links national climate action plans to budgetary commitments. The roadmap and the analytical matrices to prepare climate responsive budgeting can also eliminate the "fragmented approach" by line ministries towards adaptation and mitigation in India (Chakraborty, 2021a). However, differential tax rates can lead to "race to the bottom" to attract mobile capital and create 'pollution havens" through trading lower environmental quality for more mobile capital. The recent initiative of green bonds is a leading example of thematic bond financing, by earmarking the sovereign bonds to a specific objective. This might open an earmarking of bond financing towards human development as well in future , in addition to climate financing.

VI.Conclusion

Given the constraints on monetary policy stance to exogenous supply shocks which are growth-dampening, relying on "fiscal dominance" is crucial for sustainable economic recovery. Globally, an accommodative fiscal stance has been maintained with high fiscal deficits to support growth recovery. In India, the Union Budget 2022-23 has emphasised on "crowding-in" effects of public infrastructure investment on private investment . The efficacy of rules-based macroeconomic framework – both monetary and fiscal – needs to be recalibrated to support economic growth, as fiscal conservatism can adversely affect growth process and accentuate macroeconomic uncertainties. The credit related stimulus has limited multiplier effects and also lead to financial instability, if the liquidity infusion is not adequately followed by the credit growth in the economy. Climate change risks and uncertainties affect sustainable growth process and there is an increasing recognition to integrate climate change commitments in fiscal and monetary policies. However, the monetary policy toolkit is often viewed as inadequate to deal with climate change commitments. There is a broad consensus among economists that fiscal policy is capable to deal with the climate crisis, and national budget is an important tool for National Adaptation Communication. The financing of climate change through sovereign rupee denominated green bonds – earmarked within the gross market borrowing programme for green infrastructure – is a right step towards making fiscal policies green in future.

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Relationship between GDP Growth, Inflation and Unemployment: Some Econometric Evidence from Post-Reform India

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Abstract

This study aims to examine the dynamic causal relationship between GDP growth, unemployment, and inflation. We have taken time series data for the period 1991 to 2020. ADF test suggests that the variables are integrated at different levels. Hence, to investigate the long-run relationship among the variables under consideration we have adopted anARDL Bounds Cointegration Test. We have also tried to identify the direction of causality among the variables. An autoregressive distributed lag (ARDL), as well as the long-run error correction model (ECM), has been adopted to find out the short-run dynamic along with the long-run equilibrium. Results indicate a stable long-run relationship between the unemployment rate, inflation rate, and growth rate when we have considered unemployment rate and growth rate as dependent variables.This confirms the existence of the long-run relationship among the variables of these two models. However, model 3, where inflation is considered as the dependent variable, does not indicate any cointegration among these variables and confirms that no long-run relation exists among the variables. In model 1, there is causality from the first lag of GDP to unemployment and the first lag of unemployment to the current unemployment rate. There is no causality between Inflation and unemployment. In the second model, the significant short-run coefficient of the inflation rate indicates that inflation has a significant causal effect on GDP growth in the short run. There is no causality between unemployment and GDP growth rate. The third model shows no long-run relationship among the variables and reveals that in the short run percentage change of the first lag of inflation is associated with an increase in the inflation rate. Percentage change in the current period unemployment rate indicates a positive relationship with inflation, whereas, the percentage change in the first lag of unemployment is inversely related to the inflation rate at a 10% level of significance. GDP growth rate has no significant impact on the inflation rate. These results have important policy implications.

Keywords:*GDP Growth Rate, Inflation Rate, Unemployment Rate, ARDL Bounds Test, Error Correction Model*

JEL Classification:E01,E24, E31,

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I. INTRODUCTION

The 1991 reform, which brought radical changes in India's macroeconomic policies, is often credited and applauded for the high economic growth. But even in high growth years, the Indian economy is failing to generate substantial livelihoods for the masses. Economists termed this phenomenon as 'jobless'growth. Even after thirty years of reform, India still belongs to the category of a poverty-stricken, middle-income country. The country, has not yet, recovered from the problem of unemployment, inflation, and rising income inequality. Approximately, sixty per cent of the total population is still dependent on agriculture. Unorganized sector employment has increased at the expense of the organized sector. The dual nature of the economy is still prevalent. Given such circumstances, an exhaustive evaluation of the country's macroeconomic policies in the post-reform period is needed. Huge unemployment and a high rate of inflation are a major cause of concern even today. The situation becomes worse after the pandemic situation. This study aims to examine the relationship between GDP growth, unemployment, and inflation.

The nature of the relationship among these variables plays a critical role while formulating policies. The theory predicts an inverse relationship between growth rate and unemployment. High GDP growth leads to a fall in the unemployment rate (Okun's Law). Similarly, the Phillips Curve approach predicts the inverse relationship between inflation and unemployment. The nature of the relationship, however, exists only in the short run. Moreover, a high rate of inflation may have a negative impact on GDP growth as well. On the other hand, a higher GDP growth rate may cause an increase in the general price level. For example, if the government made an attempt to reduce unemployment, it must adopt some expansionary policies, which will lead to an increase in total demand. With a given aggregate supply this may cause an increase in the general price level. Thus, there is a kind of endogeneity problem among these three variables. We have tried to look at these relationships in terms of causality.

Using the data from 1991 to 2020, this paper examines the dynamic causal relationships between economic growth, inflation, and unemployment in India by applying the ARDL (Autoregressive Distributive Lag) bounds testing approach to cointegration, proposed by Pesaran et. al. (2001). We have tried to investigate whether there is a level long-run relationship between these three variables.

The present paper has been structured in the following way. After an introduction, in section 2, we will go through the available pieces of literature. Section 3 and 4 will state the data source and methodology adopted in the paper. Chapter 5 presents the graphical study. The sixth section empirically estimates the model and reports the important findings. Section 7 will conclude the study.

II. LITERATURE REVIEW

Unemployment, inflation, and GDP growth rate are the most important macroeconomic variable which reflects countries' economic performance. The nature of the relationship among these variables is extremely important to identify while formulating economic policies. These variables are closely knitted. Various studies have tried to find out the true causes of unemployment. Phillips A. W. (1958) observed a negative relationship between the unemployment rate and inflation in the short run. Hence the Phillips curve is in the short run happens to be a declining curve. However, it has been observed by economists that in the long run, the relation between unemployment and inflation does not exist. Phillips curve in the long run is basically vertical. Popovic (2009) conducted research on inflation and unemployment in the EU and concluded that the relation between unemployment and inflation is moderate and inverse. Lui (2009) described that there is a relationship between inflation and unemployment that give either positive or negative results which depend on goods and labour market availability. It has also been found that a higher rate of inflation increases workers' incentives to work and generates a negative effect on unemployment as compared to inflation lowers.

It has been often argued that continuous improvement in GDP not only exerts a positive effect on countries' employment rate (thus negatively related to unemployment) but also is the surest way to reduce inflation. Growth in GDP ensures the adequate supply of goods and services in the economy and thereby restricts the rise in the general price level. Hassan and Nassar (2015) have identified that the unemployment rate is negatively affected by economic growth. Balan (2014) concluded that there is a statistically significant negative effect of GDP on unemployment and the effect of net average wage on youth unemployment is positive. Bakere (2012) found that the nexus between inflation, unemployment and economic growth in Nigeria were negative. Rfindadi (2012) found a negative non-linear relationship between output and employment. Gil-Alana (2010) studied unemployment and GDP of the USA, UK and Japan. It has been found that there is a negative effect of unemployment on GDP in the case of the USA and UK and while in the case of Japan it is not statistically significant. Aminu and Anono (2012), using Granger causality, ARCH and GARCH techniques, have established negative relation between unemployment and inflation and no causation between unemployment and inflation. They also investigated the effect of inflation on economic growth and found positive correlation between these two variables. However, the result revealed that the coefficient of inflation is statistically insignificant. Causation runs from GDP to inflation implying that inflation does not Granger cause GDP but GDP does. Fakhri (2011) conducted research on the relationship between inflation and economic growth in Azerbaijan and found that there is a nonlinear relationship between inflation and economic growth. Umar and Zubairu (2012)have found a negative effect of inflation on economic growth. Chang-

Shuai Li and ZI-Juan Liu (2012) conducted a study on the relationship among Chinese unemployment rate, economic growth and inflation. They used the Granger causality test, VAR and VEC model. Their study revealed that unemployment impacted negatively on growth, while inflation impacted positively on growth. The study revealed no causation between unemployment and inflation but found causation between unemployment and growth. Two-way causation has been found between inflation and growth. Thus, from the above analysis, we can conclude that though a bunch of studies have made an attempt to detect the relation between inflation, unemployment, and GDP growth they end up with varied results. This calls for further research. The present study, thus, intends to examine what type of relationship exists between unemployment, inflation and GDP growth. Specifically, our objective is to find out the dynamic causal relationship between unemployment, Growth and inflation.We have applied the Bounds testing ARDL approach to cointegration in this context.

III. Data Source

The entire analysis is based on secondary data, and the data are collected from different official sources like the Reserve Bank of India, World Development Indicator (World Bank Data Base), and various issues of economic Survey. We have dealt with the time-series data. The period of the analysis is 1990-1991 to 2019-2020. We have considered an increase in real GDP as the proxy for economic growth. Unemployment refers to the share of the labour force that is without work but available for and seeking employment. The unemployment rate has been measured as the rate of the unemployed labour force in relation to the total labour force in the country. Inflation is captured as a percentage change in the consumer price index.

IV. Model Specification and Methodology

In order to empirically analyse the long-run relationships and short-run dynamic interactions among the variables of interest (unemployment rate, inflation and economic growth), we have adopted the bound testing autoregressive distributed lag (ARDL) cointegration technique. The Bounds testing ARDL approach to cointegration has three advantages in comparison with other previous and traditional cointegration methods like the Johansen Cointegration test. The first one is that the ARDL does not need that all the variables under study must be integrated of the same order. It can be applied when the underlying variables are integrated of order one or zero, i.e. I(1) or I(0). However, we cannot apply this technique if the variables are I(2), in order to avoid the possibility of spurious results. In the presence of variables integrated of order two, we cannot interpret the values of F statistics provided by Pesaran et al. (2001). The second advantage is that the ARDL model is relatively more efficient in the case of small and finite sample data size. By applying the ARDL technique, unbiased long-run estimates are obtained (Harris

and Sollis, 2003). Moreover, the ARDL model uses a combination of endogenous and exogenous variables, unlike a VAR model that is strictly for endogenous variables.
The ARDL(p, q) model can be specified as

$$Y_t = \beta_0 Y_t = \beta_0 + \sum_{i=1}^{p} \lambda_i Y_{t-i} + \sum_{i=0}^{q} \delta_i X_{t-i} + \varepsilon_t \ldots\ldots\ldots\ldots\ldots\ldots \quad (1)$$

Where, β, δ are coefficients

γ is the intercept parameter

ε_{jt}: error term

j=1,………k

p, q are optimal lag orders

p lags used for dependent variables and q lags used for the exogenous variables.

ARDL Bounds Test model can be expressed as

$$\Delta Y_t = \beta_0 + \sum_{i=1}^{p} \lambda_i \Delta Y_{t-i} + \sum_{i=o}^{q} \delta_i \Delta X_{t-i} + \phi_1 Y_{t-1} + \phi_2 X_{t-1} + \varepsilon_t \ldots\ldots\ldots\ldots\ldots \quad (2)$$

Where, ARDL short run terms: $\sum_{i=1}^{p} \lambda_i \Delta Y_{t-i} + \sum_{i=o}^{q} \delta_i \Delta X_{t-i}$

ARDL long run terms: $\phi_1 Y_{t-1} + \phi_2 X_{t-1}$

ε_t: Error term

ARDL short run coefficients: λ_i , δ_i

Error correction long run coefficients: ϕ_1, ϕ_2

ε_{jt}: error term

In contrast, Error Correction Model (ECM) can be expressed as

$$\Delta Y_t = \beta_0 + \sum_{i=1}^{p} \lambda_i \Delta Y_{t-i} + \sum_{i=o}^{q} \delta_i \Delta X_{t-i} + \phi Z_{t-1} + \varepsilon_t \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots (3)$$

Where, Z_{t-1} is error correction term.

With three variables, the model can be written as

$$\Delta Y_t = \beta_0 + \sum_{i=1}^{p} \lambda_i \Delta Y_{t-i} + \sum_{i=o}^{q_1} \delta_{1i} \Delta X_{1,t-i} \sum_{i=o}^{q_2} \delta_{2i} \Delta X_{2,t-i} + \phi_1 Y_{t-1} + \phi_2 X_{1,t-1} + \phi_3 X_{2,t-1} + \varepsilon_t \quad \ldots.(4)$$

As we are dealing with time-series data, first we should test the stationarity of the variables. All variables have been taken in their natural logarithms to avoid the problem of the non-linearity of parameters (log(unemployment) = lgunep, log(gdp)= lggdp, log (inflation) = lginf). STATA software has been used to carry out the econometric analysis.

To check stationarity, we have applied ADF test (Augmented Dicky Fuller test) and the Phillips-Perron test. ADF tests the null hypothesis that a time series sample contains a unit root against the alternative hypothesis that a time series sample does not contain a unit root. In general, a p-value of less than 5% means we can reject the null hypothesis at 5% significant level. We can also compare DF statistics with a tabulated critical value. If the DF statistic is more negative than the table value, we can reject the null hypothesis. The result of the stationarity tests shows that **lngdp**is stationary at level. This is shown in Table 1.

Table 1: dfullerlggdp, lags(1)

Augmented Dickey-Fuller test for unit root **Number of obs = 27**

Interpolated Dickey-Fuller

	Test Statistic	1% Critical Value	5%Critical Value	10%Critical Value
Z(t)	-4.103	-3.736	-2.994	-2.628

MacKinnon approximate p-value for Z(t) = 0.0010

Other two variables, **lnunemp**and **loginf**are stationary at level one, I(1).

Table 2:dfuller lginf_d1, lags(1)

Augmented Dickey-Fuller test for unit root **Number of obs = 26**

Interpolated Dickey-Fuller

	Test Statistic	1% Critical Value	5%Critical Value	10%Critical Value
Z(t)	-4.414	-3.743	-2.997	-2.629

MacKinnon approximate p-value for Z(t) = 0.0003

Table 3:dfuller lgunep_d1, lags(1)

Augmented Dickey-Fuller test for unit root Number of obs = 26

Interpolated Dickey-Fuller

	Test Statistic	1% Critical Value	5%Critical Value	10%Critical Value
Z(t)	-3.311	-3.743	-2.997	-2.629

MacKinnon approximate p-value for Z(t) = 0.0144

The ARDL bounds test is based on the assumption that the variables are I(0) and I(1). In the present study variables are integrated of different orders, having a combination of I(0) and I(1) series. Moreover, we have small and finite sample size (30 observations). Hence ARDL bounds test is the appropriate technique of cointegration in this context. Next our tusk is to choose the optimum lag structure for the model. We have used **Akaike information criteria** (AIC).From Table 4, we can conclude that the optimum lag for this model is 1.

Table 4: Selection-order criteria
Sample: 1993 - 2019 Number of obs = 27

lag	LL	LR	df 5%Critical Value	p 10%Critical Value	FPE	AIC	HQIC	SBIC
0	40.619				.000012	-2.78659	-2.74378	-2.64261
1	82.5514	83.865*	9	0.000	1.1e-06*	-5.22603*	-5.05478*	-4.6501*
2	88.1848	11.267	9	0.258	1.4e-06	-4.97666	-4.67696	-3.96878

Endogenous: lguneplggdplginf
Exogenous: _cons

Since we have three variables there will be three cointegrating equations to examine. To perform the bounds test for cointegration, the conditional ARDL(p, q_1, q_2) model with 3 variables can be expressed in the following way.

$$\Delta lgunep_t=\beta_0+$$
$$\sum_{i=1}^{p}\lambda_i\ \Delta lgunep_{t-i}+\sum_{i=o}^{q_1}\delta_{1i}\ \Delta lggdp_{t-i}\sum_{i=o}^{q_2}\delta_{2i}\ \Delta lginf_{t-i}+\phi_1 lgunep_{t-1}+$$
$$\phi_2 lggdp_{t-1}+\phi_3 lginf_{t-1}+\varepsilon_{1t} \quad \ldots\ldots(5)$$

$$\Delta lggdp_t=\beta_0+$$
$$\sum_{i=1}^{p}\lambda_i\ \Delta lggdp_{t-i}+\sum_{i=o}^{q_1}\delta_{1i}\ \Delta lgunep_{t-i}\sum_{i=o}^{q_2}\delta_{2i}\ \Delta lginf_{t-i}+\phi_1 lggdp_{t-1}+$$
$$\phi_2 lgunep_{t-1}+\phi_3 lginf_{t-1}+\varepsilon_{2t} \quad \ldots\ldots(6)$$

$$\Delta lginf_t=\beta_0+$$
$$\sum_{i=1}^{p}\lambda_i\ \Delta lginf_{t-i}+\sum_{i=o}^{q_1}\delta_{1i}\ \Delta lggdp_{t-i}\sum_{i=o}^{q_2}\delta_{2i}\ \Delta lgunep_{t-i}+\phi_1 lginf_{t-1}$$
$$+\phi_3 lgunep_{t-1}+\varepsilon_{1t} \quad \ldots\ldots(7)$$

All variables have their usual meaning as we have mentioned above.

The Bounds test is mainly based on the joint F-statistics under the null hypothesis of no integration. The first step in the ARDL Bounds approach is to estimate the three equations by OLS (Ordinary Least Square) technique. The estimation of three equations tests for the existence of a long run relationship among the variables by conducting an F-test for the joint significance of the coefficients of the lagged levels of the variables. We compute the F-statistics to trace the presence of cointegration restricting the coefficients of the lagged level variables equal to zero.

$H_0: \phi_1 = \phi_2 = \phi_3 = 0$

$H_1: \phi_1 \neq \phi_2 \neq \phi_3 \neq 0$

Two sets of critical values for a given significance level can be determined (Pesaran et. al. 2001). The first level is calculated on the assumption that all variables included in the ARDL model are integrated of order zero, while the second one is calculated on the assumption that the variables are integrated of order one. The null hypothesis of no

cointegration is rejected when the value of the test statistics exceeds the critical value of the upper bounds, I (1). It is accepted if the F-statistics is lower than the critical value of the lower bounds, I (0). Otherwise, the cointegration test is inconclusive, i.e. if the F statistics falls between the lower bound I(0) and upper bound I(1), the test is considered inconclusive.If there is cointegration, we have to estimate the long run model or the error correction model (ECM). If there is no integration, we have to estimate short run model or simply the ARDL (p, q_1, q_2) model.

If no-cointegration, the ARDL (p, q_1, q_2) model can be specified as

$$\Delta Y_t = \beta_0 + \sum_{i=1}^{p} \lambda_i \Delta Y_{t-i} + \sum_{i=o}^{q_1} \delta_{1i} \Delta X_{1,t-i} \sum_{i=o}^{q_2} \delta_{2i} \Delta X_{2,t-i} + \varepsilon_t$$

If there is cointegration, the ECM model is relevant which can be specified as follows

$$\Delta Y_t = \beta_0 + \sum_{i=1}^{p} \lambda_i \Delta Y_{t-i} + \sum_{i=o}^{q_1} \delta_{1i} \Delta X_{1,t-i} \sum_{i=o}^{q_2} \delta_{2i} \Delta X_{2,t-i} + \phi Z_{t-1} + \varepsilon_t$$

Where, $\phi\phi$: Speed of adjustment parameter with a negative sign.

Before proceeding further, let us graphically analyse our data in the next section.

V. Graphical Analysis:

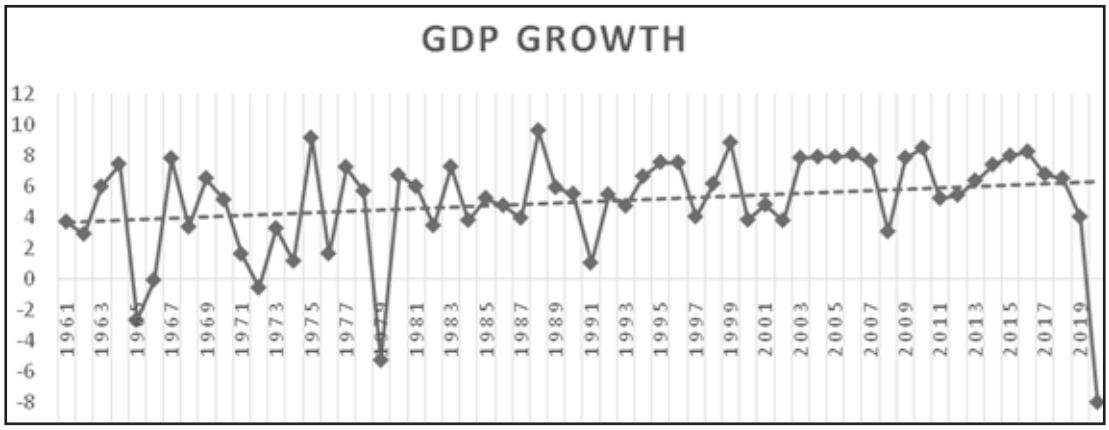
From 1950 to 1980, Indian real gross GDP grew at an annual average rate of 3.6 per cent and 1.5 per cent in per capita terms. It was a little higher in the first two decades and deteriorated to 2.9 per cent in the 1970s. Under this background policy rethinking of the 1980s took place and a **mild version of economic liberalization was started in the mid-1980s.**

The growth rate was improved in the 1980s, which indicates the positive impact of the reform undertaken during that decade. The economy grew at 5.6 per cent rate during that period. However, the rate of growth was not sustainable and some of this growth was fed by an expanding fiscal deficit, which caused severe balance of payment crisis in 1991. In the first five years (1992-1993 to 1996-1997) of the post-crisis period the economy grew at 6.5 per cent. It slowed down to 5.4 per cent during 1997-1998 to 2002-2003. This fall in growth rate, may be, was result of the East Asian Crisis, which led to the tightening of monetary policy in 1998 and also resulted in the deterioration in the investment scenario. During this period pace of economic reform was slowed down. Nevertheless, the average growth rate in the first ten years of the post-reforms period was around 6 per cent, about half a percentage point higher than in the 1980s.

From 2003-2004 to 2007-2008, i.e., before financial crisis, we can see a rapid pace of growth, with the average growth rate of 8.7 per cent. This can be attributed to a global economic boom, in which large part of the world economy, including the Indian economy, grew rapidly. During 2008-2009, Indian economy slowed down due to financial crisis. The slowdown was evitable all over the world and was reflected in fall in investment, exports, credit, manufacturing and construction. It can be attributed to the macroeconomic mismanagement – excessive fiscal response to the crisis that led to worsening macroeconomic stability and slow recovery. Prior to the crisis, growth was inflated due to the high credit growth and capital flows. As capital flows reversed and credit growth slowed down GDP growth rate slowed down too. Moreover, slowing reform momentum impacted investment and added to the slowdown. The economy grew at the rate of 3 per cent. The next seven years, after the financial crisis, 2009-2010 to 2015-2016, the economy grew on an average at the rate of 7.2 per cent. In the post reform era, for the first twenty-five-year period, 1991-92 to 2015-16, Indian economy grew at the average rate of more than 6.5 per cent. And from 2003-2004 to 2015-2016, average growth rate was 7.8 per cent, which was quite impressive. From Fig 1, we can see upward rising trend line (before pandemic), which indicates that India's growth potential has accelerated slowly but steadily and became more stable over the period.

Deterioration in growth rate was again occurred between Q3 2016-2017 and Q2 2017-2018, which can be attributed to the twin policy events – demonetization and implementation of GST. GDP growth declined to below 7 per cent during Q3, 2016-17 to Q2, 2017-2018. GDP growth, however, again accelerated to 7.7 per cent in Q3, 2017-2018. If we give a closer look on the quarterly growth rate, we can see that Index of Industrial Production (IIP) showed a sharp slowdown after the introduction of GST, but recovered in subsequent months. GDP growth rate increased to 7.2 per cent in Q3, 2017-18 from 5.7 per cent and 6.5 per cent in the two previous quarters. This indicates that the economy was able to absorb the impact of two policy shocks and was on the road to recovery. Growth rate was badly hampered and slumped into contraction under the onslaught of COVID 19. Imposition of nationwide lockdown, from 25th March 2020 to 31st May 2020, took a heavy toll on Indian economy. The combination of demand depression and supply disruption caused severe impact on the Indian economy in Q1 2020-2021, with GDP growth -24.4 per cent. Nevertheless, with gradual lifting of restrictions, the pace of contraction moderated in Q2 of the same financial year and GDP returned to positive territory in the subsequent quarters.

Fig 1:Growth Rates of GDP for Three Decades (Annual per cent)



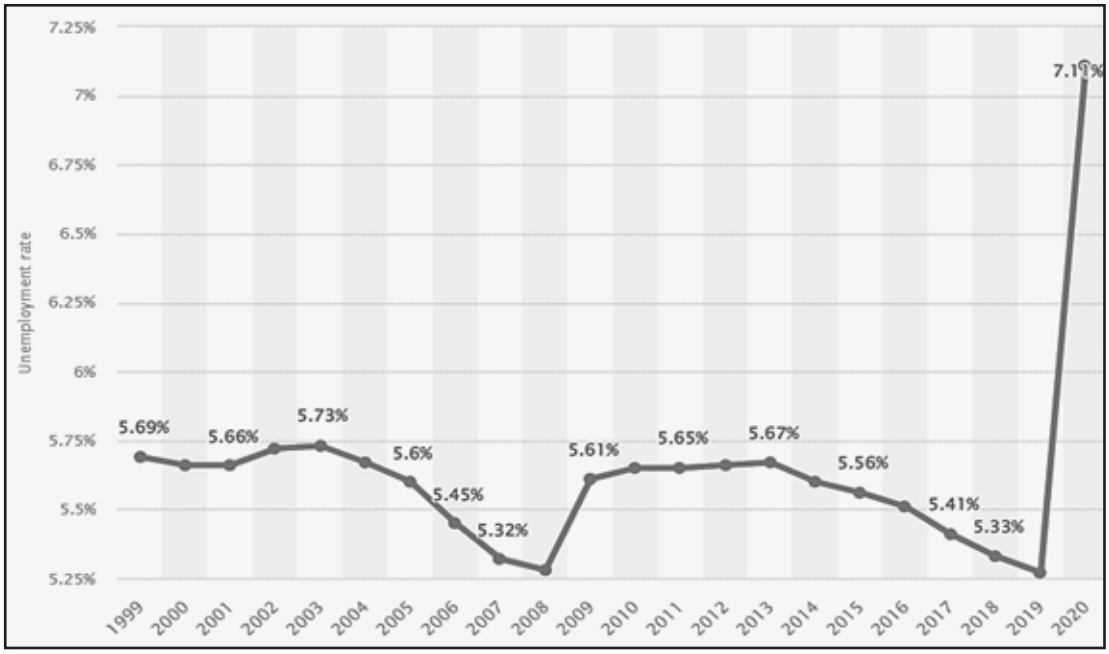
Source: World Development Indicator, World Bank

There was unanimity among the scholars and researchers that organized manufacturing sectors in India manifested jobless growth during 1980-81 to 1990-91. While the registered average rate of growth was 8.66%, the employment growth was merely 0.53%. After the onset of economic reform in 1991, initially there was a boom in formal sector employment for few years but after that Indian economy had seen high GDP growth rate without a parallel increase in formal employment. Thus, thereafter, a stagnation in the formal sector employment prevailed in the economy.

Indian Labour market witnessed a significant change since the inception of economic reform of 1991. Mainly the type of employment being created has given rise to some concern. An overwhelmingly large percentage of workers (about 92 per cent) are engaged in informal employment and a large majority of them have low earnings with limited or no social protection.

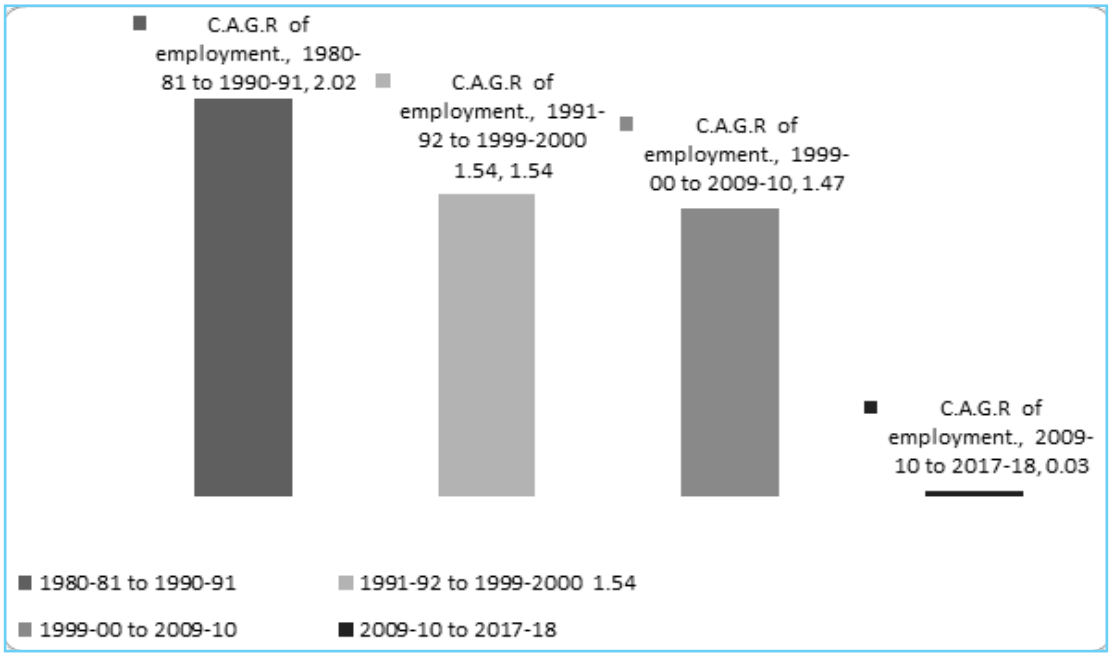
The economy had largely seen jobless growth between 1980s and 2007. The major industries that have seen growth are export oriented manufacturing, software and services. But they are not labour intensive and has not addressed the problem of unemployment and under employment. As the figure shows India's unemployment rate rose sharply to 7.11% in 2020 from 5.27% in 2019 due to the outbreak of corona virus. This pandemic paused the economy and forced the government to impose a nationwide lockdown.

Fig 2: India Unemployment Rate



Source-www.macrotrends.net

Fig 3: CAGR of Employment

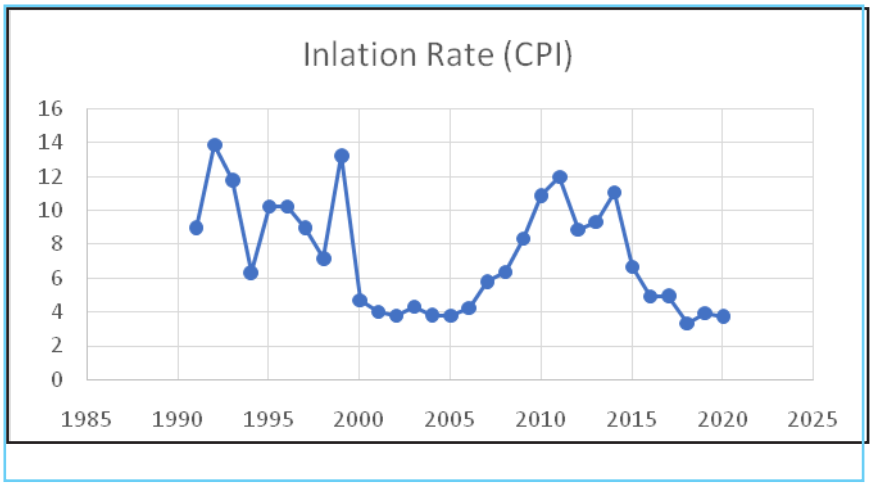


Source-R.B.I

From the figure we can state that if we consider the pre-liberalisation period of 1980-81 to 1990-91, the CAGR of jobs created was 2.02 percent, which was better than in the post-liberalisation period. What's more, the employment situation seems to be going from bad to worse. For instance, between 1991-92 and 1999-00, jobs were added at a CAGR of 1.54 percent. This was lower than in the pre-liberalisation 1980-81 to 1990-91 period. During the period 2009-10 to 2017-18, jobs growth was almost non-existent—the CAGR was a minuscule 0.03 percent. One of the main reasons for the lack of overall job growth was the exodus of people from agriculture.

The inflation rate accelerated steadily from an annual average of 1.7% during the 1950s to 6.4 % during the 1960s and further to 9.0 % in the 1970s before easing marginally to 8.0 % in the 1980s. The pickup in inflation rate from 1970s onwards reflected the impact of a sharp rise in money supply growth and also partly supply shocks from crude oil prices and crop failures. Demand pressures, emanating partly from the widening fiscal imbalances, also contributed to inflationary pressures in the 1980s. The second half of the 1990s was marked by a significant turnaround in the inflation outcome reflecting the improved monetary-fiscal interface. The declining trend in inflation since 1990 is clearly evident in India. Inflation in India has declined steadily from an average of 10.3 % between 1990–1994, to 8.9 % during 1995–1999 and to 4.3 % in this decade. Since 1990, India has experienced average growth rates of around 6 % per annum. From 2002 to 2003, the inflation rate increased by 1.19 percent and decreased by 2.88 percent from 2003 to 2004. It fell continuously and reaches to 7.12 percent from 2006 to 2007. Since 2011, inflation rate has shown declining trend.

Fig 4: Inflation Rate in India



Source: RBI

Table 5: Summary Statistics

```
. summarize rateofuneployment gdpgrowthrate inflationrate

    Variable |        Obs        Mean    Std. Dev.       Min        Max
-------------+---------------------------------------------------------
rateofunep~t |         30        5.67    .3076384       5.27       7.11
gdpgrowthr~e |         30    6.350333    1.917021       1.06       8.85
inflationr~e |         30       7.239    3.237844       3.33      13.87
```

Source-Author's own calculation

The above table has depicted the nature of data. Among the three variables the rate of unemployment has low standard deviation, whereas GDP growth rate and rate of inflation have high standard deviation. Low standard deviation means data are clustered around the mean, and high standard deviation indicates data are more spread out.

VI. Econometric Analysis and Important Findings:

In order to estimate the cointegration relationship between these three variables, unemployment, inflation and growth, we applied ARDL Bounds test. All three equations are estimated. Results are given in Table 6.

Table 6:Pesaran/Shin/Smith (2001) ARDL Bounds Test

Pesaran/Shin/Smith (2001) ARDL Bounds Test
H0: no levels relationship F = 8.574
t = -1.586

Critical Values (0.1-0.01), F-statistic, Case 3

	[I_0]	[I_1]	[I_0]	[I_1]	[I_0]	[I_1]	[I_0]	[I_1]
	L_1	L_1	L_05	L_05	L_025	L_025	5L_01	L_01
k_2	3.17	4.14	3.79	4.85	4.41	5.52	5.15	6.36

accept if F < critical value for I(0) regressors

reject if F > critical value for I(1) regressors

Critical Values (0.1-0.01), t-statistic, Case 3

	[I_0]	[I_1]	[I_0]	[I_1]	[I_0]	[I_1]	[I_0]	[I_1]
	L_1	L_1	L_05	L_05	L_025	L_025	5L_01	L_01
k_2	-2.57	-3.21	-2.86	-3.53	-3.13	-3.80	-3.43	-4.10

accept if t > critical value for I(0) regressors

reject if t < critical value for I(1) regressors

k: # of non-deterministic regressors in long-run relationship

Critical values from Pesaran/Shin/Smith (2001)

Results of cointegration tests and estimates of the cointegrating parameters show that in the first equation unemployment rates, growth rates and inflation rates are cointegrated. That is, there is long run relationship among these variables, when unemployment rate is dependent variable.

Table 7:Pesaran/Shin/Smith (2001) ARDL Bounds Test

H0: no levels relationship F = 15.345

t = -6.313

Critical Values (0.1-0.01), F-statistic, Case 3

	[I_0]	[I_1]	[I_0]	[I_1]	[I_0]	[I_1]	[I_0]	[I_1]
	L_1	L_1	L_05	L_05	L_025	L_025	5L_01	L_01
k_2	3.17	4.14	3.79	4.85	4.41	5.52	5.15	6.36

accept if F < critical value for I(0) regressors

reject if F > critical value for I(1) regressors

Critical Values (0.1-0.01), t-statistic, Case 3

	[I_0]	[I_1]	[I_0]	[I_1]	[I_0]	[I_1]	[I_0]	[I_1]
	L_1	L_1	L_05	L_05	L_025	L_025	5L_01	L_01
k_2	-2.57	-3.21	-2.86	-3.53	-3.13	-3.80	-3.43	-4.10

accept if t > critical value for I(0) regressors

reject if t < critical value for I(1) regressors

k: # of non-deterministic regressors in long-run relationship

Critical values from Pesaran/Shin/Smith (2001)

Table 7 reported the result of Bounds test, when lggdp is a dependent variable. Result confirms that there is a long run relationship. The null hypothesis of no cointegration among the variables in equation (6) is rejected.

Table 8:Pesaran/Shin/Smith (2001) ARDL Bounds Test

Pesaran/Shin/Smith (2001) ARDL Bounds Test

H0: no levels relationship F = 3.059

t = -2.181

Critical Values (0.1-0.01), F-statistic, Case 3

	[I_0]	[I_1]	[I_0]	[I_1]	[I_0]	[I_1]	[I_0]	[I_1]
	L_1	L_1	L_05	L_05	L_025	L_025	5L_01	L_01
k_2	3.17	4.14	3.79	4.85	4.41	5.52	5.15	6.36

accept if F < critical value for I(0) regressors

reject if F > critical value for I(1) regressors

Critical Values (0.1-0.01), t-statistic, Case 3

	[I_0]	[I_1]	[I_0]	[I_1]	[I_0]	[I_1]	[I_0]	[I_1]
	L_1	L_1	L_05	L_05	L_025	L_025	5L_01	L_01
k_2	-2.57	-3.21	-2.86	-3.53	-3.13	-3.80	-3.43	-4.10

accept if t > critical value for I(0) regressors

reject if t < critical value for I(1) regressors

From Table 8, it is evident that for equation (7) the null hypothesis of no co-integration is accepted. That is there is no long run relation among the variables when inflation rate is treated as dependent variable.

Thus, we can conclude that there is a long run relationship amongst the variables when unemployment rate and growth rate are dependent variable. Moreover, variables are not cointegrated when we have considered inflation rate as dependent variable. Once cointegration is established, the ARDL (p, q_1, q_2) long run model or Error Correction Model (ECM) have to be estimated. If there is no co-integration, we have to estimate only short run model or the ARDL model. The order of the ARDL (p, q_1, q_2) are selected by AIC.

MODEL 1

Let us consider the first model.

Once cointegration is established, the conditional ARDL (p, q_1, q_2) long-run model for *ln(unemp)* can be estimated as:

$$Y_t = \beta_0 + \sum_{i=1}^{p} \lambda_i Y_{t-i} + \sum_{i=0}^{q1} \delta_i X_{1t-i} + \sum_{i=0}^{q2} \delta_i X_{2t-i} + \varepsilon_t$$

Table 9 : Estimated long run coefficients using the ARDL approach

ARDL(2,1,0) regression

Sample: 1993 - 2019 Number of obs = 27

F(5, 21) = 49.36

Prob > F = 0.0000

R-squared = 0.9216

Adj R-squared = 0.9029

Log likelihood = 93.842369 Root MSE = 0.0085

lgunep	**Coef.**	**Std. Err.**	**t**	**P>|t|**	**[95% Conf.**	**Interval]**
lgunep |						
L1. |	1.1601	.1387901	8.36	0.000	.8714703	1.44873
L2. |	-.2844394	.1538667	-1.85	0.079	-.6044228	.035544
lggdp |						
--. |	-.0030986	.0056404	-0.55	0.589	-.0148286	.0086313
L1. |	-.0289826	.0057834	-5.01	0.000	-.0410098	-.0169553
lginf |	.0112285	.0042872	2.62	0.016	.0023128	.0201442
_cons |	.2510541	.1365822	1.84	0.080	-.0329841	.5350922

The estimated coefficients of the long-run relationship are significant for first lag of unemployment, second lag of unemployment, first lag of growth and for inflation rate. Percentage change of the first lag of unemployment is associated with 1.16 percent increase in unemployment on average ceteris paribus at 1 % level of significance. Percentage change of the second lag of unemployment is associated with 0.28 percent decrease in unemployment on average ceteris paribus at 10 % level of significance. Percentage change of the first lag of growth rate is associated with 0.028 percent decrease in unemployment on average ceteris paribus at 1 % level of significance. Percentage change of the inflation rate is associated with 0.01 percent increase in unemployment on average ceteris paribus at 1 % level of significance.

We obtain the short- in at least one direction which is determined by the F-statistic and the lagged error-correction term. The short run causal effect is represented by the t-statistics on the explanatory variables. run dynamic parameters by estimating an error correction model associated with the long-run estimates. The long-run relationship between the variables indicates that there is Granger-causality

The error correction model is specified as follows:

$$\Delta Y_t = \beta_0 + \sum_{i=1}^{p} \lambda_i \, \Delta Y_{t-i} + \sum_{i=o}^{q_1} \delta_{1i} \, \Delta X_{1,t-i} \sum_{i=o}^{q_2} \delta_{2i} \, \Delta X_{2,t-i} + \phi \, Z_{t-1} + \varepsilon_t$$

Where, ϕ: Speed of adjustment parameter with a negative sign.

Y_t= log(unemployment rate)

X_1 = log(growth rate)

X_2 = log(inflation rate)

Optimum lag order of ARDL model is estimated as (2, 1, 0).

Table 10: ECM when Unemployment Rate is Dependent Variable

ardllguneplggdplginf, lags(2, 1, 0) ec

ARDL(2,1,0) regression

Sample: 1993 - 2019 Number of obs = 27

R-squared = 0.6825

Adj R-squared = 0.6069

Log likelihood = 93.842369 Root MSE = 0.0085

D.lgunep	Coef.	Std. Err.	t	P>|t|	[95% Conf. Interval]	
ADJ |						
lgunep |						
L1. |	-.1243393	.0784001	**-1.89**	**0.077**	-.2873812	.0387026
LR |						
lggdp |	-.2580134	.1780852	**-1.74**	**0.093**	-.6283618	.1123351
lginf |	.0903052	.0692621	1.30	0.206	-.0537332	.2343437
SR |						
lgunep |						
LD. |	.2844394	.1538667	1.85	0.079	-.035544	.6044228
lggdp |						
D1. |	.0289826	.0057834	5.01	0.000	.0169553	.0410098
_cons |	.2510541	.1365822	1.84	0.080	-.0329841	.5350922

Table 10 shows results of Error Correction Model or long run ARDL model, which test for the short-run dynamic coefficients associated with the long run causality. The short run causal effect is represented by the t statistics of the coefficients of the short run terms. It is evident that first lag of unemployment and first lag of growth rateare statistically significant. Thus, in the short run first lag of unemployment and first lag of growth rate Granger cause unemployment. Percentage change of the first lag of unemployment is associated with 0.289% increase in unemployment, on average ceteris paribus, at more than 5% level of significance. Similarly, percentage increase in the long run first lag of GDP growth rate leads to 0.028% increase in unemployment rate, on average ceteris paribus, at 1% level of significance. This result clearly confirms the claim of 'jobless growth' phenomenon in the short run. In an era of globalization, India has witnessed extremely high growth rates of GDP, but employment has failed to keep pace.

Thus, lag value of the variables has significant casual effect on dependent variable. There is causality from first lag of GDP to unemployment and first lag of unemployment

to current unemployment rate. However, in the long run, percentage increase in the long run first lag of GDP growth rate is associated with 0.258 % decrease in unemployment rate, on average ceteris paribus, at more than 5% level of significance. The adjustment coefficient has negative value as expected, and is statistically significant at more than 5% level of significance. Negative error correction term indicates that if there is any short-term disturbance from the long run stable relationship, such a disturbance would be corrected overtime and long run stable relationship will be restored. Its value is estimated to -0.12 percent, which implies that the speed of adjustment to equilibrium after a shock is remarkably low. So, there is causality among the variables in the long run. This result implies that causality runs interactively through the error-correction term from GDP growth and inflation rate to unemployment.

It also passes all the diagnostic tests against serial correlation (Durbin Watson test and Breusch-Godfrey test), heteroscedasticity (White Heteroskedasticity Test), and normality of errors (Jarque-Bera test). The Ramsey RESET test also suggests that the model is well specified. All the results of these tests are shown in Table 11, 12 and 13.Once the ECM model has been estimated, the cumulative sum of recursive residuals (CUSUM) and the CUSUM of square (CUSUMSQ) tests are applied to assess the parameter stability (Pesaran and Pesaran (1997)). Figure5 and 6 plot the results for CUSUM and CUSUMSQ tests. The results indicate the absence of any instability of the coefficients because the plot of the CUSUM and CUSUMSQ statistic fall inside the critical bands of the 5% confidence interval of parameter stability.

Table 11: Test for Autocorrelation

Durbin-Watson d-statistic (6, 27) = 2.01517

Breusch-Godfrey LM test for autocorrelation

lags(p)	chi2	df	Prob > chi2
2	2.264	2	0.3225

H0: no serial correlation

Hence, we cannot reject null hypothesis of no serial autocorrelation as the prob>chi 2, is more than 0.05. We can conclude that there is no problem of serial autocorrelation.

Table 12:Test For Homoskedasticity

White's test for Ho: homoskedasticity
against Ha: unrestricted heteroskedasticity

chi2(20) = 23.18
Prob > chi2 = 0.2800

Cameron & Trivedi's decomposition of IM-test

Source	chi2	df	p
Heteroskedasticity	23.18	20	0.2800
Skewness	18.67	5	0.0022
Kurtosis	0.46	1	0.4975
Total	42.31	26	0.0228

Table 13: Specification Test

Ramsey RESET test using powers of the fitted values of lgunep
Ho: model has no omitted variables
F(3, 18) = 2.17
Prob > F = 0.1268

Fig 5: CUSUM graph

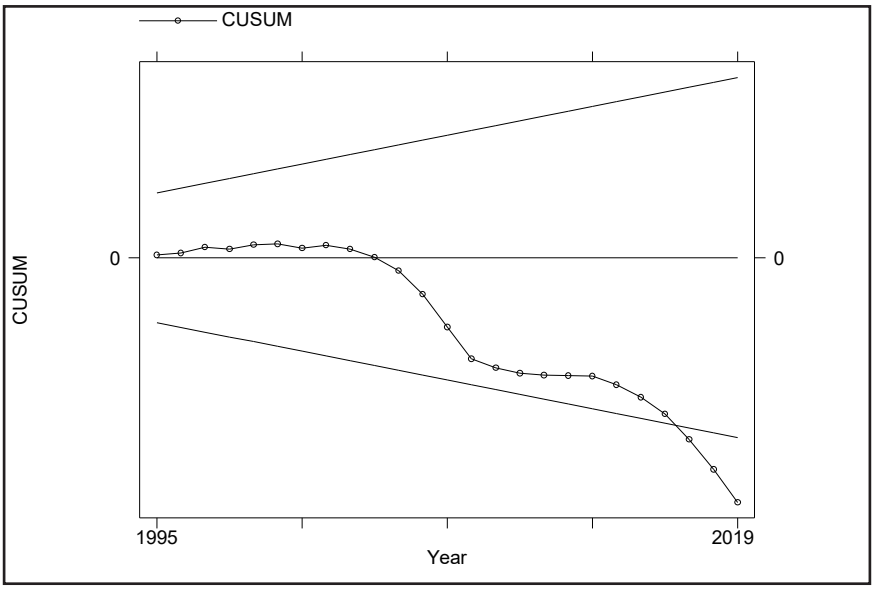
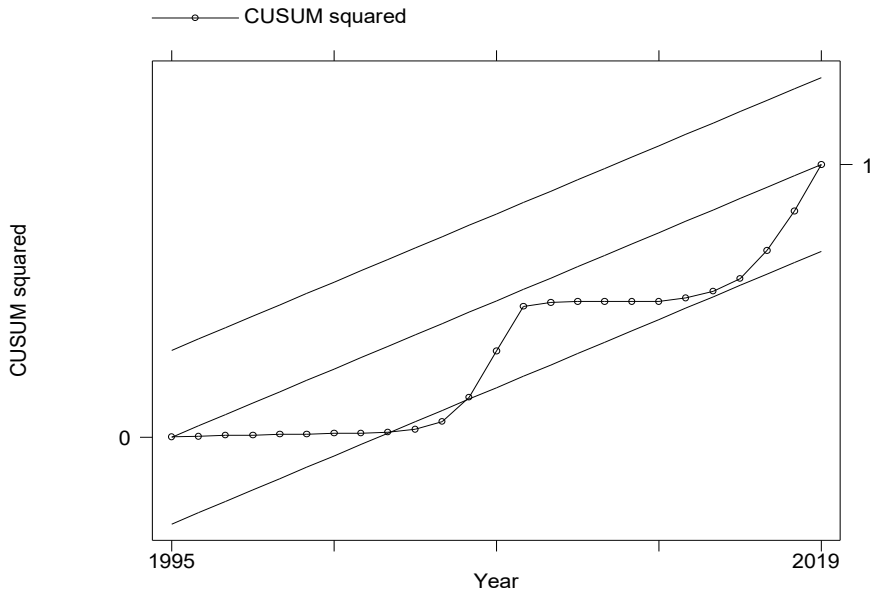


Fig 6: CUSUM Squared



Model 2

Let us now consider model 2, where log(gdp) is dependent variable and log(unemployment) and log(inflation) is considered as independent variables.

After establishing the co-integration, the conditional ARDL (*p*, q_1, q_2) long-run model for *ln(gdp)* can be estimated as:

$$Y_t = \beta_0 + \sum_{i=1}^{p} \lambda_i Y_{t-i} + \sum_{i=0}^{q1} \delta_i X_{1t-i} + \sum_{i=0}^{q2} \delta_i X_{2t-i} + \varepsilon_t$$

Table 14: Estimated long run coefficients using the ARDL approach

Sample: 1993 - 2019		Number of obs	= 27
F(4, 22)	= 0.83		
		Prob > F	= 0.5184
		R-squared	= 0.1316
Adj R-squared	= -0.0263		
Log likelihood	= -3.4094032	Root MSE	= 0.3041

lggdp	Coef.	Std. Err.	t	P>|t|	[95% Conf.	Interval]
lggdp						
L1.	.1127547	.2253118	0.50	0.622	-.3545134	.5800227
lginf						
--.	.2737582	.1906035	1.44	0.165	-.1215292	.6690456
L1.	-.3206914	.1937015	-1.66	0.112	-.7224037	.0810209
lgunep	2.194426	2.628356	0.83	0.413	-3.256451	7.645302
_cons	-2.063857	4.587168	-0.45	0.657	-11.57706	7.449346

This result, however, is not impressive. Only first lag of inflation shows negative impact on GDP growth rate, ceteris paribus, at 10 % level of significance. However, we have very low value of R^2, which needs further consideration.

The Error Correction model can be written as,

$$\Delta Y_t = \beta_0 + \sum_{i=1}^{p} \lambda_i \Delta Y_{t-i} + \sum_{i=o}^{q_1} \delta_{1i} \Delta X_{1,t-i} \sum_{i=o}^{q_2} \delta_{2i} \Delta X_{2,t-i} + \phi Z_{t-1} + \varepsilon_t$$

Where, ϕ: Speed of adjustment parameter with a negative sign.

Y_t= log(growth rate)

X_1 = log(unemployment rate)

X_2 = log(inflation rate)

Optimum lag order of ARDL model is estimated as (1, 1, 0).

Table 15: ECM ARDL(1,1,0) regression when Growth Rate is Dependent Variable

Sample :1992 -2019	Number of obs	=	28
	R-squared	=	0.7130
	Adj R-squared	=	0.6630
Log likelihood = -3.0304683	Root MSE	=	0.2975

D.lggdp	Coef.	Std. Err.	t	P>|t|	[95% Conf.	Interval]
ADJ						
lggdp						
L1.	-.8734487	.1383662	-6.31	0.000	-1.159681	-.5872165
LR						
lginf	-.0581368	.1730053	-1.84	0.080	-.4160256	.299752
lgunep	2.598397	2.84985	0.91	0.371	-3.296966	8.49376

SR							
lginf							
D1.		.321608	.1891273	1.80	0.093	-.0696316	.7128477
_cons		-2.212249	4.090073	-0.54	0.594	-10.67321	6.248712

It is evident from Table 15 that the adjustment coefficient has negative value which is statistically significant at 1% level of significance. Its value is estimated to -6.31 which implies that the speed of adjustment to equilibrium after a shock is remarkably high. So, there is causality among the variables in the long run. This result implies that causality runs interactively through the error-correction term from unemployment and inflation rate to GDP growth. Significant short run coefficient of inflation rate indicates that inflation has significant casual effect on GDP growth in the short run. Percentage change of the inflation rate is associated with 0.058% decrease in GDP growth rate, on average ceteris paribus, at more than 5% level of significance. No causality exists between unemployment and GDP growth rate.

It also passes all the diagnostic tests against serial correlation (Durbin Watson test and Breusch-Godfrey test), heteroscedasticity (White Heteroskedasticity Test). The Ramsey RESET test also suggests that the model is well specified.

Table 16: Test for Autocorrelation

Durbin Watson test Result:

```
E statdwatson

Durbin-Watson d-statistic(5, 28) =  1.947167
```

Table 17: Test for Autocorrelation

estatbgodfrey, lags(1)

Breusch-Godfrey LM test for autocorrelation

lags(p)	chi2	df	Prob > chi2
1	0.007	1	0.9355

H0: no serial correlation

Table 18: Test for Heteroskedasticity

. estatimtest, white

White's test for Ho : homoskedasticity
against Ha : unrestricted heteroskedasticity

chi2(14) = 15.85
Prob > chi2 = 0.3225

Cameron & Trivedi's decomposition of IM-test

Source	chi2	df	p
Heteroskedasticity	15.85	14	0.3225
Skewness	8.37	4	0.0788
Kurtosis	0.07	1	0.7864
Total	24.30	19	0.1849

Table 19:Specification Test

Ramsey RESET test using powers of the fitted values of lggdp

Ho: model has no omitted variables

F(3, 20) = 1.80

Prob > F = 0.1802

Fig 7:

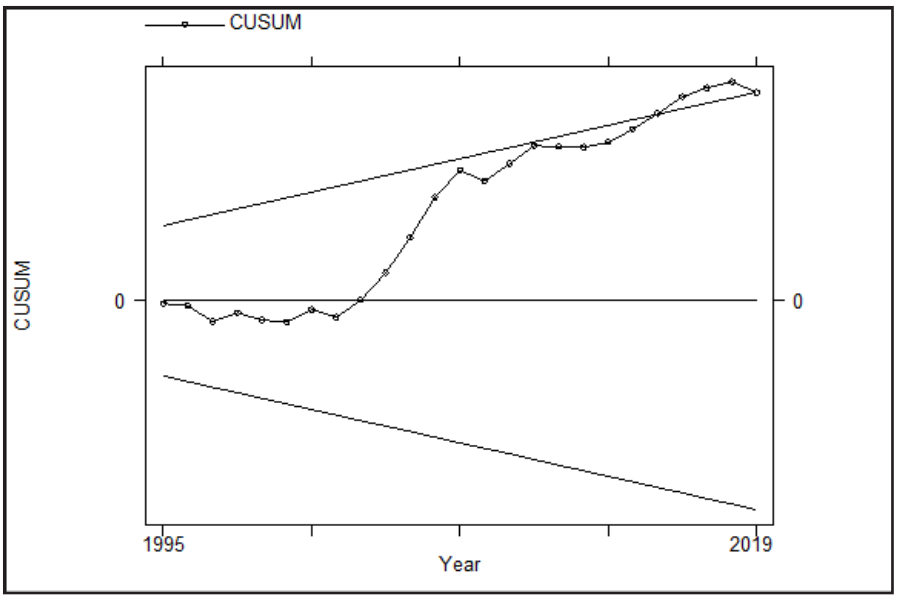
Fig 8

Model 3: ARDL Model

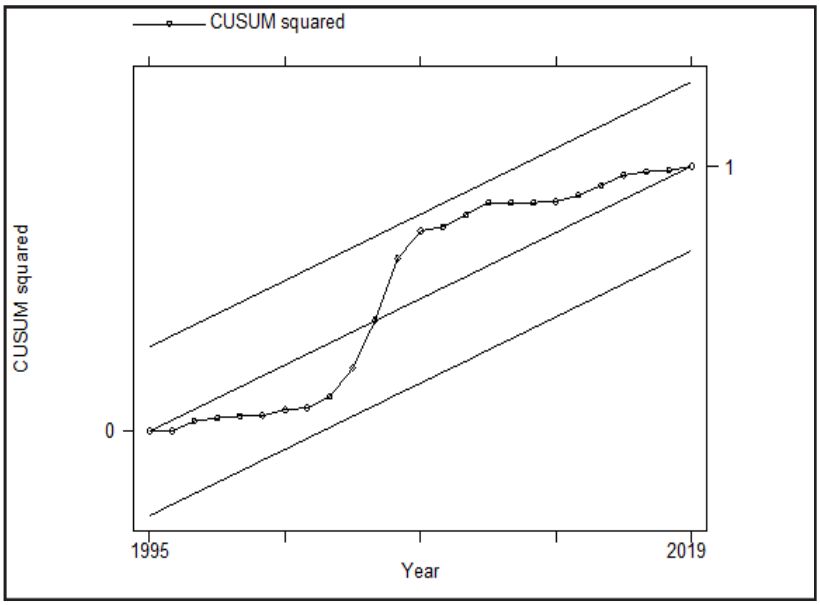
If no-cointegration, the ARDL (p, q_1, q_2) model can be specified as

$$\Delta Y_t = \beta_0 + \sum_{i=1}^{p} \lambda_i \, \Delta Y_{t-i} + \sum_{i=o}^{q_1} \delta_{1i} \, \Delta X_{1,t-i} \sum_{i=o}^{q_2} \delta_{2i} \, \Delta X_{2,t-i} + \varepsilon_t$$

Table 20: ARDL(1,1,0) regression



Sample : 1992 -2019 Number of obs = 28



F (4, 23) = 8.06

Prob > F = 0.0003

R-squared = 0.5837

Adj R-squared = 0.5113

Log likelihood = -4.8931868 Root MSE = 0.3180

lginf	Coef.	Std. Err.	t	P>|t|	[95% Conf.	Interval]
lginf						
L1.	.6579092	.1568569	4.19	0.000	.3334259	.9823925
lgunep						
--.	8.383116	4.959436	1.69	0.104	-1.876258	18.64249
L1.	-9.882329	5.260482	-1.88	0.073	-20.76447	.9998077
lggdp	.3051918	.2120314	1.44	0.164	-.1334287	.7438122
_cons	2.680877	4.592064	0.58	0.565	-6.81853	12.18028

From Table 20, we can conclude that there is no long run relationship or causality among growth rate, unemployment and inflation rate, when inflation rate is treated as dependent variable. In the short run percentage change of the first lag of inflation is associated with 0.65 percent increase in inflation rate on average ceteris paribus at 1 % level of significance. Percentage change of the current period unemployment rate is associated with 8.38 percent increase in inflation on average ceteris paribus at 10 % level of significance. However, percentage change in first lag of unemployment is inversely related with inflation rate at 10% level of significance. GDP growth rate has no significant impact on inflation rate.

Table 21: Test for Autocorrelation

Durbin-Watson d-statistic(5, 28) = 2.199181

Table 22: Test for Autocorrelation

.

. estatbgodfrey, lags(1)

Breusch-Godfrey LM test for autocorrelation

lags(p)	chi2	df	Prob > chi2
1	1.175	1	0.2783

H0: no serial correlation

Table 23: Test for Heteroskedasticity

.

. estatimtest, white

White's test for Ho : homoskedasticity
against Ha : unrestricted heteroskedasticity

chi2(14) = 11.58
Prob > chi2 = 0.6399

Cameron & Trivedi's decomposition of IM-test

Source	chi2	df	p
Heteroskedasticity	11.58	14	0.6399
Skewness	8.09	4	0.0882
Kurtosis	1.67	1	0.1957
Total	21.35	19	0.3179

Table 24: Specification Test

Ramsey RESET test using powers of the fitted values of lginf

Ho: model has no omitted variables

F(3, 20) = 1.08
Prob > F = 0.3801

7. CONCLUSION:

The paper examines the dynamic causal relationship among the series of economic growth, unemployment, and inflation for India for the period of 1991-2020. It implements ARDL model to cointegration to investigate the existence of a long-run relation among

the above-noted series, and the short-run dynamics within ECM to test the direction of causality between the variables

Major findings from Model 1, when the unemployment rate is dependent Variable:

1. The estimated coefficients of the long-run relationship are significant for first lag of unemployment, second lag of unemployment, first lag of growth and for inflation rate, when unemployment rate is dependent variable.
2. first lag of unemployment is positively related
3. second lag of unemployment is negatively related
4. first lag of growth rate is negatively related
5. current period GDP growth has no significant impact on unemployment rate
6. current period inflation rate has positive impact on unemployment rate.
7. in the short run first lag of unemployment and first lag of growth rate Granger cause unemployment.
8. This result clearly confirms the claim of 'jobless growth' phenomenon in the short run. In an era of globalization, India has witnessed extremely high growth rates of GDP, but employment has failed to keep pace. The adjustment coefficient has negative value as expected, and is statistically significant at more than 5% level of significance. Negative error correction term indicates that if there is any short-term disturbance from the long run stable relationship, such a disturbance would be corrected overtime and long run stable relationship will be restored. Its value is estimated to -0.12 percent, which implies that the speed of adjustment to equilibrium after a shock is remarkably low.So, there is causality among the variables in the long run. This result implies that causality runs interactively through the error-correction term from GDP growth and inflation rate to unemployment.

Major findings from Model 2, when the GDP growth Rate is dependent Variable:

1. There is a cointegration or long-run relationship among the variables
2. first lag of inflation shows a negative impact on the GDP growth rate
3. the adjustment coefficient has a negative value which is statistically significant at 1% level of significance. Its value is estimated to be -6.31 which implies that the speed of adjustment to equilibrium after a shock is remarkably high.So, there is causality among the variables in the long run. This result implies that causality runs interactively through the error-correction term from unemployment and inflation rate to GDP growth.

4. Significant short run coefficient of inflation rate indicates that inflation has significant casual effect on GDP growth in the short run.
5. No causality between unemployment and GDP growth rate.

Major findings from Model 3, when the inflation rate is dependent Variable:

1. No long-run relationship among the variables.
2. In the short run percentage change of the first lag of inflation is associated with an increase in inflation rate
3. Percentage change of the current period unemployment rate is associated with 8.38 percent increase in inflation on average ceteris paribus at 10 % level of significance.
4. However, percentage change in first lag of unemployment is inversely related with inflation rate at 10% level of significance.
5. GDP growth rate has no significant impact on inflation rate.

Our results clearly confirms the term "jobless growth".

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Financial Inclusion, Output Growth And Poverty Alleviation - Exploring the Alliance in A Panel TSLS Setup

Shantanu Ghosh[1] & Tarak Nath Sahu[2]

Abstract

This article aims to calibrate the social banking model – originated approximately 30 years ago by the Nobel laureate Md. Yunus, which emphasizes on the measures of poverty alleviation through addressing the needs of the unbanked population. Addressing the incidence of poverty through the conventional channels are essential though not sufficient. Financial inclusion as a significant part of the inclusive development process can be viewed as a relevant and complementary measure for poverty eradication. In this connection, this study attempts to establish the relationship between financial inclusion and output growth and verify whether this inclusion-led output growth reduces poverty. Using the two-stage least squares method the study finds financial inclusion to improve the output growth and reduce poverty significantly across the 67 countries for 2004-18. This study is important from policy perspective, especially for the developing nations like India, as it validates the genuine link of poverty eradication through financial inclusion.

Key Words: Financial Inclusion, Output Growth, Poverty Alleviation and Two-Stage Least Squares.

JEL Classification: **G00, O16, O47 and C33.**

I. Introduction

Outreach of financial services has been among the policy priorities of countries irrespective of their status of development. A deeper penetration of services further ensures stability of the formal financial system and warrants sustainable economic growth of the nation (Chibba, 2009). Though this finance led growth phenomena has a long controversial history. Following the Schumpeterian view (Schumpeter, 1911) some economists show finance as a major source of development (Goldsmith, 1969; McKinnon, 1973; Levine, 1997) whereas others argue that it is a source of development that has been overemphasized (Lucas, 1988). However, the vast body of literature especially the

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contemporary ones show evidence in favour of finance led growth proposition (Beck et al., 2000; Christopoulos & Tsionas, 2004; Herwartz & Walle, 2014; Durusu-Ciftci et al., 2017). Accessibility to funds channelized through the formal financial system increases capital accumulation and stimulates the economic growth (King & Levine, 1993). On the other hand using the same techniques Beck et al., (2000) finds the total factor productivity growth improving the process of financial intermediation, thus driving economic growth. Poverty has been among the vital policy targets questioning the efficacy of economic growth and development. Previous literature also sufficiently captures the linkages between economic growth, income inequality and poverty reduction. However, there has been a very little effort exploring the inter-dependencies between financial development, economic growth, income distribution and poverty reduction across a set of countries those are not that much famous. In this connection the present study aims to observe 67 countries across 2004-18 and address (1) whether financial inclusion improves the output growth and (2) whether financial inclusion reduces poverty through improving the output growth.

II.Literature Review

Introspecting a vast body of literature that emphasizes the inter-connections between financial development, economic growth, income distribution and poverty reduction, we observe cross-sectional as well as country specific evidences. Exploring the relationship between financial inclusion and poverty eradication using macro-level data, studies provide a generalized view but are incapable to provide nuanced and detailed insights. Whereas country specific studies at the household level are specific though inappropriate for laying a generalized perspective.

Contemporary discussions in Chibba (2009) adequately outlines the relevance of the formal financial intermediation in reducing the incidence of poverty, thus better achieving the MDG's (presently SDG's). Traditional measures used to tackle poverty are important however not sufficient to accelerate the pace of poverty reduction, hence FI may be looked upon as an opportunity to explore. In this connection, addresses from the United Nations conference on 'Financial Inclusion in Africa' in June, 2006; World Banks conference on 'Access to Finance' in March, 2007; and many other efforts taken solely as well as jointly recognizes and supports the critical role delved in the FI-PR-SDG alliance promoting the economic and social progress of a nation. International collaborations further endorses the view that the promotion of economic and social development cannot be in isolation keeping a substantial part of the society especially the marginalized aloof. Hence, an attempt to spread the outreach of financial services to all the sections of the society appears invaluable to promote development and configure the ability in a manner so that SDG's are better achieved (Dugarova & Gülasan, 2017). Investigation of the cross-sectional empirical evidences in the literature either considering the countries or the

states as units deliver a generalized outlook. Exploring the state-level panel data, Burgess and Pande (2005) finds the expansion of rural bank branches, savings and credit across the Indian provinces to effectively address the issue of poverty reduction. Assessing the impact of the financial deepening on poverty alleviation across the unbalanced panel consisting of 28 Indian states, Inoue and Hamori (2012) show deposit and credit amounts as a share of output to reduce the poverty head count significantly. Using cross-country data comprising of developing nations , Jalilian and Kirkpatrick (2002) aim to observe the effect of financial development on reducing poverty. Simulating the same sample to draw valid inferences on the causal relationship between the constructs Jalilian and Kirkpatrick (2005) find financial development to reduce poverty significantly. Following the introduction of SDG's (United Nations, 2016), more recently, Boukhatem (2016) applying the system GMM estimator across a panel of 67 low and middle-income countries shows financial development to reduce poverty significantly. This study however addresses the issues relating to over-identification and weak instruments and generates a more reliable measure of the effect. Similarly, Kiendrebeogo and Minea (2016) claim the access to financial services unequivocally reducing the incidence of poverty. Constructing a panel of 37 developing nations from the Asian continent Park & Mercado (2015) and more recently Neaime and Gaysset (2018) considering eight nations from the middle-east and the African continent affirm financial inclusion to reduce poverty and inequality (though initially). However, some studies admit the fact that aggregate data appears insufficient to represent the impact at the household level (Beck & Demirgüç-Kunt, 2008). Critical review of literature, more recently shows the incompetence of empirical evidences showing financial inclusion as a measure to alleviate poverty (Mader, 2018). Further, there are also scholarly articles that are in denial of the fact that economic development promotes the incidence of poverty (Todaro & Smith, 2012). Focussing on the country-specific evidences that exhibit the impact of financial inclusion on eradicating poverty at the household level, studies like Dawood et al. (2019) in the Indonesian context, Koomson et al. (2020) in Ghana, Uddin et al. (2014) in Bangladesh, Li (2018) in China and Aideyan (2009); Seck et al. (2017); Dimova & Adebowale (2018) in the Nigerian context deserves mention. The studies find financial development or inclusion reduces the incidence of poverty to some extent, although the functional form in the cases considered appears to be different. Thus, financial inclusion as an important element of a broader picture (i.e. social inclusion) appears extremely relevant to address the issues related to poverty and inequality through unlocking the potential opportunities especially for the disadvantaged sections of the society. Even magnifying the heterogeneity through considering an extended cross-sectional band of 116 developing nations across a period of 2004-16 suggests to promote access and usage of the formal financial services in order to maximize societies' overall welfare (Omar & Inaba, 2020). Among others, analysing the impact of financial inclusion on certain indicators of development (e.g. income, expenditure, food security

and like) with respect to gender variations doesn't support the exception (Swamy, 2014). The outreach of formal financial intermediation shows a mixed evidence of impact on the output growth and hence, leads to a foregone conclusion (Bell & Rousseau, 2001). Further, little evidence exists specially using a cross-country setup that explores the proposition whether financial inclusion reduces poverty through improving the output growth. Though, Majid et al. (2017) in the Indonesian context gives a classic example of the research question that we suppose to address in the present study. In short, to summarize, the present study aims to address (1) whether financial inclusion improves the output growth and (2) whether financial inclusion reduces poverty through improving the output growth.

III.Methods of Study

Data

For executing the objectives, we consider 67 countries over a period of 2004-18. Selection of the countries is configured mainly on the basis of availability of the data for the given study period. Data on the incidence of poverty has been collected from the SDG Indicators database of United Nations, whereas other macroeconomic variables has been sourced from the World Development Indicators maintained by the World Bank Group. Since, the structure of our dataset allows us to account for the heterogeneity across both the cross-sectional and time units, we consider applying the panel data specifications to validate the underlying theory. We further classify the countries into high-income and low-income groups based on the median values of per capita GDP and high-fragility and low-fragility groups based on the median values of non-performing loans to gross loans ratio[3]. This classification helps to explore the estimates in the specific groups and validate the deeper insights. A value of 1 is assigned if the country's per capita GDP and the ratio of non-performing loans to gross loans exceeds the median values, else 0.

Table 1 outlines the set of variables used to explore the theoretical construct and provides a primitive idea of the sample characteristics.

Methodology

Before finding a suitable model that represents the true characteristics of the phenomena, we consider testing the stationarity properties of the underlying data. Checking stationarity property is vital especially when dealing with macro-economic variables that generally exhibits a trend (non-stationary behaviour) over time leading to spurious regression output (Granger & Newbold, 1974). Applying two popular panel unit root tests, namely, the Maddala and Wu-Fisher Augmented Dickey-Fuller (ADF) test, and the Maddala and Wu-Fisher Phillips and Perron (PP) test (Maddala & Wu, 1999), results in Table 3 show that the concerned variables in the study are stationary at level, hence

3. Following the approach used in Demirguc Kunt & Detragiache (1998) and Ghosh (2008).

available to applications of the usual asymptotic theory. The errors in the panel ADF unit-root test are homoscedastic whereas that in the PP test are heteroscedastic and both are the standardized non-parametric tests prescribed to check the stationarity property in most of the econometric textbooks. We consider the following equation to represent the theoretical construct.

$$POV_{it} = \beta_0 + \beta_1 lnGDP'_{it} + \beta_2 \Delta UNEMP_{it} + \beta_3 INF_{it} + \beta_4 POP_{it} + \beta_5 \Delta DSE_{it} + u'_{it} \text{ …...…… (1)}$$

Where, the subscripts 'i' (= 1, 2…, N) and 't' (= 1, 2…, T) represents each of the country and the time period respectively. u'_{it} represents the composite error term in the population equation. Additionally, the standard definition of the variables with their respective sources can be found from Table 1.

We hypothesize the long-run elasticity coefficient for lnGDP' to remain significantly negative (i.e. $\beta_1 < 0$), so that an increment in per capita GDP would lead to a fall in the poverty.

Primarily, we use the OLS estimator (presumably the best under certain conditions) to find a best fit with the proposed hypothesis. The results in Table 4 inadvertently suggests a significant positive effect of the output growth on poverty status. Although theoretically this relationship stands valid if the measure of inequality is in place. Hence, removing the time in-variant unobservable completely (FE model) or partially (RE model) from the model will not address the specification problem. We need to consider the measure of inequality in our model and specify correctly the theoretical construct or might allow the unobservable to vary across time. In our case, we consider adoption of the second alternative due to the non-availability of data regarding inequality for the selected sample. The interaction between the regressors might differ while predicting growth and poverty incidence even with a common set of explanatory variables leading to errors of different nature (Jalilian & Kirkpatrick, 2005). An issue of multi-collinearity can also be raised between the response variables from different specifications. A better approach would be to set up a system of equations (e.g. the TSLS). Additionally, there are instances where poverty status impacts output growth fuelling the incidence of simultaneity bias. OLS estimators produce the best estimates but are inefficient under the presence of simultaneity (Woolridge, 2006). Therefore, continuing with the IV estimators (as an alternative to the OLS) we observe output growth to reduce significantly the incidence of poverty in Table 4 following eq. 1.

We propose to instrument $lnGDP'_{it}$ in eq. 1 with the estimated values of $lnGDP_{it}$ from eq. 2.

$$lnGDP_{it} = \beta_0 + \beta_1 \Delta IFI_{it} + \beta_2 \Delta UNEMP_{it} + \beta_3 INF_{it} + \beta_4 POP_{it} + \beta_5 \Delta DSE_{it} + u_{it} \quad \ldots\ldots\ldots\ldots (2)$$

In both the equations we consider the change in the unemployment status, inflation, population growth and health expenses to GDP as the common variables whose impact is controlled for. However, the efficiency of the IV estimators largely relies on the criteria of (1) Instrument Relevance and (2) Instrument Exogeneity . An instrument to be relevant requires a non-zero covariance with the variable with which it is going to be substituted [i.e. Cov (lnGDP, lnGDP') $\neq 0$], which in this case can reasonably be expected [Since, the coefficient of β_1 in eq. 2 is significant at 1 percent level (i.e. $\beta_1 \neq 0$)]. Again, Instrument exogeneity holds when the covariance between the instrument and composite error term is either zero or reasonably close to zero. [i.e. Cov (lnGDP', u'_{it}) = 0]. Since, the values for u'_{it} are estimations and can hardly be predicted with utmost accuracy with a given sample in hand, we leave this discussion for an economic introspection to be delivered in the next section.

Following the majority, we use the max-min approach to standardize the three dimensions of financial inclusion (i.e. the accessibility, availability and usage). Normalizing the raw data helps to make the variable invariant of a scale. Additionally, we combine the dimensional achievements by simply averaging them to arrive at the financial inclusion scores for the panel so far developed. By inheritance using the simple average has contended us to believe that the dimensions are a perfect substitute of each other in promoting financial inclusion.

IV.Analysis and Findings

Summary Statistics

Table 1 outlines the name, indicator, observations, mean, standard deviation and positional average of the variables selected for the study. The data on an average for the 67 cross-sectional units across the prolonged 15-year window shows 16.6 percent of the population with aged 25+ are lying below the international poverty standards. Further, an annual growth of 2.8 percent in per capita GDP, 0.05 percent in the unemployment rate, 6.5 percent in inflation, 0.55 percent in the health expenditure to GDP ratio and 7.3 percent in financial inclusion achievement scores has been observed.

Additionally, the positional average of the variables shows non-normal characteristics leading to non-normally distributed errors. Thus, suspecting the validity of the hypothesis test configured with the OLS estimator.

Correlation Matrix

The correlations in Table 2 initially validate the theoretical constructs that are to be examined. The results show lnGDP to negatively (although not significant) correlate with the measure of poverty. Further, the measure of financial inclusion is also found to share a significant positive correlation with lnGDP. Such characterization gives us reasonable evidence that financial inclusion may improve the output growth and may also reduce poverty through improving the output growth.

Unit-root Test

Critical modelling of the errors either using the parametric autoregression to estimate its ARMA structure in the test regression (i.e. ADF) as well as adjusting its form for any possible serial correlation and heteroscedasticity (i.e. PP) for the variables of interest, results in Table 3 suggests the data to be trend stationary [i.e. I(0)] in level.

IV estimation

This study primarily aims to explore the effects of output growth on reducing poverty. Assuming poverty as a linear function of output growth and other set of macro-economic variables those are controlled for, we present a generalized form of the basic equation (i.e. Equation 1).

$$POV = f(\ln GDP, \Delta UNEMP, INF, POP, \Delta GSE)$$

$$POV_{it} = \beta_0 + \beta_1 \ln GDP'_{it} + \beta_2 \Delta UNEMP_{it} + \beta_3 INF_{it} + \beta_4 POP_{it} + \beta_5 \Delta DSE_{it} + u'_{it} \ldots\ldots\ldots \quad (1)$$

Using the OLS estimator, we observe the output growth to increase poverty in Table 4 across the 67 countries for 2004-18. Economic inspection of such influence suggests that the uneven distribution of income may configure the output growth causing poverty to fall (Churchill, 2020). Hence, inequality appears as a theoretically important variable that has been omitted from our model. Such omission can make the model biased and inconsistent. We therefore address this problem through instrumenting the values of output growth (i.e. $\ln GDP'_{it}$) in equation 1 with the estimated values of output growth (i.e. $\ln GDP_{it}$ - *hat*) obtained from equation 2.

$$\ln GDP_{it} = \beta_0 + \beta_1 \Delta IFI_{it} + \beta_2 \Delta UNEMP_{it} + \beta_3 INF_{it} + \beta_4 POP_{it} + \beta_5 \Delta DSE_{it} + u_{it} \ldots\ldots\ldots\ldots \quad (2)$$

Results in panel B of Table 4 show the output growth to significantly reduce the poverty level for the complete sample. Estimates of elasticity using the IV estimators allows us to validate the theoretical construct, assuming the effects of growth in unemployment, inflation, population, states health expenditure to GDP unchanged. Further, the panel shows higher F-static values for the IV estimator as compared to the OLS estimator, suggesting

IV estimator a better fit. The relation and elasticities for the control variables are consistent with the earlier findings and also share valid economic reasoning.

A further stratification of the sample based on average output (i.e. median of per capita GDP) and average non-performing loans to gross loans shows the output growth increasing the incidence of poverty, though not significantly (except in case of countries belonging to output growth above the average) using the OLS estimator. However, these estimates become significantly negative for the countries with below average output and lower fragility applying the IV estimator. The measure of model fitness (i.e. the F-statistic) also got improved using the IV estimator for all the classifications (except the high-fragility group). Since, the F-statistic values for the high-fragility group are not significant, we avoid discussing the results due to inappropriate specification.

Among the theoretically relevant variables that we specify in the model, we observe an upward shift in the unemployment rates reduces poverty significantly across the low-fragility group and for the complete sample. Population growth significantly reduces poverty incidence across all the classifications. Further, as the ratio of health expenditure to GDP increases, incidence of poverty falls for all the groups (except for the high-income group). Whereas an increase in inflation increases the incidence of poverty across all the classifications considered.

While estimating the output growth using the OLS estimator following eq. 2, we find the FE model to appear statistically sound (i.e. significant values of F-statistic) across all the classifications except in the high-fragility group. Results in Table 5 shows that financial inclusion scores on an average are able to significantly increase the output growth across the classifications. We observe a fall in the output growth due to a positive change in the unemployment rates, health expenditure to GDP of the states and population growth. Further, inflation increases per capita output growth across the selected sample though not significantly.

Figure 1 outlines the savings intensity and the incidence of borrowing for the selected sample. These primary functions that are the integral part of the formal financial system indicates the status of prevailing efforts on increasing financial inclusion. Further, results in Table 6 shows the financial inclusion achievements for the sample countries based on income groups. Considering a sample of 67 countries across 2004-18 with values ranging between 0 to 1, Turkey from the above-average productivity group holds the first position whereas Algeria appears to be the least financially inclusive country. Similarly for the countries with below-average productivity we find Uzbekistan and Chad to hold the top and bottom positions respectively.

V. Results and Discussion

This study aims to address (1) whether financial inclusion improves the output growth and (2) whether financial inclusion reduces poverty through improving the output growth. Results in Table 5 shows that the achievements in financial inclusion are sufficiently capable to improve the output growth using the OLS estimator across all the classifications. Further, a review of the vectors associated with the predictor variables in the model also affirms the expected economic behaviour. An increase in the unemployment, population growth and health expenditure to GDP significantly reduces the output growth. Whereas, growth in the consumer prices (i.e. inflation) increases the output growth, though not significantly. Similar evidences has been documented earlier in the findings of Beck et al., (2000), Christopoulos & Tsionas (2004), Beck et al., (2007), Zhang et al., (2012) and many others. Substantial amount of theoretical and empirical work shows that an efficient and well-functioning financial system is a pre-requisite for sustainable long-run economic growth. Almost a century ago Schumpeter (1911) proposes that financial institutions through intermediation between the borrowers and savers, play a pivotal role in economic development. In a similar fashion, modern financial theorists also support the views that the banking system through arbitrage addresses the potential information asymmetries, thus, improves economic growth (Levine, 1997). Cross-country econometric analysis show that higher levels of financial development are significantly and robustly correlated with faster current and future rates of economic growth, physical capital accumulation and economic efficiency improvements (King & Levine, 1993). Allowing the simultaneous equation framework to capture causality across 63 countries during 1960-95 Levine et al. (2000) finds a strong positive link between financial intermediary development and economic growth.

Although a genuine problem associated with the cross-sectional analysis is the existence of structural heterogeneity. Categorizing the complete sample shows significant variation across the groups while analysing the financial development growth correlations (Ram, 1999; Anderson & Tarp, 2003). Country specific cases also extend similar evidences of a positive relationship between financial development and growth, but suggest the functional form to be unique (Demetriades & Hussein, 1996; Demetriades et al., 1998; Luintel & Klan, 1999). Thus a substantial amount of literature affirming the finance-led growth proposition accounts for the cross-sectional heterogeneity due to structural, institutional and policy differences among the economies considered (Jalilian & Kirkpatrick, 2005). Literature also suggests significant imperfections in the capital market from asymmetric information to impair the relationship between financial development and economic growth (Stiglitz 1993, 2000). Therefore, we relax the assumptions of independent and identical distributions for the regressors and errors to make the OLS estimator asymptotically efficient. This relaxation allows us to embark on a more generalized perspective claiming a better theoretical rigour for the results obtained.

Poverty appears as a vital policy target questioning the efficacy of economic growth and development. Hence, addressing the inquiry of eradicating poverty through financial inclusion may subject to introspection directly as well as indirectly (Akhter, 2009). Results in panel A of Table 4 investigates the impact of output growth on reducing poverty through the direct route using the OLS estimator. After adjusting the standard errors for the possible cross-sectional heterogeneity results exhibit inconsistency with the conventional theory showing output growth to increase poverty. Such a divergence is valid following the evidences across a vast body of literature. The economic reasoning behind output growth promoting the poverty incidence is largely assigned to the distribution of income finding place earlier in the studies of Kuznets, 1955; Paukert, 1973; Summers et al., 1984 and Lindert & Williamson, 1985 whereas later in contemporary studies of Goudie & Ladd, 1999; World Bank, 2001; McKay, 2002; Ravallion, 2003 and Jalilian & Kirkpatrick, 2005. To summarize, the linkage between economic growth and poverty reduction requires us to incorporate the distributional effects leading the overall growth process more or less pro-poor over time (Jalilian & Kirkpatrick, 2005). In other words, given the rate of growth, poverty reduction changes with the distribution of income , and with the initial inequalities in income, assets and access to opportunities allowing the poor to grow (World Bank, 2001). In this connection, it seems reasonable to address the issue of access to opportunities by way of incorporating the effects of financial inclusion on output growth and thus on poverty through inspection of the indirect link. Results in panel B of Table 4 shows that financial inclusion reduces poverty through improving output growth. While estimating the poverty and output growth with a common set of explanatory variables in different specifications may lead to generate errors of different nature that are unlikely to produce statistically robust estimates. However, sufficient amount of observations with a weak correlation between the output growth and poverty as dependent variables helps us to set up a system of equations (commonly known as the TSLS arrangement) (Jalilian & Kirkpatrick, 2005).

Financial institutions generally choose to park their funds in places warranted by collateral as well as having a long familiarity and rapport with the organizations, thus contributing to economic growth through improvements in accumulation as well as productivity of endowed resources (Beck et al., 2000). As a result, the status of growth differs significantly for those having access to the formal financial system with those who doesn't have such access given the unequal distribution of income and under the presence of fixed costs of monitoring (Banerjee, 2003). Economists have modelled the impact of credit market imperfections on income inequality using a variety of specifications during the process of economic development. Although we refer to the stylized u-shaped relationship from Greenwood & Jovanovic (1990), especially the later part where declining cost of using financial services ensures a wider accessibility across all the sections of the

society. Such wider accessibility or in other words improvement in financial inclusion increases the availability of credit thus augments output growth and simultaneously reduces the incidence of poverty.

VI. Conclusion and Policy Implications

This article attempts to estimate whether financial inclusion, expressed as a composition of availability, accessibility and usage dimensions, promotes output growth as well as reduces the poverty incidence by improving the output growth.

To accomplish this, we consider a sample of 67 countries for 2004-18 where data seems to be reasonably available. Additionally, the selected sample is further categorized into high-income and low-income countries based on their positional averages (i.e. median of per capita GDP) and high-fragility and low-fragility countries based on the median values of non-performing loans to gross loans ratio. Such segregations will help comparing the variation of estimates across the groups based on either the economic capacity or fragility.

Finally, based on the results from the empirical analysis, we highlight the three major contributions below.

First, a positive change in the financial inclusion score leads to an improvement in the output growth across all the classifications. This suggests that an improvement in the availability, accessibility or usage dimensions will certainly increase the output growth atleast for the sample considered irrespective of the economic capacity or fragility status of the country.

Second, an improvement in the financial inclusion led output growth reduces the poverty incidence across all the classifications. Such effects remain stronger across the low-income and the low-fragility groups as compared to the high-income and the high-fragility groups. This especially highlights the importance of financial inclusion for improving the output growth and reducing poverty incidence across the low-income countries.

Finally, an improvement in the output growth increases the incidence of poverty though not significantly across all the classifications. These sorts of findings however seem inconsistent with the underlying theory especially when the measure of inequality is not in place. By contrast, financial inclusion improves the relationship. The increment in the poverty incidence changes to a negative one when financial inclusion is allowed to intermediate, hence, creating a convergence with the underlying theory.

The scope of financial inclusion-led-poverty reduction mainly through improving the outreach of services offered – that is, improving the availability and accessibility dimensions – have recently emerged across the countries from the low-income group. This study finds output growth to increase the incidence of poverty across all the classifications. However, considering the intermediary role played by the measure of financial

inclusion into account, the positive relationship between output growth and poverty incidence changes to a negative one, thus, converges with the theoretical proposition.

These results are important from the policy perspective, especially for the countries from the lower-income group. It suggests us to extend the availability, accessibility and usage of financial resources to the excluded part and therefore addressing the problems on poverty eradication. By improving the financial accessibility for the excluded sections, given the adequate regulatory and supervisory measures are in place, policy makers can increase the output growth leading to a fall in the poverty incidence.

Moreover, as a scope for further research one can stretch the cross-sectional band as well as the time horizons to frame the heterogeneity, leading to a more generalized view of the findings. By incorporating the measure of inequality in the specification, one can further refine the estimates found and opine more insightfully on the relationship in the coming future.

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Tables and Figures

Table 1: Summary statistics

Variable Description		Obs.	Mean	Std. Deviation	Minimum	25th Percentile	Median	75th Percentile	Maximum
Name	Indicator								
Employed population below international poverty line, aged 25+ (%)	POV*	923	16.633	20.069	0	0.8	8.2	28	78.1
Natural logarithm of GDP per capita growth (annual %)	lnGDP	770	1.044	0.903	-3.912	0.637	1.234	1.627	3.139

YoY change in Unemployment, total (% of total labor force) (modeled ILO estimate)	ΔUNEMP	938	0.047	14.857	-70.297	-4.387	-0.838	3.307	176.191
Inflation, consumer prices (annual %)	INF	849	6.493	5.509	-8.97	3.05	5.42	8.67	55.41
Population growth (annual %)	POP	938	1.668	1.234	-4.54	1	1.705	2.62	6.57
YoY change in Current health expenditure (% of GDP)	ΔGSE	911	0.548	10.738	-100	-4.082	0.369	4.613	72.951
YoY change in the achievements in Financial Inclusion	ΔIFI	934	7.294	53.516	-100	-2.128	0	7.692	1000

* Data for POV has been collected from the SDG Indicators Database, United Nations; whereas others have been sourced from the World Development Indicators, World Bank.

Source: Calculated by Authors

Table 2: Correlation matrix

	POV	lnGDP	ΔUNEMP	INF	POP	ΔGSE	ΔIFI
POV	1						
lnGDP	-0.059	1					
ΔUNEMP	0.025	-0.129***	1				
INF	0.336***	0.049	0.027	1			
POP	0.569***	-0.194***	0.062	0.256***	1		
ΔGSE	-0.036	-0.105***	0.053	-0.127***	-0.046	1	
ΔIFI	0.072*	0.139***	-0.025	0.020	0.056	0.017	1

Note: i) ***, ** and * represents significance at 1%, 5% and 10% level. Common observations: 692

Source: Calculated by Authors

Table 3: Unit root test for panel data

For variables in level			
	ADF	PP	Order of integration
POV	521.568***	658.582***	I(0)
lnGDP	270.716***	264.170***	I(0)
ΔUNEMP	639.723***	610.067***	I(0)
INF	224.284***	241.162***	I(0)
POP	317.601***	320.274***	I(0)
ΔGSE	707.287***	749.410***	I(0)
ΔIFI	736.290***	799.895***	I(0)

Notes:

i) ***, ** and * represents significance at 1%, 5% and 10% level.

ii) Lag selection criteria: Schwarz Information Criterion; Include in test equation: no intercept.

iii) I(1) and I(0) implies integrated of order one (i.e. non-stationary) and zero (i.e. Stationary) respectively.

Source: Calculated by Authors

Table 4: Effect of Economic Growth on Poverty

Method	OLS					GMM (IV)				
Dep. Var.	POV_{it}									
Sample		Income		Fragility			Income		Fragility	
Class	Consolidated	High	Low	High	Low	Full	High	Low	High	Low
$lnGDP_{it}$	0.439	0.412	0.564	0.601	0.285	-4.307	0.042	-5.084	-1.223	-7.357
	(0.304)	(0.232)*	(0.598)	(0.512)	(0.319)	(2.006)**	(0.975)	(2.899)*	(3.597)	(2.838)**
$\Delta UNEMP_{it}$	-0.009	0.001	-0.019	0.003	-0.011	-0.047	-0.005	-0.031	0.003	-0.103
	(0.006)	(0.006)	(0.009)**	(0.013)	(0.010)	(0.022)**	(0.016)	(0.028)	(0.015)	(0.042)**
INF_{it}	0.395	0.231	0.425	0.179	0.340	0.393	0.238	0.403	0.126	0.347
	(0.096)***	(0.087)**	(0.114)***	(0.098)*	(0.088)***	(0.060)***	(0.059)***	(0.086)***	(0.125)	(0.094)***
POP_{it}	-2.828	-1.557	-4.566	0.023	-3.058	-4.548	-1.715	-6.345	0.251	-7.801
	(1.704)	(1.051)	(3.804)	(1.094)	(2.834)	(1.259)***	(0.806)**	(2.218)***	(1.161)	(2.675)***
ΔDSE_{it}	0.019	0.020	0.022	0.054	-0.032	-0.043	0.013	-0.045	0.050	-0.148
	(0.034)	(0.038)	(0.043)	(0.028)*	(0.033)	(0.035)	(0.031)	(0.047)	(0.031)	(0.056)***
C	18.644	5.286	34.482	19.977	17.124	26.205	5.804	44.104	21.532	32.529
	(2.635)***	(0.966)***	(8.398)***	(2.409)***	(4.398)***	(3.667)***	(1.542)***	(6.795)***	(3.697)***	(6.578)***
Panel Obs.	696	340	356	223	473	692	340	352	222	470
Hausman χ- square	49.34***	7.35†	13.64**	32.73***	35.98***	NA	NA	8.11†	1.30†	NA
F-static	4.43***	2.45*	3.50**	1.90	4.51***	11.20***	4.17***	7.47***	1.64	5.20***

Notes: i) ***, ** and * represents significance at 1%, 5% and 10% level.
ii) Standard errors are given in parenthesis ().
iii) † represents selection of the Random effects model based on Hausman specification test.

Source: Calculated by Authors

Table 5: Effect of Financial Inclusion on Economic Growth

Method	OLS				
Dep. Var.	$lnGDP_{it}$				
Sample		Income		Fragility	
Class	Consolidated	High	Low	High	Low
ΔIFI_{it}	0.003 (0.001)***	0.017 (0.004)***	0.003 (0.001)***	0.002 (0.001)	0.004 (0.001)***
$\Delta UNEMP_{it}$	-0.008 (0.002)***	-0.012 (0.003)***	-0.002 (0.003)	0.001 (0.004)	-0.012 (0.003)***
INF_{it}	0.002 (0.008)	0.011 (0.013)	-0.002 (0.009)	-0.025 (0.017)	0.004 (0.009)
POP_{it}	-0.369 (0.174)**	-0.447 (0.250)*	-0.326 (0.252)	0.117 (0.179)	-0.623 (0.203)***
ΔDSE_{it}	-0.013 (0.003)***	-0.021 (0.007)***	-0.012 (0.004)***	-0.004 (0.009)	-0.015 (0.004)***
C	1.599 (0.279)***	1.387 (0.256)***	1.718 (0.553)***	0.866 (0.303)***	1.986 (0.319)***
Panel Obs.	698	346	352	225	469
Hausman χ- square	10.33*	10.36*	11.23**	7.27†	9.58*
F-static	7.52***	8.57***	4.37***	1.22	8.17***

Notes: i) ***, ** and * represents significance at 1%, 5% and 10% level.
ii) Standard errors are given in parenthesis ().
iii) † represents selection of the Random effects model based on Hausman specification test.

Source: Calculated by Authors

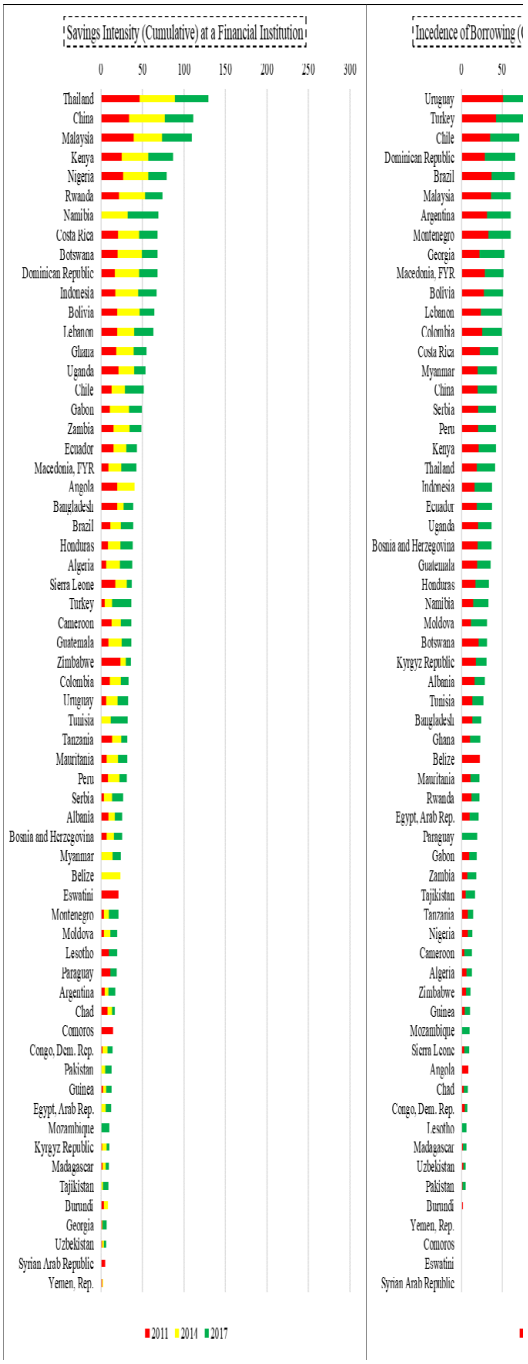
Table 6: Financial Inclusion achievements

High-income group	IFI	Low-income group	IFI
Turkey	0.5614	Uzbekistan	0.3529
Montenegro	0.5086	Honduras	0.3114
China	0.4943	Bolivia	0.2907
Serbia	0.4814	Bangladesh	0.1843
Lebanon	0.4721	Kenya	0.1843
Chile	0.4586	Syrian Arab Republic	0.1621
Bosnia and Herzegovina	0.4571	Egypt, Arab Rep.	0.1471
Malaysia	0.4493	Tajikistan	0.1414
Thailand	0.4464	Pakistan	0.1179
Belize	0.4157	Mauritania	0.1171
Cabo Verde	0.4000	Solomon Islands	0.1093
Brazil	0.3921	Kyrgyz Republic	0.1064
Georgia	0.3921	Zimbabwe	0.0964
North Macedonia	0.3700	Yemen, Rep.	0.0907
Costa Rica	0.3536	Ghana	0.0857
Uruguay	0.3386	Sierra Leone	0.0814
Tunisia	0.3357	Tanzania	0.0814
Namibia	0.2807	Burundi	0.0786
Albania	0.2743	Nigeria	0.0750
Indonesia	0.2650	Mozambique	0.0750
Colombia	0.2643	Timor-Leste	0.0664
Argentina	0.2579	Rwanda	0.0636
Ecuador	0.2450	Lesotho	0.0607
Maldives	0.2329	Uganda	0.0571
Botswana	0.2057	Zambia	0.0521
Suriname	0.1950	Cameroon	0.0493
Dominican Republic	0.1879	Madagascar	0.0350

Paraguay	0.1857	Comoros	0.0300
Peru	0.1800	Myanmar	0.0293
Eswatini	0.1536	Congo, Dem. Rep.	0.0250
Gabon	0.1093	Guinea	0.0221
Algeria	0.0814	Chad	0.0193
Average	**0.3264**	**Average**	**0.1062**
Std. Deviation	**0.1286**	**Std. Deviation**	**0.0827**

Source: Calculated by Authors

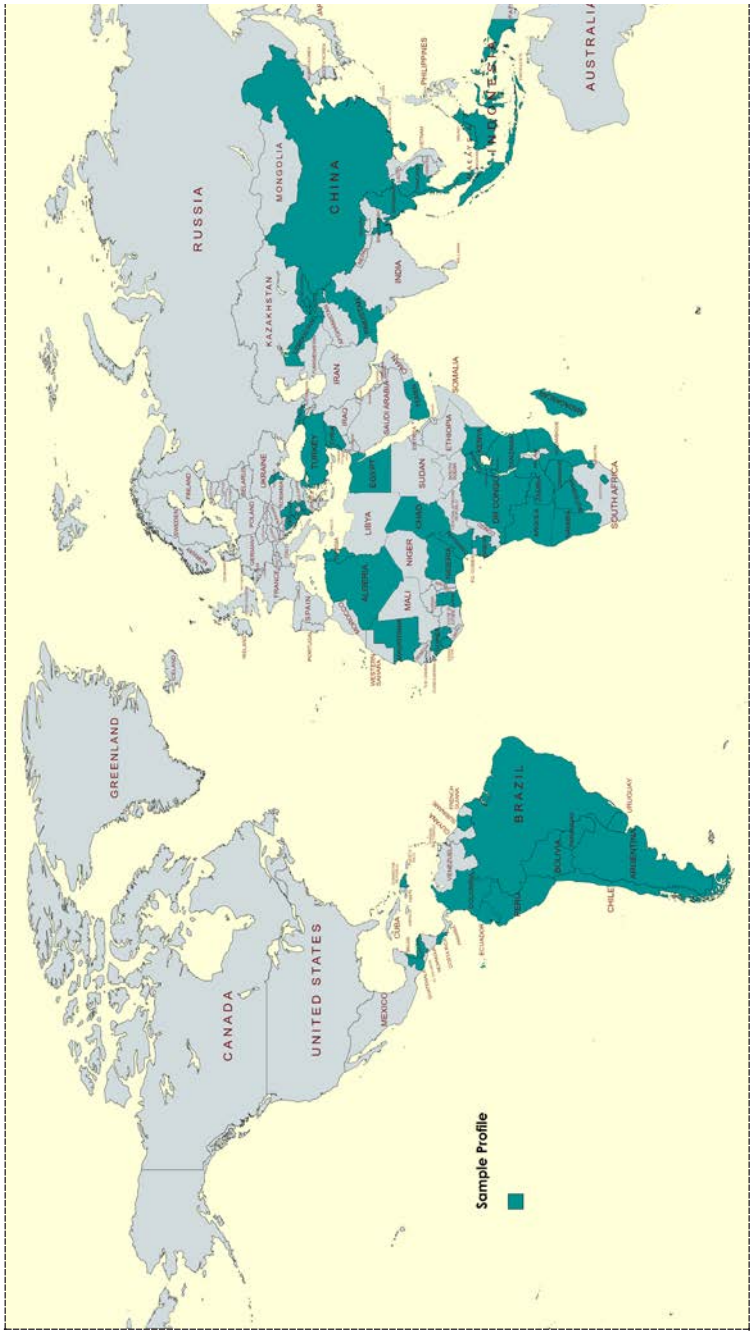
Figure 1: Accessibility to basic financial services across the



Source: Authors' presentation

Appendix

Figure 2: Sample profile at a glance



Source: Authors' presentation

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An Empirical Inquiry in to the Nature of Demand for Health Insurance in India

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Abstract

This study attempts to provide some idea of the nature of demand for health insurance in India. We explore different socio-economic and demographic factors affecting the participation and extent of purchase of the health insurance. The probability of enrolment in the health insurance, along with the premium component of insurance have been estimated applying double-hurdle model.This study has useddata from 75th round Social Consumption Survey of Health (2017-18), NSSO. NSSO data (2017-18) reports nearly 80% of people are beyond the coverage of any kind of health scheme. Empirical findings indicate that Per capita household income measured by per capita consumption significantly affects both the participation decision and the quantity purchase of the health insurance. Moreover, the participation rate and premium paid by the individuals belonging to higher quintiles is relatively higher compared to the individuals in first quintile. As the age increases, both the participation and purchase of the health insurance reduces. There exist significant differences in the demand across different social and religious communities. Education is found as a significant factor which increases the likelihood to participate and spend higher amount in purchasing health insurance. The regular salaried employees are more likely to enrol and spend for health insurance. The demand for health insurance is higher among the females compared to males in India. Though the individuals having chronic illness have a higher rate of enrolment, they spend less for insurance premium. However, the rate of participation and spending on various schemes vary across different regions across India.

Keywords: Craggit Model, Health insurance, Insurance Premium, NSSO, Universal Health Coverage.

JEL Codes: C_{13}, C_{34}, I_{10}, I_{13}, I_{14}, I_{18}, I_{19}

I. Introduction

Health takes a central place in the Sustainable Development Goals target (SDG 3) adopted by United Nations (2015). Universal Health Coverage (UHC), which is the global objective of the SDG, includes three major components- access to healthcare facilities, financial protection from the out-of-pocket expenditure and health services coverage for

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all. Access to healthcare indicates the effective use of medical services to achieve expected health outcomes. On the other hand, coverage defines the share of a population eligible for a set or package of health services. Out-of-pocket (OOP) expenditure is the health expenditure netted off the reimbursement and or cashless amount. Naturally, the OOP shouldered by the persons/households vary depending on the fact whether the persons/households are protected by health insurance or not.

Major health financing mechanisms across most of the lower and middle-income countries are out-of-pocket (OOP) expenditures. In order to reduce the financial burden support of the government in providing and financing health care and preventing catastrophic health expenditure plays a crucial role. Health insurance, which is considered as a major instrument for achieving UHC, targets to improve the access and utilization of health services by making it more affordable to members and to reduce the financial burden of members that generated as consequence of ill health. In case of employer-offered insurance plans a proportion of annual compensation is deducted as premium for providing healthcare services which in most of the cases cover both in-patient (when admitted in hospital) and out-patient expenditure. Private providers of health insurance, which is generally chosen by the individual, provide healthcare services to the family after payment of yearly insurance premium. In case of Government sponsored healthcare programmes, the benefits (mostly as 'inpatient') can be achieved at free of cost on payment upon negligible amount of premium, where the joining is either based on choice or on administrative listing. Also there exists some low premium schemes like micro insurance plans and community-based health insurance schemes in rural area. The premium component of the health insurance is determined considering the asymmetric nature of information in market which creates adverse selection and moral hazard problems.

In India, though the access to health care has improved, there exist inequalities with respect to socioeconomic status, region, gender, and in terms of high out-of-pocket expenditures. In terms of institutional set up in healthcare service India is in a worse position compared to other lower or lower-middle income countries due to low government spending. Poor infrastructure, lack of sufficient number of beds in hospitals and increasing waiting times in the public hospitals therefore encourages the patients to opt for private providers of healthcare. Almost 60% of all hospitalizations, and 70% of out-patient services are delivered by the private sector (NSS, 2019). Therefore, access to healthcare can be improved significantly only if the poor households can be protected from the out-of-pocket expenditure.

In order to improve the access to healthcare a number of health insurance programmes had been launched over time by both the central as well as the state governments. At present, Ayushman Bharat Pradhan Mantri Jan Arogya Yojana (ABPMJAY) launched in 2018, which replaced the erstwhile Rashtriya Swasthya Bima Yojana (2008), is the single

largest health insurance schemes in India. Some popular state sponsored health insurance schemes are Chief Minister's Comprehensive Health Insurance Scheme (Tamilnadu, 2012), Bhamashah Swastha Bima Yojana (Rajasthan, 2015), Swasthya Sathi (West Bengal, 2016), Arogya Karnataka Scheme (Karnataka, 2019). Along with these, there exist govt/ PSU employer supported health insurance schemes (like CGHS, WBHS, ESIC), schemes provided by private employer, insurance coverage arranged by households with insurance companies.

In spite of the existence of many public and private insurance schemes in India more than 80% of the people are beyond coverage of health insurance programmes (NSS, 2019). A share of 55.3% of total hospitalization in the private sector along with Rs. 31,845 as average medical expenditure per hospitalisation indicates that a large proportion of healthcare spending is out-of-pocket expenditure. Apart from that, people having medium level of income are not covered under the Government subsidized insurance plans and they have to consider the cost side of joining some health scheme. Thus, a significant proportion of middle-income people does not join the insurance (referred as 'Missing Middle') (NITI Aayog, 2021).

Several attempts have been made in recent times to investigate if the access to healthcare improves and out-of-pocket expenditure of healthcare services reduces among the enrolled members of health insurance, compared to non-enrolled. As the evidence shows that the participation rate is very poor, it is necessary to investigate why majority of the Indians do not participate in health insurance scheme. This paper tries to explore the socio-economic and demographic factors affecting the participation and the amount of health insurance premium paid by individuals in India. Another intention of the study is to investigate how thenature of participation and purchase of insurance plans vary across different income levels.

II.Literature Review

The issue of health insurance participation has been addressed by many researchers, in the context of developed as well as developing countries. Several studies have been performed across the globe to assess the factors affecting purchase decision of different microinsurance and community-based health insurance schemes (Jutting, 2003; Ito & Kono, 2010; Dercon et al.; 2012; Duku, 2018). The nature of demand for health insurance is quite different from other type of health insurance plans, as the health insurance demand depends on not only on the product attributes or the socio-economic characteristics but on the quality of healthcare services offered (Dercon & Kirchberger, 2008). A significant number of literatures concluded that, either the ultra-poor section is not included into the community- based insurance programmes or they tend to utilize the healthcare services at a very low rate even after joining insurance (Gumber, 2001; Agarwal, 2010; Ito & Kono,

2010). Where the factors like household income, religion, village characteristics affect the probability of this participation, exclusion of the 'poorest of the poor' section as well as exclusion of some religious or ethnic group has been observed (Jutting, 2003).

Among working age adults age, gender, educational level, marital status, health status and travelling time to the nearest healthcare centre were identified as determinants of enrolment into health insurance (Duku, 2018). Individuals having chronic illness are more likely to join the insurance (Cohen & Sebstad, 2006; Wang et al., 2017). The households having ill members demand more health insurance, pay more as insurance premium and are more likely to renew the policy (Mathiyazhagan K., 1998; Bendig & Arun, 2011).

Some studies explored the extent and nature of gender disparity in the health insurance purchase. Where in case of employer sponsored plan married women have a lower joining rate (Buchmueller, 1996) a recent study in China (Zhou et al., 2021) showed that the gender differences in health insurance were more significant in the age group above 50 years and in the low-education group. However, females are more likely to participate in the public health insurance programmes (Kimani et al., 2012).

Attributes of health insurance schemes (Churchill, 2006), education and literacy gaps (Chankova et al., 2008), willingness to pay for premium amount (Dror at al., 2007; Chankova, 2008, Ahmed et al., 2016) are concluded as important determinants of health insurance participation by different researchers. While some studies have documented the positive association between health insurance purchase and income (Acharya et al., 2012), few studies not obtained any significant impact of income on insurance purchase decision (Panda et al., 2017). On the other hand, there exist a direct association between education and insurance purchase- more educated individuals are expected to have better preventative knowledge and thus they are more likely to appreciate the benefits of health protection schemes (Sapelli & Vial, 2003; Shane & Trivedi, 2012). However, some studies discussed that the less educated households have higher enrolment rate due to the fact that lower education leads to worse healthcare practices (Bendig& Arun, 2011). Education has been obtained as less significant than past health experience in the determination of new insurance purchase (Savitha & Banerjee, 2021).

In India, several issues associated (low joining rate, high claim rates and low renewal rates) with the health insurance schemes for the poor have been addressed by some studies (Ito & Kono, 2009; Ahuja and Jutting, 2004). A number of studies have discussed for extending health coverage (Ahuja and Narang 2005; Acharya and Ranson 2005; Gupta and Trivedi 2005; Devadasan et. al. 2006). Some authors (Gumber and Kulkarni, 2000; Dror & Firth, 2014) advocated for increasing the availability and removing constraints of extending health insurance benefits to the vulnerable section (poor, women and informal sector workers). While the factors like age, coverage of illness, knowledge of insurance,

income are obtained as significant determinants of health insurance purchase, no. of children in the family, age, income and perception about future health are the factors observed as affecting the decision regarding the amount of insurance purchase (Bhat & Jain, 2006). Due to the implementation of Government sponsored insurance plans though the female participation has increased over time, utilization of healthcare under the schemes is still low, particularly among elderly women (Dupas and Jain, 2021). In case of private insurance programmes, due to the presence of dominant role of the insurance agents, though the problem of adverse selection can be eliminated, the low level of insurance awareness among the common people results poor insurance coverage rate (Vellakal, 2012). A handful of studies (Sapelli & Vial, 2003) pointed out the issue of self-selection and moral hazard in the health insurance purchase.

In India, most of the existing literature explored the demand side of joining some specific Government sponsored insurance plans implemented in some particular state which predominantly target the vulnerable section of the society. In many cases the enrolment into such plans is based on administrative decision and therefore the role of determinants is not truly reflected by such type of schemes. By taking only public health insurance plans, the middle-income people who are not eligible for public insurance plans but unable to join by paying premium, become excluded from the analysis. Again, very few studies in India have addressed the determinants of premium of health insurance. The premium component, which gives the extent of purchase varies across the nature of health insurance plan, attains positive value (may be zero in case of public insurance programme) when an individual opts for participation. Most of the Indians, have a common tendency to procrastinate the health insurance purchase until they become ill. This type of people hardly opts for enrolling themselves at health insurance below a certain age. In many cases female members of the households are not concerned about their health status and not plan to join insurance, unless they are auto-enrolled into some health scheme. Also, most of the people by nature are loss-averse and reluctant to pay yearly subscription to buy insurance. Thus, despite the existence of many public and private health insurance schemes a large number of people in India are beyond coverage of health insurance programme. In such a scenario it is necessary to examine which factors affect both the demand for health insurance and quantity of health insurance to be purchased. The present study has a twofold motive.The first objective of the paper is to investigate the factors affecting the decision to purchase health insurance and the other objective is exploring the determinants of health insurance premium. In this context the analysis gives special focus on the role of income in influencing health insurance demand.

III.Methodology and Data Sources

Purchase of health insurance is a dichotomous variable which takes value 1 if the individual joins some health insurance plan and 0 otherwise. The amount of the medical pre-

mium can be calculated dividing the total medical insurance premium paid by the family, by the household size. This premium component takes value 0 for the non-participants, but it can be zero for that of participants as well, since in most of the cases, the eligible individual becomes enrolled into the Government sponsored health insurance schemes at free of cost. Therefore, the insurance premium per head exhibits non-negative value for the participants. As participation in health insurance is a binary variable, binary logit or probit model is suitable to investigate the factors which are responsible in affecting the probability of individuals to enroll in health insurance schemes(Jutting, 2003; Wang et al., 2005).For estimating the intensity of expenditure related to health insurance, the tobit model is widely used(Al-Hanawi et al., 2018; Sriram and Khan, 2020). The tobit model is used to describe the relationship between a dependent variable and one or more independent variables when there is either left or right censoring of the dependent variable. The main critique of the tobit model is that it does not allow the set of variables used in explaining whether the binary dependent variable takes value 1 or 0, to differ from the set of variables used in explaining the value of the dependent variable conditional on the dependent variable has 1 value. In the present study different sets of independent variables may determine the positive response towards participation in health insurance and the amount of insurance premium given the positive response. For example, the types of insurance plan determine the premium component while this explanatory variable is not relevant while considering the purchasing decision. In this context the two tier or double hurdle model, introduced by Cragg (1971) can be formulated to estimate the decision of purchasing health insurance plan and the volume of the premium component given purchase takes place, with two different sets of independent variables. In the first hurdle the decision to participate in insurance is estimated whereas in the hurdle two the determinants of the extent of insurance purchase would be reported given the participation considering two different set of explanatory variables.

A handful of studies,like Bhat and Jain, 2006used two-stage model likethe Heckman (1976) selection model where both the determinants of insurance purchase decision and the factors affecting the amount of insurance purchased have been estimated at the two stages. Butthe Heckman model assumes that in the second stage there will be no zero observations once the first stage is passed, whereas Cragg's double hurdle model assumes that there may be possibility of zero observations due to the participants' choice or some random factors. In this case, Cragg's model is the appropriate choice as the premium component may take 0 value for Government sponsored insurance plans.

The decision of purchasing the membership of health insurance plan, along with the quantity of purchase depends on the socio-economic and demographic characteristics of the individuals. Based on the literature review, we find that income, age, gender, educational level, marital status, religion, caste, occupation, health status affect the decision to

participate and the size of the premium purchase for an individual. Apart from this, in a country like India the demand for insurance is expected to vary across regions i.e., over different states and rural-urban areas across the country. With this end in view, this study has formulated the double hurdle model for investigating the factors affecting the demand for health insurance for the people in India in recent times. The study is designed to estimate the demand for health insurance in two tiers. The first tier estimates the decision to participate in health insurance programme while the second tier estimate the volume of cost borne by the individual for the participation in health insurance programme.

Based on the literature review and our personal justification we have selected some variables for conducting the empirical inquiry into the nature of the demand for health insurance in India. The specification and working definition of the variables for the double hurdle models are as follows.

Decision to participate in insurance scheme:

It is constructed as a dichotomous variable indicating value 1 and 0. We attach value '1' for the individuals enrolled inany of the health insurance scheme (mentioned in table 1).The persons not covered by any type of health insurance scheme are grouped as not covered and we attach value'0'. This is the dependent variable in the first tier of the double hurdle model.

Health Insurance premium per capita:

The health insurance premium per individual is taken as the dependent variable in the tier two of the double hurdle model. The component 'insurance premium paid by the family during last 365 days'which is given in the NSS data, has been transformed into per capita insurance premium by dividing it with the respective household size.

Monthly Per capita consumption expenditure (MPCE):

Like demand function of any goods and service we examine the income effect on the demand for health insurance. Since the data on income is not available, expenditure is taken as proxy forincome. NSSO provides data on household's usual monthly consumer expenditure, which has been converted into per capita consumption by dividing it with the respective household size. In order to measure the impact of per capita expenditure on decision to participation and volume of premium paid for it we have taken log of per capita expenditure which is suitable for measuring the diminishing marginal impact of income.It is expected that expenditure for health insurance increases more slowly as total expenditure increases.However, often it is better to make income or expenditure variable as a categorical variable for reducing the measurement error. That is why; alternatively we have formulated a model taking expenditure quintile as an explanatory variable instead of log of per capita expenditure.

Expenditure quintile:

It is taken as a proxy for income quintile. Expenditure quintiles on monthly consumption expenditure per individual are constructed taking 20% of the total sample in each group when data are arranged in respect of per capita household expenditure in ascending order. The analysis with expenditure quintile would be helpful to evaluate the coverage of health insurance for different income groups of Indians. The lowest expenditure quintile is taken as the reference category.

Age of the Individual:

Physical age of an individual is an important factor to take decision to participate in health insurance scheme and regarding premium amount. We can assume that demand for health insurance first decline and then rising as age increases. To examine this hypothesis this study includes age and square of age as explanatory variable in the model of demand for health insurance.Age and square of age (in terms of year)is taken as continuous variable.

Gender:

The present study considers three categories for gender of the individuals- male, female and transgender.As the number of individuals who are transgender is negligible, this study considers one dummy for gender indicating '1' for female and '0' otherwise.

Religion:

The categories of religion under consideration are Hinduism, Islam, Christianity, Sikhism and other religions (including Buddhism, Jainism, Zoroastrianism and others). Taking Hinduism as the reference category for the current study, four dummy explanatory variables for Islam, Christianity, Sikhism and other religions respectively have been constructed.

Official Caste:

Official Caste of a person is a categorical variable indicating the person belonging to a specific official castes, i.e., General Castes, Other Backward Classes (OBC), Scheduled castes (SC), Scheduled tribes (ST). Therefore, three dummy explanatory variables have been used in this context where General Caste individuals are belonging to the reference category.

Marital status:

Marital status is a categorical variable having different states namely currently married, never married, widowed and separated. Three dummy explanatory variables have been created here where currently married is the reference category.

Education:

NSS data describes total 15 categories of education. For the ease of analysis these categories have been reduced into sevencategories. Considering 'Illiterate' as the reference category thus six dummy variables have been created, namely 'Below primary', 'Primary', 'Middle school', 'Secondary or equivalent', 'Higher Secondary or equivalent', 'Graduation or equivalent and above'.

Usual Principal Activity Status:

It indicates the activity in which the individual has spent majority time in the last 365 days. We have compiled the categories of usual activity status into 8 categories. By taking the 'Salaried employee' as the reference category the study would use seven dummy variables. These variables are: 'Self-Employed individuals', 'Casual workers', 'Individuals seeking job', 'Individuals attending some educational institutions', 'Pensioners & remittance recipients', 'Child', 'Persons having other occupations'.

Chronic ailments:

The dummy variable for the persons suffering from chronic ailment has been created as '1' if the individual has any chronic ailment and '0' otherwise.

Sector:

The binary variable for sector consists of two categories- 0 if the person resides in the 'urban' sector and 1 if the person resides in the 'rural' sector.

Region:

Instead of assigning state-code the study assigns regional dummies to the regions consisting of different states. Thus, six regions have been created- North, North-Eastern, West, Central, East, and South. The states classified under different regions are given below:

Northern Region- Chandigarh, Delhi, Haryana, Himachal Pradesh, Jammu & Kashmir, Punjab, Rajasthan

North Eastern Region- Assam, Arunachal Pradesh, Manipur, Meghalaya, Mizoram, Nagaland, Tripura

Eastern Region- Andaman & Nicobar, Bihar, Jharkhand, Orissa, Sikkim, West Bengal

Central Region- Chhattisgarh, Madhya Pradesh, Uttaranchal, Uttar Pradesh

Western Region- Gujrat, Dadra & Nagar Haveli, Daman & Diu, Goa, Maharashtra

Southern Region- Andhra Pradesh, Karnataka, Lakshadweep, Pondicherry, Tamil Nadu, Telangana, Kerala

Northern region has been taken as the reference category and dummies have been created for the rest five categories.

Types of Health Insurance:

The study considers five types of health insurance; namely Government sponsored insurance, Government/ PSU employer supported insurance, private-employer provided insurance, the insurance arranged by the household with insurance companies and other types of insurance. Here we have constructed four dummy variables and taken the Government sponsored insurance as the reference category.

The 75th round NSS data (2017-18) of Social Consumption Survey (Health), a nationally representative data set, has been used to conduct the inquiry into the nature of demand for health insurance and its premium. NSS data consists of a large number of socio-economic and demographic variables. The entire dataset consists of data on 5,55,351 individuals. Since the insurance premium data is given at household level, while calculating the premium component per head we get some positive quantity of premium for the individuals who are not enrolled in the health insurance. One possible reason for this type of finding is while the household decides to opt for some health scheme, the particular person is not covered under the family health insurance plan. Thus, we have to drop individuals who are not enrolled in any type of scheme but exhibits a positive quantity of insurance purchase. Total 1,36,761 individuals have been dropped from the dataset for this reason. We perform our analysis considering 4,18,590 individuals. Among them 94,586 individuals are enrolled into health insurance schemes. In case the amount of premium paid is not reported by the family (appears as 'missing values') it has been replaced by 0.

IV.Results and Discussion

First this study describes nature of data and overviews of the insurance purchase for different types of insurance. In accordance with the NSSO data, individuals have been classified into five categories based on their choice of joining health insurance scheme which has been shown in table 1.

Table 1: Enrolment in different types of health insurance plan across Rural & Urban India(n=4,18,590)

Sector	Percentage of persons not covered	Percentage of the sample persons covered by					
		Government sponsored schemes	Government/ PSU Employer sponsored schemes	Private employer sponsored schemes	Arranged by households with insurance companies	Others	All
Rural	79.12	18.14	1.37	0.49	0.40	0.47	100.0
Urban	74.90	11.84	5.15	3.07	4.62	0.42	100.0
Total	77.40	15.58	2.91	1.54	2.12	0.45	100.0

Source: computation based on NSS 75th(2017-18)round data

As per our sample data, nearly 80% individuals in the rural area and 75% of people in urban area are not enrolled in any type of health insurance programme. The proportion of people who join the government sponsored schemes is higher in rural area, whereas the health insurance holders of employer sponsored (both public and private employer) schemes as well as household purchased plans are larger in proportion in the urban India. Thus, rate of enrolment in health insurance program is still very low in India in spite of the functioning of several private and public health insurance programmes. The coverage of health insurance, in most of the developing nations is significantly higher than India. Like, in China more than 95% of the population are covered by some form of health insurance. Nearly 75% of the population in Thailand are enrolled in the largest government subsidized health scheme (Universal Coverage Scheme or UCS). Several Latin American countries also have expanded the coverage for different health insurance schemes by introducing fully subsidized schemes for the poor and medically vulnerable section (NITI Aayog Report, 2021).

Basic socio-economic and demographic features of the sample individuals have been presented in table 2 and 3.

Table 2: Descriptive Statistics of the Socio-economic and Demographic features of sample individuals

	Age (Year)	Per Capita Monthly consumption Expenditure(Re)	Yearly payment of health insurance premium per head paid by the participants(Re)
Sample size	4,18,590	4,18,590	94,586
Mean	28.85	2352.16	484.17
Median	27	1912.5	0
S.D.	19.68	1764.39	1594.90
C.V.	68.21	75.01	329.41
Min	0	83.33	0
Max	115	50000	42000
Skewness	0.46	4.54	8.54

Source: computation based on NSS 75th round (2017-18) data

Thus, we can see that the average age of the respondents is 28.85 which is close to the median age. 50% of the individuals have their age less than or equal to 27. Mean consumption expenditure per respondent is Rs. 2352.16 whereas the mean of the expenses for insurance premium is Rs. 484.17. There exists enough variability in the consumption expenditure across individual. Not only the minimum value but the median of yearly in-

surance premium (per head) depicts a minimum of zero. Since a large no. of participants are covered by the govt. sponsored health insurance plan, they pay 0 premium.

As both the expenditure and premium component are positively skewed these variables are taken in model after logarithmic transformation. After considering the log values, some values of the insurance premium become negative (if the original value is a positive fraction) or undefined (if the original value is 0). This issue has occurred due the fact that the Government insurance schemes are provided at free of cost. Since Craggit(1971) model considers only non-negative values of the dependent variable in the tier 2, for the purpose of analysis all these values have been replaced by 0.

Table 3: Frequency Distribution of the Categorical variables of the Individuals (n=4,18,590)

Categorical variables	Frequency	Percentage	Number Insured individuals	Insured in Percent
Expenditure (MPCE) Quintile				
Quintile 1	92,788	22.17	13,436	14.48
Quintile 2	83,564	19.96	14,434	17.27
Quintile 3	77,292	18.46	16,742	21.66
Quintile 4	82,129	19.62	20,823	25.35
Quintile 5	82,817	19.78	29,151	35.20
Gender				
Male	213,559	51.02	47,841	22.40
Female	205,004	48.97	46,739	22.80
Transgender	27	0.01	6	22.22
Religion				
Hinduism	315,465	75.36	71,608	22.70
Islam	62,459	14.92	8,323	13.33
Christianity	24,124	5.76	11,975	49.64
Sikhism	9,484	2.27	934	9.85
Others	7,058	1.69	1,746	24.74
Caste				
General	124,890	29.84	25,937	20.77

SC	72,716	17.37	13,731	18.88
ST	53,385	12.75	19,051	35.69
OBC	167,599	40.04	35,867	21.40
Education Level				
Illiterate	116,610	27.86	22,349	19.17
Below primary	58,820	14.05	12,163	20.68
Primary	50,170	11.99	11,320	22.56
Middle school	57,292	13.69	13,003	22.70
Secondary or equivalent	54,249	12.96	12,901	23.78
Higher secondary or equivalent	40,434	9.66	9,464	23.41
Graduation & above	41,015	9.80	13,386	32.64
Usual Principal Activity status				
Salaried employee	30,170	7.21	10,825	35.88
Self-employed	73,845	17.64	17,172	23.25
Casual worker	36,207	8.65	9,140	25.24
Seeking work	5,980	1.43	1,372	22.94
Attending education	95,512	22.82	20,118	21.06
Children	32,386	7.74	4,730	14.61
Pensioners & remittance recipients	8,978	2.14	2,954	32.90
Others	135,512	32.37	28,275	20.87
Marital status				
Never married	181,482	43.36	35,667	19.65
Currently married	216,936	51.83	53,478	24.65
Widowed	19,139	4.57	5,057	26.42
Separated	1,033	0.25	384	37.17
Suffering from chronic aliment				

Yes	17,891	4.27	7,032	39.30
No	400,699	95.73	87,317	21.80
Sector				
Rural	248,308	59.32	51,839	20.88
Urban	170,282	40.68	42,747	25.10
Region				
North	73,135	17.47	17,009	23.26
Northeast	47,154	11.26	12,723	26.98
East	75,224	17.97	8,707	11.57
West	103,302	24.68	12,407	12.01
Central	48,789	11.66	8,816	18.07
South	70,986	16.96	34,924	49.20

Source: computation based on NSS 75th round(2017-18) data

Table 3 depicts that the nearly half of the total sample is female. Among people of different religion, Hindus are largest in number. In case of social community (caste) the people belonging to the OBC category takes the highest count. Nearly 28% of the respondents are not literate; only 9% falls in the category 'graduation and above'. Only 7% of the individuals are salaried employee. Larger proportion of people resides in the rural sector. Around 4.27% of the sample respondents suffer from some type of chronic health issues.

The enrolment rate in health insurance is highest for 5th income quintile, though it is less than 50%. Both males and females have more or less similar rate of joining. Among individuals of different religions, Christians possess the highest rate of health insurance purchase, whereas the people belong to the 'Scheduled Tribe' community have the highest enrolment. The proportion of insured increases as individual receives more education. The 'Salaried Employee' category has the highest proportion of insured people. Southern region in India shows the largest percentage of insured persons among all regions.

Table 4: Determinants of Participation in Health Insurance scheme & Its Premium

Estimating Cragg's Double hurdle model assuming conditional independence						
	Model 1 (Log likelihood= -169630.29)			Model 2 (Log likelihood= -171260.21)		
Variable name	**Coefficient**	**z statistics**	**P - value**	**Coefficient**	**z statistics**	**P- value**
Tier I						
Constant	-6.380	98.56	0.000	-1.923	-68.97	0.000
log (Household MPCE)	.633	98.56	0.000			
MPCE Quintile						
Quintile 2				0.225	16.81	0.000
Quintile 3				0.333	25.38	0.000
Quintile 4				0.536	42.28	0.000
Quintile 5				0.898	68.89	0.000
Age	-0.006	-5.44	0.000	-0.006	-5.87	0.000
Age-square	0.0001	10.00	0.000	0.0001	11.17	0.000
Gender						
Female	0.034	4.40	0.000	0.040	5.13	0.000
Caste						
Scheduled Caste	-0.192	-18.19	0.000	-0.229	-21.70	0.000
Scheduled Tribe	0.176	13.48	0.000	0.147	11.30	0.000
Other Backward Classes	-0.175	-21.71	0.000	-0.206	-25.62	0.000
Religion						
Islam	-0.016	-1.58	0.114	-0.041	-4.08	0.000
Christian	0.659	48.23	0.000	0.657	48.15	0.000
Sikh	-0.337	-14.48	0.000	-0.312	-13.53	0.000
Others	0.388	19.23	0.000	0.401	20.09	0.000
Education Level						

Below primary	0.312	22.59	0.000	0.318	23.05	0.000
Primary	0.301	21.76	0.000	0.310	22.46	0.000
Middle school	0.368	27.43	0.000	0.383	28.59	0.000
Secondary or equivalent	0.329	24.78	0.000	0.349	26.35	0.000
Higher secondary or equivalent	0.386	27.30	0.000	0.416	29.44	0.000
Graduation and above	0.60	42.87	0.000	0.682	49.13	0.000
Usual Principal Activity status						
Self-employed	-0.332	-27.01	0.000	-0.328	-26.80	0.000
Casual worker	-0.266	-17.28	0.000	-0.262	-17.05	0.000
Seeking work	-0.299	-12.05	0.000	-0.332	-13.49	0.000
Attending education	-0.164	-11.25	0.000	-0.149	-10.27	0.000
Children	0.040	1.81	0.071	0.059	2.68	0.007
Pensioners & remittance recipients	-0.274	-13.66	0.000	-0.262	-12.97	0.000
Others	-0.180	-16.15	0.000	-0.178	-16.00	0.000
Marital status						
Unmarried	0.006	0.42	0.672	0.017	1.29	0.197
Widowed	-0.064	-3.96	0.000	-0.069	-4.25	0.000
Separated	0.161	3.21	0.000	0.177	3.52	0.000
Having chronic ailment						
Yes	0.271	20.75	0.000	0.284	21.71	0.000
Sector						
Rural	-0.130	-17.61	0.000	-0.171	-23.07	0.000
Region						
Northeast	0.123	8.39	0.000	0.103	7.00	0.000
East	-0.064	-5.61	0.000	-0.096	-8.28	0.000
West	0.097	8.55	0.000	0.080	7.07	0.000

Central	-0.379	-30.75	0.000	-0.415	-33.98	0.000
South	.365	34.72	0.000	0.348	33.29	0.000
Tier- II						
Constant	-2.858	-23.53	0.000	2.955	49.77	0.000
log (Household MPCE)	0.823	59.57	0.000			
MPCE Quintile						
Quintile 2				0.211	5.39	0.000
Quintile 3				0.390	10.39	0.000
Quintile 4				0.629	17.66	0.000
Quintile 5				1.224	34.70	0.000
Age	-0.011	-5.51	0.000	-0.014	-6.89	0.000
Age-square	0.0001	7.09	0.000	0.0002	9.05	0.000
Gender						
Female	0.044	2.67	0.008	0.055	3.30	0.001
Education Level						
Below primary	-0.152	-4.65	0.000	-0.144	-4.32	0.000
Primary	-0.109	-3.24	0.000	-0.089	-2.59	0.009
Middle school	0.0002	0.01	0.994	0.038	1.15	0.250
Secondary or equivalent	0.093	2.96	0.003	0.128	3.97	0.000
Higher secondary or equivalent	0.175	5.27	0.000	0.225	6.68	0.000
Graduation and above	0.352	10.91	0.000	0.499	15.38	0.000
Usual Principal Activity status						
Self-employed	-0.018	-0.65	0.514	-0.004	-0.16	0.875
Casual worker	-0.411	-11.29	0.000	-0.392	-10.54	0.000
Seeking work	-0.183	-3.67	0.000	-0.231	-4.58	0.000
Attending education	-0.016	-0.54	0.592	0.018	0.58	0.565
Children	-0.110	-2.14	0.032	-0.086	-1.66	0.097

Pensioners & remittance recipients	0.057	1.39	0.166	0.051	1.22	0.223
Others	-0.079	-3.41	0.001	-0.078	-3.33	0.001
Having chronic ailment						
Yes	-0.071	-2.74	0.006	-0.058	-2.19	0.028
Sector						
Rural	-0.438	-27.44	0.000	-0.481	-29.30	0.000
Region						
Northeast	-0.298	-11.79	0.000	-0.334	-13.00	0.000
East	0.045	1.54	0.124	-0.023	-0.77	0.439
West	0.250	9.27	0.000	0.182	6.75	0.000
Central	0.119	4.04	0.000	0.053	1.78	0.075
South	-0.351	-15.63	0.000	-0.401	-17.66	0.000
Type of Insurance						
Government/ PSU employer sponsored	2.221	109.17	0.000	2.212	107.24	0.000
Private employer sponsored	2.836	110.02	0.000	2.861	109.70	0.000
Arranged by households	3.428	139.71	0.000	3.510	141.25	0.000
Others	1.092	33.63	0.000	1.170	35.71	0.000
Sigma_constant	1.305	267.47	0.000	1.322	267.63	0.000

Source: computation based on NSS 75th round (2017-18) data

The results of Cragg's Double hurdle model have been reported in the table 4.

The first model deals with the log of monthly consumption expenditure (per head) as a continuous variable. In the second model, monthly average expenditure is taken as categorical variable, in terms of expenditure quintile.

Whereas the tier 1 of the model identifies the determining factors of the participation in health insurance in India, tier II points out the determinants of the premium amount of insurance.

Let us interpret the result of tier I of the first model. Log of average household expenditure shows a positive and significant coefficient. An on unit rise in log average expenditure results an increase in likelihood of insurance enrolment by 0.63%. Therefore, higher is the average monthly consumption of the individual, higher is the participation rate of insurance.

The coefficient of age is -0.006, significant at 1%, tells us that the log likelihood in favour of joining health insurance increases by 0.6% as the age increases by 1 year. Square of age also has, very small but significant impact on insurance purchase. That means the tendency of joining health insurance decreases with age at an increasing rate.

Gender is a significant determinant of health insurance membership. Compared to males, the log likelihood of buying a health insurance scheme is 3.4% higher in case of females.In case of social group, scheduled class and other backward class people have a lower rate of participation than general category people while the individuals belonging to the scheduled tribe category have a better enrolment than general caste people. The study has found religion as another significant determinant. Though the coefficient of participation in case of Muslims is insignificant, the other religions show significant results. For Christians the rate is higher than Hindus while in case of Sikhs it is lower.

Education has been obtained as significant determinant of joining health insurance plans. Compared to the individuals who are illiterate, persons attained different levels of education have higher probability of participation in the health insurance. The usual activity status is another important factor affecting the purchase decision. Individuals who are casual workers, self-employed, seeking work, pensioners & remittance recipients and persons not currently working, attending domestic duties have lower likelihood of participation than the salaried persons.

Another important influencing factor of health insurance purchase is marital status. Whereas widowed persons have a lower joining rate, individuals who are separated have a higher rate of participation than married individuals. Widowed persons are generally aged and thus have a poor enrolment rate. However, we have obtained the coefficient of never married category as insignificant.

Chronic ailment of individuals is a significant factor that determines the membership of health insurance. Persons having some chronic ailment have 27.1% higher log likelihood of enrolling in the health insurance.

The analysis reports a lower participation of people residing in rural India than that of urban. Region-wise comparison depicts a higher rate of joining for the states in the north-eastern region, western region and southern region and lower rate of participation in case of states in the eastern and central region, than the states of north India. The im-

plementation and coverage of different state-sponsored insurance schemes is the main reason behind this regional disparity in participation of health insurance.

The other model also exhibits more or less same results. The study observes positive and significant coefficient for all the expenditure quintiles, where the value of the coefficients shows increment as moving from lowest to highest expenditure quintiles. This finding indicates that expenditure, as a proxy of income, is an important socio-economic determinant of health insurance participation. Wealthier people are more prone to enrol in health insurance. However, in the second model we obtain a negative and significant coefficient for the Muslims which implies that the rate of health insurance participation is significantly lower for individuals belonging to Islam religion than Hindu people.

Let us now explain the determinants obtained in tier II of the model. Both of the models display similar kind of result in this case. Higher is the consumption expenditure, higher is the volume of purchase. People belonging to the highest expenditure quintile spend the highest amount in purchase of health insurance.

Given that the participation is positive, age and age-square both have significant coefficient. However, the extent of insurance purchase falls as the age increases. It may be reason that the elder people are more loss-averse and therefore, reluctant to spend much paying the premium. Compared to men, women have higher tendency to spend more amount for health insurance.

Individuals belonging to the first two categories of education, i.e., below primary and primary have a lower likelihood of spending for health insurance that the individuals who are not literate. The coefficient of the category 'Middle school' is insignificant. Persons having lower level of education may have the knowledge of different Government insurance schemes, and thus they can take the advantage of such schemes and join insurance at a very low cost. The rest of the categories of education have higher value of the coefficient than that of the category 'illiterate'. Overall, it can be concluded that after a certain level of education, more educated is the individual, higher is the likelihood to pay for premium.

Among different categories of activity status, the salaried persons have likelihood to pay high insurance premium. Salaried employees are generally enrolled into the health schemes provided by the employer for which a yearly subscription has to be paid.

However, the purchase of insurance quantity is low for the persons suffering from chronic health diseases. This type of persons actually accesses the insurance at a lower compared to others which is actually a consequence of adverse selection problem. The amount of premium component differs across different regions in India. Compared to north India it is lower in southern and north-eastern states but higher in western and cen-

tral regions. This variation in the extent of insurance purchase may occur due to variation in the coverage different state sponsored insurance health schemes. Individuals, belonging to some state may end up spending low for premium amount if the particular state has a very high enrolment rate into some Government sponsored insurance plan.

The result also confirms that the individuals who are enrolled into the Government schemes, spend the lowest as premium whereas this amount is highest in case of health insurance offered by private companies.

V.Conclusion

First of all, the Government has to take initiatives to increase awareness and confidence about health insurance among the public through different modes such as hospitals, health centres, healthcare workers. Education definitely improves the knowledge of healthcare facilities as well as different health insurance policies. The individuals who do not receive coverage under any of the health insurance schemes, actually belong to the vulnerable section of the society. A poor enrolment rate of the elderly people results lower access and utilization of healthcare among the aged persons. Lower participation of the retired persons brings in the similar type of problem in the society. It is clear that a large number of informal workers, unemployed people and household workers do not able to take the benefits of health insurance. Most of the minority communities are in worse position in terms of availing health insurance. Introduction of standardized, low-cost insurance with simplified terms and conditions, having the facility of getting cashless treatment definitely helps this vulnerable section of the society. Administrative listing at the grassroots level is necessary to increase the coverage of subsidized Government sponsored insurance plan. Definitely, the coverage has increased among the poor & informal sector after the introduction of Ayushman Bharat Pradhan Mantri Jan Arogya Yojana (ABPMJAY) scheme in 2018. The lower-middle and middle income group people, who are not covered under the Government subsidized insurance plans, must get access to some low-cost insurance introduced by Government or public sector insurance companies. Auto-enrolment of family in the employer provided health scheme upon payment of yearly subscription may be made mandatory in case of contractual and part-time workers. Evidence shows that both participation as well as premium payment is higher among women than men. Like Swasthya Sathi scheme in West Bengal, Government health insurance schemes can be issued in the name of some women member in the family in order to increase the utilization of proper health care facility of the women. Premium component is to be decided with special attention in case of persons having chronic illness. Moreover, the healthcare infrastructure in the country must be capable enough so that the people can get access healthcare facilities as per requirement, utilizing the benefits offered by the health insurance.

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