Alleviating Poverty through Job Creation: Quantity Equation of Money may Come into Play

Bamadev Paudel

ABSTRACT

This study proposes a new approach to combat global poverty which founds on the premises of quantity equation of money. The quantity equation of money, in growth rates, postulates that a rise in the growth of money velocity is accompanied by a rise in the growth of real GDP provided that the money supply and general prices grow proportionately. This study offers an evidence of money velocity’s positive role on economic activities by conducting an empirical analysis of the data from different countries and also by simulating a dynamic stochastic general equilibrium (DSGE) model by introducing a velocity shock. It is claimed that the relatively dormant poor economies in the world need a stroke of rising money velocity to create jobs and lead them into prosperity. Some computational and prototype models are discussed to substantiate this claim. The results are intended to provide a baseline for further research. Various policy prescriptions, ranging from testing the approach by using randomized control trials to an in-depth diagnosis of money velocity in a micro level, have been forwarded to implement and observe the effects of this new approach.

JEL Classification: E01, E58, O11, O23

Keywords: Quantity Equation of Money, Global Poverty, Money Velocity, Dynamic Stochastic General Equilibrium (DSGE) Model, Randomized Control Trials, Growth

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1 KarmaQuest International, 5640 Rosaline Rd, Burlington, ON L7L 6T4. E-mail: bdpaudel@karmaquest.org
When a coin drops into a pond, you should spend, if necessary, hundreds of coins to take that coin out of the pond so that the survived coin, including those you spent to recover the coin dropped into the well, will flow into the economy and continue to help generate income throughout their remaining life. – Anonymous

1. Introduction

Global poverty has become one of the biggest challenges for humanity for long. Many attempts have been put into place in the past to combat this challenge but the outcomes are mixed. The recent manifestation of such global commitment has been an announcement of Millennium Declaration at the start of this century which had set clear objectives for substantial reduction in poverty by 2015. The exclusive focus on pro-poor policies in this Declaration was the consequence of a deep-rooted disillusionment with the development paradigm which placed absolute emphasis on the pursuit of growth and the trickle down effects that it causes for last six decades (Pasha 2002). The Millennium Development Goals Report (2015) proclaims that more than one billion people have lifted out of poverty after the announcement of this global commitment.

With the paradigm shifts happening in the field of development, innovative and pragmatic approaches have started surfacing. Sachs (2005), for example, offers a promise to uplift poor countries on the first rung of ladder by channeling sufficient aid from developed world to the less developed world and make poverty history by 2025. Easterly (2006), on the other hand, proposes a differing view according to which bottom-up market-based approach is the only way that has capability to eradicate poverty out of the global face. Offering a radical approach based on microscopic economic behavior of the poor, Banerjee and Duflo (2011) put forward an argument for an incentive-based piecemeal solution to poverty which grounds on the evidences mostly taken from randomized control trials they did in many poor countries in the world2.

Joining hands with ongoing collaborative efforts, this study proposes a new approach to combat global poverty which bases on quantity equation of money. While it is not claimed that the approach presented here is once-and-for-all solution to the problem, the purpose of this study is to invite rigorous discussion from academia, policymakers and other stakeholders on this new approach and bring it into test by conducting randomized control trials to check its validity. The quantity theory of money (QTM) postulates that money supply has a direct and positive relationship with the price level. This postulation is based on the quantity equation $MV = PY$ where $M$ is money supply, $V$ is velocity, $P$ is price level and $Y$ is real GDP. Since the revelation of the theory’s modern version by Irving Fisher (Fisher, 1911), the equation has drawn extensive attention in the macroeconomics literature receiving both praise and criticism. While the relationship between money and price is shown to be positive3, the relationship between other two variables has surprisingly attracted little attention in the policy debate. This study conducts an extensive diagnosis to identify this relationship and establishes a positive association between money velocity and real economic activities. This relationship justifies making a further claim that increased velocity would help create jobs in relatively dormant economies and lead them to prosperity.

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2 Other prominent economists such as Collier (2007), Moyo (2009), and Collins et al. (2009) have also contributed to the radical thinking in development economics in recent times.

3 The evidences suggest that in the long-run money and prices have direct relationship.
Historically, the relationship between velocity and real economic activities has been a controversial issue. As an identity, the quantity equation does not imply any causality among the variables. In the absence of the restrictions and assumptions, a 5% increase in velocity, for example, could be accompanied by a 5% decrease in money supply, without having any effect on price level and real GDP. Even if the causality is established, the relationship between money velocity and real GDP could potentially be negative. Friedman (1959), for example, claims that a decline in velocity is accompanied by a secular rise in real income per capita, which is a result of persistent rise in the stock of money at a higher rate than the money income. Ezekiel and Adekunle (1969) and Melitz and Correa (1970) observe the similar results in their study of cross-country comparisons. Padrini (1996a) further argues that velocity does have a negative role to output resulted from rise in the interest rates.

Nonetheless, the negative association between money velocity and real economic activities could potentially be attributed to the assumption of money velocity being constant which earlier studies took for granted. The recent trend, however, has changed dramatically regarding the behavior of money velocity and its cyclicality to economic activities. Even though the literature demonstrating a positive association between velocity and real activities are relatively rare⁴, the recent data however exhibited a strong tie between money velocity and real GDP, particularly after 1980s. This sudden change in the relationship can be attributed to the new innovations in the global financial system which contributes for a rise in money velocity and thereby in economic activities (Padrini, 1996b). Besides, and as has been evidenced in this study, the cross-country regression results and the simulation of dynamic stochastic general equilibrium (DSGE) model also justify money velocity’s positive contribution to the real GDP. Intuitively as it appears, when the proportionality between money and prices is maintained, as monetarists have claimed, it must be the case that a rise in money velocity (achieved through various policy measures and incentive programs as discussed in prototype models in Section 3) must transmit into the growth of real GDP provided that the quantity equation of money is valid.

On this ground, this study imparts arguments to use the implications of quantity equation of money as a means to boost economic activities in an economy to create jobs, particularly in those where the economic activities are relatively stagnant. It is proposed that the central banks of developing countries opt for relaxing excessive focus – if not obsession – on inflation control as their prime goal but rather pay equal attention to development issues which they have long been aspiring for by adopting poor-friendly monetary policy by applying the implication of quantity equation of money.

The rest of the paper unfolds as follows: Section 2 discusses whether the orthodox monetary policy approaches are pro-poor or not. Section 3 presents empirical justifications and the discussion of prototype models to make the case for money velocity as a means to combat global poverty. The study concludes with discussion on the results and the future research directions in Section 4.

⁴ Among the very few studies that demonstrate positive relationship between money velocity and real economic activities include Sudo (2011). This study reveals that Japanese economy following the banking crisis of late 1990s, referred to as the lost decade for the economic history of Japan, witnessed a continuous decline in velocity of circulation of money and the consequent decline in the price level and real GDP.
Orthodox approaches to monetary policy: are they pro-poor?

Conventional wisdom has been that monetary policy should exclusively assume price stability as its prime goal. Other goals such as fostering economic growth, creating jobs, and maintaining favorable balance of payment situation were also on the menu of the objectives of many burgeoning central banks during the start of the 20th century but when the world witnessed a persistent rise in inflation during 1970s leading to the concern for macroeconomic stability, the central banks switched their priorities towards price stabilization as a single most important goal. The paradigm of inflation targeting – that emerged in early nineties – led this approach even further. A widespread consensus now is that as a result of inflation targeting, inflation in many countries has remained relatively at low levels in recent years.

The orthodox monetary policy focusing on price stability as a primary objective is not invariably pro-poor, however. Theoretical inconsistencies are prevalent in the traditional monetary policy approaches and are plagued by the assumptions which are at variance with the realities of the poor countries. The failure of the structural adjustment programs implemented in many poor countries in the past explains this reality.

The orthodox approaches believe that high inflation is costly to the poor than the rich and the central banks must strive for achieving low inflation to benefit not only the rich but also the poor. These claims are based on the belief that poor have fixed nominal earnings such as wages, pensions, state welfare contributions and such earnings lose their value when inflation rises. Besides, poor keep a lot of liquid funds as compared to rich, the purchasing power of which is lost when inflation rises. The poor cannot also hedge against inflation as they do not have easy access to financial system (Pasha and Palanivel, 2004 and Cashin et al., 2001). Romer and Romer (1998) also conclude that high inflation and unstable aggregate demand do not help elevate the welfare of the poor.

On the flip side, however, the low inflation is not always pro-poor. A low inflation is achieved only when government cuts spending, central bank reduces money supply and raises interest rates, all of which affect poor adversely one or another way. The global inflation control measures have indeed reduced commodity prices in developing countries meaning that poor countries are paying the cost of inflation control measures taking place in rich countries. As an example, rich countries depend heavily on raw materials available in African continent but the prices of these raw materials have substantially tumbled down forcing Africa suffer more now than before (Moyo, 2009).

This is far from the complete story and there are several other reasons to justify why low inflation doesn’t matter much for the poor or it may even affect them adversely. First, many poor live in rural areas and they survive mostly on what they produce, suggesting that they are less exposed to monetary economy and hold little cash to purchase goods and services from the market. This little saving of the poor is not affected much with changing inflation (Cashin et al., 2001). Second, since the poor are net debtors, lower prices in fact would increase their debt burden, particularly when they are net food producers and they would sell their food at low prices in the market. Third, low inflation is associated with high unemployment (at least in the short-run as suggested by short-run Phillips curve). When unemployment rises, it is most likely that they are the poor who lose jobs first because they are less skilled. Finally, the high

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unemployment resulting from the low inflation forces to reduce the real wages which makes rich even richer and poor even poorer resulting in higher income inequality.

The obsession of central banks to maintain low level of inflation through inflation targeting also deserves criticism. The motto of inflation targeting is to maintain a low level of inflation – indeed a very low level – which always directs its policies to hassle aggregate demand ultimately depriving poor from benefitting government-sponsored pro-poor activities. In addition, the inflation targeting is said to have controlled inflation through manipulation of interest rates, particularly the interbank interest rates. There is, however, no guarantee that all macroeconomic objectives such as low inflation, low unemployment and exchange rate stability are achievable through altering a single interest rate, precisely in developing countries where markets are abundantly imperfect.

Central bank independence, on the other hand, is also often not pro-poor. There is a growing concern of policymakers in the fiscal front that central bank autonomy is creating hurdle to implement pro-poor policies. Upon freedom achieved through independence, the central banks always stick to low level of inflation which is not always good for the poor as detailed above. Moreover, it is blamed that the central bank independence edges the power of central banks towards financial market interests not paying much attention to pro-poor policies but instead working for the interests of rich financial players who dominate the financial system. These players sometimes have control over the formulation and implementation of monetary policy by restricting the central banks as being completely independent organizations (Arestis and Sawyer, 1998 and Forder, 2003).

Furthermore, both inflation targeting and the central bank independence are also practically difficult to pursue for developing countries because of their typical nature. First, for these approaches to implement, it needs rigid institutional requirements, democratic government and strong legal system. But, all these requirements are in weak condition in developing countries. Second, financial markets in developing countries are in very rudimentary stage and are much vulnerable to crisis which limits the scope for interest rate manipulation required to meet inflation target. Third, most of the developing countries are experiencing balance of payment crisis which obviously undermines the capability of these countries to pay exclusive focus on inflation targeting. Forth, poor countries have remained poor for long. Their major economic agenda is to overcome the pressing problem of poverty rather than the macroeconomic stability. Fifth, even though central banks in developing countries adopt inflation targeting as their monetary policy regime, there is no guarantee that the inflation would be contained because the inflation in developing countries depends significantly on structural factors rather than interest rates and money supply. In other words, the conventional monetary policy regime attempts to manipulate the demand side of the economy to control inflation but the inflation in poor countries is mostly determined in the supply side of the economy.

In light of all these shortcomings of excessive focus on inflation control by central banks, alternatives to orthodox monetary policy deserve to be reconsidered and adopt pro-poor monetary policy regime, especially in those countries where the development agenda takes the highest priority. While this study does not mean to impart the argument that central banks should abandon inflation control as their prime goal, it rather advances an argument that the central banks of developing countries – where the economic development is an urgent need – should opt for complementary goals that are consistent with achieving economic prosperity at the same time.
The central banks have plenty of complementary tools to pursue because they are in charge of implementation of major economic policies in a country. A former World Bank staff Paul Collier rightly states that central banks after all need to come to the development agenda despite their other priorities.\(^6\)

The statement above indicates that in order to achieve developmental goals, it is necessary to shift the focus of central banks towards the satisfaction of human needs and help people in the world who fall on the bottom rung of the development ladder. To achieve this goal, the policies may include some of the distributive elements of Keynesian macroeconomics which allows for the active participation of the central banks to work for the poor to help alleviate global poverty. In this regard, this study proposes an approach, called velocity approach, which makes use of the vehicle the central banks have long been using in macroeconomic analysis – the quantity equation of money. While some may regard the velocity approach proposed in this study as an unorthodox approach to monetary policy, it is indeed not because it rather founds on orthodox economic principle as underlying in quantity equation of money. The study only appeals the central banks to participate in a rigorous discussion on this approach and consider testing for its validity at the same time.

2. Conceptual Framework, Model, and Empirics

2.1 Linkage between Money Velocity and Real Economic Activities

Money velocity is defined as the average frequency with which a unit of money is spent. Mathematically, velocity is the ratio of net national product in current prices to the money stock (Friedman and Schwartz, 1963). Earlier, the concept of money velocity was clearly described by Irving Fisher (Fisher, 1911). According to Fisher, the structure of the institutions and how they make transactions determines the extent of the money velocity in an economy. The advances in technology in financial services is regarded as one of the reasons that increase velocity in an economy because the technological advances in banking system translate into less money being required to conduct transactions.

Even prior to Irving Fisher, Wicksell (1898) forwarded the same argument saying that purely physical conditions under which money can be paid and transported set a definite limit to the magnitude of the velocity of circulation. Wicksell further observes that there are three reasons why money lies unused and has less velocity. The first is what is now called the transaction motive. This happens when some technical and natural features sometimes cause a concentration of receipts at one time and of payments at another time. The second reason is what the modern literatures define as the precautionary motive, according to which people hold money keeping in view of unforeseen disbursements in the future. The third reason is the excess amount

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\(^6\) The agency with official responsibility for oversight of the financial sector is usually the central bank. Central banks are about as far removed from aid agencies as it is possible to get while still being agencies within the same government. For example, politically, the staffs of aid agencies are on the far left of the government, while central bankers are on the far right. Aid agencies have little choice but to focus on the bottom billion; they are not going to be able to duck the problem. But central bankers will most surely be able to duck it, claiming it has nothing to do with them and that their priorities lie elsewhere. Somehow, central banks have to get this onto their agenda. (Collier 2007, pp. 136-137).
of money temporarily accumulated by wealthy people as a result of the sale of capital, as referred to speculative demand for money in present day definition.

The Wicksell’s money demand explanation above inherently leads to the discussion of implied relationship between money demand and money velocity. The so-called Cambridge group worked on this relationship and derived a revised quantity equation which focused on money demand rather than money supply. According to this approach, the demand for money is inversely related to the velocity of money. Mathematically, Cambridge equation states that a fraction of nominal income, k, is held as cash for the security and convenience reason as money demand, which leads to the equation \( M^d = k \cdot P \cdot Y \) or \( M = \frac{k}{1/k} \cdot P \cdot Y \), where \( 1/k \) is the velocity of money. The equation implies that less the money people would hold as cash (lower \( k \)), the more the velocity in money circulation would result. The Cambridge equation also indicates that the higher interest rate is associated with higher velocity because money demand is the inverse function of interest rates.

Money velocity is traditionally assumed to be constant. The quantity equation, by itself, implies that there is a direct and proportional relationship between money supply and price level, assuming other two variables in the equation relatively fixed. The recent evidences, however, have shown that there is a robust connection between velocity and real economic activities. The assumption of constant velocity was true from about 1950 until 1978 when Milton Friedman was doing his seminal work. After around 1980s the velocity has exhibited a dramatic behavior making the assumption of constant velocity no more valid and, unbelievably, the velocity and economic activities in the U.S. have been found to be procyclical in recent decades (Figure 1).

![Figure 1: Cyclical variation of narrow money velocity (VM1) and real GDP (RGDP) in the United States. Notes: Both series are the difference between the levels and their Hodrick-Prescott-filtered series.](image)

Until around 1980 the cyclical variation in narrow money velocity and cyclical variation in real GDP do not appear to have any association but after that period the cyclicality happens to be significant. The Granger causality test justifies that the causality runs from velocity to real GDP (the null of cyclical narrow money velocity does not Granger cause the cyclical real GDP is

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\footnote{Economists Alfred Marshall, A.C. Pigou, and John Maynard Keynes associated with Cambridge University maintained this view.}
rejected at 1 percent significance level). The remarkable change in the association of velocity and real activities is potentially attributed to the technological progress that took place particularly after 1980s with the emergence of information age. Parker and Parker (2008) claimed that this new development led to the several innovations in financial markets making velocity and economic activities closely connected each other.

Results in Table 1 further substantiate this claim showing an apparent positive relationship between velocity and the real economic activities in various economies. The empirical test was first carried out for the U.S. data ranging from 1959:Q2 to 2015:Q3 and the velocity growth of narrow money has a significant positive effect on the growth of U.S. real GDP as shown in Equation 1. The effect still remains to be positive and highly significant in cyclical data as well (Equation 2). Another specification runs the regression for the log of U.S. real GDP on velocity and two other major factors of production, capital and labor hours, the effect of velocity again turns out to be positive and statistically significant. The impact of velocity is however little less than that of capital and labor hours to explain the U.S. real GDP. A one percent change in narrow money velocity, for example, raises U.S. real GDP by 16 percent whereas the same change in capital and labor hours raises U.S. real GDP by 22 percent and 59 percent, respectively (Equation 3).

Table 1: Regression results for money velocity and economic activities

<table>
<thead>
<tr>
<th>Country/Region (Dependent Variable)</th>
<th>Equation</th>
<th>Explanatory Variables</th>
<th>Coefficient</th>
<th>P-value</th>
<th>R²</th>
</tr>
</thead>
<tbody>
<tr>
<td>U.S. (Real GDP Growth)</td>
<td>1</td>
<td>Velocity Growth of Narrow Money</td>
<td>0.29</td>
<td>0.00</td>
<td>0.30</td>
</tr>
<tr>
<td>U.S. (Cyclical Velocity)</td>
<td>2</td>
<td>Cyclical Velocity</td>
<td>1.48</td>
<td>0.00</td>
<td>0.21</td>
</tr>
<tr>
<td>U.S. (log Real GDP)</td>
<td>3</td>
<td>Log(velocity)</td>
<td>0.16</td>
<td>0.00</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Log (Capital)</td>
<td>0.22</td>
<td>0.00</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Log (labor hours)</td>
<td>0.59</td>
<td>0.00</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>AR (1)</td>
<td>0.99</td>
<td>0.00</td>
<td>0.99</td>
</tr>
<tr>
<td>Nepal (Real GDP Growth)</td>
<td>4</td>
<td>Velocity Growth</td>
<td>0.71</td>
<td>0.00</td>
<td>0.45</td>
</tr>
<tr>
<td>OECD (Real GDP Growth) a</td>
<td>5</td>
<td>Velocity Growth</td>
<td>0.05</td>
<td>0.00</td>
<td>0.07</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Narrow Money Growth</td>
<td>0.09</td>
<td>0.00</td>
<td></td>
</tr>
</tbody>
</table>

a Sample comprises 14 countries including emerging economies such as India and South Africa.

A regression was also run for Nepal, one of the least developed countries in the world, to observe if velocity has anything to do with real economy in an underdeveloped country. The similar significant positive effect of velocity on real GDP was observed in this specification as well (Equation 4). In addition, a panel data model was estimated for a large cross-section of
OECD countries, including two emerging economies India and South Africa, money velocity was again found to be significantly contributing for a positive change in real GDP in those countries as well (Equation 5).

The positive association between money velocity and economic activities is also confirmed by the observation that the U.S. economy witnessed a sharp decline in velocities of both M1 and M2 right after the recent financial crisis (see FRED Economic Data, Federal Reserve Bank of St. Louis). Such a decreased velocity must have contributed further to decrease real GDP because people feared using money, which was abundantly being injected by the Fed during the time, in economic transactions in the market but kept them idle.

To substantiate the claims made above regarding positive role of money velocity in economic activities, an economy is simulated with the introduction of velocity shock in a dynamic stochastic general equilibrium (DSGE) model in the sub-section that follows.

2.2 Simulation of an Economy with Velocity Shock

The model presented here is primarily draws upon Nason and Cogley (1994) and Schorfheide (2000), but, adds velocity shock into the model which is fundamental to this study. Nonstationarity in the model comes from three stochastic processes: technology, money, and velocity shocks. The economy is characterized as follows:

This typical economy is assumed to be a small poor economy with a low level of economic activities. The government, in collaboration with the central bank and the donor agencies, launches a program to combat poverty prevailing in this economy. The economy consists of a representative household, a firm and a financial intermediary. The household derives utilities from consuming goods and services and disutility from working. The financial intermediary is owned by households and it has the responsibility to keep records of deposits from households and make loans to small business firms. This institution is sort of a financial NGO that generates funds from donor agencies, government programs and the deposits of the households. The central bank converts donors’ foreign currency into domestic currency and channels funds into this financial NGO. The financial institution earns interest on loans and pays interest on deposits. The profits made by financial institution are distributed to the households. Besides, the financial institution keeps records of consumption premium, discussed below in detail, generated from households’ purchase of goods and services from the business firms. The representative business firm produces consumable goods using labor available in the economy and borrows from financial intermediary to run the business. The firm’s dividend is distributed to the households. The structure of this economy appears as shown in Figure 2.

In this representative economy, money is injected from the central bank and it circulates around three economic agents: a household, a firm and a financial intermediary. Money circulates in terms of dividends, loans, deposits, wages, interest payments and consumption premiums. The faster these payments circulate among economic agents, the faster the growth of this economy is ensured.

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8 This model economy may resemble the one as designed by Earth Institute in Columbia University, United States which is in operation in many villages in African continent in a mini scale. The difference between the Earth Institute’s model and the model explained here is that this model incorporates the provision of incentives for production and consumption by economic agents through consumption premium which lacks in the model of the Earth Institute.
A typical infinitively lived household maximizes the following expected utility function making choice of consumption $c_t$, hours worked $h_t$, cash holding for the next period $M_{t+1}$, and deposits $d_t$:

$$\max_{\{c_t, h_t, M_{t+1}, d_t\}} E_0 \left[ \sum_{t=0}^{\infty} \beta^t \left\{ (1 - \psi) \xi_t \ln c_t + \psi \ln (1 - h_t) \right\} \right]$$ (1)

Subject to the following constraints

$$p_t c_t \leq M_t - d_t + w_t h_t + z_t$$ (2)

$$0 \leq d_t$$ (3)

$$M_{t+1} = (M_t - d_t + w_t h_t - p_t c_t) + r_{d,t}(d_t + z_t) + \pi_{f,t} + \pi_{b,t}$$ (4)

Here, the consumption is subject to the velocity shock $\xi_t$ as shown in Equation (1). The first constraint is cash-in-advance constraint which implies that all consumption purchases must be paid for with the accumulated cash balance. The cash balance accumulates from wage earnings $w_t h_t$, consumption premium $z_t$, money transfers from the central bank $m_t$, all is net of deposits $d_t$ deposited at the financial intermediary. The term $z_t$ is important because it induces households to consume more so they receive more consumption premiums, which businesses will deposit at the consumer’s bank account on each consumption unit. The banking with electronic transfer facilities, such as mobile banking, will facilitate to make records of such transactions, which makes sense for today’s economies where cell phone use has been ubiquitous. The deposits and the consumption premiums earn interest $r_{d,t} - 1$ for the households.

The second equation restricts household to borrow from the financial intermediary, the assumption borrowed from Nason and Cogley (1994) and Schorfheide (2000). The third equation
implies that the money balance left over after present consumption, interest earnings, and the dividends from bank \((\pi_{b,t})\) and from the firm \((\pi_{f,t})\) is brought into next period.

The financial intermediary solves the following problem

\[
\max_{\{\pi_{b,t}, l_t, d_t\}} \mathbb{E}_0 \left[ \beta^{t+1} \frac{\pi_{b,t}}{c_{t+1} p_{t+1}} \right]
\]

Subject to

\[
\pi_{b,t} = d_t + r_{l,t} l_t - r_{h,t} (d_t + z_t) - l_t + x_t \tag{6}
\]
\[
l_t \leq x_t + d_t + z_t \tag{7}
\]

Nominal dividends are discounted by the date \(t + 1\) marginal utility of consumption \(c_{t+1} p_{t+1}\) because financial intermediaries are owned by households and the households value nominal dividends in terms of consumption it brings next period (Equation 5). The first constraint in the Equation (6) implies that the banks derive dividends as the difference between cash receipts (the sum of deposits, a cash injection \(x_t (M_{t+1} - M_t)\) from the central bank, and the return from making loans) and cash outlay (the sum of interest payment on deposits and consumption premiums and the loan disbursement). The second constraint (Equation 7) is the balance sheet of the financial institution as right-hand-side elements being liabilities and the left-hand-side as assets.

Firm’s problem is similar to the financial intermediary’s problem, which maximizes the following firm’s current period dividend \(\pi_{f,t}\) (again discounted by marginal utility of consumption) by choosing dividend, labor demand, loan demand and next period’s capital

\[
\max_{\{\pi_{f,t}, k_{t+1}, l_t, n_t\}} \mathbb{E}_0 \left[ \beta^{t+1} \frac{\pi_{f,t}}{c_{t+1} p_{t+1}} \right]
\]

Subject to

\[
\pi_{f,t} \leq l_t + p_t \left[ k_t^a \left( a_t n_t \right)^{1-a} \right] - k_{t+1} - (1 - \delta) k_t - w_t n_t - l_t r_{l,t} - z_t \tag{9}
\]
\[
w n_t \leq l_t \tag{10}
\]

The first constraint implies net cash flow of dividends which must be less or equal to sales proceeds (which is \(p_t c_t\) where \(c_t = y_t - i_t\) and \(y_t = k_t^a \left( a_t n_t \right)^{1-a}\) and \(i_t = k_{t+1} - (1 - \delta) k_t\)) plus loan disbursements minus wage payments, interest payments on loans and consumption premiums). The second constraint implies that wage bills are paid by borrowing from the financial intermediary.

For the equilibrium to hold in the model economy, it requires that the following market clearing conditions are satisfied in labor, money, goods and credit markets.

Money Market:

\[
p_t c_t = M_t + x_t \tag{11}
\]

Labor Market:

\[
h_t = n_t \tag{12}
\]

Goods Market:

\[
c_t + (k_{t+1} - (1 - \delta) k_t) = k_t^a \left( a_t h_t \right)^{1-a} \tag{13}
\]

Credit Market:

\[
x_t + d_t + z_t = l_t \tag{14}
\]

Money market equilibrium clears when money demand equals money supply, and money demand is nominal consumption expenditures \(p_t c_t\) whereas money supply is current nominal
balance $M_t$ and money injection $x_t$. For money market to be clear, the labor market must clear with the equality between labor demand and labor supply along with Equation (10) to hold with strict equality, that is, $w_t n_t = l_t$. Goods market clears when consumption plus investment equals the total production in the economy. Credit market clears when Equation (7) holds with strict equality, meaning that money injection, deposits and consumption premiums must equal the total loan amount that financial intermediary disburses to the firms. This further implies that $r_{d,t} = r_{l,t} = r_t$ due to equal risk profiles of the loans, and the amount of dividends paid by financial intermediary equals money injection inclusive of interest earnings, that is, $\pi_{b,t} = r_t x_t$.

This village economy is assumed to be perturbed by three exogenous processes. Of them, the technology follows a random walk with drift

$$\ln a_t = \gamma + \ln a_{t-1} + \varepsilon_{a,t}, \quad \varepsilon_{a,t} \sim N(0, \sigma_a^2)$$  \hspace{1cm} (15)

The growth of money stock ($M_{t+1}/M_t$) is an autoregressive stationary process

$$\ln m_t = (1 - \rho) \ln m^* + \rho \ln m_{t-1} + \varepsilon_{M,t}, \quad \varepsilon_{m,t} \sim N(0, \sigma_M^2)$$  \hspace{1cm} (16)

The basic assumption underlying Equation (16) is that the central banks allow money stock, $M_t$ to grow at the rate $m_t = M_{t+1}/M_t$. This equation is being interpreted as a simple monetary policy rule without feedbacks. The innovations, $\varepsilon_{M,t}$ capture unexpected changes of the money growth rate due to normal policy making and a changes in $m^*$ or $\rho$ corresponds to a rare regime shift.

The third perturbation in the system comes from velocity shock in consumption $\zeta_t$. This is an important source of movements in aggregate variables in this economy and this shock lies on the center of the discussion in this research. The velocity shock is assumed to be behaving in the same way as monetary shock.

$$\ln(\zeta_t) = (1 - \kappa) \ln(\zeta^*_t) + \kappa \ln(\zeta_{t-1}) + \varepsilon_{\zeta,t} \quad \varepsilon_{\zeta,t} \sim N(0, \sigma_{\zeta}^2)$$  \hspace{1cm} (17)

The first order conditions, the equilibrium conditions, the model closure and the stochastic processes constitute the system of equations to be solved in this model economy. The model is estimated and simulated using detrended variables. The linearized equations from the dynamic stochastic general equilibrium (DSGE) model leads to the following linear rational expectation system in 14 equations and 14 endogenous variables. The deep parameters of the model are: $\Omega = [\alpha, \beta, \gamma, m^*, \rho, \kappa, \psi, \delta, \zeta^*]$.

$$E_t \left\{ \frac{\zeta_t \hat{r}_t}{\hat{c}_{t+1} \hat{p}_{t+1} m_t} \right\} = -\frac{\beta}{\hat{r}_{t+2}} e^{-\alpha(y + \varepsilon_{a,t+1})[1 - (\delta) + a \hat{a}_{t+1} \hat{r}_{t+1}^{-1} n_{t+1}^{1-a}]}$$  \hspace{1cm} (18)

$$\bar{a}_t \left( 1 - p \right) \left( \frac{1}{n_t} \right) = \frac{i}{n_t}$$  \hspace{1cm} (19)

$$\hat{c}_t = \frac{\hat{r}_t e^{-\alpha(y + \varepsilon_{a,t+1})[1 - (\delta) + a \hat{a}_{t+1} \hat{r}_{t+1}^{-1} n_{t+1}^{1-a}]} \hat{a}_t}{\bar{a}_t}$$  \hspace{1cm} (20)

$$\hat{h}_t = \frac{1}{\hat{c}_t \hat{p}_t} e^{-\alpha(y + \varepsilon_{a,t+1})[1 - (\delta) + a \hat{a}_{t+1} \hat{r}_{t+1}^{-1} n_{t+1}^{1-a}]} E_t \left( \frac{1}{l_{i m_{t+1}} \hat{p}_{t+1}} \right)$$  \hspace{1cm} (21)

$$\hat{r}_t = \frac{e^{-\alpha(y + \varepsilon_{a,t+1})[1 - (\delta) + a \hat{a}_{t+1} \hat{r}_{t+1}^{-1} n_{t+1}^{1-a}]} E_t \left( \frac{1}{l_{i m_{t+1}} \hat{p}_{t+1}} \right)}{\bar{a}_t}$$  \hspace{1cm} (22)

$$\hat{c}_t + \hat{h}_t = e^{-\alpha(y + \varepsilon_{a,t+1})[1 - (\delta) + a \hat{a}_{t+1} \hat{r}_{t+1}^{-1} n_{t+1}^{1-a}]} E_t \left( \frac{1}{l_{i m_{t+1}} \hat{p}_{t+1}} \right)$$  \hspace{1cm} (23)
\[ \hat{p}_t \hat{c}_t = m_t \]  
\[ m_t - 1 + \hat{d}_t = \hat{l}_t \]  
\[ y_t = e^{-\alpha(y + \epsilon_{a,t+1})} \hat{k}_t^{\alpha} n_t^{1-\alpha} \]  
\[ \ln(m_t) = (1 - \rho) \ln(m^*) + \rho \ln(m_{t-1}) + \epsilon_{M,t} \]  
\[ \ln(\zeta_t) = kl\ln(\zeta_{t-1}) + \epsilon_{\zeta,t} \]  
\[ \frac{a_t}{a_{t-1}} = da = e^{(y + \epsilon_{A,t})} \]  
\[ \frac{y_t}{y_{t-1}} = e^{(y + \epsilon_{A,t})} \frac{\bar{g}_t}{\bar{g}_{t-1}} \]  
\[ \frac{p_t}{p_{t-1}} = \frac{p_t}{p_{t-1}} \frac{m_{t-1}}{e^{(y + \epsilon_{A,t})}} \]

The simulation of this DSGE model is achieved by using Dynare software (Adjemia et al., 2011). The definition and parameter values are summarized in Table A1 in the Appendix. One of the difficulties to choose the parameter values for this economy was the lack of literatures that offer these values. While some of the parameters are taken from standard earlier literatures (for example, the discount factor and depreciation rate), others were assigned intuitively based on the judgment of typical condition of poor economies in the world.

The results from the simulation are presented in the Appendix. Table A2 reports simulated correlation of endogenous variables. While the results are mixed, the correlation between velocity and consumption turns out to be significantly positive, as expected in the model economy. Impulse response functions, on the other hand, demonstrate that the velocity shock has positive effect on consumption at the initial forecasting periods but the effects do not exhibit such tendency in later periods. For output, labor hours, and deposits, the effects are negative at the beginning but subsequently become positive in the later periods (Figure A1).

The mixed results are attributed to several factors and calls for further discussion. First, the chosen parameter values may not be reflective of the true conditions of the poor economy as they have been taken based on logical reason lacking empirical justification. Second, the shocks in the model may not follow the processes as assumed in the model. The velocity shock, for example, may not behave in the same way as monetary shock. Third, the steady state property of this model economy may not be true for the reason that the velocity shock may affect the economy in a permanent way without allowing it to come back to the steady state. Forth, the model economy in Nason and Cogley (1994) has produced an unexpected negative impact of monetary shock on the real output and this study borrows many ingredients from that study, which provide logical ground to believe that the same problems might have been persisted in this study as well.

Having said all this, the performance of the model is believed to improve when true parameter values become available when the experiments of randomized control trials are accomplished as proposed in this study. It is believed that the reliable data and other information collected during the experiment will help refine the model and obtain consistent results which is left for the future research.
2.3 Further Justifications for the Velocity Approach

In this sub-section, three prototype models are discussed in order to garner further support for the velocity approach of alleviating poverty.

**Model 1: Velocitizing the money supply**

In this model, a hypothetical poverty-stricken economy is discussed in which it is assumed that there are a few households who subsist on what they produce at home. These households are poor by any standards that measure poverty, such as acute shortage of calorie needs, no schooling for children, no health services for the family and the shortage of other basic needs available to them. This village is typical of what one can see in most of the rural parts in poor countries. The good thing, however, is that these small village economies are characterized by a surplus labor which can be productively used to produce goods and services and this excess labor force also plays a role of creating effective demand for products for a market to grow within itself⁹.

How would a rise in money velocity help exploit such a latent market? To start out, first take two households who plan to start two businesses – a bakery store and a tea store – and each store is owned by each household. For simplicity, it is also assumed that the households can produce bakery and tea by using the resources they own in present situation excluding the capital, meaning that they don’t need to buy raw materials from outside to run their businesses.

Now each household is injected with $100 capital at the beginning to buy necessary utensils to establish their businesses (may it come from donors as has been discussed in the model above). Each of them also receives $5 cash, in addition to the capital, which will be used as a means to make transactions when purchasing tea or bread from one another. There is a monetary authority which makes cash available needed for them to buy capital equipments and conduct transactions. There is no interest rate charged for the capital and inflation is also not allowed in this simple setting.

A hypothetical linear computation shows how a $5 bill can produce relatively a large volume of real GDP in this hypothetical small rural economy when the bill is velocitized (Table showing these calculations will be made available upon request). To begin with, the two households make an agreement that each household every morning will buy and consume one unit of each item produced by other household. Before this agreement, they both had potential to produce a cup of tea and a loaf of bread each day but they were not producing them. From now on, though, the production has taken place systematically in the newly created market for the products to sell and consume. In doing so, the $10 bill ($5 from each household) will move from one household to another every morning.

A question may, however, arise why these households should engage in such an agreement even though they do not generate profits from their businesses? The households will have incentive to do it simply because they have now become more productive than before and they do it at least to satisfy their calorie needs which they were previously lacking and increase

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⁹ This similar condition is seen in extremely populated Ganges Belt in South Asia where a majority of the world’s poor reside. This belt is rich in resources such as fertile land and abundant labor supply which allows enough room for any economic activities to foster quickly. See Banerjee and Duflo (2011) to understand how an exploitation of missing market would become one of the effective measures to fight global poverty (pp. 269-270).
their welfare level in the end. In addition, they are now consuming two varieties of products as opposed to only one when they produced the items for self-consumption previously. In this economy, the total money supply is $10 (excluding the $100 capital injection which was used to buy utensils from outside market) and the average velocity is 30 (a month) because the nominal GDP (and also the real GDP because of no inflation assumption in this economy) is $300 (a month). When the model is simulated by increasing velocity to 60 (that is, one hundred percent increase which happens when the households decide to consume bread and tea twice a day depending on their production capacity), the real GDP will increase to $600. The same $10 money supply raised real GDP by 100 percent when there is a rise in velocity by 100 percent. In this model, the growth of money supply and inflation rate both were assumed to be zero and therefore the entire growth in velocity transmitted to the growth in real GDP. The point of this simple model is to demonstrate that raising money velocity would lead to the higher economic activities in an economy as measured by real GDP given that money growth and prices are constant.

The model explained here is something like a gift economy\textsuperscript{10} where the gifts, a loaf of bread and a cup of tea, are being exchanged between two households each day. This simple economy benefits from higher level of consumption and the exploitation of existing production capacity. The lack of these two features is in fact the problem of poor economies. They have production potential in place but they don’t produce goods and their consumption also remains at very low level. Such poor economies have significant level of uncultivated demand but, ironically, there is no income to support this demand. The process explained above feeds on itself until this uncultivated demand is satisfied completely. Nonetheless, this simple model has many limitations such as the availability of startup capital, production capacity of the rural economy, and intertwined relationship among various socio-economic factors.

The analysis so far includes only one component of aggregate demand: consumption. The model now is extended to include investment demand in the analysis. Suppose that the households decide to make profit out of these businesses. The profit is generated on each consumption activity, say $1 as a markup, which turns out to be a saving for each household. Now the incentive has been created for the households to make more consumption (or production) so they would generate more savings. As for the money supply, it has two components now: the first $10 (possessed by two households) is entitled to the velocity as before which moves household to household on each consumption but another part, which is saving, is not entitled to velocity. The central bank as assumed in this model will provide the latter on each transaction. The total real GDP in this example amounts to be $360 (Table showing these calculations will be made available upon request). When the frequency of transaction doubles, the real GDP also becomes twice as much, that is, $720, which also includes $60 savings for each household. The accumulated savings may turn into investment later which will help expand their businesses and help create jobs in the economy in the future.

\textsuperscript{10} Gift economies were prevalent in the economic history before market economies emerged. In such economies, there is a reciprocal gift offering, such as in the model explained, you allow me to eat a loaf of bread and I allow you to drink a cup of tea each morning. Money is not needed to make this agreement but money was introduced in this model because it helps to calculate velocity by using quantity equation of money. The remnants of gift economy are still seen around the world which has been facilitated by the growing information technology in this digitally networked world where the transfer of gifts from one person to another has been exceptionally easy.
Apparently, such process can be extended for the entire village instead of only two households. The model, however, is a very simple linear calculation and may not be the representative of the complex society where one lives today. It is not that easy to velocitize the money by any-fold as explained in the model but a marginal growth in the velocity, while containing inflation at low level with lower growth of money supply, may produce a significant rise in real GDP, at least in the long-run. The point here is that velocitizing money as supported by productive activities by exploring missing market in the developing countries may turn out to be an innovative way to combat global poverty. The unexploited, dormant, under-produced and under-consumed rural economies prevailing in developing countries need some sort of self-sustaining process as explained in this model to bring them out of abject poverty. A huge growth potential as substantiated by large population in such poor economies is regarded as an opportunity to become prosperous when economic dynamism is created in these economies.

Model 2: Increase in money supply and creation of velocity points

The quantity equation of money in growth rates is defined as:

\[ \%\Delta M \text{ (money growth)} + \%\Delta V \text{ (velocity growth)} = \%\Delta P \text{ (inflation)} + \%\Delta Y \text{ (real GDP growth)} \]

Assuming that the inflation is constant, a growth in real GDP results from two sources: growth in money supply or the growth in velocity or both. Monetarists maintain that real GDP grows at a positive rate at least in the short-run when there is an increase in money supply. But at the same time when some policy measures are taken to increase the velocity of money, it will create a synergic effect on the growth of real GDP. All it needs is that inflation should be contained. In the short-run both money growth and velocity growth will contribute to the growth of real GDP whereas in the long-run the growth in money supply becomes proportional to the inflation but the velocity will continue contributing to the growth of real GDP. This means that while money is neutral in the long-run, the velocity is not. Therefore, in order to achieve positive growth in real GDP both in the short-run and in the long-run, there must be a positive growth in money supply and the positive growth in velocity, net of inflation. By raising money supply just enough and by creating as many velocity points as possible through various monetary and fiscal policy measures will help velocitize the money and achieve higher economic growth.

A simple model is discussed to show how this framework works. It is assumed that there is a small, poverty-stricken village with a couple of households, similar to the one in the first model above but with an additional feature that the village already has a small grocery store and a government-run public school\(^{11}\). The village is connected with a nearby market from where the store buys stuff to sell for its customers, mainly the teachers and students from the nearby school and some other passerby and residents. The store is run by self-employed individuals. This is a

\(^{11}\) In fact, this model is developed on the premises of a typical village where I grew up and did my high school. During my study years the village was so poor that there was no clean water to drink, no electricity and no health clinic but a high school. The owner of the grocery store was indeed one of my relatives and the couple in the family seemed to be working so hard in their full capacity most of the time. The money they made from the store seemed to be just enough to meet their everyday needs because, as I was a witness throughout the store’s history until I left the village after my high school, the store never grew bigger than the size when it was in its inception and, frustratingly, when I visited the village recently again and I found that the store wasn’t there anymore and the village too had not achieved any progress since then.
similar kind of store as illustrated in Banerjee and Duflo (2011) which has very little potential to
grow into a bigger size (p. 217).

What can be done to increase the size of this business and, potentially, establish other
businesses in the community that can provide jobs for other people in the locality? The
description that follows ascribes two factors – the increase in money supply and the increase
in velocity of money by creating multiple velocity points – which would help not only increase the
size of this business but can lead the entire village into prosperity.

(i) Increase in money supply

As explained above, the students and school teachers were the only customers that the
store could mostly sell the items. There were a few other households in the village but they were
only occasional customers of the store because they were living in subsistence level of income
and they did not have enough income to afford items available in the store. Literally speaking,
the village was deserted with money. The lack of money income prevented villagers to make
purchases possible and thus making it impossible for the store to get bigger in size with increased
sale. The only money that was flowing into the village was the salary of teachers and a little
more that was coming from the occasional sale of agricultural produce by the villagers in the
nearby market.

The question is how the money supply could possibly increase in this village so
purchasing power would be generated for the villagers who can now spend part of their income
in the store and help expand the business. The possible avenues are: (i) increase the salary of the
teachers, (ii) launch any new project in the village that creates jobs for the villagers, (iii) people
opt for leaving villages to work in nearby cities or abroad (iv) and potentially the helicopter drop
of money (Friedman (1969) pp. 4-8) provided that production increases at the same time. When
one or all of these happens, the money will start flowing into the village creating effective
demand for the items in the store and help make the businesses expand.

(ii) Creating multiple velocity points

Besides an increase in money supply, even more important is the increase in velocity of
money through creating multiple velocity points to foster economic activities in the village and
then the size of the grocery store at the same time. Taking the same example again, the teachers
in the village spend money in the stores only during the lunch time. It is assumed that the
teachers are reluctant to spend money in the store because they have a concern that when they
spend money in the store, the money would never come back to them or their savings would
deplete. To avoid this concern, a hypothetical arrangement is made among the teachers and the
owner of the grocery store that the more often the teachers spend money in the store the more
benefit both the teachers and the store owner would materialize. In order for this to happen, as
already mentioned, the grocery store was spending a fraction of money to purchase raw materials
from the market outside the village. Once this money leaves the village, it never comes back (we
can regard this as imports which contribute to reduce real GDP in the village). The question is
how to retain that money within the village and make it move faster. One day teachers’ wives sit
together and make a genius plan. They decide to set up a new business in the village that makes

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12 One can clearly see how a village gets prospered when a factory is set up in the village (See Banerjee and Duflo
delicious food items (most probably from home grown stuff) to supply to the store\textsuperscript{13}. The teachers, on the other hand, switch to dine for the homegrown items in the store so that the money they spent in the stores partially comes back home in the form of their wives’ earnings. By doing this, one velocity point, that is the business set by teacher’s wives, was created. More importantly, the women who were previously unemployed got self-employed. The more the teachers spent in the store, the more their wives are going to make money through their businesses. At the meantime, the tea store also gets expanded with increased sale than before.

To this point the teachers, the grocery store and their families have been involved in the economic process. There are many other people in the village who are still deprived of the economic opportunities and have remained outside of the process. How to bring them into the system? The village now aims to create another velocity point. As being a poor village, it does not have clean water to drink and the kids become sick quite often, which is unbearable for any family residing in the village. The villagers arrange a meeting in another morning and make a decision that they will request a donor agency or the government to setup a health clinic in the village. A democratic government or a genuine philanthropic donor would be happy to accept this offer and become ready to pay for a nurse and supply of medicines in the store. The store will charge a nominal fee for the medicine which will be used to pay the person who runs the store\textsuperscript{14}. By doing this a person got employed, in addition to the health benefit the villagers would receive from the clinic. Moreover, the more frequent the families visit the clinic, the more chance there would be for other people to get hired in the store. Now another velocity point as a health clinic has been created.

With expanding businesses in the community, people may now feel the need for a better training to run those businesses more efficiently. As with health clinic, the villagers will ask government or donor agencies to help open a vocational school in the community to meet the purpose. Once the school is opened, the villagers can set up a rule that unless a certain level of training is achieved, one cannot hold any job in the businesses available in the community. According to the velocity theory, community itself is an employer, as a result of which people have great incentives to join this school so that they will get the job within their community. In addition, the villagers can also make an arrangement of offering rewards as consumption premiums, as described in the preceding section in DSGE economy, when households join this school to get the service (as an example, a program called PROGRESA pursued similar approach in Mexico to encourage families to send their children to school which produced encouraging outcome and the program is now being replicated in other parts of the world (Schultz (2004)). Now the next velocity point has been created as a vocational school.

When economic activities start to foster in the village, the community members may feel the need of a financial institution to meet their growing financial needs. They would now set up a financial cooperative which will also employ people from within the village. Once the financial institution begins its operation, the fund would become available for others to run the businesses that have potential to grow inside the community. Some would run restaurants, others would operate movie theatres, and so on so forth, all businesses serving as velocity points in the

\textsuperscript{13} This can best explain the so-called locavores movement (local food movement) once history had witnessed and according to which people have tendency to purchase locally produced items rather than import from outside. In the macro context, it is regarded as import substitution.

\textsuperscript{14} This provision of paying a fee is consistent with the approach proposed by Easterly (2006) and others who believe in market approach to alleviate global poverty.
community. Once some velocity points are created, the villagers would search for other potential areas where additional velocity points may emerge, depending on the suitability of the local conditions. They may setup a business to sell items for cultural events, say, if such events are thriving in the community.

The striking point in this analysis is that each unmet need of poor society would serve as a velocity point. Building hospitals, running insurance businesses, running entertainment centers, which are in under-developed stage in poor countries, would be the potential areas to generate velocity points. The combined efforts of the community, government and all other stakeholders can be directed to generate as many velocity points as possible. After all, the velocity points would start feeding on themselves and the growth in the community would become self-sustaining.

This analysis takes it for granted that money must flow within the village as much as possible. Also, the villagers must be cooperative each other and they should not hesitate to spend their money within the village to their fullest. They should not be reluctant to send their kids to school, make regular hospital visits, and even eat frequently in restaurants. These all are the characterization of economically prosperous society in developed world. The more they spend the more they would get benefit out of it at the end. This also encourages producers to produce more at the same time. This is similar to the argument as maintained by Say’s law, which, when borrowing the term coined by John Maynard Keynes, postulates that supply creates its own demand. Galbraith (1987) rightly pointed out that while it is false in theory, Say’s law is true in practice because an increased demand for products leads to increased supply with increased availability of jobs which ultimately again increases in demand and in production. This perpetual causation is what Keynesians call multiplier process.

Velocity approach puts an over-emphasis on consumption which may be regarded as an incarnation of consumerism that was once prevalent in the history and still observed in some parts of the world. Consumerism maintains that an economic system develops in such a way that people have desire to purchase goods and services in ever greater amounts over time. Consumerism has a deep root and long been in practice that goes all the way back to civilizations such as Ancient Egypt, Babylon and Ancient Rome. Industrial revolution led this approach even further as products became available at remarkably low prices. Consumerism was not only the product of capitalism but it could be even intentionally applied as a policy choice. Frederick (1929) observed that it is necessary to spend freely, and even waste creatively, so as to break the vicious circle of low standard of living.

Model 3: Interaction of money velocity and Keynesian multiplier

Finally, a simple mathematical model based on Keynesian framework is derived to demonstrate how the creations of multiple velocity points help achieve higher economic prosperity.

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15 Insurance business designed for poor has not become successful as pointed out by Banerjee and Duflo (2011) for the reason that there is huge moral hazard problem in poor communities. The problem occurs when the insurance business is operated by outsiders but according to the velocity approach the business is operated by community itself, so there is less chance to have moral hazard problem but a great potential to exploit the huge market not penetrated so far.

16 Wang et al. (2010) develop a link between Keynesian multiplier and the velocity of money and derive a conclusion that the macroeconomic policies directing towards stimulating aggregate demand in an economy can be achieved through the variations in the velocity of money circulation.
In quantity equation $MV = PY$, $V$ is defined as the average frequency a unit of money changes hands. It is assumed that money changes hands at different velocity points representing the money transacted as the equivalent sum of income or production\(^{17}\). Then the magnitude $V$ can be approximated as the number of velocity points. The more the velocity points exist the faster the money travels through each velocity points. In other words, people have tendency to consume more when there are more velocity points available which ultimately raises the money velocity. Therefore, consumption is assumed to be the function of both income and velocity points. In the linear approximation, consumption becomes

$$C = C_0 + c_1 Y + c_2 V$$ (32)

where $c_1$ is marginal propensity to consume and $c_2$ is marginal propensity to velocity points and $0 < c_1 < 1$ and $c_2 > 0$.

Assume a closed economy without government and investment for simplicity. Substitute equation (32) into national income identity to get

$$Y = C_0 + c_1 Y + c_2 V$$ (33)

The simple derivation of this equation leads to

$$\frac{\Delta Y}{\Delta V} = c_2 / (1 - c_1)$$ (34)

This equation shows that when both marginal propensity to consume and marginal propensity to velocity points are higher, the contribution to real GDP would be higher and vice versa. It is generally the case that these two magnitudes have tendency to move together: the higher number of velocity points would make people to have tendency to consume more and vice versa. When, for example, a restaurant is opened as a new velocity point, the people in the area would most likely to spend more out of their additional income by starting to spend in this new business available in the community. Similarly, when more and more velocity points are created, people will start spending even at the greater extent raising marginal propensity to velocity points further ahead. When both propensities are lower, a marginal increase in velocity points does not contribute much to real economic activities but a large propensity to consume substantiated by many velocity points with larger velocity propensity will contribute more when there is a marginal increase in income and velocity points. The inherent problem of poor economies is to have the low value of both of these propensities with lower income level and lower number of velocity points. In the absence of profound implication of velocity points in consumption behavior, the Keynesian analysis based on only marginal propensity to consume is not complete because marginal propensity to consume largely depends on the opportunities people have in consuming goods in various velocity points.

### 2.4 How to Make Money Velocity an Exogenous Policy Variable?

The notion of whether the velocity of money affects economic activities or the other way around has been much controversial. Mainstream economists are probably not in a position to

\[^{17}\text{When money changes hands from one point to another but does not generate income or production, V does not serve as a velocity point. An example is the financial transaction of borrowing or lending in which money merely changes hands but the equivalent sum of borrowing or lending is not an income of any party involved. Collins et al. (2009) reveals that the total volume of monthly financial transactions has been observed to be as high as 1.85 times the monthly income in poor households in South Africa. Interestingly, such cash flow intensity of income is higher for poor than the rich (pp. 32-33).}\]
accept velocity as exogenous, primarily on the ground that there is no concrete evidence and theoretical justification that support this claim. However, few works have shown that the money velocity is an exogenous factor. Padrini (1996b), for example, demonstrates that the innovation of electronic money make velocity a cause rather than an effect. The money in the electronic form has made economic transactions much easier leading to fast movement of money and thereby to more economic activities. As an extreme form of such payment system, Woodford (2003) envision the cashless world waiting to materialize and if this situation happen, the velocity of money would turn out to be even faster than it is now which would contribute for an economy to grow faster at the same time. Besides, the empirical evidences discussed in Section 3 also demonstrate that velocity of money has a significant bearing to affect economic activities in an economy.

The goal of this study, however, is not to dwell on the extensive discussion of the nature of velocity but to provide arguments for making this variable as an exogeneous policy instrument so that higher economic growth would be achieved by taking measures to raise the money velocity. Returning to quantity equation again, while controversy still persists regarding the causality among the variables in the equation, mainstream economists have a great deal of consensus that the quantity equation in itself is valid and it accurately characterizes an economy. Then, if quantity equation correctly represents an economy, it must be the case that when some policy measures make velocity to grow, it must transmit into growth of real GDP provided that the proportionality between money growth and inflation is maintained. In this case, the policy measures that help achieve high velocity growth would serve as an exogenous policy variable to help achieve higher economic growth. It should not be asking like a puzzling question whether egg or hen born first but rather it should be saying that if something produced fertilized egg, the hen must have been on the offing. This ‘something’ is what it means by raising the velocity by creating as many velocity points as possible through various policy measures.

Then, how would policymakers control velocity of money? The combined effect of monetary and fiscal policies would produce the synergetic effects to create velocity points and then higher money velocity in the economy. In the prevailing context of economic policy-making front, central banks as such do not have entire control over their existing monetary policy tools to affect the economy, even though they boast on their independence. Inflation, for example, depends on the size of fiscal deficit which in fact depends on the budgetary situation of the government. Likewise, open market operation is mostly conducted through the use of government securities to affect short-term interbank rates but the transmission mechanisms of this interest rate to medium and long-term interest rates and other macroeconomic indicators are still questionable. Therefore, the central banks should not hesitate to work collaboratively with the government for the successful implementation of velocity approach proposed in this study. The following measures are recommended:

First, government should direct its policies towards creating as many velocity points as possible. As discussed in this section above, all basic needs such as hospitals, schools and financial institutions would serve as velocity points. Those areas where the private sector is reluctant to participate should be taken care of by the government and such areas include hospitals, schools, utilities and the infrastructures. The private sector, on the other hand, would run their private businesses such as restaurants, movie theatres and health clinics and the government should facilitate their businesses with concession on taxes, proper enforcement of property rights, and offering of subsidies.
Second, technological progress would play the crucial role. This is relevant particularly for the poor economies because poor are the one who are eager to use new technology. It is easier to control velocity in poor societies because the more poor you are the faster you have to spend your money, not only because they have no choice but also because they have tendency to imitate what higher class people are doing. This is also in consistent with the view that poor are more impatient (See, for example, Becker and Mulligan, 1997). When a new cell phone with latest technology shows up in the market, it will be the poor who will be tempted to buy it first provided it is affordable.

Third, households should be discouraged to hold cash in their pockets. As explained earlier, an increase in money demand (all transaction, precautionary and speculative) decreases velocity. If consumption is not their choice, excess money should be deposited into banks so banks would contribute to create velocity points through credit expansion. In this context, central banks can play a vital role to decrease people's holding of money by directing their policies requiring banks to expand financial access in remote areas. Central banks should encourage banks to adopt new schemes for saving mobilization such as mobile banking, which microcredit programs have already initiated. Since the growth rate of velocity is purely determined by the evolution of payments mechanisms, the central banks do have control over payment systems in an economy and thus on the velocity of money as well.

Forth, saving into banks and financial institutions should go hand in hand with promoting more spending in social activities and cultural ceremonies. Contrary it may seem though for the current trend of saving drives designed for the poor, it is these activities that has kept poor societies alive both economically and emotionally. Such activities have at least helped create few jobs in the form of self-employed store-keepers in poor societies. Both bank savings and public spending help increase money velocity, the latter would have greater effect to local societies because banks have tendency to mobilize deposits locally and invest it elsewhere in the economy where they see more profits.

Fifth, central banks can opt for traditional approach of credit rationing. The credit should be directed towards the areas which are already low in economic activities and can create many velocity points. Besides, central banks should promote for opening up of infrastructure banks so that such banks would have particular focus on developing infrastructure which ultimately helps create more velocity points and then more jobs.

2.5 Discussion

Because global poverty has drawn an exceptional focus in recent years, new approaches to combat this challenge are being opted for from all quarters of development experts. Even after the continuous efforts during the past six decades, the challenge continued to persist as a result of which new signs of commitment have re-emerged leading to requiring collaborative efforts to overcome this global challenge. This study was motivated by this fact and proposes a new model called velocity approach to combat global poverty. The study also calls for rigorous discussion on the approach from all stakeholders including those who want to test the validity of the approach by conducting randomized control trials.

Velocity approach has been proposed at a time when central banks have put excessive emphasis on inflation control as their prime agenda but have been reluctant on the agenda of economic growth and development on their policy prescriptions. In the context of current collaborative efforts surfacing all around to make poverty a history, only inflation control as an
exclusive mandate of the central banks, however, deserves revising, especially by the central banks of developing countries. This does not mean to prescribe though that the central banks in developing countries should abandon the traditional goal of inflation control but it’s an appeal only to be regarded as a fact that adding a pressing goal of poverty alleviation in their major economic agendas is an urgent need.

The velocity approach to alleviate poverty maintains that a rise in money velocity would transmit into the rise in real GDP when proportionality between money growth and inflation is achieved and therefore the central bank, by collaborating with the government, should adopt various policy measures to increase money velocity in the economy. The central banks has spent substantial amount of time to explore the relationship between money and prices and used this evidence mostly in the formulation of monetary policy but it is now time to devote efforts to investigate the link between two other variables in the quantity equation particularly for the sake of uplifting the lives of billions of poor people around the globe through job creation.

Earlier, the exploration of this channel attracted little attention because velocity was assumed to be constant and it had no bearing with real economic activities in the economy. This anecdote has changed remarkably after 1980s when velocity and real economic activities have shown strong cyclicality. The empirical findings presented in this study also validate this relationship. Both the regression results in velocity and economic growth and the simulation of the dynamic stochastic general equilibrium (DSGE) model with velocity shock demonstrate that money velocity is a driving force to maneuver the economy.

The velocity approach also addresses the concerns of the competing approaches taken by recent prominent development economists to combat global poverty (Jeffery Sachs, William Easterly and Esther Duflo, to name a few). Jeffery Sachs calls for the effective and fair use of foreign aid to lead poor countries into prosperity, which velocity theory has in fact been designed for and invites donors and international organizations such as International Monetary Fund (IMF) and World Bank (WB) to actively participate in the process. William Easterly, on the other hand, emphasizes for market-based approach to mitigate poverty, which the velocity theory is all about because market development by creating as many velocity points as possible is the motto of this approach. Esther Duflo’s concern is taken care of by testing the predictions of the proposition by conducting randomized control trials.

The velocity approach is fundamentally different from micro-finance revolution. Microfinance is mostly trade-based model whereas velocity approach is production-based model. In micro finance, the entrepreneurship is essentially absent (though efforts have been made recently to address this issue) and poor are engaged in trading activities after they borrow money from the micro finance institutions. This is one of the reasons why microfinance has been criticized for. Banerjee and Duflo (2011) advance an argument against microfinance in the context that businesses run from small microfinance loan do not have potential to grow into larger sizes and thus the microfinance may not be a panacea to alleviate global poverty (pp. 180). Moreover, businesses run by microfinance loans have little chance to get to the point where small scale businesses can hire other people from the society but rather become only self-employed for themselves (pp. 213). Besides, some people in the society, particularly the women, do not intend to run the businesses but instead prefer to work for a job (pp. 87). Velocity approach addresses all these issues and allows for both business and service sector to grow simultaneously making room for all people to fit into the profession they want to opt for. The businesses in this model have potential to grow at bigger sizes as well because the purchasing
power in this model is generated from within the society in a collective way which helps businesses expand incessantly\(^\text{18}\).

This new approach is also different from charter cities doctrine of economic development (Fuller and Romer, 2012). The charter cities doctrine maintains that rich countries will sign a contract with poor countries to build cities in the latter with all necessary infrastructure and other legal provisions being already established and then allowing interested people from outside to move into the newly established cities with good rules and regulations. This model imposes development from outside as opposed to the development taking place from within the society in the velocity approach. As it sheds enormous doubt on charter city idea in regard to feasibility of the model in a political sense, velocity model does not have any issue like this. The growth from velocity approach is going to be home-grown growth. In addition, charter cities doctrine builds cities first and then allows people move later into the cities but velocity approach allows cities to develop later once the velocity starts getting momentum in the community.

Velocity approach is consistent with the idea of sustainable development as well. The growth is allowed in this approach from within the society without allowing any large industrial production in the community that is prone to environmental deterioration. The approach also encourages protecting cultural heritages of the society, requiring people to spend as much as they can in cultural events. The values in some societies maintain that an excessive obsession on the accumulation of wealth does not always offer happiness but what matters is that people can live their life happily by becoming important part of the society and active participant in local traditions and cultures that promotes social harmony. Velocity approach encourages people to maintain societal values while pursuing economic goals (See Layard, 2006 for detail on how happiness matters much for a better society).

To sum up, in order to make velocity approach successful it is required that the central banks should work in collaboration with the governments and direct their policies to create as many velocity points as possible. In doing so, they should not hesitate to involve different stakeholders from the society as well so that they will not be obsessive about inflation control over and above other social goals that the society desperately needs. In a pro-poor policy framework, inflation control is not the province of only the central banks but this is social commitment and a strategic national objective (Filho, 2005). At times, it becomes sensible that central banks should be ready to amend the central bank law to include in its objectives not only inflation stabilization but also economic growth, employment generation, financial sector stability, and more importantly, the alleviation of poverty. It becomes certainly hard to take unorthodox approach as an alternative to the mainstream view but the approach presented in this study is the combination of both. In the context of new approaches coming into discussion regarding the overwhelming problem of poverty, pro-poor alternatives of monetary policy is going to be one of the challenging field people with radical thought would be working on in the future and the central banks do have quantity equation of money as a powerful lever for that.

3. Prescribed Actions

A number of initiatives that may follow after recognizing that the velocity approach proposed in this study can serve as a potential policy prescription to alleviate global poverty.

\(^{18}\) Velocity approach is believed to achieve inverted L-shape curve in pp. 13 rather than an S-shape curve in pp. 12 as explained in Banerjee and Duflo (2011).
First, the approach has to be examined through randomized control trial experiments to test its validity. In such experiments, two locations are selected and one location would receive a treatment of a policy that encourages higher money velocity and another does not. The impact evaluation would then follow based on the different economic outcomes observed in these two locations (See Duflo, 2006 and Duflo et al, 2007 for details about randomized control trial experiments).

Second, the money velocity has been so far defined in terms of macro level, that is, the ratio of national nominal GDP to the aggregate money supply. A micro analysis of velocity such as how a piece of money travels in an economy from one individual to another has not yet been a subject of research. A bill gets out of the central bank and finally arrives back to the bank after a long voyage, either to be destroyed or re-circulated, but the entire route the bill passes through out of the bank is mostly vague. Central banks are believed to have capability that they can develop a mechanism to identify the path of money that it travels around, at least to a certain extent. The development of an algorithm to solve such micro velocity model would potentially be much helpful to identify the factors that control money demand or money velocity in an economy leading to more effective tools available for central banks to conduct effective monetary policy.

Third, the money velocity up until now has taken space only in quantity equation of money but there is a great potential to explore the relationship of velocity with other macroeconomic parameters such as Keynesian multiplier and credit multiplier (Wang and Qiu, 2005 and Wang et al., 2010). Once such relationships are developed, there would be more understanding of the linkages between the monetary sector and the real sector of the economy such that the policy would be designed effectively to produce desirable effects.

Forth, the core concept behind velocity approach is to develop economic networks by creating various velocity points to generate economically vibrant economy. The networks have turned out to be much effective means in recent times to generate positive outcomes in the society, be it a social media or the international trade networks. Velocity approach may come helpful to contribute in advancing the underlying concept of economics of networks which was once regarded as an important discourse in economics discipline (see, for example, Pigou, 1920 for system-optimized vs. user-optimized solution in a network system). The better understanding of such networks would help develop an accurate nexus between policy actions and policy goals.

Fifth, velocity approach proposed in this study may also be used to determine the optimal number of businesses in a typical community that can create enough jobs for its members through various velocity points. Based on this argument, a quantitative model can be developed such that, given the population size and the resources available in the community, the model will identify the optimal number of businesses the community needs, the types of businesses the community can establish, optimal level of finances required, and the types of jobs that can be created. For empirical analysis, the project can pick two towns – one as a economically vibrant and another a relatively a dormant – to compare them in terms of population size, businesses on operation, available resources, and other pertinent factors inherent to them such that the analysis will provide a clear understanding of how a relatively passive economy can be transformed into a active economic center.
Appendix

Table A1: Parameters used in estimating DSGE model.

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Description</th>
<th>Values</th>
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<tr>
<td>$\alpha$</td>
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<tr>
<td>$\beta$</td>
<td>Discount factor</td>
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<tr>
<td>$\gamma$</td>
<td>Deterministic trend component of technology growth</td>
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<td>$m^*$</td>
<td>Steady state money growth rate</td>
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<tr>
<td>$\rho$</td>
<td>Persistence parameter for monetary policy rule</td>
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<tr>
<td>$\kappa$</td>
<td>Persistence parameter for velocity process</td>
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<td>$\psi$</td>
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<td>$\delta$</td>
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<tr>
<td>$\zeta^*$</td>
<td>Steady state velocity growth rate</td>
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</table>

Notes: Some of these values were taken from standard literatures whereas others were chosen intuitively to make them consistent with poor economies. Output elasticity of capital, for example, is chosen to be only 0.05 in contrary to approximately 1/3 in standard literatures on the ground that poor economies have very low capital base.

Table A2: Correlations of simulated variables.

<table>
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<th>Variables</th>
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<th>$e$</th>
<th>$\zeta$</th>
<th>$W$</th>
<th>$R$</th>
<th>$k$</th>
<th>$d$</th>
<th>$n$</th>
<th>$I$</th>
<th>$y$</th>
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</table>

Notes: Results produced by Dynare
Figure A1: Impulse responses

Notes: Since the velocity shock has been the prime focus of this study, theoretical impulse response functions only of orthogonalized velocity shock have been shown.
References


Easterly, W. (2006). *The white man’s burden: Why the west’s efforts to aid the rest have done so much ill and so little good*. Oxford: Oxford University Press.


