The objective of this paper is to develop a macro-theoretic model to examine the likely impact of demonetization in India. It shows that its initial impact is on the unorganized sector of the economy. The unorganized sector will contract. This will, through both forward and backward linkages, bring about a contraction of the organized sector as well. The contraction in the latter will lead to further contraction in the former and so on. However, remonetization will reverse the process of cumulative contraction. The paper argues that demonetization is a harsh measure. It is particularly harsh on the poor and the weak. However, it is likely to leave most of the accumulated black wealth unaffected. To the extent it encourages digitization, it will hurt the lower middle class by destroying low skilled jobs.

**JEL Classification**: E12, E58, E65

**Keywords**: Demonetization, Unorganized Sector, Organized Sector

1. **Introduction**

Government of India (GoI) dramatically demonetized 500 rupee and 1000 rupee notes, which constituted about 85 percent of the total currency notes in circulation, on 8 December 2016 causing untold suffering to the common people. The reason was to stop generation of black money and fake currency notes. Surprisingly, instead of strengthening the administrative apparatus to stop tax evasion, corruption and illegal activities, GoI went in for demonetization. It only eliminates that part of black wealth, which is held in the form of demonetized currency and the fake demonetized
currency, but leaves the process of or the scope for the generation of black money or fake currency completely unaffected. Obviously, GoI acted on the presumption that people hold a sizable part of their black wealth in the form of high denomination currency notes. However, there is little logical basis for such a presumption. Black wealth can be held in the form of precious metals, gems and jewellery and real estate. It may be held in the form of bank deposits as well in banks, which do not reveal client information to the authorities. In the absence of a strong administrative apparatus to stop illegal activities, many banks (not only the Swiss banks) may behave that way. In fact, currency is the least attractive instrument for holding black wealth. The real rate of return on black wealth held in the form of currency is negative. It is equal to the negative of the rate of inflation. Moreover, it runs the risk of being stolen or demonetized. Demand for luxury items such as precious metals, gems, jewellery, real estate etc. are highly income elastic. Hence, over time, with growth in income, prices of these items are likely to increase at faster rates than the general price level. Therefore, the real rate of return on wealth held in the form of these physical assets is likely to be positive. Demonetization is, thus, unlikely to affect the major part of the black wealth. Again, demonetization cannot affect generation of fake currencies if the administrative apparatus to stop illegal activities is weak. Apart from the harassment it causes to people, who have to stand in long queues in the banks or at ATMs, it is likely to hit the cash-dependent unorganized sector hard and through it the economy as a whole. GoI (2017, p.13), like most people, recognizes this. The objective of this paper is to develop a disaggregated macro-theoretic model that divides the economy into an unorganized sector and an organized sector and examines how demonetization affects the two sectors.

The literature on demonetization in India contains two types of studies. One set of studies compare the present demonetization measure with the ones taken in the past. Examples of such studies are Rajakumar and Shetty (2016) and Nag (2016). The other set of studies attempt at theoretically capturing the effects of demonetization. Dasgupta (2017) and Wasnik (2017) are examples of such studies. However, Dasgupta’s is an aggregative study and cannot capture the impact of demonetization on the unorganized sector separately. Wasnik’s, on the other hand, is a disaggregated study. It divides the economy into two segments of which one is connected with the formal credit sector and the other is not. However, the major problem with his model is that the two segments are not connected with each other. Since the impact of demonetization principally operates through the unorganized sector, and since the
organized and unorganized sectors are interdependent, we consider it worthwhile to examine how demonetization affects the organized and the unorganized sectors, when the two sectors are interconnected.

Even though there is a wide-spread belief that demonetization will lower growth rates, evidences in India do not support such claims. Available figures of growth rates in the third quarter of 2016-17 are much higher than expected. This is, however, not surprising, given the frank admissions in GoI (2015) and GoI (2017). To quote GoI (2017, p.13): “Recorded GDP growth in the second half of FY 2017 will underestimate the overall impact (of demonetization) because the most affected parts of the economy - informal and cash-based - are either not captured in the national income accounts or to the extent they are, their measurement is based on formal sector indicators”. More fundamentally, GoI (2015, p.6) states: “New estimates for GDP have been provided for the years 2011-12 to 2014-15. How should one view these estimates? First, the improvement in data and methods puts India on par with international standards of GDP estimation. However, the growth estimates warrant further reflection. On the one hand, directionally the growth estimate for 2014-15 relative to that for 2013-14 seems plausible and consistent with the fact of improving investor sentiment and reform actions. On the other, both directionally and in level terms, the growth estimate for 2013-14 is puzzling. According to the new estimates, growth at market prices in 2013-14, being 6.9 percent, apparently accelerated by 1.8 percentage points (1.5 percentage points for growth at basic prices). These numbers seem difficult to reconcile with other developments in the economy. 2013-14 was a crisis year— capital flowed out, interest rates were tightened, there was consolidation—and it is difficult to see how an economy’s growth rate could accelerate so much in such circumstances”. Thus, the official data provided these days are regarded with suspicion even by the GoI.

The paper is planned as follows: Section 2 develops the model within which the impact of demonetization is analyzed. Section 3 contains the concluding observations.

2. The Model

The economy is divided into two sectors: the organized sector and the unorganized sector. The latter is the cash-dependent sector, where all transactions in normal
circumstances are carried out in cash. The former, in contrast, is a cashless sector except for the fact that it uses cash to buy unorganized sector’s output.

2.1 The Unorganized Sector

Producers and workers in the unorganized sector cannot access institutional financial facilities because of illiteracy and lack of collateral, even though government’s rules and regulations may compel them to have bank deposits. Because of illiteracy of the producers, informal money lenders have to lend to them in cash. For simplicity and without any loss of generality, we assume that producers in the unorganized sector produce their output, denoted X, with family labour using only one input, which they have to buy from the organized sector. The amount of this input required to produce one unit of X is m. The amount of the input the producers are able to buy depends upon the amount of cash they have in their possession. Denoting this stock of cash in the possession of the producers by H, which may include borrowings from informal money lenders, we make it a decreasing function of demonetization policy denoted by D. The reason is the following. Demonetization here means demonetization of currency notes of certain denominations along with restrictions on withdrawal of non-demonetized currency notes from bank deposits. An increase in D indicates an increase in the number of currency notes of different denominations demonetized and/or stricter restrictions on the withdrawal of currency from bank deposits. Following demonetization, producers in the unorganized sector (and the informal money lenders) have to deposit their demonetized notes, but they can withdraw a smaller amount in non-demonetized notes. Hence, H goes down. Obviously, the higher the value of D, the larger is the decline in H. Thus,

\[ H = H(D) \quad H' < 0 \] (1)

Accordingly, output of X is given by

\[ X = \frac{H(D)}{P_y m} \] (2)

In (2), P_y denotes the price of the output of the organized sector. The producers keep a fraction, a, of X for self-consumption and sell off the rest in the market to the organized sector. Therefore, supply of X to the organized sector, denoted \( X^s \), is given by
2.2 The Organized Sector

Output of the organized sector is denoted by Y. It is produced with labour and capital. The stock of capital is fixed. The sector is oligopolistic. Price of the output of the organized sector is set by applying a fixed mark-up to the average variable cost of production. Hence,

\[
P_y = (1 + v) W_l
\]  

In (4), v is the fixed mark-up, and W denotes the money wage rate. Labour requirement per unit of output is l so that Wl gives the average variable cost of production. We shall assume W to be fixed in the short run. Workers’ income in terms of Y is given by

\[
(W_l/P_y)Y = \frac{1}{1+v}Y
\]  

Income of the capitalists in terms of Y is, therefore, given by

\[
Y - (W_l/P_y)Y = \frac{v}{1+v}Y
\]  

We assume for simplicity that capitalists and workers of the organized sector spend \( b_c \) and \( b_w \) fractions of their income to purchase the products of the unorganized sector. As these expenditures have to be made in cash, we make them decreasing functions of demonetization indexed by D. Demand for X of the organized sector, denoted \( X^d \), is, therefore, given by

\[
X^d = (b_c(D)\frac{v}{1+v})Y + (b_w(D)\frac{1}{1+v})Y)(Py/P_X) \]  

There is equilibrium in the unorganized sector, when \( X^d = X^s \):

\[
{(b_c(D)\frac{v}{1+v})Y + (b_w(D)\frac{1}{1+v})Y})(Py/P_X) = (1 - a)[H(D)/P_Y m] \]
Following Kalecki (1954), Rakshit (1976), Taylor (1977), Bose (1989) et al., we assume that the price in the unorganized sector is perfectly flexible and clears the X-market.

Since the organized sector is oligopolistic, capitalists set their prices on a cost-plus basis and adjust their output to demand that comes forth at the prices set. Aggregate output of the organized sector is, therefore, demand determined. Capitalists and workers of the organized sector use Y for purposes of consumption. Producers in the unorganized sector use it as an intermediate input in their production. Investors use it for purposes of investment. Accordingly, Y is determined by the following equation,

\[ Y = c_w [1 - b_w(D)][1/(1+v)]Y + c_c [1 - b_c(D)][v/(1+v)]Y + H(D)/P_y + I(r_0) \] (9)

The RHS of (9) gives the aggregate planned spending on Y. The first term on the RHS gives the aggregate planned consumption spending of the workers of the organized sector on Y. The second term gives the aggregate planned consumption spending of the capitalists on Y, the third term is the aggregate spending of the producers of the unorganized sector on Y. Finally, the last term is the aggregate planned investment spending, which is assumed to be a decreasing function of interest rate, denoted r. In India, the RBI seeks to keep r at a target level through its liquidity adjustment facility and open market operations. So, we regard r as a policy variable of the RBI and assume that it keeps r fixed at a target level \( r_0 \). The specification of the model is now complete. The model consists of two key equations (8) and (9) in two unknowns \( P_x \) and Y. We can solve (9) for the equilibrium value of Y. It is given by

\[ Y = \left[ \frac{(H(D)/P_y)/(1 - c_y(D)) + I(r_0)/(1 - c_y(D))}{(1 - c_y(D))} \right] \] (10)

where, \( c_y(D) = c_w [1 - b_w(D)][1/(1+v)] + c_c [1 - b_c(D)][v/(1+v)] \).

Note that,

\[ (dc_y/dD) > 0 \text{ since } db_w/dD < 0 \text{ and } db_c/dD < 0 \] (11)
Figure 1: Determination of Y

Figure 2: Determination of $P_x$
Putting the equilibrium value of Y in (8), we can solve it for the equilibrium value of \( P_x \). It is given by

\[
P_x = b(D) \left\{ \frac{((H(D)/P_y)/(1-c_y(D)) + [I(r_0)/(1-c_y(D))]P_y/[H(D)/P_m]}{[H(D)/P_y]} \right\} + \left\{ \frac{I(r_0)}{[H(D)/P_m]} \right\}
\]

(12)

where \( b(D) = (b_v(D))[v/(1+v)] + (b_w(D))[1/(1+v)] \). Note that,

\[
(d_b/dD) < 0, \text{ since } (d_b/cD) < 0 \text{ and } (d_b/wD) < 0
\]

(13)

The solutions of \( Y \) and \( P_x \) are shown in Figures 1 and 2 respectively. In Figure 1, YY schedule gives the value of planned demand for \( Y \) (denoted \( Y_D \)) given by the RHS of (9) corresponding to every different value of \( Y \) and the equilibrium \( Y \) corresponds to the point of intersection of YY and the 45\(^{0}\) line. In Figure 2, XD line gives planned demand for X (representing the LHS of (8) with the equilibrium value of \( Y \) substituted for \( Y \)) corresponding to different values of \( P_x \) and XS schedule gives the supply of X (representing the RHS of (8)) corresponding to different values of \( P_x \). The equilibrium \( P_x \) corresponds to the point of intersection of the two schedules.

2.3 Impact of Demonetization

We shall now examine how demonetization affects X, Y and \( P_x \). We shall do it first diagrammatically using Figures 1 and 2. Following an increase in D, production of X, which is given by (2), falls. As evident from (2), it falls by \( (dH/dD)/P_m \). Accordingly, supply of X to the market, which is given by (3), goes down. It declines by \( (1-a)(dH/dD)/P_m \). The output of the unorganized sector, thus, contracts. Let us now focus on Y. Let us examine how YY representing the RHS of (9) in Figure 1 will shift. The fall in X reduces aggregate planned demand for Y corresponding to any given Y by \( (dH/dD)/P_y \). However, demonetization also forces people to transfer their demand from the unorganized sector to the organized sector bringing about an increase in \( c_y(D) \) (see (9) and (11)). This raises demand for \( Y \) corresponding to any give \( Y \). If the former impact dominates, which is quite likely for reasons that we shall explain shortly, YY will shift downward leading to a fall in \( Y \). This result can easily be derived mathematically using (9) and (11). Let us now focus on \( P_x \). Following an increase in D, as we have already pointed out, \( X^s \) (supply of X in the
market) falls bringing about a leftward shift in the XS schedule in Figure 2 (see (8)). If Y declines following the increase in D, XD schedule will shift to the left too (see (8)). Hence, the direction of change in P_x is ambiguous. All these results can easily be derived mathematically from (8) and (9). We sum up our finding below.

Following demonetization, output in the unorganized sector necessarily contracts. This produces a dampening effect on the output of the organized sector. However, this is countered by the transfer of demand from the unorganized sector to the organized sector, which is caused by the scarcity of cash. Direction of change in the output of the organized sector is, therefore, ambiguous. However, it is highly likely to contract, since the switching from the unorganized sector’s output to the organized sector’s output may not be feasible on a significant scale in the short and the medium run. The reasons are the following. The coverage of the organized sector may be too inadequate. The organized sector may not consider it profitable to spread beyond the affluent localities. Hence, switching from the unorganized sector to the organized sector may not be feasible for those who do not live in affluent localities. Many people may be averse to non-cash modes of payment because of lack of familiarity and a reluctance or inability to learn, apprehension regarding the security of such payment modes, suspicion of high-tech corruption/frauds etc. People may also be averse to non-cash modes of payment because of their job destroying capacity. For these reasons switching of demand from the unorganized sector to the organized sector may not be significant.

2.4 The Source of H: The Complete Model

In the model specified above, we did not specify the source of H, the stock of cash that the producers in the unorganized sector use to purchase inputs from the organized sector. We now postulate that the revenue from the sale of the marketable surplus of X to the organized sector in the previous period is used to purchase inputs from the organized sector in the current period. Thus, to put it formally

\[ H_t = P_{xt-1}(1 - a)X_{t-1} \]  \hspace{1cm} (14)

For simplicity, let us write

\[ H_t(D) = (1 - \delta)H_t = (1 - \delta)(1 - a)P_{xt-1}X_{t-1}, \hspace{0.5cm} 0 \leq \delta < 1 \]  \hspace{1cm} (15)
Let us explain (15). In the period in which demonetization strikes, the part of the sales revenue received in demonetized notes has to be deposited. Since there are restrictions on withdrawals, a part of the sales revenue becomes unusable. In the subsequent periods, the producers of the unorganized sector may have to accept cheques to protect their sales. Hence, with restrictions on withdrawals, a part of the sales revenue becomes unusable. We capture this by assuming that in every period a fraction \( \delta \) of the sales revenue becomes unusable until the economy is fully remonetized. Producers of the unorganized sectors cannot themselves issue cheques because of lack of credibility and illiteracy.

From (15) it follows

\[
X_t = (1 - \delta) \frac{[P_{xt-1}(1 - a) X_{t-1}]}{P_y m} \tag{16}
\]

Substituting (15) into (10), we rewrite it as

\[
Y_t = \left[ I(r_0)/(1 - c_y(D)) \right] + \left[ (1 - \delta) (1 - a) (1/P_y) P_{xt-1} X_{t-1} \right]/(1 - c_y(D)) \tag{17}
\]

From (8) and (2) we find that

\[
(b(D))Y_t = (1 - a). P_x X_t \tag{18}
\]

where,

\[
b(D) = \{ (b_c(D)) [v/(1+v)] + (b_w(D)) [1/(1+v)] \} P_y \tag{19}
\]

Substituting (17) into (18), we get

\[
x_t = \left[ (b(D))/(1 - c_y(D))(1 - a)) \right] I(r_0) + \left[ (b(D))/(1 - c_y(D)) \right] \left[ (1 - \delta) (1/P_y) \right] x_{t-1} \tag{20}
\]

where \( x_t \) denotes \( P_x X_t \).

Equation (20) is a linear first-order difference equation. We can solve (20) for the time path of \( x_t \). Denoting the steady state value of \( x_t \) by \( x^* \), we can substitute \( x^* \) for \( x_t \) and \( x_{t-1} \) in (20) and solve it for \( x^* \). Note that the coefficient of \( x_{t-1} \) is positive. We
Figure 3: Steady State Value of $x$

Figure 4: Steady State Value of $X$
assume that it is less than unity for stability. We show the value of $x^*$ in Figure 3, where the xx line representing (20) gives the value of $x_t$ corresponding to every different value of $x_{t-1}$. The value of $x^*$, labeled $x^{*0}$, corresponds to the point of intersection of xx and the 45° line. Putting the value of $x^*$ in (16) and (17), we get the steady state values of X and Y respectively. We show these values in Figures 4 and 5. In Figure 4, the ray through the origin XX represents (16). It gives the value of $X_t$ corresponding to every different value of $x_{t-1}$. The steady state value of X, labeled $X^{*0}$, corresponds to the steady state value of $x, x^{*0}$. Again, the yy line in Figure 5 represents (17) and shows the value of $Y_t$ corresponding to every different value of $x_{t-1}$. The steady state value of Y labeled $Y^{*0}$ corresponds to $x^{*0}$ on yy.

2.5 Impact of Demonetization in the Complete Model

We shall now examine the impact of demonetization. We shall do this with the help of Figures 6, 7 and 8, where the initial steady state values of $x, X$ and $Y$ are labeled $x^{*0}$, $X^{*0}$ and $Y^{*0}$ respectively. Demonetization brings about an increase in $D$ and $\delta$, which in turn leads to a downward shift in the xx schedule representing (20) in Figure 6. Let us explain the process. Following an increase in $D$, $b(D)$ falls and $c_y(D)$ rises. However, for reasons we have already explained, these changes are unlikely to be significant. Thus, both the numerator and the denominator in the ratio $b(D)/[1 – c_y(D)]$ fall. Hence, the change in this ratio is insignificant too. However, the term
[(1 – δ) (1/P_y)] will fall and its impact will dominate. The locus xx will, therefore, shift downward bringing about a cumulative decline in x as indicated by the arrows. The result can easily be derived mathematically. With the fall in x_t, values of X_t and Y_t given by (16) and (17) also decline. Their new steady state values are labeled X^{*1} and Y^{*1} respectively in Figures 7 and 8. Their decline is shown by arrows.

Let us explain the intuition behind the result. Following demonetization, a part of the money balance (δ fraction of the money balance by assumption) the producers of the unorganized sector have for buying inputs from the organized sector becomes unusable. Hence, their output will fall. The shrinkage in demand for the output of the organized sector will bring about a contraction in its output too. The contraction will occur because the switch in demand from the unorganized sector to the organized sector is unlikely to be significant for reasons we have already explained. The fall in Y lowers the organized sector’s expenditure on the unorganized sector’s output. The value of the marketed surplus of the unorganized sector falls. Even though producers in the unorganized sector cannot pay with cheques because of their lack of credibility, they may have to receive cheques to prevent their sales from plummeting. They will deposit their cheques, but will not be able to withdraw the whole amount because of the restrictions on withdrawal. A part of the sales revenue, δ fraction of the sales revenue by assumption, therefore, becomes unusable. Thus, the amount of cash they have at their disposal for purchasing inputs from the organized sector becomes less than that in the previous period. This process of cumulative decline in outputs in both the sectors will continue until the new steady state is achieved.

Note that, remonetization will reverse the process, as the producers of the unorganized sector will be able to withdraw the accumulated deposits, which they could not withdraw so far.
Figure 6: Demonetization and Steady State Value of x

Figure 7: Demonetization and Steady State Value of X
3. Conclusion

This paper demonstrates that demonetization is likely to bring about cumulative decline in output levels in both the organized and the unorganized sectors. To what extent the cumulative contraction in output levels will take place depends upon how fast the economy is remonetized. Remonetization will reverse the process of cumulative contraction. If, to achieve the goal of digitization to the maximum possible extent, remonetization is delayed, the contraction in output levels may be severe causing considerable harm to the masses. Demonetization affects the poorer segments of the people the most. They are so poor that even temporary losses in their incomes can drive them to bankruptcy, starvation and death. Owners of black money or producers of counterfeit notes are influential, wealthy and powerful people. They can devise myriad ways to neutralize the adverse effects of demonetization. They are quite likely to factor in the possibility of demonetization, while deciding on how to hold black wealth or how to carry on with their businesses. Thus, demonetization is unlikely to produce much of an impact on the generation of black income and counterfeit notes. But, it will surely adversely affect the most vulnerable sections of the people. Providing the masses with adequate quantities of quality food, clothing, shelter, health care, education, and gainful and fulfilling employment should be the objective of government’s policies. Digitization, wide-spread use of internet etc. produce just the opposite effect by destroying jobs on a mass scale. The employment
and deprivation scenario in India is bleak, to say the least. For details, one may go through Ghosh and Ghosh (2016, Chapters 1 and 12) and Ghosh (2017).

References


