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Highlights

Impact of Economic Events

Empirical Evidence from Ethiopia

Discovering Thoughts, Inventing Future

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The Necessity for Large Private Business Organizations in the Economy of Honduras

By John Theodore

JDT Management Consultants, United States

Abstract- The purpose of this article is to expose the necessity for large national private business organizations in the Republic of Honduras. A comparison was made with the early industrialized nations of the United Kingdom and the United States whose economies necessitated large private enterprises in order to attract large investments and professional management. It was proposed in the article that the government of Honduras selectively privatizes its large enterprises that are not essential to the defense and security of the country and are not natural monopolies. It was also suggested that the government needs to encourage and support the formation of new large private enterprises in order to create a competitive economy on a national, regional and global basis.

Keywords: first and second industrial revolutions, industrialization, economic development, agriculture, agricultural products, pymes, large government enterprises, large private enterprises, natural monopolies, privatization, productivity, production, global competitiveness.

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THENECESSITYFORLARGEPRIVATEBUSINESSORGANIZATIONSINTHEECONOMYOFHONDURAS

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I. Introduction

In Honduras the government owns and operates a number of large enterprises. On the contrary, there is an abundance of small and medium size private enterprises (pymes) that are classified as micro empresas (micro business) that have one to four employees, and pequeñas empresas (small businesses) with five to 10 employees. Medianas empresas (medium size businesses) have 11 to 50 employees. Large enterprises have more than 50 employees. The average number of employees in the microbusiness is three; in the small ones seven, and in the medium size 14 (Banco Interamericano De Desarrollo, 2013).In this article, the author is referring to national Honduran enterprises only, be either private or government owned and operated.

II. The Development of Large Private Enterprises in the Anglo-American World

Nations that accepted the Protestant Reformation created advanced industrial economies. A positive impact emanating from religion creates an economic system which favors, sustains, and develops industrialization as a major factor of the economic activities of a nation (Theodore, 2011). In the latter part of the 18th century the factory system appeared in England as the result of the transformation of the production of cotton which was a vital industry in the country. This drastic economic change is known as the First Industrial Revolution when new industries appeared on the scene (Allen, 2009). As the direct result of the First Industrial Revolution, the development of large-scale private enterprises appeared and demanded large-scale capital. The corporate form of business in the newly established large private enterprises offered the advantages of broadly distributed ownership, limited liability, and the ability to attract many investors (Brech, 2002).

The Protestant Reformation also affected the United States. Such strong impact, accompanied by the entrepreneurial motive, resulted in a decentralized and independently owned and operated industrial complex, a democratic educational system, and a flexible social structure. Such impact also assisted Americans toward pushing industrialization and developing their infrastructure instead of trying to expand the agricultural sector with more and more land (Howe, 2007).

The Second Industrial Revolution that took place in the United States immediately required the presence of large private enterprises, especially in the corporate form, which provided all the necessary factors of production the new socio-economic system of the country needed. The large private business enterprises dominate the United States economy today. The United States threw off early structures and systems, such as partial or total ownership and/ or control of large business enterprises by the government, and moved towards having large private business enterprises in the corporate form and a professional management economy at high speed (Wilson & Thompson, 2006).

III. The Case of Honduras

Honduras witnessed an important reform known as the Liberal Reform at the end of the 1800s, the result of which was the centralization of power by the government. The economic infrastructure was defined and structured around the exportation of agricultural products, such as coffee, sugarcane, bananas, cacao and other similar products (Arancibia, 2001). During its colonial period, Honduras did not have any industries and did not inherit an industrial tradition from Spain.

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Unlike the United States that pushed for industrialization and paid less attention to agriculture, Honduras selected the opposite choice (Hernandez, 2000).

Furthermore, Honduras exported its natural resources, such as minerals, in order to attract foreign capital and revenues (Bacerra, 2012). Large government enterprises were created to control the sizeable factors in agriculture—production, distribution, exportation, etc.—whereas a large number of farmers assisted the government in the above-cited factors through their very small business operations, mainly proprietorships.

The Honduran government continued to support the idea of the nation being an agricultural state and exporter of agricultural products and raw materials until it became necessary to create industrialization in order to enter into complete integration with the Central American and Latin American states at the end of the second quarter and the beginning of the third quarter of the previous century. Large enterprises with more than 50 employees were 2% and the remaining 98% were pymes. The industrial sector remained the third element in the GDP of the nation and it was the lowest among all the Central American nations (Funes & Zelayal, 2007). During the same period, the less developed agricultural nations of South Europe were reaching high industrial development levels through the assistance received from the United States (Theodore, 2013).

Preparing for the Central American Integration, the Honduran government created additional large enterprises which were owned and operated by it (Avilla, 1999). On the other hand, private industrial enterprises remained small and produced artifacts, shoes, footwear, and garments and operated with semi-skilled personnel (Molina, 1982). No large private enterprises were created.

In 1982 a change in the government took place that promulgated the reduction of government involvement in the economy, privatization of government enterprises, and the exportation of non-traditional products, such as textiles, garments, and footwear (Hernandez, 1992). Lamentably, none of the above goals was implemented due to continuous political turmoil. At the end of the previous century, industrialization remained stagnant and, in some cases, declined because of the high cost of the raw materials and transportation (Barahona, 2005).

Honduras entered the new century and the new millennium as an agricultural nation and exporter of agricultural products at the time many other small nations around the world had attained a high level of industrialized economies. One of the major problems that retarded economic development has been the weakness of the state in articulating development policies. The state needs to control enterprises that provide public services and also allow the private sector to exist (Agosin, Machado & Nazal, 2004)

IV. The Necessity for Large Private Enterprises in Honduras

Honduras needs to maintain its economic strength in agriculture, the exportation of agricultural products and services, and the exportation of minerals and raw materials. It must also create industries beyond those existing today. Additional industrialization will necessitate the creation of large private enterprises (more than 50 employees) and the selected privatization of a portion of large government enterprises (Euraque, 2008). Privatization means the sale of government businesses and monopolies. Private enterprises will function better, will have good factors of production, and will attain economies of scale(Molina1982).Industrial, agrarian, and commercial business transactions need to be private operations financed, owned, and operated by private persons (Bacerra, 2012).

By having fewer large enterprises under its control and ownership, the government can manage more effectively and efficiently those enterprises retained by necessity due to their nature—such as natural monopolies (Sanchez, 2013).Furthermore, by taxing large private enterprises which have to have the corporate form due to their size and complexity, the government will receive high revenues. Newly created private enterprises must receive the necessary assistance from the government in the beginning of their formation in order to survive and developed (Funes & Zelayal, 2007).

In addition, large private enterprises can have a small portion of their managers and investors from developed nations—with minority control interests in order for Honduran enterprises to maintain the national entity-- who can provide global strategic directions and high power performance operations that are necessary today for the effective and efficient competition on a global basis.

V. Conclusions and Recommendations

Honduras has several large national enterprises that are owned and operated by the government. In order for the economy of the country to be competitive globally, the government needs to selectively privatize its large enterprises that are not essential to the defense of the nation or are not natural monopolies. In addition, the government needs to promote the formation of new large private enterprises and assist them during their early years of operation.

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Market Dynamics: Measuring Impact of Economic Events and Government Programs on Production and Employment

By Joshua F. Dayanim

Market Dynamix, United States

Abstract- The impact of austerity, fiscal and monetary programs has been a subject of numerous studies and findings regarding the effectiveness of such government policies in combating economic downturns by stimulating growth, increasing employment, and promoting investment. The recently introduced Market Dynamics method has been extended to provide a dynamic Production model that incorporates employment, wages, consumption, investment, government spending, interest rate, taxes, and other related factors. The model is used to compare the impact of austerity, fiscal and monetary programs in response to an economic downturn and to measure the size and effectiveness of government actions including changes in spending, taxation and interest rates. A conservation of commerce principal is defined stating that money flow from wages, spending, borrowing and interest activities must match the change in production trades. The latter mechanism is responsible for a lag in response as the full impact of an event is gradually realized over its time horizon.

Keywords: market, dynamics, production, commerce, employment, wages, government, spending, consumption, investment, austerity, fiscal, monetary, growth.

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Keywords: market, dynamics, production, commerce, employment, wages, government, spending, consumption, investment, austerity, fiscal, monetary, growth.

I. Introduction

Several models are widely used to measure the impact of economic events and government responses on production and employment with varying strengths and weaknesses. These include large-scale macroeconomic, vector autoregression (VAR), and dynamic stochastic general equilibrium (DSGE) (Auerbach 2012). Macroeconomic based methods are often difficult to construct and compare since observed data does not point to a single preferred policy (Wielan 2012). In contrast, VAR models utilize systems with multiple variables each defined by its own lagged response values as well as those of other remaining variables. Using an impulse-response approach, future expected values of these variables are calculated in response to a unit increase in a single variable (Sims 1980). Lastly, DSGE models rely on empirical data to calibrate the values of structural components such as demand, supply and government policy, and apply a synthetic series of shocks in order to calculate the corresponding moments and then compare to observed data. The latter also utilizes an impulse-response approach along with stochastic methods in order to calculate the expected outcomes (Ruge-Murcia 2007; Sbordone 2010). These models can vary based on assumptions related to price flexibility and simulated behavior of their structural components.

It seems a more foundational model that incorporates various factors of production and their interactions would be benefitial. Such approach would present a more consistent view of the economy and provide new insight into the relatinships between employment, wages, consumption, spending, investment, and other production factors. The presented extension to Market Dynamics (Dayanim 2011, 2016) provides a differential approach to measuing the impact of economic events and government responses on production output. The formulation introduces a production equation, defines a conservation of commerce principal, and uses an event driven approach to measuring the impact of economic activities. Starting with a basic production equation, the model is enhanced in successive steps to take into account the various factors affecting production. An event time horizon as well as several dynamic indicators are presented that assist in measuring the progress towards the expected change in production. A superposition method is introduced that provides for the addition and measurement of the cumulative impact from multiple consecutive events with overlapping time horizons.

The model is applied to a comparative analysis and measurement of possible government responses to an economic downturn event in the form of austerity, fiscal and monetary porgrams. These programs are based on several prevelant theories regarding the impact of government actions on the economy. Historically, the Keynesians argue that government can fuel growth by borrowing money and returning it into the economy through various spending programs (Kaynes 1936). On the other hand, "Deficit Hawks" believe that budget deficits are at fault as they lead to higher interest

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rates which in turn results in lower investment. Hence, Austerity in the form of increased taxation and reduction in government spending is viewed as the primary means for resolving and averting crisis (Crotty 2011). Finally, Monetary policy aims to promote employment, stable prices, and moderate long term interest rates through actions by the central bank including purchase and sale of government securities, adjustments to the short term discount rate, and changes in bank reserve requirements (Board of Governors of the Federal Reserve System 2016).

The model is used to measure the size of austerity, fiscal and monetary programs in the form of changes in government spending, taxation and interest rate required to restore production and employment to pre-economic downturn levels. Using current economic data, the model is further applied to the analysis of observed slow down in production and money flow growth. By determinig the sources of economic slow down several potential courses of action are identified.

II. Dynamics of Production

a) *The Production Equation*

The production level for a simplistic isolated economy consisting of individual workers, buyers, and sellers who freely exchange goods and services can be stated as:

$$P_n = \mathrm{C}_n + \mathrm{I}_n \tag{1}$$

where P_n represents the production level in a specific time period *n*, C_n the value of consumable goods traded during the same period, and I_n the value of traded investments. P_n is also a measure of purchasing power or in this case earned wages and can be measured by multiplying the number of gainfully employed labor force f_n by the average prevelant wage to obtain total wages in the economy, that is:

$$P_n = \mathrm{W}_n = \mathrm{f}_n . \overline{w_n} \tag{2}$$

with employment level in turn measured as the ratio of employed labor force over the total available labor force seeking employment F_n, or:

$$E_n = \frac{f_n}{F_n} \tag{3}$$

In this context, consumables are goods and services that are used by individuals and provide little residual value past their expected life such as food and cars, while investments represent accumulated capital such as inventory, equipment and buildings. Note that the generation of consumed goods and investments may have occured during any past or present period, and what is relevant is when the value is realized through a trade activity. Hence, any goods or services that are not traded due to lack of interest or inactivity are ignored until discarded or sold in a later period. The value of consumables is determined using a value added approach by measuring the sum of all trades or purchases *p* during the period less the cost of any raw material, equipment or services (excluding wages) used in production *m*, that is:

$$C_n = \sum_i (p_{\mathrm{ni}} - m_{\mathrm{ni}}) \tag{4}$$

Similarly, investment value or accumulated capital is measured as the sum of individual transactions by adding the difference between the buyer's purchase value and the seller's cost basis for each transaction less the cost of any improvements, that is:

$$I_n = \sum_i (ps_{\mathrm{ni}} - pb_{\mathrm{ni}} - m_{\mathrm{ni}}) \tag{5}$$

where ps is the sale price and pb the original purchase price. In this manner, equation (1) states that in a simple isolated economy earned wages are fully utilized to purchase consumable goods or invest in capital assets. Combining equation (1) and (2) results in:

$$P_n = \mathrm{W}_n = \mathrm{C}_n + \mathrm{I}_n \tag{6}$$

i. *Government Spending*

Basic sources of government spending include taxes *T* collected from earned wages and loans *L* obtained from participants in the economy who are willing to lend funds in return for repayments *R* over an extended period of time at a set interest rate. The government spending can be viewed as additional production capacity that is added to the economy while wage taxes represent a corresponding reduction, that is:

$$P_n = \mathrm{W}_n - T_n + \mathrm{G}_n = \mathrm{C}_n + \mathrm{I}_n \tag{7}$$

where wage tax is measured as a product of earned wages and the weighted average tax rate:

$$T_n = \mathrm{W}_n . \overline{t_n} \tag{8}$$

and government spending consists of several components:

$$G_n = a_n . T_n + GL_n - GR_n \tag{9}$$

where the tax spending coeficient *a* represents the portion of wage taxes spent back in the economy, *GL* the level of government borrowing in the current period, and *GR* the accumulated loan repayment amount for the period. It is reasonable to set a equal 1 where there is new government borrowing in the period so that all taxes are spent prior to borrowing additional funds. However, the value of a may be less than 1 if taxes are used to pay down loans and lower the repayment amount on past borrowing activities. Government spending in the economy effectively transforms into worker wages hired to perform government sponsored initiatives.

ii. *Exports and Imports*

In the presence of other foreign economies, goods and services may be traded across national boundaries. To account for this, consumables can be viewed to consist of domestically produced goods and services consumed within the local economy CD_n, as well as two new elements related to the consumption of exports *CX* and imports *CM*:

$$C_n = CD_n + CX_n - CM_n \quad (10)$$

with the latter stating that production level increases with growing exports and decreases with a rise in imports. Equations (7) and (10) when taken together somewhat resemble the familiar aggregate demand equation:

$$\mathrm{AD}=\mathrm{C}+\mathrm{I}+\mathrm{G}+\mathrm{X}-M \quad (11)$$

where *X* and *M* indicate exports and imports (Wikipedia 2016).

iii. *Foreign Investment*

Similarly, participants in foreign economies may invest in the local economy and the investment component is adjusted to account for foreign investment activities, that is:

$$I_n=\mathrm{ID}_n+\mathrm{IM}_n-\mathrm{IX}_n \quad (12)$$

with *ID* representing domestic investment by local investors. The level of investment in the local economy increases as foreigners invest in the system *IM* and is lowered as local funds flow outside the system *IX*.

iv. *Personal Savings and Borrowing*

Savings represents excess earned wages lent by participants in the economy to investors in return for received interest income. In this manner, savings lowers the production impact of wages but in turn results in an increase in investment activity as more funds are available for borrowing. Participants in the labor force can also borrow money for investment and pay back over time with interest. The net effect of personal savings and borrowing is as follows:

$$P_n=\mathrm{W}_n-T_n+\mathrm{G}_n+\mathrm{F}_n \quad (13)$$

where

$$F_n = FL_n - FR_n - FS_n + FN_n \quad (14)$$

with *FL* and *FR* representing personal borrowing and loan repayment, and *FS* and *FN* representing personal savings and earned interest. The amount of earned interest depends on the prevailing rate of interest for savings *rfs*, that is:

$$\mathrm{FN}_n = \left(1+\overline{\mathrm{rfs}_n}\right).\mathrm{FS}_n \quad (15)$$

and similarly the repayment on a personal loan is based on the prevailing loan interest rate *rfl*:

$$\mathrm{FR}_n = \left(1+\overline{\mathrm{rfl}_n}\right).\mathrm{FL}_n \quad (16)$$

v. *Inflation*

Inflation may be viewed as an increase in the price of consumable goods and services. Equation (4) can be stated using prices from the prior period in order to account for the current period's inflation, as follows:

$$C_n = \textstyle\sum_i (1+ri_{\mathrm{ni}}).p_{(n-1)i}.q_{\mathrm{ni}} \quad (17)$$

$$C_n = \left(1+\overline{ri_n}\right).\textstyle\sum_i p_{(n-1)i}.q_{\mathrm{ni}} \quad (18)$$

where a weighted average inflation rate $\overline{ri}$ is used to measure consumption amount at the end of the period using prior period prices. If similar quantities of good and services were purchased in both periods, the above can be restated as:

$$C_n = \left(1+\overline{\mathrm{ri}_n}\right).C_{n-1} \quad (19)$$

However, inflation can have a negative impact on consumption due to higher prices unless accompanied by a similar increase in wages.

vi. *Economic Growth*

Economic growth may be a result of an increase in employment or population, a rise in wages or labor productivity, elevated domestic consumption or investment, additional foreign interest in domestic products, or similar factors. This can be stated as:

$$P_n = \left(1+\overline{\mathrm{rg}_n}\right).P_{n-1} \quad (20)$$

where *rg* is the average rate of growth. A moderate economic growth is considered beneficial as it encourages higher average wages and employment, lower government borrowing, and increased investment.

vii. *Behavioral Factors*

Changes to the production level can be attributed to individual events, some tangible such as a change in personal lending rate or additional government spending with others more behavioral such as loss of consumer or investor confidence. The impact of behavioral elements is reflected as changes to the values of *C* and *I*. For example, the trading value of an investment such as a security or rental property may be stated as the product of its current earnings *IE* and price to earnings multipler *IPE*, that is:

$$p_i = IE_i.\mathrm{IPE}_i \quad (21)$$

where the value of *IPE* incorporates the behavioral aspect of investors (Dayanim 2011, 2016). The value of *IPE* can be measured historically, for example using a 30 day average for recent transactions, or estimated using other behavioral based models. By applying a partial derivative to an investment the impact of a change in the multiplier on the investment value can be determined using:

$$\Delta p_i = \Delta IE_i.\mathrm{IPE}_i + \mathrm{IE}_i.\Delta\mathrm{IPE}_i \quad (22)$$

The overall number of transactions may also be affected due to a drop in investor demand as uncertainty in the economy rises. A similar approach can be applied to Consumables component of production using equation (4) where transaction price and quantity incorporate the relevant consumer behavior. For example, a demand and supply based model can be used to estimate the change in consumable trades in the aftermath of an event.

viii. *Other Production Factors*

Local wage or sales tax, currency exchange rates, depreciation of goods and similar production factors can be introduced into the formulation by adjusting the corresponding component in the Production equation. For example for a wage and consumption sales tax imposed by a locality new terms can be added to equation (13) as follows:

$$P_n = \mathrm{W}_n - T_n + \mathrm{G}_n + \mathrm{F}_n - \mathrm{LT}_n + \mathrm{LG}_n \qquad (23)$$

where *LT* is the local sales tax and *LG* the local government spending. These can in turn be restated as:

$$\mathrm{LT}_n = \mathrm{LW}_n.\mathrm{lt}_n + \mathrm{LC}_n.\mathrm{lst}_n \qquad (24)$$

using local wages *LW*, local consumption *LC,* as well as local wage and sales tax rates *lt* and *lst.* Also,

$$\mathrm{LG}_n = \mathrm{la}.\mathrm{LT}_n + \mathrm{LGL}_n - \mathrm{LGR}_n \qquad (25)$$

using a local tax spend coefficient *la*, local government borrowing *LGL* and loan repayment amount *LGR*.

b) Conservation of Commerce

Equation (6) represents a conservation principal stating that money flow from various sources such as wages, government borrowing and interest earnings equals the added value in traded consumables and investments., that is:

$$\mathrm{MF}_n = \Delta\mathrm{P} = \Delta(\mathrm{C}+\mathrm{I}) = \mathrm{C}_n + \mathrm{I}_n \qquad (26)$$

where ΔP represents the change in production capacity in time period *n* or simply P_n and *MF* the money flow. In this manner contributions from successive periods can be added in order to measure the aggregate commerce over time:

$$P(t) = \sum_n \mathrm{MF}_n = \sum_n (C_n + \mathrm{I}_n) = \mathrm{C}+\mathrm{I} \qquad (27)$$

where *C* and *I* represent the total trade in consumables and investments during the observation time period starting from an initial equilibrium point. The full impact of an economic event is realized over an event's *Time Horizon* as money flow from various trade activities accumulates to fully account for the anticipated change in production.

c) Dynamic Indicators

Several movement indicators are defined that provide for the measurement of progress towards a target production level for an event. As an event's time horizon nears, the accumulated money flow from trading activities fully supports the anticipated change in production and a new stable production level is formed. An event's *Support Level* may be measured by dividing the accumulated money flow from trades at time *t* by the anticipated change in production:

$$\mathrm{ESL}(t) = \frac{\mathrm{MF}(t)}{\Delta P} \qquad (28)$$

where $\Delta \mathrm{P} = \mathrm{P}_T - P_0$ with P_0 representing the initial production level at the event's onset. The target production level P_T is measured using equation (7) after adjusting for changes in the various production factors. The event's *Time Horizon* can be estimated using:

$$\mathrm{ETH} = \frac{t}{\mathrm{ESL}(t)} \qquad (29)$$

assuming a linear progression in time. The support level reaches 1 once the event's time horizon is reached. The expected production level P_E incorporates changes attributed to the accumulated money flow at time *t* and is estimated using:

$$P_E(t) = \mathrm{P}_0 + \Delta\mathrm{P}.\mathrm{ESL}(t) \qquad (30)$$

A *divergence* indicator is defined to measure the difference between the target and current observed production levels:

$$ED(t) = \frac{P_T - P(t)}{P(t)} = \frac{\Delta P_T}{P} \qquad (31)$$

while a similar *expectance* indicator measures the difference between the expected and current observed production levels:

$$\mathrm{EE}(t) = \frac{P_E(t) - P(t)}{P(t)} = \frac{\Delta P_E}{P} \qquad (32)$$

d) Superposition of Events

Using the presented dynamic model, the aggregate impact of events such as economic shifts and government actions on the production level can be measured by superposing multiple events and adding their individual impact on production. This is possible since the formulation in equation (6) presents a linear system. This process is particularly important as the full impact of an event often lags behind its initial onset. The effect on the economy and production is seldom immediate since it requires time for participants and governments to digest and analyze an event, adjust their consumption level, borrow funds, find investment opportunities, or lower tax rate and interest on loans. An event *Time Horizon* can be defined representing the elapsed time from the onset of an event until its impact is fully realized. In this manner, one often observes the aggregate impact of multiple events with overlapping time horizons when measuring various economic indicators.

To demonstrate this, Table 1 lists the federal reserve monetary policy actions from 2006 through 2015. This data is used along with first mortgage originations in Table 2 to estimate the change in borrowing level and repayment amounts and calculate the impact on money flow and production for this one factor. To do so, the expected *ΔFR*, that is the anticipated change in consumer debt repayment for each federal funds rate change event is measured by considering that the total outstanding mortgage debt as of the event's onset will be refinanced over time at the lower rate. To demonstrate the point a quick estimation of the expected change in repayments is made by multiplying the total mortgage debt by the rate change as though the debt consists of equity line mortgages. Alternative estimation methods can prove more accurate by using the average mortgage balance, financing rate, remaing term and monthly payments. Finally, the expected loan repayment also includes adjustments related to shifts in the aggregate borrowing level *FL* which is measured using a product of the incremental change in borrowing and the current interest rate.

As the impact of a rate change is realized gradually over time the event's time horizon can be estimated by dividing the number of outstanding mortgages by the mortgage origination volume for the quarter. For example for the 2008Q1 rate change event, the estimated time horizon is 25.4 quarters or 6.3 years. The event's incremental *ΔFR* contribution for each pursuing quarter can also be estimated by multiplying the total expected change in debt repayment at the event's onset by the ratio of quarterly mortgage originations to the total outstanding mortgages in 2008Q1. This iterative process ends once the aggregate quarterly mortgage originations reaches the total oustanding mortgages at the event's onset indicating a full portfolio turn-over. The latter discussion assumes the average mortgage loan value remains relatively unchanged during the event's time horizon, but a more accurate treatment would utilize the aggregate mortgage values rather the counts. Table 3 details the impact over time for three successive rate change events starting with 2008Q1 and the results are displayed in Figure 1. Each dotted or dashed line depicts the lagging behavior attributed to a specific event with the solid line showing the aggregate impact.

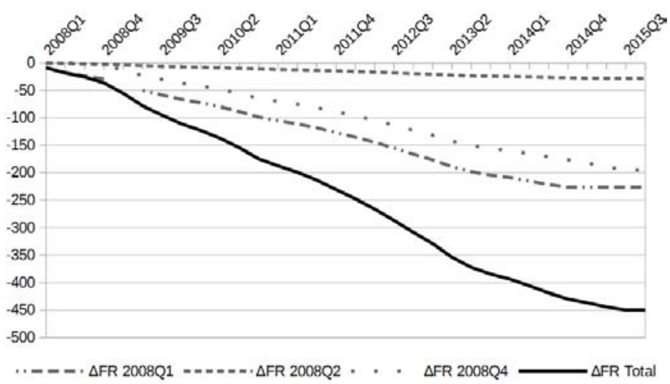

Fig.1: Expected change in mortgage repayments ($B)

III. Government Programs

a) *Economic Downturn Scenario*

Equipped with a dynamic model of production and its various factors, it is now possible to evaluate the impact of discrete events and analyze how a specific government response may affect the economy. Consider a scenario where an event results in a drop in demand and the right side of the production equation (1) suddenly shifts downward. Since the government is interested in avoiding an economic downturn, there is an interest in determining how to maintain the starting employment level and wages prior to the onset of the event. Three popular programs are analyzed include austerity, fiscal and monetary policies.

b) *Austerity*

Policy makers believe that the economy is over-leveraged due to excess borrowing and the path to recovery is to pay down debt by raising taxes and cutting government spending on social programs. The policy objective is to maintain the starting employment level and wages despite a recent decline in the right side of the production equation, that is a drop in consumption and investment. In this scenario, additional taxes need to be raised along with a cut in spending in order to push down the borrowing level. Using equations (7) and (9), assuming no additional borrowing during the period and by requiring the government to divert a portion of tax revenues to paying down accumulated debt, yields the following:

$$P_n = W_n - T_n + a_n . T_n - GR_n \qquad (32)$$

$$P_n = W_n - (1 - a) . T_n - GR_n = C_n + I_n \qquad (33)$$

For simplicity, assume that the borrowing rate remains unchanged at $\overline{rl_0}$ over the covered time period. The total government loan debt at the beginning of the period is represented by GLT_{n-1} and is lowered by the portion of taxes not spent back in the economy. The revised repayment amount can be calculated as:

$$GR_n = \overline{rl_0} . (GLT_{n-1} - (1 - a_n) . T_n) \qquad (34)$$

$$GR_n = GR_{n-1} - \overline{rl_0}.(1-a).T_n \quad (35)$$

and the required change in repayment amount in order to achieve wage and employment stability can be stated as:

$$\Delta GR_n = -\overline{rl_0}.(1-a_n).T_n \quad (36)$$

The change in the production equation (33) due to downturn is measured using:

$$\Delta P_n = \Delta C_n + \Delta I_n = 0 - (1-a).\Delta T_n - \Delta GR_n \quad (37)$$

$$= -(1-a).\left(\Delta T_n - \overline{rl_0}.T_n\right) \quad (38)$$

$$= -(1-a).\left(\Delta T_n - \overline{rl_0}.(T_{n-1} + \Delta T_n)\right) \quad (39)$$

and the required incremental tax to achieve stable employment and wages is:

$$\Delta T_n = \frac{-(\Delta C_n + \Delta I_n)}{(1-a).(1-\overline{rl_0})} + \overline{rl_0}.T_{n-1} \quad (40)$$

As an example, if production drops by 10% of wages, loan interest rate is at 4%, starting tax rate is 25%, and 65% of taxes are used to pay down debt, the additional austerity related tax can be calculated as:

$$\Delta T_n = \frac{0.1W_0}{(1-0.35).(1-0.04)} + 0.04.0.25W_0 \quad (41)$$

$$\Delta T_n = 0.16W_0 + 0.01W_0 = 0.17W_0 \quad (42)$$

effectively requiring a 17% increase in tax rate to 42%. Government spending is also reduced from 25% of wages to 15% (35% of the new 42% tax rate) less any borrowed amount during the prior period.

i. *Effects of Austerity*

For an austerity program to restore the economic production to its prior level, it likely requires a substantial increase in wage taxes as well a material reduction in government spending. The size of the program is dependent upon the level of reduction in production capacity. The increase in wage tax rate can deter people from consuming or investing due to shrinking after-tax net wages, and the higher the increase the more severe the impact. This in turn places further pressure on the job market as employers become reluctant to hire due to a drop in consumption. Lowering government spending can further raise the cost of living due to lost entitlements and places at risk certain populations that rely on social benefits. However, a moderate tax rate adjustment coupled with a more judicious spending on social benefits can prove to be a valuable tool in lowering the national debt repayments, reducing risk of default on loans, and restoring economic health.

c) *Fiscal Policy*

Fiscal policy relies on additional government borrowing and spending in order to stimulate the economy and in this case maintain a neutral wage and employment level in response to an economic downturn. Using equations (7) and (9) several assumptions are made related to an increase in borrowing, stable wage tax rate and employment, and fully spending wage taxes back into the economy, that is:

$$\Delta GL_n > 0; \Delta t = 0; a = 1; \quad (43)$$

then the change in production can be restated as:

$$\Delta P_n = \Delta GL_n - \Delta GR_n = \Delta C_n + \Delta I_n \quad (44)$$

where

$$\Delta GR_n = \overline{rl_0}.GL_n \quad (45)$$

leading to

$$\Delta P_n = \Delta GL_n - \overline{rl_0}.GL_n = \Delta C_n + \Delta I_n \quad (46)$$

and using $GL_n = GL_{n-1} + \Delta GL_n$ the incremental borrowing can be calculated as follows:

$$\Delta GL_n.\left(1-\overline{rl_0}\right) - \overline{rl_0}.GL_{n-1} = \Delta C_n + \Delta I_n \quad (47)$$

$$\Delta GL_n = \frac{\Delta C_n + \Delta I_n + \overline{rl_0}.GL_{n-1}}{1-\overline{rl_0}} \quad (48)$$

For the prior example, if production drops by 10% of wages, loan interest rate is at 4% and assuming no government borrowing for the prior period, in order to raise the production to its former level the additional fiscal policy related borrowing and the associated repayment cost can be calculated as:

$$\Delta GL_n = \frac{0.1W_0}{(1-0.04)} = 0.104W_0 \quad (49)$$

$$\Delta GR_n = (0.04).(0.104W_0) = 0.004W_0 \quad (50)$$

indicating that a relatively modest increase in government loan repayments is required in response to the downturn.

i. *Effects of Fiscal Policy*

The increase in the size of government borrowing and loan repayments can lead to rising loan interest rates. These rates are also subject to fluctuations in currency exchange rates if a foreign currency is used as the basis of received loans and repayments. An increase in the cost of borrowing can result in a spiralling down of the economy as investment slows down due to higher cost of financing and loss of investor confidence. However, provided a moderate national debt level and a nominal increase in loan interest rates fiscal policy can prove a powerful tool in combating an economic downturn. The impact of fiscal policy appears to diminish in the presence of prior period borrowing as indicated in Equation (48) due to the added contribution in the numerator which requires coverage through additional borrowing.

Fiscal policy at times is accompanied by a lowering of taxes on the premise that it increases net wages thus consumers feel they have more disposable income and apply it towards purchasing additional goods and services. However, as equation (32) indicates where wage taxes are fully returned to the economy through government spending the impact of lower taxes may be more psychological and without a lasting effect during a prolonged downturn. This outcome matches survey findings regarding the 2001 tax rebate stimulus impact (Shapiro 2013). However, such tax cuts may be directed at and benefit certain populations that are at greater risk such as lower income households.

d) Monetary Policy

Loan repayment are sensitive to interest rates set by the national regulator or Fed. By adjusting and lowering the personal loan interest rate the Fed can stimulate investment. Using equation (13) and (14) the change in production can be stated as:

$$\Delta P_n = \Delta FL_n - \Delta FR_n = \Delta C_n + \Delta I_n \quad (51)$$

assuming there is no change to the rate of personal savings or government spending during the observation period. When personal loan rates drop investors can refinance existing debt at lower rates and borrow additional funds while maintaining the same repayment levelFR_0. The increase in personal borrowing is then used for additional investment in the economy. The impact can be calculated using equation (16) as follows:

$$\Delta\overline{rfl}_n < 0; \Delta FR_n = 0; \quad (52)$$

$$\Delta FL_n = FL_n - FL_{n-1} = \frac{FR_0}{\overline{rfl_n}} - \frac{FR_0}{\overline{rfl_{n-1}}} \quad (53)$$

$$\Delta FL_n = \frac{-FR_0.\Delta\overline{rfl_n}}{\overline{rfl_n}.\overline{rfl_{n-1}}} = \frac{-FL_{n-1}.\Delta\overline{rfl_n}}{\overline{rfl_n}} \quad (54)$$

$$\Delta P_n = \frac{-FL_{n-1}.\Delta\overline{rfl_n}}{\overline{rfl_n}} - 0 = \Delta C_n + \Delta I_n \quad (55)$$

$$\Delta\overline{rfl}_n = \frac{-\overline{rfl_n}.(\Delta C_n + \Delta I_n)}{FL_{n-1}} \quad (56)$$

For the prior example, if production level is dropped by 10% of wages with personal loan rate of 6%, given that the prior period personal borrowing is at 20% of wages, the required change in pesonal interest rate to maintain a stable wage and employment level is:

$$\Delta\overline{rfl_n} = \frac{-(0.06+\Delta\overline{rf_n}).(0.1W_0)}{0.2W_0} \quad (57)$$

$$\Delta\overline{rfl_n} = \frac{-(0.06+\Delta\overline{rfl_n})}{2} \quad (58)$$

$$3\Delta\overline{rfl_n} = -0.06 \quad (59)$$

$$\Delta\overline{rfl_n} = -2\% \quad (60)$$

$$\overline{rfl_n} = 6\% - 2\% = 4\% \quad (61)$$

The loan interest rate must be lowered by 2% to reach the stated goal. The new pesonal loan level is:

$$FL_n = FL_{n-1}.\frac{\overline{rfl_{n-1}}}{\overline{rfl_n}} = 0.2W_0.\frac{0.06}{0.04} = 0.3W_0 \quad (62)$$

which has increased by the amount of drop in the prior period production level.

i. *Effects of Monetary Policy*

The drop in personal loan rate can result in increased borrowing and consequently a boost in production level provided investors are mainly considered with repayment costs. However, the increased personal debt can pose a problem as loan rates return to normal levels over time resulting in higher repayment costs and an increasing number of defaults on personal debts. This negative impact can be mitigated through the use of fixed rate term loans as well as a more gradual renormalization of rates.

In reality, the effect of monetary policy may be somewhat smaller since aside from line of credit loans most term loans require repayment of a portion of the principle with each payment. For example, for a 30 year loan at 6% interest the annual payment for interest and principle is 7.2% of the initial loan amount payable in monthly installments, whereas at 4% interest the annual payment is 5.7% of the loan amount for a difference of only 1.5%. In order to reach the same level of increase in personal borrowing a larger interest rate drop is required. In the long run, borrowers can benefit from the principal repayment which lowers the loan amount and allows them to borrow additional funds through refinancing.

IV. Economic Growth

Current economic growth can be estimated by incorporating changes in various production factors. The data is Table 4 is used to demonstrate the expected change in production. Combining equations 6, 9, 10 and 14 results in:

$$P_n = C_n + I_n = W_n - T_n + a_n.T_n + GL_n - GR_n + FL_n - FR_n - FS_n + FN_n \quad (63)$$

$$\Delta P_n = \Delta W_n + \Delta GL_n - \Delta GR_n + \Delta FL_n - \Delta FR_n - \Delta FS_n + \Delta FN_n \quad (64)$$

and the incremental annual changes can be measured for the period between 2013 and 2016 assuming $a = 1$ and is presented in Table 5.

The data indicates that the pace of growth in production or money flow is slowing down, specially when measured per employee as shown in Table 6. This is largely attributed to a slower growth in personal income and personal debt which are the largest two contributors to money flow. At the same time, the growth in consumption appears to be tapering down as well. As the trade deficit has remained relatively unchanged, the latter implies a slower rise in domestic production output.

In order to accelerate production growth, the money flow needs to increase. This can be achieved by additional government spending, a rise in domestic wages due to tighter labor markets or higher foreign labor costs, increased domestic investment by foreign nationals, or increased household borrowing. Specific actions may include new government spending on infrastructure projects, inclusion and enforcement of fair labor practices in trade deals, improvement in international economies leading to higher employment and wages overseas, incentives for investment in domestic plant and manufacturing, and further easing of consumer credit. At the same time, the expected rise in federal funds rate serves as a retardant force. Each possible action requires careful consideration in order to avoid negative side effects such as escalating national debt, trade wars, and household loan defaults.

V. Conclusion

This study presents a dynamic model for the economy that takes into account various factors contributing to the production and trade of consumables and investments. Using a conservation of commerce principle, the formulation shows how flow of money from wages, spending, borrowing, and interest earnings fully accounts for observed trade activities. While economic events result in shifts in production capacity, the full impact of such events often lags behind and is materialized over an event's time horizon as trading activities continue. Once the accumulated commerce matches the observed change in economic production an equilibrium condition is reached representing a stable and fully supported production level.

Starting with a simple production model, the formulation is extended to incorporate key economic factors such as taxes, government spending, personal savings and borrowing, and provides for further extensions and analysis of specific areas of interest. This includes tangible as well as intangible behavioral elements that directly impact the level of consumption and investment in the economy. The latter remains an area that requires further investigation.

As multiple economic events may occur within an observation time period, a superposition method is introduced for adding the impact of individual events over their applicable event time horizons. In this manner, the approach provides for the study of production movements over extended periods of time. The dynamic model may also be used to forecast changes in production based on assumptions related to each contributing factor. Further work is needed in applying the model using historical data for key economic events and government actions and subsequently comparing the calculated outcomes against observed values.

The dynamic model is used to analyze the impact of austerity as well as fiscal and monetary policy during an economic downturn. This relies on a methodical derivation using the introduced production equation and is presented in the form of a comparative study on how each policy can restore the economy to its prior production level. The presented approach can be used to analyze the effectiveness and impact of government policies on the economy as well as the associated risks. Using published data, the model is also used to review the current production capacity and money flow and identify potential sources for observed sluggish growth.

The presented dynamic method provides needed insight and understanding of the mechanisms responsible for changes to the production level. The classical approach enables access to a vast pool of existing scientific knowledge with potential application to the fields of finance, economy and commerce. The approach may be extended to any market with an orderly clearance of trade transactions, where intrinsic price values can be associated with the underlying traded commodities and goods. The valuations should follow a linear price equation that factors in the underlying market and human elements.

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Table 1: Federal Funds Rate Changes 2006-2015

Date	Fund Rate (%)	Funds Rate Change
12/17/2015	0.50	+0.25
12/16/2008	0.25	-0.75
10/29/2008	1.0	-0.50
10/8/2008	1.50	-0.50
4/30/2008	2.00	-0.25
3/18/2008	2.25	-0.75
1/30/2008	3.00	-0.50
1/22/2008	3.50	-0.75
12/11/2007	4.25	-0.25
10/31/2007	4.50	-0.25
9/18/2007	4.75	-0.50
6/29/2006	5.25	+0.25
5/10/2006	5.00	+0.25
3/28/2006	4.75	+0.25
1/31/2006	4.50	+0.25
1/1/2006	4.25	0
Source:	Federal Reserve Bank of New York	Board of Governers of the Federal Reserve System

Table 2: First Mortgage Origination Data 2006-2016

Date	Total Mortgage Debt – Single Family ($T)	First Mortgages Outstanding (M)	First Mortgage Origination	Avergae Loan Balance ($)	First Mortgage Origination ($B)	ΔFL Total Mortgages ($B)	rfl	Δrfl (%)	ΔFR Expected ($B)	ΔP Expected ($B)
2006Q1	9.75					0	4.75	0.50	48.750	-48.750
2006Q2	10.08					330	5.25	0.50	67.725	262.275
2006Q3	10.34					260	5.25	0	13.650	246.350
2006Q4	10.50					160	5.25	0	8.400	151.600
2007Q1	10.73					230	5.25	0	12.075	217.925
2007Q2	10.94					210	5.25	0	11.025	198.975
2007Q3	11.13					190	4.75	-0.50	-46.625	236.625
2007Q4	11.24					110	4.25	-0.50	-51.525	161.525
2008Q1	11.32	56.29	2,219,390	144,930	322	80	2.25	-2.00	-224.600	304.600
2008Q2	11.30	56.56	2,127,172	142,620	303	-20	2.00	-0.25	-28.650	8.650
2008Q3	11.26	56.26	1,604,608	138,288	222	-40	2.00	0	-0.800	-39.200
2008Q4	11.15	56.16	1,372,698	138,264	190	-110	0.25	-1.75	-195.400	85.400
2009Q1	11.14	55.46	2,380,585	151,572	361	-10	0.25	0	-0.025	-9.975
2009Q2	11.09	55.17	2,845,034	149,173	424	-50	0.25	0	-0.125	-49.875
2009Q3	11.00	54.57	2,066,527	138,735	287	-90	0.25	0	-0.225	-89.775
2009Q4	10.94	54.39	1,987,193	139,469	277	-60	0.25	0	-0.150	-59.850
2010Q1	10.80	54.42	1,507,370	137,346	207	-140	0.25	0	-0.350	-139.650
2010Q2	10.73	53.74	1,793,454	136,271	244	-70	0.25	0	-0.175	-69.825
2010Q3	10.65	52.99	2,160,284	149,107	322	-80	0.25	0	-0.200	-79.800
2010Q4	10.45	52.24	2,498,105	153,809	384	-200	0.25	0	-0.500	-199.500
2011Q1	10.39	52.64	1,589,669	143,911	229	-60	0.25	0	-0.150	-59.850
2011Q2	10.32	52.58	1,477,656	137,236	203	-70	0.25	0	-0.175	-69.825
2011Q3	10.26	52.14	1,790,007	140,288	251	-60	0.25	0	-0.150	-59.850
2011Q4	10.21	51.56	2,159,959	146,944	317	-50	0.25	0	-0.125	-49.875
2012Q1	10.14	51.28	2,104,254	149,485	315	-70	0.25	0	-0.175	-69.825
2012Q2	10.08	51.11	2,309,196	148,980	344	-60	0.25	0	-0.150	-59.850
2012Q3	10.03	50.59	2,594,017	152,773	396	-50	0.25	0	-0.125	-49.875
2012Q4	9.98	50.48	2,724,464	154,728	422	-50	0.25	0	-0.125	-49.875
2013Q1	9.92	49.79	2,569,939	153,153	394	-60	0.25	0	-0.150	-59.850
2013Q2	9.89	48.75	3,076,005	145,819	449	-30	0.25	0	-0.075	-29.925
2013Q3	9.90	49.22	2,301,341	156,637	360	10	0.25	0	0.025	9.975
2013Q4	9.88	49.87	1,548,731	147,859	229	-20	0.25	0	-0.050	-19.950
2014Q1	9.86	50.22	1,152,554	145,952	168	-20	0.25	0	-0.050	-19.950
2014Q2	9.85	49.90	1,518,593	149,574	227	-10	0.25	0	-0.025	-9.975
2014Q3	9.87	49.81	1,620,548	154,137	250	20	0.25	0	0.050	19.950
2014Q4	9.88	50.02	1,568,467	157,307	247	10	0.25	0	0.025	9.975
2015Q1	9.85	49.90	1,685,587	165,751	279	-30	0.25	0	-0.075	-29.925
2015Q2	9.90	49.48	2,102,167	168,619	354	50	0.25	0	0.125	49.875
2015Q3	9.95	49.94	1,952,662	166,930	326	50	0.25	0	0.125	49.875
2015Q4	9.97	49.73	1,689,754	168,624	285	20	0.50	0.25	25.025	-5.025
Source:	Board of Governers of the Federal Reserve System	Equifax Consumer Credit Trends Report	Equifax Consumer Credit Trends	Equifax Consumer Credit Trends	Mortgage Origination . Loan Balance	ΔTotal Mortgage Debt	Funds Rate	Funds Rate Change	Total Mortgage Debt . Δrfl + ΔFL . rfl	ΔFL - ΔFR

Table 3: Change in Loan Repayment for Multiple Events

Date	Total Mortgage Debt – Single Family ($T)	First Mortgages Outstanding (M)	First Mortgage Origination	First Mortgage Origination ($B)	Δrfl (%)	ΔFR Target Single Event ($B)	ΔFR Expected 2008Q1 Event ($B)	ΔFR Expected 2008Q2 Event ($B)	ΔFR Expected 2008Q4 Event ($B)	ΔFR Expected Multi-Event ($B)
2008Q1	11.32	56.29	2,219,390	322	-2.00	-226.4	-8.926			-8.93
2008Q2	11.30	56.56	2,127,172	303	-0.25	-28.25	-8.556	-1.062		-9.62
2008Q3	11.26	56.26	1,604,608	222	0		-6.454	-0.801		-7.26
2008Q4	11.15	56.16	1,372,698	190	-1.75	-195.13	-5.521	-0.686	-4.769	-10.98
2009Q1	11.14	55.46	2,380,585	361	0		-9.575	-1.189	-8.271	-19.04
2009Q2	11.09	55.17	2,845,034	424	0		-11.443	-1.421	-9.885	-22.75
2009Q3	11.00	54.57	2,066,527	287	0		-8.312	-1.032	-7.180	-16.52
2009Q4	10.94	54.39	1,987,193	277	0		-7.993	-0.993	-6.905	-15.89
2010Q1	10.80	54.42	1,507,370	207	0		-6.063	-0.753	-5.237	-12.05
2010Q2	10.73	53.74	1,793,454	244	0		-7.213	-0.896	-6.231	-14.34
2010Q3	10.65	52.99	2,160,284	322	0		-8.689	-1.079	-7.506	-17.27
2010Q4	10.45	52.24	2,498,105	384	0		-10.047	-1.248	-8.680	-19.98
2011Q1	10.39	52.64	1,589,669	229	0		-6.394	-0.794	-5.523	-12.71
2011Q2	10.32	52.58	1,477,656	203	0		-5.943	-0.738	-5.134	-11.82
2011Q3	10.26	52.14	1,790,007	251	0		-7.199	-0.894	-6.219	-14.31
2011Q4	10.21	51.56	2,159,959	317	0		-8.687	-1.079	-7.505	-17.27
2012Q1	10.14	51.28	2,104,254	315	0		-8.463	-1.051	-7.311	-16.83
2012Q2	10.08	51.11	2,309,196	344	0		-9.288	-1.153	-8.023	-18.46
2012Q3	10.03	50.59	2,594,017	396	0		-10.433	-1.296	-9.013	-20.74
2012Q4	9.98	50.48	2,724,464	422	0		-10.958	-1.361	-9.466	-21.79
2013Q1	9.92	49.79	2,569,939	394	0		-10.336	-1.284	-8.929	-20.55
2013Q2	9.89	48.75	3,076,005	449	0		-12.372	-1.536	-10.688	-24.6
2013Q3	9.90	49.22	2,301,341	360	0		-9.256	-1.149	-7.996	-18.4
2013Q4	9.88	49.87	1,548,731	229	0		-6.229	-0.774	-5.381	-12.38
2014Q1	9.86	50.22	1,152,554	168	0		-4.636	-0.576	-4.005	-9.22
2014Q2	9.85	49.90	1,518,593	227	0		-6.108	-0.758	-5.276	-12.14
2014Q3	9.87	49.81	1,620,548	250	0		-6.518	-0.809	-5.631	-12.96
2014Q4	9.88	50.02	1,568,467	247	0		-4.789	-0.783	-5.450	-11.02
2015Q1	9.85	49.90	1,685,587	279	0			-0.842	-5.857	-6.7
2015Q2	9.90	49.48	2,102,167	354	0			-0.213	-7.304	-7.52
2015Q3	9.95	49.94	1,952,662	326	0				-5.752	-5.75
2015Q4	9.97	49.73	1,689,754	285	0					
Total						-449.78	-226.4	-28.25	-195.13	-449.78

Table 4: Annual Data for US Production Factors

Year	Government Spending ($T)	Budget Deficit ($B)	Government Interest Payments ($B)	Employment Non-Farm (M)	Real Personal Consumption ($T)	Trade Deficit ($M)
2013	3.24	15.5	416	138	10.682	-462
2014	3.23	15.8	430	140	11.059	-490
2015	3.36	16.2	402	143	11.352	-500
2016 est	3.95	16.5	433	146	11.560	-496
Source	InsideGov	InsideGov	Treasury Direct	Bureau of Labor Statistics	Bureau of Economic Analysis	US Census Bureau
	G	GL	GR	E	C*	CX-CM*

Year	Household Debt ($T)	Household Debt Service Payment (% Dispoable Income)	Disposable Personal Income ($T)	Household Debt Service ($T)	Personal Savings ($B)	Personal Income ($T)
2013	11.52	10.14	12.576	1.275	620	14.294
2014	11.83	9.90	13.289	1.316	726	15.138
2015	12.12	9.96	13.771	1.370	784	15.738
2016 est	12.37	10.00	14.200	1.420	809	16.180
Source	Federal Reserve Bank of New York	The Federal Reserve Board	Bureau of Economic Analysis	(derived value)	Bureau of Economic Analysis	Bureau of Economic analysis
	FL	FR/DI	DI	FR	FS	W + FN

Table 5: Change in US Production Factors

Year	ΔW+ΔFN ($B)	ΔGL ($B)	ΔGR ($B)	ΔFL ($B)	ΔFR ($B)	ΔFS ($B)	ΔP ($B)	ΔC* ($B)
2014	844	0.3	14	310	41	106	993	477
2015	600	0.4	-28	290	54	58	806	293
2016 est	442	0.3	31	250	50	25	586	208

**Estimated values due to included cost of raw material*

Table 6: US Production Trend

Year	P ($T)	P/E ($K)
2013	23.5185	170.4
2014	24.5118	175.1
2015	25.3182	177.1
2016 est	25.9045	177.4

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Overseas Employment and Remittance: Exploring the Nexus in the Context of Bangladesh

By Muhammad Rabiul Islam Liton, Md. Alauddin, Md. Nazmus Sadekin & Subrata Saha

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Abstract- Since 1960s, Bangladesh met with regular and enormous labor migration to overseas countries and it is now one of the salient remittance gaining countries in Asia. With a few exceptions, manpower export has been showing increasing trend year by year. Most of the expatriates, who are largely unskilled, are working in the Middle East countries and in the UK and the USA. Like overseas employment, remittances flow has been increasing every year with its increased share in GDP and becomes vital elements for accelerating economic growth in Bangladesh. In this study, In addition to exploring current trend of migration & remittance inflows, we investigate whether there is any significant relationship between inflows of foreign remittances and overseas employment. We also made an effort to identify some barriers that impedes overseas employment and remittance earnings and considering these aspects, we suggest some recommendations that can gear our remittance earnings. Our analysis reveals that the relationship between remittance earning and overseas employment is statistically significant.

Keywords: migration, employment, overseas, remittance, obstacles, development.

GJMBR-B Classification: JEL Code: M00

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Strictly as per the compliance and regulations of:

Overseas Employment and Remittance: Exploring the Nexus in the Context of Bangladesh

Muhammad Rabiul Islam Liton [α], Md. Alauddin [σ], Md. Nazmus Sadekin [ρ] & Subrata Saha [ω]

Abstract- Since 1960s, Bangladesh met with regular and enormous labor migration to overseas countries and it is now one of the salient remittance gaining countries in Asia. With a few exceptions, manpower export has been showing increasing trend year by year. Most of the expatriates, who are largely unskilled, are working in the Middle East countries and in the UK and the USA. Like overseas employment, remittances flow has been increasing every year with its increased share in GDP and becomes vital elements for accelerating economic growth in Bangladesh. In this study, In addition to exploring current trend of migration & remittance inflows, we investigate whether there is any significant relationship between inflows of foreign remittances and overseas employment. We also made an effort to identify some barriers that impedes overseas employment and remittance earnings and considering these aspects, we suggest some recommendations that can gear our remittance earnings. Our analysis reveals that the relationship between remittance earning and overseas employment is statistically significant. We found that unskilled manpower, insufficient government initiatives for exploring new overseas market for labor, employees' reluctance to use legal channel for sending money are some of the reasons that inhibits the remittance inflows in Bangladesh. In this regard, we think that proper training, raising awareness and government active role will be suffice in gearing inflows of foreign remittances.

Keywords: migration, employment, overseas, remittance, obstacles, development.

I. Introduction

Human migration is the movement of people from one place to another for purposes of permanent or temporary residence and/or employment. In general, human migration has occurred throughout history and began with the movements of the first human groups out of their origins in East Africa (Tigno, 2006).Bangladesh is a hugely labour surplus country and consequently participates in the supply side of the global labour market (Refugee and Migratory Movement Research Unit, 2008). The country has long history of migration. Increasing oil price in 1970s opened up vast scope for Bangladeshi migrants in the Middle East which was later on expanded to the newly industrialized countries of South East Asia (Siddiqui, 2003). The government of Bangladesh has promoted international labour migration as part of an overall development plan since 1976 which geared labour migration from the country (Refugee and Migratory Movement Research Unit, 2007). Remarkable migration from Bengal may be noticed by the visit of Buddhist religious scholar and saint Atish Dipankar to Tibet in 1042. During the 18th and early 19th century, sailors originating from the southeastern part of Bangladesh were employed in the British merchant navy. Some of them settled in UK and USA. During early sixties the Middle Eastern countries enriched their economy on the basis of oil exploration and started to recruit various kinds of manpower. After independence of Bangladesh in 1971, formal migration started for employment in 1976. The labour migration scenario of Bangladesh is highly country specific. Recent political unrest in these Middle Eastern countries might causes an adverse effect on migration and remittance-balance for Bangladesh. In FY 2010-11, the amount of remittance from Middle Eastern country totals USD 7,215.53 million which is0.10 per cent less than that of FY 2009-10. However, remittance from non-Middle Eastern countries in FY 2010-11 totals USD 4,434.79 million, which is 17.80 per cent more than that of the previous fiscal year.

The paper is organized as follows: Following the introduction in section 1, Objective in section 2, Methodology express in section 3, Literature review is given in section 4, Section 5 analyzes the scenario of migration and remittance inflow in Bangladesh, Section 6 describes the performance of remittance and section 7 shows barriers to migration in Bangladesh, Section 8 expresses some recommendations and 9 discusses the conclusion.

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II. Objectives of the Study

The present research study has been undertaken with the following objectives:

i. To investigate and find out the statistical relationship between overseas employment and remittance income of Bangladesh.
ii. To know the significance of remittance income for the economic development of Bangladesh;
iii. To find out the problems of remittance income of Bangladesh; and
iv. To recommend some suggestions based on findings to overcome the barriers of remittance income in Bangladesh.

III. Research Methodology

This research study has been conducted and analyzed on the basis of secondary data and information. The sample period of these secondary data and information is 1976-2011. These data and information were collected from different A-ranked journals, articles, published books, conference proceedings, newspapers, and magazines. A large part of this research report's data and information was collected from the website of Bangladesh Economic Review (BER), websites of Ministry of Expatriate's Welfare and Overseas Employment, Bangladesh Bank, Bureau of Manpower Employment and Training (BMET) and Refugee and Migratory Movements Research Unit (RMMRU).

In order to explore the nature of relationship employment and remittance flow we used several econometric tests namely: correlogram test, unit-root test, ADF test, Vector Error Correction Model (VECM) which confirms us that the relationship between these two variables is significant.

IV. Review of Literature

Various studies on the effect of remittances to economic growth have shown diverse results. For instance, Faini (2002) and Ang (2007) found that the impact of remittances on growth is positive. Faini(2002) argues that remittances overcome capital market imperfections and allow migrant households to accumulate positive assets. Ang (2007) shows the relationship between workers' remittances and economic growth at the national and at the regional levels in the case of Philippines. He found that at the national level remittances do influence economic growth positively and significantly. Giuliano and Ruiz-Arranz (2005) also show that in the economies where the financial system is underdeveloped, remittances alleviate credit constraints and work as a substitute for financial development, improving the allocation of capital and therefore accelerating economic growth. On the contrast, Chami et al. (2003), covering 113 countries found that remittances had a negative effect on growth. The authors of the study attribute this negative effect on the moral hazard problem that remittances create. Essentially, the study concluded that income from remittances allows receiving families to decrease their own work and productivity, which then translates into a reduction in the labor supply for the developing country. In a study conducted by IMF (2005) about the impact of remittances on growth over an extended period (1970-2003) for 101 developing countries found no statistical link between remittances and per capita output growth or between remittances and other variables such as education or investment rates. However, remittances, like aid, may be more effective in a good policy environment. This study wants to examine the effectiveness of remittance on economy of Bangladesh.

V. Trends of Migration and Remittance Inflow

After independence of Bangladesh in 1971, formal migration started for employment in 1976. Then after 2000, emigration became as important as exports and results a great wave of emigration. Emigration from Bangladesh started in 1976 with a modest number of six thousands only. Presently Bangladeshis are engaged in overseas employment in more than 100 countries. In 1980 it reached 30 thousands; though 103 in 1990 and 222 thousands in 2000. After that migration got its wave and reached 254 thousands in 2005 and 381 thousands in 2006 respectively. The flow of labor migration has been following an increasing trend over the years until FY 2007-08. Later, it continued to decline over the next three successive fiscal years. The reason is that the global economic recession and collapse of the construction sector in the Middle East due to which the demand for external labor declined. Again, the flow of labor migration increased in FY 2011- 12 in comparison with the preceding years. In the fiscal year of 2011-13, again labor migration falls very high due to the political instability in Bangladesh and many middle-east countries and some economic recession in western countries. However, the data from the Bureau of Manpower Employment and Training (BMET) reveals that the number of labor migration and remittent is increasing over the year at a diminishing rate.

It is observed from table 1 that both overseas employment and remittance inflow increase steadily. The number of emigrants becomes 4 times more in FY 2011 than FY 1981 and in the same time duration amount of earning remittance becomes 30 times more. Up to 1986 both employment remittances earning increase more consistently. But due to political instability in Middle-East, during last half of 1980s and first half 1990s both are increases at a decreasing rate even, sometimes at a negative rate. After this time period remittances earning becomes consistent again, but due to economic recession and political instability in Middle-East after 2008 remittances increase at a lower rate.

a) Empirical Results

The data range we are working with exhibits non-stationary problem. To be certain we use correlogram test (Ljume-Box test). We see both series are non-stationary. For more confirmation, we use unit-root test (we have considered that we have a deterministic trend and an intercept in our data series). In this case, Remittance series show unit root problem and employment series does not show unit root problem. As there are many tools for testing unit root problem, we specifically choose to use Augmented Dicky Fuller Test to identify unit root problem. We found that there is non-stationary problem for remittance. In the same way, we accomplish ADF test for employment data. So, there is no unit root problem at 5% and 10% significance level. Then we try to find out long run association between the variables and for that we use Johansen cointegration test. In Johansen test, trace test indicates that there are a one cointegrating equation at the 5% significant level and no cointegration exists at the 1% level. On the other hand, Max-Eigen statistics confirms that there is one cointegrating equation at both 5% and 1% levels. As we find our data series have long run association, then we use System Equation System (SES) to solve our model. For that reason we can use Vector Error Correction Model (VECM) or Vector Autoreggresive Model (VRM). Since we included restriction (Deterministic trend and intercept), therefore we choose to use vector error correction model.

Then we create following system equation:

D(R) = C(1)*(R(-1) - 0.007588442109*E(-1) - 798.6859445) + C(2)*D(R(-1)) + C(3)*D(R(-2)) + C(4)*D(E(-1)) + C(5)*D(E(-2)) + C(6)

D(E) = C(7)*(R(-1) - 0.007588442109*E(-1) - 798.6859445) + C(8)*D(R(-1)) + C(9)*D(R(-2)) + C(10)*D(E(-1)) + C(11)*D(E(-2)) + C(12)

Now we apply the OLS to estimate the above regression model:

	Coefficient	Std. Error	t-Statistic	Prob.
C(1)	0.050935	0.093302	0.545916	0.5879
C(2)	0.679608	0.282702	2.403976	0.0205
C(3)	0.014285	0.265604	0.053782	0.9574
C(4)	0.002079	0.000686	3.029245	0.0041
C(5)	0.000953	0.000930	1.025071	0.3109
C(6)	94.05221	112.3836	0.836885	0.4072
C(7)	70.71046	28.42482	2.487630	0.0167
C(8)	20.00590	86.12641	0.232285	0.8174
C(9)	-255.3070	80.91742	-3.155155	0.0029
C(10)	0.437423	0.209095	2.091986	0.0422
C(11)	-0.342875	0.283307	-1.210260	0.2326
C(12)	95507.38	34238.22	2.789496	0.0078
Determinant residual covariance		2.07E+14		

Equation: D(R) = C(1)*(R(-1) - 0.007588442109*E(-1) - 798.6859445) + C(2)*D(R(-1)) + C(3)*D(R(-2)) + C(4)*D(E(-1)) + C(5)*D(E(-2)) + C(6)

Observations: 28

R-squared	0.837943	Mean dependent var	393.9582
Adjusted R-squared	0.801112	S.D. dependent var	553.2914
S.E. of regression	246.7504	Sum squared resid	1339487.
Durbin-Watson stat	1.976992		

Equation: D(E) = C(7)*(R(-1) - 0.007588442109*E(-1) - 798.6859445) + C(8)*D(R(-1)) + C(9)*D(R(-2)) + C(10)*D(E(-1)) + C(11)*D(E(-2)) + C(12)

Observations: 28

R-squared	0.556088	Mean dependent var	18172.93
Adjusted R-squared	0.455199	S.D. dependent var	101846.7
S.E. of regression	75173.73	Sum squared resid	1.24E+11
Durbin-Watson stat	2.454692		

After the causalty test, our revised system equations are given below:

Equation 1: D(R) = C(1)*(R(-1) - 0.007588442109*E(-1) - 798.6859445) + C(2)*D(R(-1)) + C(5)*D(E(-2)) + C(6)

Equation 2: D(E) = - 0.007588442109*E(-1) - 798.6859445) + C(8)*D(R(-1)) + C(10)*D(E(-1))

System equations with coefficients:

Equation 1: D(R) = 0.050935(R(-1) - 0.007588442109*E(-1) - 798.6859445) + 0.679608*D(R(-1)) + 0.000953*D(E(-2)) + 94.05221

Equation 2: D(E) = -0.007588442109*E(-1) - 798.6859445) + 20.00590*D(R(-1)) + 0.437423*D(E(-1))

From the analysis, we get the both employment and remittance influenced by one another, and the tests are highly statistically significant because tests have satisfied all statistical prerequisites. From the test, we get that in equation 1, the value of R square is 84% which implies that dependent variable R (Remittance) influenced by independent variable E (Employment) and their lags values. Likewise, in the equation 2, the value of R square is 56% which implies that dependent variable E (Employment) influenced by independent variable R(Remittance) and their lags values.

b) Migration and Remittance growth rate

From the beginning of 1980s both the overseas employment and remittance earnings was decreasing. But after some successive years it returns to positive growth. Then both factors increase at a consequent growth. Though migration has some experience of negative growth but earnings of remittance increase at a positive rate after FY 1984.

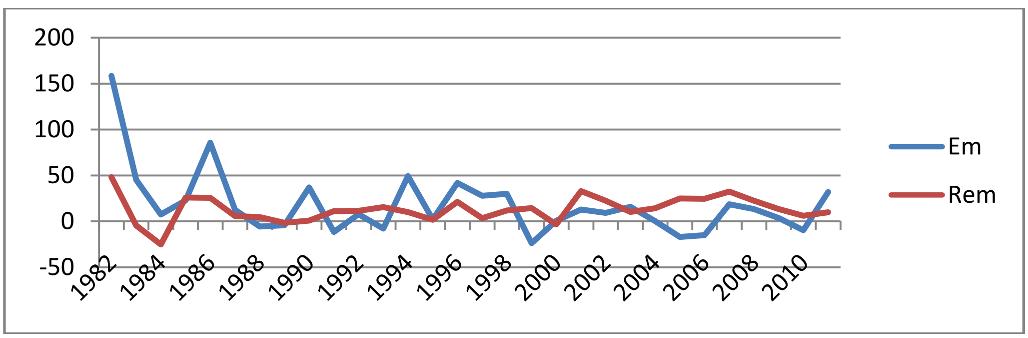

Figure 1: Growth rate of Migration and Remittance of Bangladesh (1981-2011)

Source: Author's own calculations by using data from Foreign Exchange Policy Department, Bangladesh Bank.

Current political unrest in these Middle Eastern countries might cause an adverse effect on migration and remittance balance for Bangladesh. But fluctuation of migration represents the unsecured future of remittance earning.

c) Composition of Skill of Migrated workers

Mahmood, R. A. (1992) concludes that the vast majority of outward migrants were semi skilled and unskilled. Overtime, Bangladeshi workers migrating to the region experienced significant changes in terms of their number, country of destination, and skill composition. In terms of composition of the labour force migrating to the Middle-East, there has been a significant reduction in the relative's share of skilled migrants, who have given way to more low and unskilled migrants. More than 50% of the emigrants up to 2011 of Bangladesh are un-skilled, only 1/3 are skilled and rest of total overseas emigrants are semi-skilled. In 1990, 34 percent of the migrant workers were skilled category, 6 percent were professional and the rest of the 40 percent were unskilled and 20 percent were semi-skilled category. However, after 1990, the manpower export increased gradually and the number of skill workers also increased. In 2011, the shares of skilled, semi-skilled and unskilled workers were 40, 5 and 55 percent respectively. So, it is imperative to increase the skill of unskilled migrants which can contribute to boost the remittances inflow in Bangladesh.

d) Country Wise Migration and Remittance

Total labour migration from Bangladesh is increasing but it is also highly dependent on the Middle East countries. The ten highest labour migration destination countries - Saudi Arabia, UAE, Qatar, Oman, Bahrain, Kuwait, Libya, Iraq, Singapore and Malaysia - hold 96.83 per cent of total labour supplied from Bangladesh for last 31years. Up to 2011 only Saudi Arabia employed 35.39% and UAE employed 23.12% of total Bangladeshi emigrant.

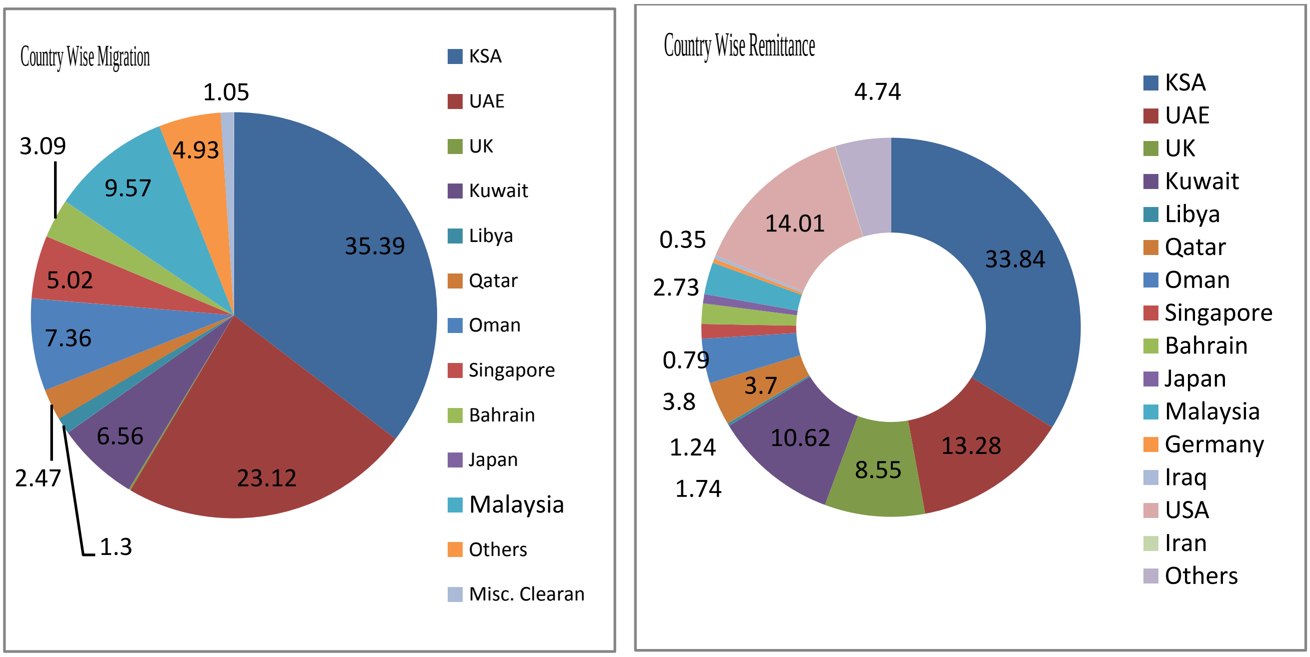

Figure 1: Country Wise Migration and Remittance

Source: Author's own calculations by using data from Bureau of Manpower, Employment and Training (BMET) and Foreign Exchange Policy Department, Bangladesh Bank.

Remittance earning is also highly dependent on the Middle East countries. Up to FY2011 Bangladesh earns 84373.99 million US$ and Saudi Arabia alone provides 28552.22 million US$ which is one-third of total remittance. Other Middle-East countries also supply mentionable amount of remittance. UAE has supplied 13.28% and Kuwait has supplied 10.62% of total remittance. On the other hand, among non-middle-east countries only USA and UK provide a mentionable amount of remittance. Up to 2011 USA has supplied 14.01% and UK 8.55% of total remittance. This highly country specific skewed labour migration suggests largely a risky scenario for the labour migration and remittance. For example, Current political unrest in these Middle Eastern countries might cause an adverse effect on migration and remittance balance for Bangladesh. In calendar year 2010, labour migration in Saudi Arabia has dropped down by 51.80 per cent than that of 2009 and 95.11 per cent than that of 2000. In the FY 2012-13, both the amount of remittance as well as its growth falls nearly to 10% due to political instability in Banglades has well as in middle-east Asian countries. Even in FY 2012-13, total number of migrants also lower than that of FY 2011-12. But, now, comparing to Middle Eastern countries, labour migration in non-Middle Eastern countries is on the rise. . In FY 2010-11, the amount of remittance from Middle Eastern country totals USD 7,215.53 million which is 0.10 per cent less than that of FY 2009-10. However, remittance from non-Middle Eastern countries in FY 2010-11 totals USD 4,434.79 million, which is 17.80 per cent more than that of the previous fiscal year of USD 4,434.79 million. The contribution of remittance from Middle Eastern and Non-Middle Eastern countries has increased by 93.2 and 97.66 respectively in FY 2010-11 than that of FY 2006-07.

VI. Effects of Remittance in Bangladesh Economy

Remittance income is more important for any developing country like Bangladesh. It affects our economy positively as follows:

Remittance is the greatest source of the reserve of our foreign currencies. We need huge amount of foreign currencies for meeting for the imports food and food products, various commodities, machineries, raw materials of the industries and technology every year. It would be simply impossible to maintain the optimum reserve of foreign currencies if we would not get the remittance.

Bangladesh has a shortage of domestic capital. So we cannot increase the speed of our economy. Remittances increase the flow of capital and ensure more investment which is playing a vital role in our economic development.

Most of the un-skilled and semi-skilled overseas Bangladeshi workers have gone from rural areas. The go abroad for changing their fates. Their remittance develops the economic conditions of their family and accelerates the rural economy.

International migration decrease unemployment in two ways. First, it employed Bangladeshi workers in overseas countries. Second, it develops rural-economy and creates new jobs in rural areas.

A huge number of people in Bangladesh are living under poverty line. The remittances are reducing poverty. It also reduces the economical imbalance of the society.

Finally, remittance is playing a vital role to ensure future development of our economy. Remittance is considered as an important factor for future economic development of the country. According to a study conducted by Centre for Policy Dialogue (CPD) in Bangladesh, it is estimated that the required level of remittances in FY2020 for consistent 4%, 6%and 8% GDP growth as table provided in the Annex (Table 2).

VII. Barriers for Flourishing of Remittance Earnings

The migrant workers of Bangladesh have been contributing immensely to the economy with strong positive impact on growth, employment, foreign reserve and balance of payments. But the path of earning remittance is not smooth. We have identified some factors behind this scenario:

Although the number of skilled and professional personnel is increasing, but it is still only 33 percent of total manpower exported. The government has established some new science and technological universities, polytechnic and vocational institutes for increasing the number of skilled and professional personnel. But still the number is very small than the actual demand. Moreover, the qualities of education of these institutes are not up to the mark in comparison with the institutes of other top manpower exporting countries.

The Government foreign policy and diplomatic relationship and promotional activities are important to increase manpower export. Although, the government has undertaken various policies to boost manpower export, but still Bangladesh is far behind in establishing diplomatic relationship and promotional activities than the other countries.

Most of the Bangladeshi migrants are un-skilled. They do not have sufficient training and educational qualification. They don't get any training from the private and government recruiting agencies before pre-departure.

Migrant workers of Bangladesh are regularly encountering various problems in sending remittances, especially to the remote areas of the country, through formal channels because the process of sending remittance through banks is slow and complicated.

The foreign missions of Bangladesh are not efficient. They cannot maintain a strong diplomatic relation with other countries that can accelerate remittance earnings. Moreover, due to the lack of proper guidance and inspiration, Bangladesh cannot ensure the welfare of its migrant workers.

VIII. Recommendations

For avoiding the barriers and flourishing the remittance inflow, we can follow the following recommendations-

Skilled migrants can earn more remittance. But most of the Bangladeshi migrants are un-skilled. So, we should take necessary steps to skilled migrant workers. Government should take initiatives for proper certification of skills that a good section of migrant workers possess, such as electrician, mason, bricklayer, plumber, fitter, turner etc. In this respect, special incentives may be provided to private recruiting agencies who export skilled manpower.

For increasing remittance government should ensure educational qualification and training of migrant workers. Education and training increase the productivity and efficiency of workers that may ensure more remittance earnings.

Sending remittance is a great problem for migrant workers. So, The Bangladesh Bank's policy of not allowing private banks opening branches in foreign cities where nationalized commercial banks have their branches needs to be reconsidered. If banks gear themselves adequately for harnessing migrants' remittance then opening of branches by private banks would lead to a healthy competition and thus is likely to contribute increased flow of remittance.

International organizations can jointly establish migrant workers resource centers (MWRCs) in receiving countries. These MWRCs can provide all kinds of services including remittance information to the migrants of different labour-sending countries.

There is much room for improvement in the functioning of Bangladeshi missions abroad with respect to remittance. When queries are made on opening new branches and corresponding relationships, the missions need to act on them promptly. Procedural delays have to be minimized by fixing specific time frames.

Finally, we should incorporate vocational training in mainstream primary and secondary level curricula. We should also incorporated chapters on migration in textbooks. To increase the communication skills, government can introduce English as a second language from the first grade. Micro Finance Institutions and Civil Society Bodies Tested microfinance institutions should come forward to play a role in managing migration.

IX. Conclusion

Remittance is a vital element for gearing economic growth in Bangladesh and it becomes the safest, shortest and lasting route to economic emancipation for Bangladesh. But this route is not smooth. For eliminating the obstacles in this route, we can address the total migration process with an integrated approach towards creating a congenial environment for safe migration for all. These include the human resource development and also strengthening the migration process and welfare services. Only then we can increase the remittance flow in Bangladesh and ensure our economic development.

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Annex

Table 1: Trends of migration and remittance inflow

Year	Employment	Remittance(m. $)
1981	55787	381.17
1982	62762	418.48
1983	59220	619.49
1984	56714	590.60
1985	77694	441.60
1986	68658	555.81
1987	74017	697.45
1988	68121	737.43
1989	101724	770.82
1990	103814	758.20
1991	147131	764.04
1992	188124	847.97
1993	244508	944.00
1994	186326	1088.79
1995	187543	1197.63
1996	211714	1217.06
1997	231077	1475.40
1998	267667	1525.42
1999	268182	1705.74

2000	222686	1949.32
2001	188965	1882.10
2002	224206	2501.13
2003	254190	3061.97
2004	263292	3371.97
2005	237736	3848.29
2006	313290	4801.88
2007	736421	5978.47
2008	682092	7914.78
2009	475278	9689.26
2010	390702	10987.40
2011	568062	11650.32

Source: Author's own calculation by using data from Bureau of Manpower, Employment and Training (BMET) and Foreign Exchange Policy Department, Bangladesh Bank.

Table 2: Required Level of Remittances

	Remittances Required (million US$) to Achieve			Remittances Required (as % of GDP) to Achieve		
Year	4%GDP	6%GDP	8% GDP	4%GDP	6%GDP	8% GDP
2006	3195.34	3667.57	4190.31	5.55	5.91	6.26
2007	3435.94	3435.94	4082.01	5.74	6.20	6.67
2008	3694.67	4543.27	5548.44	5.94	6.51	7.11
2009	3972.88	5056.66	6384.59	6.14	6.84	7.57
2010	4272.04	5628.07	7346.74	6.35	7.18	8.07
2011	4593.72	6264.04	8453.90	6.56	7.54	8.60
2012	4939.63	6971.87	9727.90	6.78	7.91	9.16
2013	5311.58	7759.70	11193.89	7.01	8.31	9.76
2014	5711.55	8636.54	12880.81	7.25	8.73	10.40
2015	6141.63	9612.47	14821.95	7.50	9.16	11.08
2016	6604.0	10698.68	17055.62	7.75	9.62	11.81
2017	7101.38	11907.63	19625.90	8.02	10.10	12.58
2018	7636.11	13253.19	22583.52	7.75	9.62	11.81
2019	8211.11	16417.64	29903.08	8.57	11.14	14.28
2020	8829.41	16417.64	29903.08	8.86	11.69	15.21

Source: Estimation of Bhattacharya. Debapriya, 2006

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Does Trade Openness Reduce Inflation? Empirical Evidence from Ethiopia

By Minyahil Alemu Haile
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Abstract- Of the most commonly celebrated propositions in international trade is the hypothesis that trade liberalization is associated with declining prices, so that protectionism is inflationary. The New Growth Theory is strongly in favor of this view. However, the "Cost-push advocators" claim for the existence of positive correlations between trade openness and inflation variables. Moreover, empirical studies have been confirming inconclusive results regarding the nature of relationships between the two variables. These theoretical and empirical departures are the principal motivations to the current study. This study is aimed to test the relationship between inflation and trade openness variables in Ethiopia, using the time series data set for the period serially ranging from 1976/77 to 2016/77. Augmented Dickey Fuller and Phillips Perron approaches will be employed for testing the stationarity properties of individual variables in the model and the Johnson's maximum likely-hood approach will be employed for cointegration tests.

Keywords: *cointegration, ethiopia, inflation, openness, vector error correction model 1.*

GJMBR-B Classification: *JEL Code: M29*

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Abstract- Of the most commonly celebrated propositions in international trade is the hypothesis that trade liberalization is associated with declining prices, so that protectionism is inflationary. The New Growth Theory is strongly in favor of this view. However, the "Cost-push advocators" claim for the existence of positive correlations between trade openness and inflation variables. Moreover, empirical studies have been confirming inconclusive results regarding the nature of relationships between the two variables. These theoretical and empirical departures are the principal motivations to the current study. This study is aimed to test the relationship between inflation and trade openness variables in Ethiopia, using the time series data set for the period serially ranging from 1976/77 to 2016/77. Augmented Dickey Fuller and Phillips Perron approaches will be employed for testing the stationarity properties of individual variables in the model and the Johnson's maximum likely-hood approach will be employed for cointegration tests. Finally, Vector Error Correction will be estimated in order to determine the relationships among variables entered the inflation model adopted, both in the short and the long run periods.

Keywords: cointegration, ethiopia, inflation, openness, vector error correction model 1.

I. Introduction

For the significantly celebrated benefit of international economic integration, no country can afford to isolate itself from the global economy. The highly significant role of this economic integration goes to developing economies as well. The possible economic gains from outward-looking development strategies have been extensively discussed in theoretical and empirical literatures in the world of economics.

The benefits of outward-looking policies have been believed to be realized from international trade and capital flows.

Following these hypothetical integration-growth ties, a great deal of world economies has resorted to opening up their gates and, a considerable shift has been observed from a closed to open and more flexible economic structure at around 1990s. The celebrated benefit of openness is that it boosts the level of real output. The associated hypothesis has been also been that, through its positive effect on output higher openness has a reducing effect on the rate of inflation. But, the issue follows that, "has globalization really changed inflation in the way expected?" The issue remained a subject of debate for long in economic literatures. In most countries, even though the relationship between openness and output operates as expected, but takes different forms with inflation due to various structural and country specific factors. However, there is no unique agreement on the interaction between higher trade openness and inflation. Rogoff argues that "globalization has played strong supporting role in the past decade's process of disinflation" (Rogoff, 2003). He evidenced the realized inverse correlation between openness and inflation. However, contrary to Rogoff, Ball (2006) claimed for the existence of only little, probably insignificant impact of openness on inflation. While continuing his argued for the probable existence of only the modest and little relationship between the two macroeconomic variables. Despite the existence of varying views on these links, the pronounced phenomenon in economic theories has been to regard inflation and openness the negatively varying variables. Surprisingly, but not impressive, this theoretical link between the openness and inflation remained a bench mark in national policy setting in for a considerable number of economies even today. Ethiopia is not an exception to this.

Though regarded to serve positive role in rare case, inflation creates obvious costs to economic, social, political and other aspects of the country. The higher rate of inflation has commonly recognized negative effects in any typical economy. It could lead to poor resource utilization by forcing inefficient transactions and speculations, dampens the scope for rational economic decisions, and moreover creating a horrible situation by which the government policies loss credibility. When monetary economy to the largest extent losses power in dealing with macro wise economic aspects, good conditions are created to welcome hyper inflationary situations (see Krugman, 1991). Moreover, with higher inflation rates the economic growth process is also distorted via its reducing effect on domestic propensity to save. That means since inflation is meant to evaporate the purchasing power of money income, people's tendency to save part of their income for future consumption, of course it forms part of domestic investments, diminishes; and hence, economic activities as well.

Whatever the relationship between openness and inflation is, stability in macroeconomic variables is a

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key for a sustainable and real economic growth to take place. Inflation, hence, is among the main concern. Fischer (1993) supports the view that a stable macroeconomic environment is conducive element to sustained economic growth. From his empirical observations we see that countries with low inflation have grown faster and vice versa. An important issue for the present analysis could be that stable and moderate growth rate of inflation is inevitable.

The present study is aimed to test the empirical correlation between inflation and openness in Ethiopia. Once the significant role of stable inflation is recognized, there is a need to determine its link with other macroeconomic variables; one is the trade openness variable. Hence, it is intended to test whether the two variables are operating in line with the theoretical claims. From the past experience in the literatures of inflation, inflation has been thought to be influenced by various monetary, fiscal and structural phenomenons; with an economies exposure to international economic and political integration other factors with a potential of affecting home inflation could be introduced. Hence, efforts will be made to incorporate the effects of both the internal and external influences on the domestic price level.

II. Statement of the Problem

The hypothetical claim with the New Growth Theory on the link between inflation and openness has been an important point of macroeconomic debates. The claim with the theory is that higher openness reduces the rate of inflation. In line with this theory (Romer, 1993) investigated a negative relationship between trade openness and inflation, using a large cross- section of 114 countries over the period 1973 to 1988. However, other views and empirical findings exist in contrast to the above cases. For instance, the "Cost-push myth" holds for inflation to vary positively with the degree of openness (Mayer, 2003). The argument is that, an opened up economy is highly subject to imported inflation and weekend domestic macroeconomic policies (particularly of monetary and fiscal policies) with the introduction of external shocks (like exchange rate conditions and other unfavorable happenings in trading partners), see Aron and Muellbaur (2007). Heavy reliance on import of manufactured and industrial goods and intermediate inputs by emerging economies will have higher possibility of importing foreign inflation simultaneously, which can be reflected directly on domestic prices. Hence, given all these possibilities, the 'Cost-Push' advocators claimed that, it is the net effect that determines the level of output and, hence price level; but not only the justified benefits of trade openness. Apart from this theoretical departure, there are also empirical contradictions on the nature of correlations among the two variables. For instance, a study by Sanginabadi et al (2011) and Zakaria (2010) have confirmed a positive and significant effect of trade openness on inflation in the respective economies of Iran and Pakistan. Induced primarily by these theoretical and empirical contradictions regarding the link between inflation and trade openness variables, the present study will be directed to determine the empirical relationship between the two variables; given that no previous empirical study has been undertaken in the country in the sprit at hand. Hence, the motivation could be to which of the hypothetical claim explains the case in Ethiopia; that is; "the New Growth Theory or the Cost Push Myth".

The notion that there are no or little previous studies in the country somewhere in this paper suggests for the desirability of the present study. Therefore, the present study is expected to contribute significantly by adding value to the countries inflation literatures, with the specific reference to openness to trade. In fact, one could find similar previous works in Ethiopia, though are limited too in concerning availability as well as statistical requirements. The only considerable study in the country in exactly similar issue could be a work of Meseret (2014), which is unpublished graduate study. Her control variables include the money supply, gross fixed capital formation as a share of GDP, per capita income and the government's consumption expenditure together with the openness variable (the principal element in the model). The study, even though, related is found to be limited on a number of grounds. In the first place, the government expenditure takes many forms, not only consumption. Government expenditure can be made for consumption of public goods and services, public investment activities and transfer payments. In all the cases, currency is being injected in to the economy thereby creating respective effects on the economy. Hence, the current study will try to incorporate the full effect of government expenditure on inflation model, which is to be discussed latter in this paper. Moreover, her analysis was limited to home side factors except the openness variable, which is the principal variable in the model. Yet, with higher exposure to international trade there could be a possibility that other external factors could have significant role in the domestic economy. For instance, in an opened up economies variables like imported inflation, exchange rates, balance of payments and possibly foreign interest rates affect domestic economy but ignored due consideration in the study by Meseret. Therefore, it will be tried to investigate the monetary, fiscal, structural andexternal variables in a relation to inflation in the present study.

Moreover, previous studies in Ethiopia have been focusing on the general cause-effect aspects of inflation with no particular attention to money supply and inflation; as opposed to their share in inflation theories and literatures. Even though, a little work has been done, they all commonly share serious limitations: variables employed as well as the number of observations were of limited size. Besides, not a little of them were concerned with food inflation alone. For example, a study by Josef et al (2008) has considered only the short run issues. Demirew (1998) for example used only agricultural and money supply variables in a relation to inflation as cited by Kibrom (2008); and Josef et al (2008) controlled only money supply, exchange rate, agricultural production shocks and foreign price. This study is limited basically on three grounds; by employing small number of variables, observations and considering the short run issue only. Other recent studies are also not out of this limitation: study by (Tsegay, 2014; Meseret, 2014) might exemplify it. Moreover, majority of them used only small size of observations. For instance; Kibrom (2008), Jema and Fekadu (2012); Josef et al (2008); Habtamu (2013) and Temesgen (2013) are mentioned among others. Carrying out analysis in such a way leads to defective conclusions. The present study differs from the previous once on a number of grounds. First, both the size of observations and variables are extended as appropriate as the econometric models employed.

III. Objectives of the Study

The present study is principally intended to empirically investigate the relationship between trade openness and inflation variables in Ethiopia using the time series data set for the period ranging from 1976 to 2016.

Towards attaining the set broad objective, the following specific objectives to be addressed in this study include;

→ Empirically investigating the direction of causality between inflation and openness variables;

→ Examining both the short and long run effects of trade openness on inflation and;

→ Determining the relative magnitude of each exogenous variable employed in explaining the process of inflation in Ethiopia.

IV. Review of Literatures

a) Theoretical Literature

i. *New Growth Theory versus Cost-push Myth*

The relationship between inflation and openness has been a subject of research, theoretical as well as empirical. However, the literature on the subject is relatively scant. According to 'new growth theory', openness is likely to affect inflation through its likely effect on output (Jin, 2000). This link could be operating through: a) increased efficiency which is likely to reduce cost through changes in composition of inputs procured domestically and internationally, b) better allocation of resources, c) increased capacity utilization, d) rise in foreign investment which can stimulate output growth and ease pressures on prices (Ashra, 2002). Okun (1981) postulates that the shocks to the domestic price level due to domestic output fluctuation are likely to ease as the economy opens up. However, the "Cost-push advocators" put the case differently. The "Cost-push myth" holds for inflation to vary positively with the degree of openness (Mayer, 2003). The argument is that, an opened up economy is highly subject to imported inflation and weekend domestic macroeconomic policies(particularly of monetary and fiscal policies) with the introduction of external shocks (like exchange rate conditions and other unfavorable happenings in trading partners), see Aron and Muellbaur (2007). Heavy reliance onimport of manufactured and industrial goods and intermediate inputs by emerging economies will have higher possibility of importing foreign inflation simultaneously, which can be reflected directly on domestic prices. Hence, given all these possibilities, the 'Cost-Push' advocators claimed that, it is the net effect that determines the level of output and, hence price level; but not only the justified benefits of trade openness.

ii. *The Classical Quantity Theory*

The theory bases its analysis on the Fishers (1911) quantity equation given by ($MV = PY$): where, M (money supply); V (Velocity of money); P (general price) and Y (real GDP). Assuming V and Y to be constants in the model, the theory claims that ($\%M = \%P$), implying the existence of equi-proportional relationships between monetary growth and the rate of inflation. Therefore, inflation is always and everywhere onetary phenomenon and in that no other factor could have a role as money plays in the determination of inflation process; see (Johnson et al, 2000; Hetzel, 2007; Milton, 1971; Nelson, 2007 and Ray and Anderson, 2011).

iii. *Keynesian Theories of Inflation*

In contrast to the case with classical economists, money creates real impact where idle capacities are present for Keynes. He claimed in such an economy that, any additional money balance reduces the rate of interest, increases investment and, hence, output. As a result the initial rise in price could be completely offset by the latter reduced price, hence, no way forit to directly transmit to the general price level (Keynes, 1936). Keynes identified three basic reasons why an economic agents demand money balance; the transaction demand (in line with the traditional economists), the precautionary demand (for emergency cases) and the speculative demand (money even as store of value); with the latter being the key tool in his attack against the QTM (Keynes, 1936). He contained these three motives together in his money demand function given by ($\frac{M^d}{P} == \mathrm{f}$ (-i, +Y)), and related money demand positively to income and negatively to the level of interest rates: thereby recognizing the role of interest rate in affecting the demand for money. Price being determined by the demand and supply for money, Keynes formulated his own quantity equation given by $P=\frac{M}{D}$, or, $\frac{M}{P}=D$. Where; M is the nominal stock of exogenously determined money supply; D, the demand for money and P is the general price level (Keynes, 1936). With the nominal interest rate included in his money demand function, Keynes stressed that, changes in the quantity of money affect price level only after impacting the level of interest rate, and hence investment, output and employment (Humphrey, 1974). So that, the transmission mechanism between money and the price level is indirect. The immediate impact of change in the quantity of money rests on the interest rate but not on price. It implies that when interest rate decreases (following positive shock in the quantity of money), the level of investment responds by increasing. Hence, the levels of output, income and employment increase also as well. The additional level of employment, in fact, imposes additional pressure on aggregate demand, and that the rising wage and other costs together induce the price level to rise. Here, the transmission of monetary impact on price is not only indirect, but the effect is not complete, since part of the money balance is held by the speculators (see Krusell P., 2004; Nelson, 2007).

Both versions of the quantity are, however, similar for an economy operating at its full capacity. For Keynes money could impose even a higher than full inflationary effect in the long run being aggravated by inflationary expectations. The Keynes's version reveals that the elasticity of price with respect to any monetary shock be equal to zero (ep = 0) in an economy with idle resources to utilize. According to him, in such an economy, monetary injections would enable utilize idle resources and employment which increases output in a proportion to changing aggregate demand, hence there would be no impact on prices in the short run(see Kenneth and Anthony, 2015). The elasticity becomes one, given the level of output and employment fixed at full capacity and is 'True inflation' for Keynes. Any monetary growth while the economy is operating at full capacity induces proportional change on price.

Secondly, the constant assumption of velocity was no more guaranteed in Keynes's version of QTM. In his Tract, he claimed that velocity of money is rather pro-cyclical (subjected to shocks)by considering the impact of interest rate on demand for money. Capturing velocity by $(V=\frac{PY}{f(i,Y)})$, Keynes argued that velocity is a positive function of interest rate. It works like this; when interest rate increases, money demand decreases and, as a result velocity of money increases. The implication is that, increased interest rate induces cash holders to save more to gain extra benefit from rising rates. So that, they put more of their balance at bank and remain with few and since the amount of balance available in the economy is now less, it frequently changes hands to serve the remaining unsatisfied motives for money. With unstable velocity, no way for money to directly transmit to price and vice versa; i.e. any change in price or income would also be absorbed by the same process as a result no increasing response from money supply (Snowdon and Vane, 2005).

iv. *Demand-Pull Theory of Inflation*

As the name implies this type of inflation is the result of excess demand in the economy. From the Keynesians traditional national income identity (Y = C + I + G), aggregate demand is a function of aggregate consumption (C), investment (I) and government expenditure (G). The demand pull inflation occurs when this sum exceeds the total level of supplies in the economy. Any factor causing aggregate demand to increase above its potential level would result in inflation. According to Oludele et al (2002), Keynesians' had a simple and direct tool to deal with this type of inflation. Their advice is to absorb money back from the public sufficient enough in reducing the extra effective demand imposing adverse shock on the price level.

v. *The Cost-Push Fallacy*

These types of inflation emerge from any negative shocks in the supply side of the economy. Following Lahari (2011), the supply side of the general economy explains output, inflation and the economy's adjustment to equilibrium at the potential level of output. The argument here is that, any factors contributing negatively to the production side of the economy are all inflationary. For example, increasing raw material costs, rising labor costs and indirect taxes could direct reflect in the form of increased prices or induce price to increase thereby reducing outputs. It is frequently stated in theoretical literatures like, Batten (1981) and Humphrey (1976), for this type of inflation to take place in the following manner: to cope up with the rising living costs in a condition of rising aggregate prices, employees may bargain and form a union demanding additional wage income; rising wages in turn can help drive inflation. This type of price surge also is regarded to spread in other sectors of the economy. It implies that, if a given production sector involves the input use of goods and services produced in another sector for which the production costs are increasing; then the prices of the goods produced in the first sector also increases.

vi. *The Structuralist's Explanation*

This theory briefs the causes of inflation particularly in less developed economies by identifying structural rigidities commonly underlying these economies. For instance, Ray and Anderson (2011) have identified three structural factors commonly explaining inflation in under developed economies. These are inelastic supply of agricultural products,

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insufficient national resource (government budget constraint) and foreign exchange bottlenecks. The implication with the first case is that, the unbalanced growth trends in agricultural sector and urbanization could result in higher rate of inflation in most LDCs. That means agricultural productivity is insufficient to meet its growing demand as urbanization is going ahead. Besides, due to weak domestic capacity complemented with loss of trust by external lenders, most LDCs resort to monetization of their deficits which is inflationary in practice in line with the traditional QTM. The structuralis' maintain that factors forcing monetization of deficits in LDCs are accounted for this type of inflation but not money supply as it is induced by those structural rigidities. Moreover, Donath and Dima (2000) and Jema and Fekadu (2012) also highly stress the case in line with Olson (2010). Foreign exchange limitations and huge price differentials in the international trade are also among the main headaches of underdeveloped economies. Finally, structuralists' have a message to LDCs at least to minimize the effect of inflation resulting from structural rigidities. That is to develop any optimum measure as well as capable institutions enough to avoid structural rigidness and imbalances in various sectors of the developing economies and bring these changes in the economy.

vii. *Theoretical Link between Deficits and Inflation*

Budget deficit is the second important variable in this study (next to money supply variable) because of its theoretical link to monetary growth. Via the QTM approach, the monetarists argue that monetization of budget deficit is inflationary. There are three ways to finance the public expenditures; borrowing from the public, borrowing from the central bank (Seigniorages) and external borrowing (Sargent and Wallace, 1976; Rebecca, 2014). Relative to the other two methods, the central bank financed deficits impose higher inflationary pressures. That is when money is created to fill deficits, the quantity of money in the economy increases and could result in inflation. Budget deficit affects price only after affecting the level of nominal money growth in an economy. It means, as long as the deficit is not monetized, no link exists between deficits and the price level. Sargent and Wallace (1981) postulate that, following exogenous government spending and taxes, monetization of the deficits would lead to monetary variable induced inflation in the long run. According to them, deficit cause money growth and which in turn causes inflation. Besides, they argue in such a condition, for the existence of feedback effect from inflation to budget deficits in the manner that inflation reduces the value of real revenue to the government, leading to fiscal deficit in the long run. Sargent and Wallace maintain that if monetization of deficits could result in growth of money supply and hence inflation, the situation would be termed as 'fiscal dominance,' due to the fact that the whole process is forced by the initial shocks in the fiscal policy. Lags in the collection of government's tax revenue adversely affect the government's fiscal position thereby reducing the real value of the public's tax revenue; this might further induce monetary creation.

b) *Empirical Evidences*

From early empirical discoveries, Triffin and Grudel (1962) tested the hypothesis that openness boosts productivity and hence leads to cheaper availability of goods that are costly in the country otherwise and confirmed an inverse relationship between openness and inflation variables in sample of 5 countries in European Economic Community. It, hence, is in line with the claim of New Growth Theory and the Romer's hypothesis. Romer (1993) finds that closed economies tend to have higher inflation. He argues that central banks in economies more open to trade find currency fluctuations caused by money surprises more painful and therefore exercise more restraint than their closed economy counterparts.

Empirical findings by Lane (1997), Ashra (2002), Sachsida et al.(2003), Yanikkaya (2003), Gruben and Mcleod (2004), Kim and Beladi (2004), Daniels et al. (2005), Razin and Loungani (2005), Aronand Muellbauer (2007), Badinger (2007), Bowdler and Nunziataz (2007) all validate Romer's argument. However, Terra (1998) only marginally supports Romer's argument by claiming that the negative correlation is only evident in severely indebted countries during the 1980s crisis period. Similarly, Batra (2001) argues that tariffs do not necessarily cause inflation, at least in the US. Gruben and Mcleod (2004) show that there does not exist any significant openness– inflation relationship among OECD economies. Kim and Beladi (2004) have estimated a positive relationship between price level and trade openness for some advanced economies, such as the US, Belgium, and Ireland, while for other countries, both developed and developing, their finding is in line with Romer's (1993) argument. Finally, it is interesting to note that Romer (1993) himself finds no significant openness–inflation relationship among OECD economies.

The country specific case is concerned; a study by Meseret (2014) could be primarily mentioned. She estimated the negative but insignificant impact of trade openness on inflation in contrast to the theoretical claims. Minyahil (2016) has also estimated the dynamics of inflation in a relation with other macroeconomic variables by controlling the openness variable. His finding indicates that the relationship between the two variables is positive and highly significant both in the short and long run. He justified the case to the country specific conditions like rigid economic policies, the prolonged internal and external conflicts with a potential of blocking the suspected benefits of large openness.

V. Methodologies

The quality of any macroeconomic analysis can be determined by the accuracy, consistency and availability of any macroeconomic variables in question. The problem in Ethiopian case is the inconsistency of macroeconomic data from different sources: to cope up with this problem, money sources will be referred as possible. The study uses secondary time series data set for the period serially ranging from 1976/77 to 2016/17, which is for about 41 years. The data are to be sourced from both the domestic and external organizations.

The potential domestic sources include; Ministry of Finance and Economic Cooperation (MoFEC), National Bank of Ethiopia (NBE), Central Statistics Agency (CSA) and the Ethiopian Economic Association (EEA). External sources include; World Bank (WB) data base, International Monetary Fund (IMF) and the African Development Bank (AfDB).

a) *Econometric Model Specification*

The inflation variable can be measured in either of the following ways;

→ GDP-Deflator: - computed as the ratio of nominal to real GDP. This ratio at any time (t) indicates the level of inflation.

→ Producer Price Index (PPI):- It measures the positive change in the average price of inputs or raw materials used by producers. Its delinquency is that it considers only raw materials, not finished goods and services.

→ Consumer Price Index (CPI):- It is the change in the average price of consumable goods and services. It measures the positive net change in the average price of consumer goods and services.

No doubt, higher proportion of income in Ethiopia is spent on consumption of final goods and services. According to the Ethiopian 2014/15 third quarter economic report of UNDP, more than 56% of households' expenditure was made on food, beverages and other final consumable goods and services. Therefore, to use CPI is more appropriate and contextual in case of Ethiopian economy. GDP-Deflator is inappropriate since it excludes the impact of imported inflation on domestic prices owing to the definition of Gross Domestic Product. On the other hand, Producer Price Index (PPI) is not effective in representing inflation in Ethiopia compared to CPI, since the proportion of income spent on consumption of final goods and services exceeds spending on the purchase of raw materials and other inputs. Hence, CPI is reasonably a good candidate to measure inflation in Ethiopia, so that, it is a proxy to inflation variable (a response variable) in this study. Hereafter, while using CPI anywhere in this paper, we are referring to the inflation variable in other way round.

Modeling inflation is among the complex phenomenon in Economies as it is subject to various influences. However, it can be possible to determine the key variables the process of inflation in the countries like Ethiopia. The most empirically popular way in examining the relationship between trade openness and inflation variables has been to employ the single equation model, treating openness as the exogenous variable and; obviously, inflation (CPI) is the endogenous variable the model setting.

Hence, based on Solomon (2004), Mukhtar (2010) and Aron and Muellbauer (2007), the dependent and independent variables employed in modeling inflation in the current study are functionally related as follows;

$$CPI_t = f\,(BD_t, GDP_t, RER_t, OT_t, M2_t, GCF_t) \text{ ....} \quad (1)$$

Where; CPI = Consumer Price Index which is a proxy to inflation variable; BD = Budget Deficit; It is the difference between government expenditure and receipts for a given fiscal time period; GDP is Gross Domestic Product and RER is Real Exchange Rate. OT is the openness to trade variable. It is equal to the sum of import and export values divided by nominal GDP; thereby all the exports, imports and the GDP are measured in current price and current exchange rates.

$$\text{Openness} = \frac{\textit{Export value+import value}}{\textit{Nominal GDP}}$$

M2 = Stands for the broad money supply in Ethiopia. It forms the definition of money supply in the operational setting of National Bank of Ethiopia (the central banker of Ethiopia); and, GCF is Gross Capital Formation as a share of GDP; and t, captures any time trend in each case.

Just, the intention here is to determine the elasticity of each of the predictor variables with respect to inflation; and, due to the fact that, not everything is controlled in the model, we need to adopt the econometric model incorporating the identified variables and also considering the effect of other variables not included in the model. The model is set as follows;

$$lnCPI_t = \beta_0 + ln\, BD_t + lnGDP_t + lnRER_t + lnOT_t + lnM2_t + lnGCF_t + u_t \text{ ....} \quad (2)$$

Where; In stands for the logarithmic form of each variable, and u is the stochastic white noise error term, distributed with zero mean and constant variance in different observations. The error term (ut) is assumed to have a normal distribution.

i. *The Unit Root Test*

Since most macroeconomic time series are variables are usually non-stationary (Harry, 2012; Lahari, 2011) and thus leads to spurious regression, the stationarity test will be undertaken at the outset of cointegration analysis, which will be briefed latter on.

Testing for unit roots is among the common statistical procedures, several testing procedures have been developed over the year. Many of the latter tests are designed to overcome the difficulties encountered in practice.

In this regard, the present study will use the Augmented Dickey Fuller (ADF) and Phillips Perron (1988) methods for stationarity purposes. The ADF procedure is based on the t- ratio of the parameter and, is conducted by extending all the equations under consideration by adding the lagged terms of the dependent variables, and requires estimation of the following regression.

$$\Delta y_t = \alpha_0 + \eta_1 t + \delta y_{t-1} + \sum_{j=1}^{s} \Pi j \Delta y_{t-1} + \sum_{j=1}^{s} \varpi i \Delta y_{t-p+1} + \varepsilon_t \ldots \quad (3)$$

Where, εt; is the usual pure white noise error term, $\delta = \Pi$-1 and $\Delta Y_{t-1} = (Y_{t-1} - Y_{t-2})$, $\Delta Y_{t-2} = (Y_{t-2} - Y_{t-3})$, & the like. α_0 is the intercept term, η_1 is the trend coefficient, t– the time/trend variable and where; s, are the lag terms. For this test, the hypothesis would be;

H_0: $\delta = 0$; there is unit root→ (implying the time series is non-stationary).

H1: $\delta < 0$; No unit root → the time series is stationary

Decision: reject the null hypothesis of ($\delta = 0$), hence the time series is stationary; if the computed t-statistic (in absolute terms) exceed the ADF critical values; the variable under consideration is stationary.

On the other hand, the test regression for the Phillips-Perron (PP) unit root approach looks;

$$\Delta y_t = \beta L_t + \delta y_{t-i} + u_t \ldots\ldots\ldots\ldots\ldots\ldots \quad (4.4)$$

But, the error term (u_t) is stationary at level, and may be heterosckedastic and serially correlated. However, the problems will be corrected in PP test by modifying the test statistics of $t_{\delta=0}$ and $T\hat{\delta}$ in the first regression. Based on Harry (2012); Sjo (2008), the new test statistics would be represented by Z_t and Z_δ as;

$$Z_t = [(\frac{\widehat{\sigma 2}}{\hat{\rho} 2})^{½} * t_{\delta=0} - \frac{1}{2}(\frac{\hat{\rho}2 - \hat{\sigma}2}{\hat{\rho}2}) * (\frac{T*SE(\hat{\delta})}{\hat{\sigma}2})] \text{ and; } Z_\delta = [T\hat{\delta} - \frac{1}{2} \frac{T2*SE(\hat{\delta})}{\hat{\sigma}2}(\hat{\rho}^2 - \hat{\sigma}^2)]$$

Where, $\hat{\sigma}^2$ and $\hat{\rho}^2$ are the consistent variance estimates of the following respectively;

$$\sigma^2 = \lim_{T\to\infty} T^{-1}\left(1+\frac{1}{n}\right)^n \sum_{t=1}^{T} E[u_t]^2; \text{ and } \rho^2 = \lim_{T\to\infty} \sum_{t=1}^{T} E\,(T^{-1}\sum_{t=1}^{T} u_t).$$

Under the null of $\delta = 0$ (i.e. unit root exists), the Z_t and Z_δ statistics in the Phillips-Perron (PP) procedure above, assume similar asymptotic distribution as with the conventional DF t-statistic. The PP procedure is advantageous over the ADF mechanism on at least two grounds; 1st, the PP is robust to general forms of heteroskedasticity in the error term; and, 2nd, and it does not need specification of lag length for regression as it is adjusted at length three by default in econometric and statistical software.

ii. *Lag Length Determination*

It is also essential at the onset of cointegration analysis that the problem of determining optimal lag length should be considered as multi-variate cointegration analysis is very sensitive to the lag length selection. The two most common way used to determine the optimum lag length are the one where Akaike information criterion (AIC) is minimum and one which is suggested by majority of the criteria.

iii. *The Cointegration Test*

The econometric framework to be used for analysis in this study is the Johanson (1998) maximum likelihood cointegration technique, which investigates both the existence and the number of cointegrating vectors. This multivariate cointegration test can be modeled as:

$$Z_t = K_1 Z_{t-1} + K_2 Z_{t-2} + \ldots\ldots + K_{k-1} Z_{t-k} + \mu + \upsilon_t \ \ldots\ldots \ (4)$$

Where;

Z_t = (BD, GDP, RER, OT, M2, GCF) i.e. a 5 x 1 vector of variables that are integrated of order one [i.e. I(1)]. is a vector of constant and, t is a vector of normally and independently distributed error term.

Equation (4) can be reformulated in a Vector Error Correction Model (VECM) as follows;

$$\Delta Z_t = \Gamma_1 \Delta Z_{t-1} + \Gamma_2 \Delta Z_{t-2} + \ldots\ldots + \Gamma_{k-1} \Delta Z_{t-k} + \pi Z_{t-1} + \mu + \upsilon \ldots\ldots\ldots\ (5)$$

Where; $\Gamma_i = (I - A_1 - A_2 \ldots\ldots\ldots\ldots - A_i)$, i = 1, 2, 3....... K-1 and $\pi = -(I - A_1 - A_2 \ldots - A_i)$. The coefficient matrix π, provides information about the long-run relationships among the variables in the model. Π can be factored into $\alpha\beta'$, where α will include the speed of adjustment to the equilibrium coefficients while the β' will be the long run matrix of coefficients. The presence of r cointegrating vectors between the elements of Z implies that Π is of the rank r, (0 < r < 5). To determine the number of cointegrating vectors, Johnson (1998) developed two likelihood ratio tests: the trace test (λ_{trace})

and the maximum Eigen value test (λ_{max}). If there is any divergence of results between these two tests, it is advisable to rely on the evidence from λ_{max} because it is more reliable in small samples (see Dutta and Ahmed, 1977, and Odhiambo, 2005; Mukhtar, 2010)

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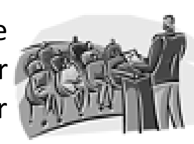

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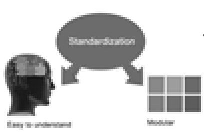

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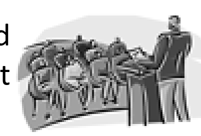

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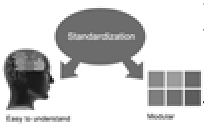

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What to keep away from

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Results:

The principle of a results segment is to present and demonstrate your conclusion. Create this part a entirely objective details of the outcome, and save all understanding for the discussion.

The page length of this segment is set by the sum and types of data to be reported. Carry on to be to the point, by means of statistics and tables, if suitable, to present consequences most efficiently.You must obviously differentiate material that would usually be incorporated in a study editorial from any unprocessed data or additional appendix matter that would not be available. In fact, such matter should not be submitted at all except requested by the instructor.

Content

- Sum up your conclusion in text and demonstrate them, if suitable, with figures and tables.
- In manuscript, explain each of your consequences, point the reader to remarks that are most appropriate.
- Present a background, such as by describing the question that was addressed by creation an exacting study.
- Explain results of control experiments and comprise remarks that are not accessible in a prescribed figure or table, if appropriate.
- Examine your data, then prepare the analyzed (transformed) data in the form of a figure (graph), table, or in manuscript form.

What to stay away from

- Do not discuss or infer your outcome, report surroundings information, or try to explain anything.
- Not at all, take in raw data or intermediate calculations in a research manuscript.
- Do not present the similar data more than once.
- Manuscript should complement any figures or tables, not duplicate the identical information.
- Never confuse figures with tables - there is a difference.

Approach

- As forever, use past tense when you submit to your results, and put the whole thing in a reasonable order.
- Put figures and tables, appropriately numbered, in order at the end of the report
- If you desire, you may place your figures and tables properly within the text of your results part.

Figures and tables

- If you put figures and tables at the end of the details, make certain that they are visibly distinguished from any attach appendix materials, such as raw facts
- Despite of position, each figure must be numbered one after the other and complete with subtitle
- In spite of position, each table must be titled, numbered one after the other and complete with heading
- All figure and table must be adequately complete that it could situate on its own, divide from text

Discussion:

The Discussion is expected the trickiest segment to write and describe. A lot of papers submitted for journal are discarded based on problems with the Discussion. There is no head of state for how long a argument should be. Position your understanding of the outcome visibly to lead the reviewer through your conclusions, and then finish the paper with a summing up of the implication of the study. The purpose here is to offer an understanding of your results and hold up for all of your conclusions, using facts from your research and generally accepted information, if suitable. The implication of result should be visibly described. Infer your data in the conversation in suitable depth. This means that when you clarify an observable fact you must explain mechanisms that may account for the observation. If your results vary from your prospect, make clear why that may have happened. If your results agree, then explain the theory that the proof supported. It is never suitable to just state that the data approved with prospect, and let it drop at that.

- Make a decision if each premise is supported, discarded, or if you cannot make a conclusion with assurance. Do not just dismiss a study or part of a study as "uncertain."
- Research papers are not acknowledged if the work is imperfect. Draw what conclusions you can based upon the results that you have, and take care of the study as a finished work
- You may propose future guidelines, such as how the experiment might be personalized to accomplish a new idea.
- Give details all of your remarks as much as possible, focus on mechanisms.
- Make a decision if the tentative design sufficiently addressed the theory, and whether or not it was correctly restricted.
- Try to present substitute explanations if sensible alternatives be present.
- One research will not counter an overall question, so maintain the large picture in mind, where do you go next? The best studies unlock new avenues of study. What questions remain?
- Recommendations for detailed papers will offer supplementary suggestions.

Approach:

- When you refer to information, differentiate data generated by your own studies from available information
- Submit to work done by specific persons (including you) in past tense.
- Submit to generally acknowledged facts and main beliefs in present tense.

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Introduction	Containing all background details with clear goal and appropriate details, flow specification, no grammar and spelling mistake, well organized sentence and paragraph, reference cited	Unclear and confusing data, appropriate format, grammar and spelling errors with unorganized matter	Out of place depth and content, hazy format
Methods and Procedures	Clear and to the point with well arranged paragraph, precision and accuracy of facts and figures, well organized subheads	Difficult to comprehend with embarrassed text, too much explanation but completed	Incorrect and unorganized structure with hazy meaning
Result	Well organized, Clear and specific, Correct units with precision, correct data, well structuring of paragraph, no grammar and spelling mistake	Complete and embarrassed text, difficult to comprehend	Irregular format with wrong facts and figures
Discussion	Well organized, meaningful specification, sound conclusion, logical and concise explanation, highly structured paragraph reference cited	Wordy, unclear conclusion, spurious	Conclusion is not cited, unorganized, difficult to comprehend
References	Complete and correct format, well organized	Beside the point, Incomplete	Wrong format and structuring

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