MACROECONOMICS OF COVID-19 PANDEMIC : A THEORETICAL PERSPECTIVE WITH REFERENCE TO INDIA

Mainak Bhattacharjee*

Dipti Ghosh**

[*The pandemic caused by COVID-19 virus and the imposition of great lockdown has thrown the global economy off its feet by putting the trade and commercial in utter impasses. At this juncture, standard wisdom of macroeconomics envisages a massive disruption in supply as well as in demand. This paper seeks to examine the economic fallout of the pandemic in the light of demand-supply constrained macroeconomic equilibrium. It has been illustrated how imposition lockdown led to severe plummeting of aggregate demand with the emergence of poignant aversion to spending at spree in anticipation of future economic predicament. Beside this, investors also become pessimistic leading to investment turning relatively interest inelastic. Under the circumstances, though fiscal expansion to combat the crisis emerged as the linchpin the macro-economic policies, it becomes essential to investigate the efficacy of fiscal stimulus (backed by monetization of deficit) of the government on the real variables of the economy which is addressed in this paper. Besides, this study also reveals the potential risk of overshooting the inflation rate associated with this kind of fiscal stimulus.*

Keywords: Pandemic, Economic Lockdown, Fiscal Stimulus, Deficit Monetization, Inflation]

Introduction

The advent of pandemic posed COVID-19 virus has brought a grievously tough time for the world and in particular, it has thrown the global economy off its feet by putting the trade and commercial in utter impasses. At this juncture, standard wisdom of macroeconomics envisages a massive disruption in supply as well as in demand, as what the social and consequently, economic shutdown manifest. This posits a reasonable ground to put this context into a framework of demand-supply constrained macroeconomic equilibrium, much in form of what is typical of the stylized approach to macroeconomic analysis. To take a deeper look into the above dispensation, the prolonged lockdown promulgated as the only means (as what is the sole way to respond to the extant health crisis, when there is palliative or some well-testified medical treatment) to contain the spread of the infection by COVID-19 has completely mopped up the normal tenor

* Assistant Professor, Loreto College, Kolkata, E-mail: *mainkbh4@gmail.com*

** Research Scholar, Jadavpur University, Kolkata, E-mail: *dipti.ghosh1992@gmail.com*

of buying and selling of goods and services, putting the demand-side on its knees (the case of demand –constrained equilibrium) the one hand, along with the hobbling of transport services on the other leading to an immobility in the factors of production (especially, labour) as a deterrence to the supply of goods and services (so as to beget a supply-constrained equilibrium). The current time has catapulted the global into an unchartered predicament beset with smack of boisterous economic derailment, as what this paper seeks to capture in the light of the standard Keynesian perspective.

Literature Review

The outbreak of COVID-19 has created multifariouseconomic implications. Many contemporary studies have been conducted in these macro aspects. Some of them are listed below.

A study by K R Shyam Sundar et al. (2020) argues that changes to labour laws by state governments will lead to anarchy in the labour market. It states that multiple labour market securities in the formal sector like employment, health and safety, skills, and income will either be weakened or destroyed. It suggests that the collectivization of workers is essential to restore stability. The article by Uma Lele et al. (2020) analyzes the post COVID-19 situation in respect to India's food supply and demand management. Pinarayi Vijayan(2020)advocates that a truly federal set-up with shared responsibilities between the centre and states is better suited to deal with situations like the present one rather than a centralized system with reference to the case of Kerala where a participatory mode of governance with empowered local governments helped in pandemic mitigation effective. Frederic Boissay et al. (2020) in a review article elaborated the macroeconomic effects of Covid-19 and compared it with the1918 pandemic and SARS on the basis of some selected indicators.

Anton Pichler et al. (2020) provides quantitative predictions of first-order supply and demand shocks for the US economy where it was found that these shocks would threaten around 22% of the US economy's GDP, jeopardise 24% of jobs and reduce total wage income by 17%. They classify industries as essential or non-essential and construct a Remote Labor Index to analyze the supply shock. It also reveals that how these shocks are likely to have an impact at different occupation levels and among different industries.

Gavin Goy et al. (2020)**argues that**t he COVID-19 crisis will push down the equilibrium real interest rate further if potential growth falls and risk premia remain elevated due to increased risk aversion while analyzing the impact of the COVID-19 crisis on the equilibrium interest rate . On the other hand if the increased supply of government bonds persists, there will be an upward effect on the equilibrium interest rate. In other words, it acknowledges that the overall effect of the crisis on the equilibrium interest rate is ambiguous and will depend partly on the extent to which the increasing public debt can provide the

private sector with a safe asset for holding precautionary savings.

However, the supply side and demand side impact in a 1918-like pandemic scenario was analyzed and calculated by Arnold et al (2006), by combining an estimated loss of employee work days with an estimated productivity per worker.

The Model

The paper develops a macroeconomic model reflecting demand and supply sides much in line with the Complete Keynesian Model (CKM) with inflation replacing the price level done by invoking to the setting of the said framework, Philips curve hypothesis augmented with inflation expectation. At this point, it is to be noted that regardinginflation expectation this paper forms alignment with the rule based monetary policy targeting inflation, which is what remains de jure in the pursuit of such policy in many countries, including India. Hence the model framed herein is as described below.

(a) Goods market (real sector):

$Y = E(A,Y,G,\theta,r)$, $0<E_Y<1$, $E_A>0$, $E_G>0$, $E_\theta<0,E_r<0$

(b) Money-cum-bond market (financial sector): $M = L(Y, i)$, $L_Y>0,L_i<0$

(c) Fishers equation : $i=r+\pi^e$

(d) Expectation-augmented Philips Curve:

$\pi=\pi(\pi^e,Y-\overline{Y})+\varepsilon$; $\pi_y>0,\pi_\pi e>0,y=(Y-\overline{Y})$

(e) Expectation formation :

$\pi^e=h(\pi^*-\pi)+v$; $h'>0$

Let us explain the significance the equation delineated above. To begin with (a) which is significant of the goods market equilibrium from the demand side (as what IS curve represents) based on the equality of the planned aggregate output (Y) with planned aggregate expenditure (E) which is in turn dependent on Y, real interest rate (r) and the fiscal policy parameter namely, government expenditure (G) and tax rate (θ). Moreover, for the sake of the stability of macroeconomic equilibrium, the E has been assumed to be decreasing in Y. This apart, as evinced by the adjacent specifications, the E is diminishing in the real interest rate on the back of the interest- sensitive private investment, where in, a rise in real interest rate dampens the private investment by raising its real cost. Followed by this comes money market equilibrium condition as of (b) and this alternatively demonstrates the bond market equilibrium given that these two markets are mirror images of each other by dint of Walrasian law of markets. Thereafter, the equation (c) reveals the relationship between the nominal interest rate and real interest rate mediated through expected future inflation. Now coming to the last equation which is crucial in this context in terms of the treatment of inflation expectation under the circumstance of active monetary policy rule anchored to inflation rate. Under this the central bank decides the policy rate based on the present inflation scenario relative to its targeted inflation rate (π*) which is well in the knowledge of people. Thus in this vein, it can be argued that a higher present inflation rate

relative to the target (π^*) would prompt anticipation about the monetary squeezing in future to bring an inflation rate down towards the target and henceforth, a lower expectation of future inflation. However, the inflation gap is not factor influencing the inflation expectations which therefore is also driven potentially by people's idiosyncratic perceptions about other macroeconomic factors. Lastly expectation-augmented Philips Curve (PHC) [as evinced by equations, (d) and (e)] has been incorporated to reflect the supply side, where the current inflation rate is influenced by inflationary expectation, output gap denoted by ($Y - \overline{Y}$) and other supply-side disturbance clubbed into (ε). Given the above dispensation, we can elicit the demand and supply sides in terms of aggregate output and inflation rate as follows. To get through, one must note that apparently there are five

unknowns, namely, Y, r, i, π^e, π which can be solved from structural equations depicted at the outset. However, by applying implicit function, one may solve nominal interest rate from (b) for given Y and M as: i = i(Y, M) wherein, i varies directly with Y and inversely as M. Besides, from (c) and (d), one may solve r as r = i(Y, M) − h($\pi^* - \pi$) − v which when substituted in (a) determines Y (aggregate demand for goods and services) as $Y^D = Y^D$(A, Y, G, θ, M, π^*, v) …(1), representing the relationship of aggregate demand with inflation. Lastly, the expectation-augmented PHC reflects the relation between Y and π from supply side which can be simultaneously with (1) for equilibrium (Y,π) as [also, illustrated in fig.1]:

$$Y = Y(A, Y, G, \theta, M, \pi^*, \overline{Y}, v, \varepsilon) \quad …(2)$$

$$\pi = \pi(A, G, \theta, M, \pi^*, \overline{Y}, v, \varepsilon) \quad …(3)$$

Figure - 1
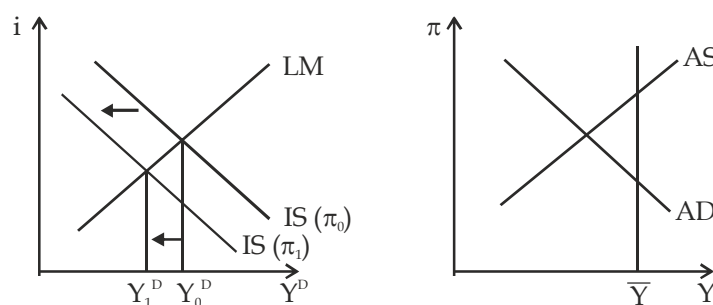
Let us now explain the aggregate demand side with respect to inflation rate. In this vein, a higher in the current time relative to the target will lower the inflationary expectation vide the inflation targeting monetary policy, given that there no

foreseeable case of monetary policy failure in containing inflation or any event that can put in question the credibility of central bank in tamping the inflation down toward the target as when there is rising trend showing up [i.e. E(v) = 0]. As

result, the perceived real interest cost of investment by private sector becomes higher, leading to the fall in private and consequently, the contraction of aggregate demand and is this is what is evinced by the downward shift in IS curve following the rise in inflation rate from π_0 to π_1 accompanied by fall in aggregate demand for goods and services from Y_0^D to Y_1^D.The other side of the framework is featured by the relation between aggregate supply and inflation which essentially owes to the expectation-augmented PHC with the random shock term (ε) [which has zero mean by assumption which is meant to reflect the case that these shocks get cancelled out on average over time].

Economic Fallout of the Pandemic

his section is sought to highlight the macroeconomic adversity that is quiet likely stem from the outbreak of the pandemic. Given the scale of the persistence owing to its contagious nature, the national governments in all affected countries have been found to be enforcing lockdown that has pushed both social and economic life out of gear in a much of mutually reinforcing manner. Here, we can invoke the demand angle, in the light of the autonomous drop in expenditure (most immediately, the aggregate consumption expenditure will take a drastic decline, particularly applying to non-essential items, as the people are compelled to stay at home and even, some are refraining from going outcome in fear of getting exposed to the virus) and the supply angle, in the light of the breakdown of supply chain locally and globally (in particular, the collapse of the local supply chain becomes more pronounced with the collapse of global counterpart in as much as, the inputs used in domestic productions are significantly sourced to foreign production under economic globalization). The matters rolls further as the derangement in supply paves way to further contraction of demand through loss in employment and pay cuts. Let us now depict the above dispensation with the following diagram.

Figure - 2
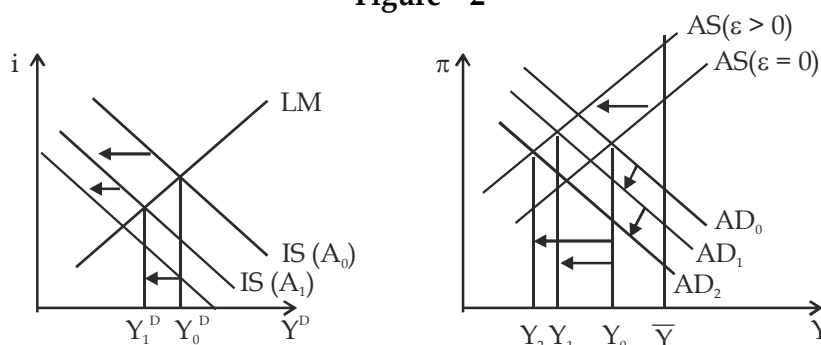
The scenario consisting of demand-cum-supply side fallout of the pandemic is illustrated in fig.2. The onset of the pandemic which ushers a major disruption

in supply is reflected by the leftward shift of the aggregate supply curve (with 'ε' being the parameter indicating shock to aggregate supply) and consequently, aggregate supply contracts going further apart from the full employment level, given the economy is already underperforming its potential due to the paucity of effective demand. This adverse development is then coupled by the collapse in demand led by the decline in the transaction at the final and intermediate levels of the ecosystem due to the imposition of lockdown and consequently, the partial (or nearly complete in some cases) stoppage of the transportation along with high restricted public movement, thwarting the purchasing spree of people. As a result, there occurs a massive exogenous shrinkage in autonomous expenditure (A) leading to the leftward shift in IS curve and corresponding the same in the AD curve from AD_0 to AD_1. However, this slippage of demand get exacerbated on the back of the retrenchment of workers by business firm and flagrant pay across the spectrum as austerity measures , alongwith the collapse of informal economy leading to large-scale of loss of livelihood faced by economically marginalized sections (including, daily wage-earners, casual labourers, self-employed individuals and more). This is what stands emergent from the further leftward shift in IS curve and coherently, the same in AD curve leading to further contraction of aggregate output. However, the overall consequence on inflation rate remains a bit ambivalent and is rather contingent on how the

demand side contraction counters the supply side one. The overall consequence as delineated above has been depicted in the following results (arrived at from the comparative static exercise on the aforesaid model).

$$dY = \left[\frac{E_A\{-(1+h'\pi_{\pi^e})\}dA}{D} + \frac{-E_r h'(-d\varepsilon)}{D} \right]$$

< 0; $dA < 0$, $d\varepsilon > 0$

$$d\pi = \left[\frac{-E_A \pi_y dA}{D} + \frac{(1-E_y - E_r i_y)(-d\varepsilon)}{D} \right]$$

$\leq$ or > 0; $dA < 0$, $d\varepsilon > 0$

Where,

$D = [- (1-E_y - E_r i_y)(1 + h'\pi_{\pi^e}) + \pi_y E_r h'] < 0$

Fiscal Stimulus and Deficit Monetization

Let us now ponder the implication of fiscal stimulus backed by monetization of deficit. In that the deficit spending by government is sponsored by central bank through the purchase of government bonds from primary bond market and by convention wisdom, such bankrolling is supposed to result in the increasing money supply to allow a fall in interest rate and thereby to offset the crowding out aftermath. However, such a tack to support fiscal expansion is significantly contingent upon the interest elasticity of money demand and interest sensitivity of private investment. Now in case there is a strong apprehension of recession or in worst case, depression, then the aforementioned would firmly militate against the efficacy of the monetized fiscal stimulus in priming up the real economy. In particular, the whenever

there is some recession offing, economic agents manifest a strong preference for liquidity as means of wealth holding over financial instruments like bonds and in that case, the money demand become highly interest elastic. Moreover, the investors stricken by economic pessimism get shy in responding to interest rate movement and as a result, the aggregate

private investment turn inelastic to interest rate. Therefore, an attempt to inject fiscal stimulus through monetization will not shed much impact on real economic activities due to weakening of interest channel led by the aforementioned factor, as what is being manifest from the following dispensation.

Figure - 3
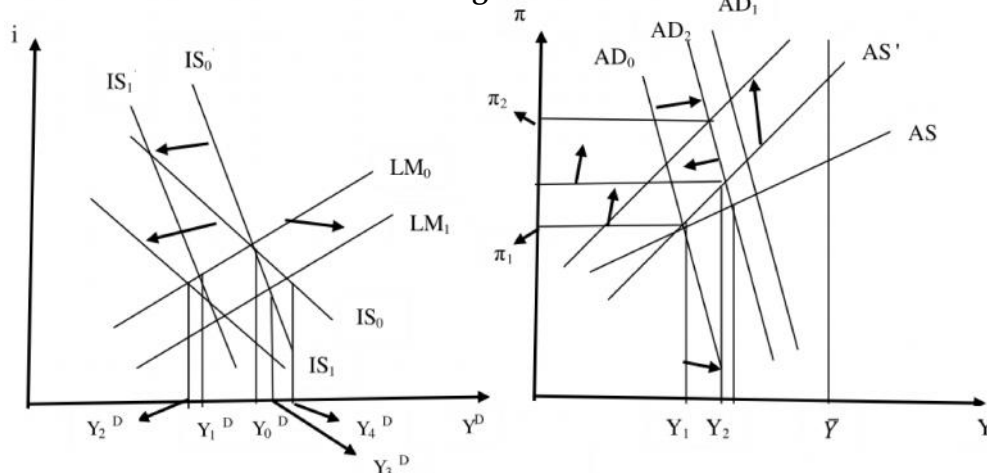
The above fig. illustrates that in case, the money demand becomes relatively elastic to interest rate while the private investment becomes relatively inelastic, the IS curve gets relatively steeper while LM curve turns relatively flatter. As a result, with an increase in inflation rate the aggregate demand declines but to smaller extent, as in what Y^D shrinks from Y_0^D to Y_2^D, instead of Y_1^D and thereby the AD curve stands relatively steeper. Now with the injection of fiscal stimulus financed by central bank through monetization, aggregate demand shoots at smaller magnitude, from Y_1^D to Y_3^D as opposed to Y_4^D and thereof, the AD curve shift from AD_0 to AD_1 as against AD_2 with

the consequent increase in equilibrium real aggregate output from Y_1 to Y_2. At this juncture, it is to be noted that the supply bottlenecks emanating from the imposition of lockdown exacerbates the supply-side rigidities, making the aggregate supply relatively more inelastic and thereof, the AS curve relatively steeper (AS') Besides, there happens rise in inflation rate which in turn opens up new angle to this eventuality. It is so because that given the substantial uncertainty about the dynamics of the pandemic and also, the roadmap to it containment (especially the periodicity of lock down), ambiguity can potentially loom large over the time required for the

supply to be normal along with the future monetary policy stance in face dilemma between growth and inflation. Consequently, there may arise suspicion over the reversion of hike in inflation immediately, after the injection of fiscal stimulus and resultantly, the rise inflation rate can potentially translate into rise in inflationary expectation (with $v > 0$) causing the AS curve to shift upward to AS''. Now this adverse development can pave way to further contraction of demand led by abject skepticism about further pushing spending into a deeper limbo. Thus is what the left ward shift in AD curve from AD_2 illustrates and going further, it leads to partial offsetting of expansion in aggregate output one the hand with the inflation rate overshooting on the other (from π_1 from π_2).

Conclusion

The Covid-19 pandemic has not only threatens people's lives and safety, but also has a significant impact on the economy. The COVID-19 has created a perennial impact on the macro economy which will probably hinder the economic activities for a longer time than any crisis in the past. The economic crisis caused by the corona virus pandemic is worse than the great depression of 1930s affecting the growth rate of the 170s countries of the world negatively. The International Monetary Fund (IMF) has estimated a global gross domestic product (GDP) loss of $9 trillion. The great lockdown of economies create conditions in which the aggregate demand plummets and the people become inclined to hold more of their assets in cash. Beside this, investors also become pessimistic and investment demands turn relatively interest inelastic. At this juncture, fiscal expansion to combat the crisis emerged as centre of macro-economic policy. However, this article shows that how a fiscal stimulus of the government backed by monetization of deficit may lead to overshooting of inflation rate in the economy.

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