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Understanding Business Cycle Fluctuations in Pakistan

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Notwithstanding the level of improvement in understanding the complexities of an economy, it is now well accepted that the ultimate incidence of various policy interventions leads to varied outcomes in terms of magnitude and persistence depending upon the structure of the economy. The objective of the present study is to disentangle the relative contributions of various exogenous and domestic shocks that contribute to business cycle fluctuations in Pakistan. The study is based on the New-Keynesian Open economy model, which is an extended version of (Gali & Monacili 2005). Keating's two-step approach (1990, 2000) is employed to capture the dynamic behaviour of the variables of interest. Impulse response functions, along with forecast error variance decomposition analyses, are used to gain useful insights into the understanding of the transmission mechanism of policy and non-policy shocks. It is observed that fiscal policy does matter, at least in the short-run. The interest rate shock leads to the exchange rate appreciation thereby confirming the exchange rate puzzle. In response to adverse supply shocks, the Monetary Authority responds with a monetary contraction that prolongs the recessionary periods. Furthermore, it has a limited power to control inflation as inflation in Pakistan stems from supply-side factors as well as fiscal dominance.

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1. INTRODUCTION

Notwithstanding the level of improvement in understanding the complexities of an economy, it is now well accepted that the ultimate incidence of various policy interventions leads to varied outcomes in terms of magnitude and persistence depending upon the structure of the economy (Cargill et al. 2003; Mohanty & Turner, 2008). Therefore, besides the knowledge of theoretical underpinnings, it is also important to know the degree of openness, nominal rigidities, sectoral distribution, institutional framework, financial liberalisation, and financial deepening within each economy.

Moreover, due to the large undocumented economy and lack of high-frequency macroeconomic time series, basic features of developing economies are expected to offer a completely different picture as compared to the developed economies where such discrepancies are less pronounced. Probably this is the reason that most of the policies being followed in the developed world when replicated in developing economies not only miss their targets but sometimes yield contradictory outcomes. Therefore, we contend that a thorough understanding of the true structure of a developing economy is imperative for modelling and consistent policy analysis.

The objective of the present study is to detangle the relative contribution of various exogenous factors contributing to business cycle fluctuations in Pakistan by incorporating domestic as well as external shocks in the analysis. We believe that open economy considerations have generally been overlooked. Some central concerns include the 'fear of floating' debate that highlights the significance of monetary and exchange rate policy interaction to minimise the exchange rate variation and its implications for a foreign exchange constrained economy. Similarly, the volatility of international commodity markets, which poses a profound negative impact on the economic growth of trade-dependent developing economies, is an important issue (Combes & Guillaumont, 2002; Guillaumont, 2009; Arezki & Gylfason, 2011). Moreover, keeping in view the extensive literature on oil price-macroeconomy relationship, especially in oil-importing countries like Pakistan, the oil needs to be added to the production function as an additional factor input to analyse the role of international oil price fluctuations.[1] Furthermore, fiscal policies, conducted in a pro-cyclical manner, do act as shocks intensifying the impact of exogenous shocks, and therefore have limited scope for stabilisation. We, therefore, have to specify government spending shock in the aggregate demand equation of the model, keeping in view the behaviour of fiscal policy and its dominant role in Pakistan.

Besides open economy considerations, various domestic factors (shocks) are also important for comprehensive coverage of the economy. Within this perspective, we believe that domestically-originating cost-push factors act as adverse supply shocks, embodying the impact of factors other than those originating from the demand-side of the economy on marginal cost. Similarly, the Monetary Authority (MA) of the country is assumed to anchor inflationary expectations, stabilise the output gap, and exchange rate variation through manipulating short-term interest rate confronted by the commercial banks. Thus, the monetary policy shock has to be incorporated into the model through a forward-looking Taylor rule (1993). It is expected that control over short-term interest rate along with money supply empowers the MA to influence the volume of liquidity in the economy, and the expectations of rational economic agents, which affects the consumption of durable goods and investment decisions, and finally the aggregate demand.

Based on the foregoing, this paper studies the response of various exogenous shocks on macroeconomic aggregates using the New-Keynesian Open economy model for Pakistan. The study is based on a model which is an extended version of Gali and Monacili (2005). Keating's (1990, 2000) two-step approach has been employed to capture the dynamic behaviour of the variables of interest. Impulse response functions,

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[1]See for example Hamilton (1983, 1996, 2004); Blanchard and Gali (2007); Edelstein and Kilian (2007, 2009); Khan and Ahmed (2014) and many others.

along with forecast error variance decomposition analyses, are used to gain useful insights into the understanding of the transmission mechanism of policy and non-policy shocks.

The rest of the paper includes a detailed derivation of the model and methodological discussion in Sections 2 and 3, respectively. Data and empirical findings are presented in Section 4 and the final section concludes the study.

2. THEORETICAL FRAMEWORK

In this section, we describe the salient features of a small open economy (SOE) dynamic stochastic general equilibrium (DSGE) model, which is derived to represent the structure and functioning of the economy of Pakistan. This forward-looking model has micro-foundations and is closely linked to the SOE literature of Gali and Monacelli (2005) (GM, 2005 henceforth,), Clarida et al. (CGG henceforth) (1999, 2002) and McCallum and Nelson (MN henceforth) (1999, 2000). The basic concept is taken from GM (2005).[2] The world economy is assumed to be a continuum of small economies. The domestic economy is one among those economies, relatively very small in size (is of measure zero) with respect to the size of the rest of the world's economies. Hence, the actions (decisions) of domestic economic agents like consumer price level, interest rate, and aggregate demand, do not influence variables in the rest of the world. These economies are interconnected and share similar preferences and technology. Economic agents are rational and forward-looking, making the best use of all available information. Domestic prices and wages are sticky, adjust infrequently, and are partially indexed to expected inflation. This is the most powerful assumption and enhances the realism of the model.

We have introduced certain modifications to the original model to keep it tractable, so that it represents the mechanics of Pakistan's economy, and serves the required task of policy analysis. First, oil is introduced into the production process as a basic input where oil prices are assumed to be exogenously determined. Secondly, in view of the existence of a large-scale public sector in Pakistan, the role of fiscal policy is assessed by adding government spending to the aggregate demand function. Like other developing economies, the labour market in Pakistan confronts various types of rigidities, including minimum wage laws that distort equilibrium wages, and the demand for labour. Hence, we have assumed it to be imperfect. Finally, due to imperfect domestic financial markets and limited access to international financial markets, along with huge domestic and external debt, the risk premium is introduced in the uncovered interest parity condition to hold in the short-run.

2.1. Households' Problem

The household problem is standard where a representative domestic household is infinitely lived. The household's consumption basket includes domestically produced goods and foreign goods imported from the rest of the world. Households also provide differentiated labour effort to firms and get equivalent wage compensation. Furthermore,

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[2]The complete model has been originally derived in Khan (2016) and reproduced in Khan and Ahmed (2017). It is presented in this section of the paper in response to one of the comments made by the referee of the journal.

firms are owned by households who receive profits generated by these monopolistically competitive firms.

The preferences of the representative household seeking to maximise lifetime utility are defined through the following separable utility function,

$$E_0 \sum_{t=0}^{\infty} \beta^t \left(\frac{C_t^{1-\sigma}}{1-\sigma} - \frac{N_t^{1+\varphi}}{1+\varphi} + \frac{(M_t/P_t)^{1-\vartheta}}{1-\vartheta} \right) \qquad \dots \qquad \dots \qquad \dots \qquad \dots \quad (2.1)$$

so that the period utility function becomes $U(C_t, N_t, M_t/P_t) = \frac{C_t^{1-\sigma}}{1-\sigma} - \frac{N_t^{1+\varphi}}{1+\varphi} + \frac{(M_t/P_t)^{1-\vartheta}}{1-\vartheta}$ where $N_t, C_t, M_t/P_t$ denotes labour effort, aggregate consumption index, and demand for real cash balances. Furthermore, $0 < \beta < 1$ is the discount factor, σ represents the degree of relative risk aversion and $\frac{1}{\sigma}$ is the elasticity of inter-temporal substitution. ϑ is the inverse of the interest elasticity of real money holding and φ stands for the inverse of the elasticity of labour supply. The household budget constraint can be written as:

$$P_t C_t + E_t \{ F_{t,t+1} D_{t+1} \} + M_t \leq D_t + W_t N_t + M_{t-1} + T_t \qquad \dots \qquad \dots \quad (2.2)$$

Solving Equations 2.1-2.2 yields the following optimality conditions (linearised versions).

$$w_t - p_t = \sigma c_t + \varphi n_t \qquad \dots \qquad \dots \qquad \dots \qquad \dots \qquad \dots \qquad \dots \quad (2.3)$$

$$c_t = E_t\{c_{t+1}\} - \frac{1}{\sigma}(r_t - E_t\{\pi_{t+1}\} - \rho) \qquad \dots \qquad \dots \qquad \dots \qquad \dots \quad (2.4)$$

$$m_t - p_t = [\frac{\sigma}{\vartheta}]c_t - \frac{1}{\vartheta}[\frac{1}{(1+i)i}]i_t \qquad \dots \qquad \dots \qquad \dots \qquad \dots \qquad \dots \quad (2.5)$$

where the lower-case letters denote the log of upper-case letters. Equation (2.3) represents the household labour supply decision and Equation (2.4) describes consumption smoothing behaviour. In general, given the diminishing marginal utility of consumption, the forward-looking household tries to smooth her consumption pattern through lending and borrowing where the real interest rate is the additional determinant of the current consumption. Equation (2.5) is the money demand function that shows that money demand is positively associated with income (transaction demand for money) and decreases due to an increase in the interest rate (speculative demand for money). The nominal interest rate is $log i_t = log(1 + i_t) \approx i_t$ and $\rho = -log\beta$.

2.2. Allocation of Government Spending

Similar to many other studies, including Corsetti and Pesenti (2005) and Ganelli (2005), to simplify the analysis we assume that government spending is home-biased. To abstract from debt-related issues, Ricardian equivalence is assumed to hold and nominal government spending equals lump-sum taxes and seigniorage revenues, i.e.,

$$P_{H,t} G_t = T_t + \frac{M_t - M_{t-1}}{P_t}.$$

Here, government spending is exogenous and follows an AR(1) process, where $\rho_g \in [0,1]$ and ε_t^g is an i.i.d. shock.

$$G_t = \rho_g G_{t-1} + \varepsilon_t^g \qquad \dots \qquad \dots \qquad \dots \qquad \dots \qquad \dots \qquad \dots \quad (2.6)$$

2.3. Consumer Price Inflation (CPI) and Exchange Rate

The bilateral real exchange rate ($Q_{i,t}$) is defined as: $Q_{i,t} = \frac{\mathcal{V}_{i,t}P_t^i}{P_t}$, where $\mathcal{V}_{i,t}$ is the nominal exchange rate and P_t^i is the country *i*'s CPI; P_t is the domestic and $P_{F,t}$ is the aggregate CPI of the rest of the world. The real effective exchange rate (REER henceforth) can be defined as: $Q_t = \frac{P_{F,t}}{P_t}$ whose log-linearising yields: $q_t = p_{F,t} - p_t$.

Using the log-linearised form of domestic CPI around the symmetric steady state $p_t = (1 - \alpha)p_{H,t} + \alpha p_{F,t}$ and REER, we redefine the relationship between CPI, domestic inflation and REER as $p_t = p_{H,t} + \frac{\alpha}{1-\alpha}q_t$, which by forwarding and algebra manipulation yields the following expression:

$$\pi_{t+1} = \pi_{H,t+1} + \frac{\alpha}{1-\alpha}\Delta q_{t+1} \quad \ldots \qquad \ldots \qquad \ldots \qquad \ldots \qquad \ldots \qquad \ldots \quad (2.7)$$

We assume that asset markets are complete and similar preferences across different economies prevail. It means that the household, whether living in a small open economy or elsewhere in the world faces the same optimisation problem. Thus, by combining the domestic and foreign versions of the Euler equations, we get the following relationship, which is known as the risk-sharing condition. It implies that domestic consumption is a function of international consumption instead of the domestic economy's own current, lagged, or lead income.

$$c_t = c_t^* + \frac{1}{\sigma}q_t \qquad \ldots \qquad \ldots \qquad \ldots \qquad \ldots \qquad \ldots \qquad \ldots \quad (2.8)$$

Similarly, investors having access to domestic and foreign bonds due to complete financial markets, invest both in domestic and foreign bonds to minimise the idiosyncratic risk. However, keeping in view the riskiness of domestic bonds, a risk premium is involved for the foreign investor to invest in domestic bonds. In this case, the Uncovered Interest Parity (UIP) condition holds in the following form:

$$E_t\{\Delta q_{t+1}\} = (i_t - E_t\{\pi_{t+1}\}) - (i_t^* - E_t\{\pi_{t+1}^*\}) - \varepsilon_t^{v*} \qquad \ldots \qquad \ldots \quad (2.9)$$

where ε^{v*} is the risk premium paid to a foreign investor to compensate for holding a domestic risky bond. We further assume that the risk premium is positively related to the default risk that stems from over-borrowing. The risk-sharing condition implies that the domestic economy can be shielded against internal idiosyncratic shocks but at a relatively higher cost.

2.4. Supply Side

Firm Problem: The firm's problem consists of two steps and is solved in two stages. In the first stage, the firm decides over the least-cost combination of inputs subject to existing technology and its specific demand function. In the second stage, the firm seeks to maximise its profits depending upon the revenue generated from selling the product at an optimal price conditioned that prices are sticky.

Cost Minimisation Problem: Assuming that oil and labour are the only inputs needed to produce the specific goods, the firm tries to minimise its cost of production by choosing the least-cost combination of the two inputs (oil and number of workers),

subject to given prices of these inputs, and the prevailing state of technology. The short-run production function can, therefore, be written as:

$$Y_t(j) = [A_t N_t(j)]^\eta [O_t^d(j)]^{1-\eta} \qquad \dots \qquad \dots \qquad \dots \qquad \dots \qquad \dots (2.10)$$

Where $O_t^d(j)$ is the amount of oil demanded by firm j as an intermediate input to produce one unit of output, η is the share of labour in total output, and $(1-\eta)$ is the share of oil. For computational ease, we assume perfect competition in the labour market, (later on this assumption will be relaxed). Log of productivity $a_t = log(A_t)$ is assumed to be stochastic and follows an AR(1) process $a_t = \rho_a a_{t-1} + \varepsilon_t^a$, where $\{\varepsilon_t^a\}$ is an i.i.d. shock to productivity and $\rho_a \in [0,1]$.

Solving the first-order conditions yield:

$$(1-\eta)W_t N_t(j) = \eta O_t^d(j) P_{O,t} \qquad \dots \qquad \dots \qquad \dots \qquad \dots \qquad \dots (2.11)$$

The nominal marginal cost of the firm is:

$$MC_t^n = \frac{W_t}{\eta A_t^\eta N_t(j)^{\eta-1} O_t^d(j)^{1-\eta}}$$

Using the cost minimisation condition, the MC_t^n can be written as:

$$MC_t^n = \frac{W_t^\eta P_{O,t}^{1-\eta}}{\eta^\eta (1-\eta)^{(1-\eta)} A_t^\eta}$$

The real marginal cost in terms of the domestic price can be expressed as:

$$MC_t^n = \frac{W_t^\eta P_{O,t}^{1-\eta}}{\eta^\eta (1-\eta)^{(1-\eta)} A_t^\eta P_{H,t}}$$

Log-linearising the real marginal cost expression yield,

$$mc_t^r = \eta w_t + (1-\eta)p_{O,t} - \eta a_t - p_{H,t} \qquad \dots \qquad \dots \qquad \dots \qquad \dots (2.12)$$

It implies that the marginal cost function is increasing in the price of oil and the nominal wage but decreasing in productivity growth. The demand for oil by firm j is given by:

$$o_t^d(j) = \left[\frac{\eta\sigma+1+\varphi}{1+\varphi(1-\eta)}\right] y_t - \left[\frac{\eta(1+\varphi)}{1+\varphi(1-\eta)}\right] a_t - \left[\frac{\eta}{1+\varphi(1-\eta)}\right] p_{O,t} \qquad \dots \qquad \dots (2.13)$$

The aggregate domestic output of overall firms is $Y_t = \left[\int_0^1 Y_t(j)^{(\theta-1)/\theta} dj\right]^{\frac{\theta}{\theta-1}}$. Lastly, the log-linearised version of the production function is

$$y_t = \eta a_t + \eta n_t + (1-\eta)o_t^d \qquad \dots \qquad \dots \qquad \dots \qquad \dots \qquad \dots (2.14)$$

Firm Profit Maximisation: In the second stage, given that prices are sticky, firms choose an optimal price that maximises their expected profits. Following Calvo (1983), firms are assumed to share identical technology, produce differentiated goods, and face monopolistic competition. Due to price stickiness, a fraction ϱ of firms is incapable of adjusting its price in period t and stick to the price that prevailed in period t-1. Thus ϱ is naturally an index of price stickiness and represents the probability that firm j will not be

able to adjust its price in period t. Then the firm's profit-maximising pricing strategy yields the following Phillips curve:

$$\pi_t = \beta E_t\{\pi_{t+1}\} + \lambda \widehat{mc}_t \qquad \dots \qquad \dots \qquad \dots \qquad \dots \qquad \dots (2.15)$$

where $\lambda = \frac{(1-\theta)(1-\beta\theta)}{\theta}$ and $\widehat{mc}_t$ is the log deviation of real mc_t from its flexible price equilibrium. Now following CGG (2002) we relax the assumption of perfect labour markets and introduce a cost-push shock to the Phillips curve so that household labour supply decision can be written as:

$$C_t^\sigma N_t^\varphi exp^{\varepsilon_t^w} = \frac{W_t}{P_t} \qquad \dots \qquad \dots \qquad \dots \qquad \dots \qquad \dots (2.16)$$

where $exp^{\varepsilon_t^w}$ is the wage markup, reflecting government intervention in terms of minimum wage laws in the labour market that would distort the real wage from its equilibrium level under perfect markets. This allows us to rewrite Equation (2.15) as follows:

$$\pi_t = \beta E_t\{\pi_{t+1}\} + \lambda \widehat{mc}_t + \mathcal{E}_t^w \qquad \dots \qquad \dots \qquad \dots \qquad \dots (2.17)$$

2.5. Demand Side Equilibrium

The goods market equilibrium requires:

$$Y_t(j) = C_{H,t}(j) + \int_0^1 C_{H,t}^k(j)dk + G_t \qquad \dots \qquad \dots \qquad \dots \qquad \dots (2.18)$$

where $Y_t(j)$ is the total production of good j by all domestic firms, $C_{H,t}(j)$ is the total consumption demand by the domestic household for domestically produced goods j and $\int_0^1 C_{H,t}^k(j)dk$ is country k's demand for good j (exports).

$$Y_t(j) = (1-\alpha)\left(\frac{P_{H,t(j)}}{P_{H,t}}\right)^{-\theta}\left(\frac{P_{H,t}}{P_t}\right)^{-\gamma} C_t + \alpha\left(\frac{P_{H,t(j)}}{P_{H,t}}\right)^{-\theta}$$

$$\int_0^1 \left(\frac{P_{H,t}}{v_{k,t}P^k_{F,t}}\right)^{-\theta}\left(\frac{P_{F,t}}{P^k_t}\right)^{-\gamma} C_t^k + \left(\frac{P_{H,t(j)}}{P_{H,t}}\right)^{-\theta}\left(\frac{P_{H,t}}{P_t}\right)^{-\gamma} G_t$$

But

$$Y_t(j) = \left(\frac{P_{H,t(j)}}{P_{H,t}}\right)^{-\theta} Y_t \qquad \text{or} \qquad Y_t = Y_t(j)\left(\frac{P_{H,t(j)}}{P_{H,t}}\right)^{\theta}$$

Using the optimal allocation of resources for SOE, ROW, the REER definition, and the behavioural similarity assumption we get,

$$Y_t = \left(\frac{P_{H,t}}{P_t}\right)^{-\gamma}\left[\left((1-\alpha) + \alpha\int_0^1 (S_t^k S_{k,t})^{\gamma-\theta} \quad Q_{k,t}^{\gamma-\frac{1}{\sigma}}dk\right)C_t + G_t\right]$$

where $\int_0^1 (S_t^k S_{k,t})^{\gamma-\theta} dk = 1$ in the symmetric a steady-state hence,

$$Y_t = \left(\frac{P_{H,t}}{P_t}\right)^{-\gamma}\left[\left((1-\alpha) + \alpha\int_0^1 Q_{k,t}^{\gamma-\frac{1}{\sigma}} dk\right)C_t + G_t\right]$$

Log-linearising around the symmetric steady-state and using $p_t - p_{H,t} = \frac{\alpha}{1-\alpha} q_t$ yields,

$$y_t = c_t + \alpha \left(\frac{(2-\alpha)\gamma}{1-\alpha} - \frac{1}{\sigma} \right) q_t + g_t \quad \dots \quad \dots \quad \dots \quad \dots \quad \dots (2.19)$$

Assuming $c_t^* = y_t^*$ substituting in risk-sharing condition $c_t = y_t^* + \frac{1}{\sigma} q_t$ and finally substituting in Equation (2.19) we get,

$$y_t = y_t^* + \left[\frac{\alpha\sigma\gamma(2-\alpha)+(1-\alpha)^2}{\sigma(1-\alpha)} \right] q_t + g_t \quad \dots \quad \dots \quad \dots \quad \dots (2.20)$$

Now substituting the Euler Equation (2.4) in Equation (2.19)

$$y_t = E_t\{c_{t+1}\} - \frac{1}{\sigma}\left(i_t - E_t\{\pi_{H,t+1}\}\right) - \left[\frac{\alpha(2-\alpha)(\gamma\sigma-1)}{\sigma(1-\alpha)} \right] q_t + g_t \quad \dots \quad \dots (2.21)$$

Forwarding Equation (2.19) one period ahead and solving for $E_t\{c_{t+1}\}$ yields

$$E_t\{c_{t+1}\} = E_t\{y_{t+1}\} - \alpha\left(\frac{(2-\alpha)\gamma}{1-\alpha} - \frac{1}{\sigma} \right) E_t\{q_{t+1}\} - E_t g_{t+1} \quad \dots \quad \dots (2.19)$$

By substituting (2.19) in Equation (21) and rearranging the terms we get:

$$y_t = E_t\{y_{t+1}\} - \frac{1}{\sigma}\left(i_t - E_t\{\pi_{H,t+1}\}\right) - \left[\frac{\alpha(2-\alpha)(\gamma\sigma-1)}{\sigma(1-\alpha)} \right] E_t\{\Delta q_{t+1}\} - E_t\{\Delta g_{t+1}\} \quad \dots (2.22)$$

But from Equation (2.7)

$$E_t \pi_{t+1} = E_t \pi_{H,t+1} + \frac{\alpha}{1-\alpha} E_t\{\Delta q_{t+1}\}$$

Solving Equation (2.7) for $E_t\{\pi_{H,t+1}\}$ and substituting in Equation (2.22) we get

$$y_t = E_t\{y_{t+1}\} - \frac{1}{\sigma}(i_t - E_t\{\pi_{t+1}\}) - \alpha\left[\frac{1+(2-\alpha)(\gamma\sigma-1)}{\sigma(1-\alpha)} \right] E_t\{\Delta q_{t+1}\} - E_t\{\Delta g_{t+1}\} \quad \dots (2.23)$$

2.6. Supply-Side Equilibrium

The New Keynesian Philips curve (NKPC hereafter) with real marginal cost cannot be estimated directly due to the non-availability of data on marginal cost in national income accounts. Two methods are generally employed in the literature to estimate NKPC by replacing marginal cost by an appropriate proxy variable. These are the Output-Gap method and Unit Real Labour Cost method. Following (GM, 2005) and (CGG, 2002), we proceed by establishing the relationship between marginal cost and economic activity through labour and goods market clearing conditions. The marginal cost function derived from the labour market [Equation (2.12)] can be transformed in real terms as below:

$$mc_t = -\eta a_t + \eta(w_t - p_t) + (1-\eta)\left(p_{0,t} - p_t\right) - \left(p_{H,t} - p_t\right) \quad \dots \quad \dots (2.24)$$

Substituting the intertemporal optimality condition (2.3) and the definition of CPI we get

$$mc_t = -\eta a_t + \eta(\sigma c_t + \varphi n_t) + (1-\eta)\tilde{p}_{0,t} + \frac{\alpha}{1-\alpha} q_t$$

where $\tilde{p}_{o,t} = p_{O,t} - p_t$ is the inflation-adjusted price of oil. Using the log-linearised version of cost minimisation (2.11), aggregate production function (2.14), and risk-sharing conditions (2.8), we get:

$$mc_t = -\psi_1 a_t + \psi_2 y_t^* + \psi_3 y_t + \psi_4 \tilde{p}_{O,t} + \psi_5 q_t \qquad \dots \qquad \dots \qquad \dots (2.25)$$

The above equation shows a negative relationship between marginal cost and productivity and a positive relationship between domestic and foreign output and the real price of oil. The parameters of (2.25) are: $\psi_1 = \frac{\eta(1+\varphi)}{1+\varphi(1-\eta)}, \psi_2 = \frac{\eta\sigma}{1+\varphi(1-\eta)}, \psi_3 = \frac{\eta\varphi}{1+\varphi(1-\eta)}, \psi_4 = \frac{(1+\varphi)(1-\eta)}{1+\varphi(1-\eta)},$ and $\psi_5 = \frac{\eta}{1+\varphi(1-\eta)} + \frac{\alpha}{1-\alpha}$

Solving (2.20) for y_t^* and substituting in (2.25) we get:

$$mc_t = -\psi_1 a_t + (\psi_2 + \psi_3)y_t - \psi_2 g_t + (\psi_5 - \psi_2 \varpi)q_t + \psi_4 \tilde{p}_{o,t} \qquad \dots (2.26)$$

where $\psi_6 = (\psi_2 + \psi_3)$. If there is no price rigidity and all firms are able to adjust their price optimally in each period under flexible price setting, then there will be no mark-up differential and all the firms will charge an equal mark-up $\overline{mc}_t = -\mu$. Here $\overline{mc}_t$ is the flexible price equilibrium constant marginal cost and $\mu = log\left(\frac{\theta}{1-\theta}\right)$. If $\bar{y}_t$ shows the flexible level of output, then solving (2.26) for flexible price-output yield:

$$\bar{y}_t = \frac{-\mu + \psi_1 a_t + \psi_2 g_t - (\frac{1}{1-\alpha} - \psi_2 \varpi)q_t - \psi_4 \tilde{p}_{o,t}}{\psi_6} \qquad \dots \qquad \dots \qquad \dots \qquad \dots (2.27)$$

where $x_t = y_t - \bar{y}_t$ is the output gap, according to the output-gap method, marginal cost is considered as cyclical in nature and varies directly with the gap between actual output and potential output. When the actual output is greater than potential output, the competition for available factors of production will push their prices up, and consequently the real marginal cost increases. Furthermore, marginal cost is also influenced by the exchange rate and a rise in oil price in the short run in a country like Pakistan. Thus

$$\widehat{mc}_t = \psi_8 x_t + \psi_9 q_t + \psi_{10}\tilde{p}_{o,t} \qquad \dots \qquad \dots \qquad \dots \qquad \dots \qquad \dots (2.28)$$

The New-Keynesian Phillips Curve: Using expressions (2.28) and (2.17), the NKPC can be expressed as below:

$$\pi_t = \beta E_t\{\pi_{t+1}\} + \lambda\psi_8 x_t + \lambda\psi_9 q_t + \lambda\psi_{10}\tilde{p}_{o,t} + \mathcal{E}_t^w \qquad \dots \qquad \dots \qquad \dots (2.29)$$

The New-Keynesian IS Curve: Now using expression (2.23) along with the definition of the output gap, the AR (1) productivity process, and AR (1) oil price process, the New Keynesian IS curve can be written as:

$$x_t = E_t\{x_{t+1}\} - \frac{1}{\sigma}(i_t - E_t\{\pi_{t+1}\}) - \left[\frac{\frac{1}{1-\alpha} - \psi_2 \varpi}{\psi_6} + \alpha\left(\frac{1+(2-\alpha)(\gamma\sigma-1)}{\sigma(1-\alpha)}\right)\right]$$
$$E_t\{\Delta q_{t+1}\} - \frac{\psi_4}{\psi_6}E_t\{\tilde{\pi}_{o,t+1}\} + \frac{\psi_1}{\psi_6}(\rho_a - 1)a_t + (\frac{\psi_2}{\psi_6} - 2)E_t\{\Delta g_{t+1}\} \qquad \dots (2.30)$$

As we have assumed productivity and government expenditures to be exogenous shocks therefore the above equation can be rewritten as follows.

$$x_t = E_t\{x_{t+1}\} - \frac{1}{\sigma}(i_t - E_t\{\pi_{t+1}\}) - \left[\frac{\frac{1}{1-\alpha} - \psi_2 \varpi}{\psi_6} + \alpha\left(\frac{1+(2-\alpha)(\gamma\sigma-1)}{\sigma(1-\alpha)}\right)\right]$$

$$E_t\{\Delta q_{t+1}\} - \frac{\psi_4}{\psi_6} E_t\{\tilde{\pi}_{o,t+1}\} + \mathcal{E}_t^{af} \qquad \dots \qquad \dots \qquad \dots \qquad \dots (2.31)$$

2.7. Oil Price Setting

We assume that the SOE is a net oil importer and price taker in the international oil market. Further considering the existing legal framework regarding the oil pricing mechanism, we assume full exchange rate pass-through. During the period under consideration, oil prices were revised in Pakistan monthly initially by the Oil Company Advisory Committee (OCAC) and later by the Oil and Gas Regulatory Authority (OGRA). Thus, the price of imported oil in domestic currency can be expressed as:

$$\tilde{p}_{O,t} = \tilde{p}_{O,t}^* + q_t \qquad \dots \qquad \dots \qquad \dots \qquad \dots \qquad \dots \qquad \dots (2.32)$$

where, q_t is the log real effective exchange rate. Since, as the domestic economy has no power in setting international oil price, hence the oil price variable is taken as exogenous that follows an AR (1) process as:

$$\tilde{p}_{O,t} = \rho_o \tilde{p}_{O,t-1} + \varepsilon_t^{po} \qquad \dots \qquad \dots \qquad \dots \qquad \dots \qquad \dots (2.33)$$

where ε_t^o is a shock to oil price and $\rho_o \in [0,1)$.

2.8. Monetary Policy Reaction Function

The MA is assumed to respond by adjusting the rate of interest in a countercyclical manner. More precisely, it is assumed that the MA follows an augmented Taylor-type rule to anchor inflation expectations, check the output gap, and resist exchange rate volatility. Thus the rule is:

$$i_t = \phi_\pi E_t\{\pi_{t+1}\} + \phi_x x_t + \phi_q E_t\{\Delta q_{t+1}\} + \varepsilon_t^r \qquad \dots \qquad \dots \qquad \dots (2.34)$$

3. METHODOLOGY AND IDENTIFICATION

The basic intuition behind the methodology adopted in this paper is to overcome the Lucas critique as rational economic agents are supposed to continuously update their information and revise expectations as they receive new information. Therefore, instead of relying on observed aggregate relations, the dynamic macro-econometric models are derived from microeconomic foundations where decision making by consumers and firms is conditional upon intertemporal optimisation problems. In this case, the need to estimate policy invariant deep structural parameters cannot be overemphasised. The DSGE models that fully incorporate micro-foundations along with nominal rigidities are probably the best options available to researchers for policy analysis given the state of knowledge at this moment. In the present study, the empirical estimation of deep structural parameters has been carried out based on Keating's strategy (1990, 2000) using the method of maximum likelihood. Prior to this, a similar approach has been followed by Leu (2011) for estimating the role of monetary policy for the Australian economy and Nawaz and Ahmed (2015) for Pakistan, among others. This estimation is followed by an analysis of the dynamic properties including the propagation mechanism and identification of the underlying sources of variation through impulse response functions and forecast error variance decomposition analysis. We start with the identification of the structural shocks under rational expectations.

(a) SVAR Identification Restrictions Under Rational Expectations

Identification of the SVAR model under rational expectations takes several steps as has been discussed earlier by Nawaz and Ahmed (2015). First, the extended version of the open economy model described in the theoretical framework can be expressed as follows.

$$x_t = E_t\{x_{t+1}\} - \alpha_1(i_t - E_t\{\pi_{t+1}\}) - \alpha_2 E_t\{\Delta q_{t+1}\} - \alpha_3 E_t\{\tilde{\pi}_{o,t+1}\} + \mathcal{E}_t^{af} \quad (3.35)$$

$$\pi_t = \beta_1 E_t\{\pi_{t+1}\} + \beta_2 x_t + \beta_3 \tilde{p}_{0,t} + \varepsilon_t^w \quad \ldots \quad \ldots \quad \ldots \quad \ldots (3.36)$$

$$\tilde{p}_{O,t} = \rho_o \tilde{p}_{0,t-1} + \varepsilon_t^{po} \quad \ldots \quad \ldots \quad \ldots \quad \ldots \quad \ldots \quad \ldots (3.37)$$

$$q_t = E_t\{q_{t+1}\} - \gamma_1(i_t - i_t^*) + \varepsilon_t^q \quad \ldots \quad \ldots \quad \ldots \quad \ldots \quad \ldots (3.38)$$

$$i_t = \phi_\pi E_t\{\pi_{t+1}\} + \phi_x x_t + \phi_q E_t\{\Delta q_{t+1}\} + \varepsilon_t^r \quad \ldots \quad \ldots \quad \ldots \quad \ldots (3.39)$$

The identification requires conversion of the system of equations (Equations 3.35 to 3.39) into an equivalent innovation representation. The transformed equations consisting of reduced-form VAR innovation and structural disturbances are achieved by subtracting from each variable observed value the expected value at time $t-1$ of that variable based on all publicly available information.

$$\mathcal{E}_t^{af} = (x_t - E_{t-1}x_t) - (E_t\{x_{t+1}\} - E_{t-1}\{x_{t+1}\}) +$$
$$\alpha_1(i_t - E_{t-1}i_t) - \alpha_1(E_t\{\pi_{t+1}\} - E_{t-1}\{\pi_{t+1}\}) + \alpha_2(E_t\{\Delta q_{t+1}\}$$
$$-E_{t-1}\{\Delta q_{t+1}\}) + \alpha_3(E_t\{\tilde{\pi}_{o,t+1}\} - E_{t-1}\{\tilde{\pi}_{o,t+1}\}) \quad \ldots \quad (3.35.a)$$

$$\varepsilon_t^w = (\pi_t - E_{t-1}\pi_t) - \beta_1(E_t\{\pi_{t+1}\} - E_{t-1}\{\pi_{t+1}\})$$
$$-\beta_2(x_t - E_{t-1}x_t) - \beta_3(\tilde{p}_{O,t} - E_{t-1}\tilde{p}_{O,t}) \quad \ldots \quad \ldots \quad \ldots \quad (3.36.a)$$

$$\varepsilon_t^{po} = (\tilde{p}_{O,t} - E_{t-1}\tilde{p}_{O,t}) \quad \ldots \quad \ldots \quad \ldots \quad \ldots \quad \ldots \quad (3.37a)$$

$$\varepsilon_t^q = (q_t - E_{t-1}q_t) - (E_t\{\Delta q_{t+1}\} - E_{t-1}\{\Delta q_{t+1}\}) + \gamma_1(i_t - E_{t-1}i_t) \quad \ldots \quad (3.38a)$$

$$\varepsilon_t^r = (i_t - E_{t-1}i_t) - \phi_\pi(E_t\{\pi_{t+1}\} - E_{t-1}\{\pi_{t+1}\}) - \phi_x(x_t - E_{t-1}x_t)$$
$$-\phi_q(E_t\{\Delta q_{t+1}\} - E_{t-1}\{\Delta q_{t+1}\} \quad \ldots \quad \ldots \quad \ldots \quad \ldots \quad (3.39a)$$

where $(x_t - E_{t-1}x_t)$, $(\pi_t - E_{t-1}\pi_t)$, $(\tilde{p}_{O,t} - E_{t-1}\tilde{p}_{O,t})$, $(q_t - E_{t-1}q_t)$, $(i_t - E_{t-1}i_t)$ are the VAR innovations (reduced-form residuals) of the output gap, inflation rate, oil price, exchange rate, and nominal interest rate equations. In addition to VAR innovations, the structural disturbances are related to forward-looking components describes as expectation revision process by the rational economic agents. The forward-looking economic agents continuously update their information set regarding future values of the relevant variables such as output gap $(E_t\{x_{t+1}\} - E_{t-1}\{x_{t+1}\}$, inflation rate $(E_t\{\pi_{t+1}\} - E_{t-1}\{\pi_{t+1}\})$, the exchange rate $(E_t\{\Delta q_{t+1}\} - E_{t-1}\{\Delta q_{t+1}\})$ and oil price $\left(E_t\{\tilde{\pi}_{o,t+1}\} - E_{t-1}\{\tilde{\pi}_{o,t+1}\}\right)$. [3]

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[3]Innovations to foreign variables become factors inside the system of reduced form residuals to the five domestic variables.

Now to calculate these values effectively we rewrite the reduced-form VAR in stacked form as:

$$Y_t = AY_{t-1} + Qe_t \quad \dots \quad \dots \quad \dots \quad \dots \quad \dots \quad \dots \quad \dots (3.40)$$

Or equivalently

$$\begin{bmatrix} y_t \\ y_{t-1} \\ y_{t-2} \\ \vdots \\ y_{t-s+1} \end{bmatrix} = \begin{bmatrix} A_1 & A_2 & \cdots & \cdots & A_s \\ I_n & 0_n & \cdots & \cdots & 0_n \\ 0_n & I_n & 0_n & \cdots & 0_n \\ \vdots & \vdots & \ddots & \ddots & \vdots \\ 0_n & \cdots & 0_n & I_n & 0_n \end{bmatrix} \begin{bmatrix} y_{t-1} \\ y_{t-2} \\ y_{t-3} \\ \vdots \\ y_{t-s} \end{bmatrix} + \begin{bmatrix} I_n \\ 0_n \\ 0_n \\ \vdots \\ 0_n \end{bmatrix} e_t \quad \dots \quad \dots \quad \dots (3.41)$$

where n denotes the number of endogenous variables and s stands for lag-order of these variables. Since under rational expectations $E_t(e_t) = 0$, hence j periods ahead expectations of (Equation 3.40) can be written as

$$E_t Y_{t+j} = (A)^j Y_t \quad \dots \quad \dots \quad \dots \quad \dots \quad \dots \quad \dots \quad \dots (3.42)$$

To locate the variables to be forecasted, four vectors of length $n \times s$ are created:

$$\acute{r}_x = (1,0,0,0 \dots ,0) \text{ for the output gap} \quad \dots \quad \dots \quad \dots \quad (3.43a)$$

$$\acute{r}_\pi = (0,1,0,0 \dots ,0) \text{ for inflation rate} \quad \dots \quad \dots \quad \dots \quad \dots \quad (3.43b)$$

$$r'_{po} = (0,0,1,0, \dots ,0) \text{ for price of oil} \quad \dots \quad \dots \quad \dots \quad \dots \quad (3.43c)$$

$$\acute{r}_q = (0,0,0,0,1 \dots ,0) \text{ for the real effective exchange rate} \quad \dots \quad (3.43d)$$

The expected values of the relevant endogenous variables can be calculated by pre-multiplying (3.42) by the vectors defined by (3.43) as:

$$E_t X_{t+1} = \acute{r}_x A \quad \dots \quad \dots \quad \dots \quad \dots \quad \dots \quad \dots \quad (3.44a)$$

$$Y_t \, E_t \pi_{t+1} = \acute{r}_\pi A Y_t \quad \dots \quad \dots \quad \dots \quad \dots \quad \dots \quad \dots \quad (3.44b)$$

$$E_t po_{t+1} = r'_{po} A Y_t \quad \dots \quad \dots \quad \dots \quad \dots \quad \dots \quad \dots \quad (3.44c)$$

$$E_t q_{t+1} = \acute{r}_q A Y_t. \quad \dots \quad \dots \quad \dots \quad \dots \quad \dots \quad \dots \quad (3.44d)$$

The expectation revision process can now be defined as:

$$E_t X_{t+1} - E_{t-1} X_{t+1} \; = \; \acute{x} A (Y_t - E_{t-1} Y_t) \; = \; \acute{r}_x A Q e_t \quad \dots \quad \dots \quad (3.45a)$$

$$E_t \pi_{t+1} - E_{t-1} \pi_{t+1} \; = \; \acute{r}_\pi A (Y_t - E_{t-1} Y_t) \; = \; \acute{r}_\pi A Q e_t \quad \dots \quad \dots \quad (3.45b)$$

$$E_t Po_{t+1} - E_{t-1} Po_{t+1} \; = \; r'_{Po} A (Y_t - E_{t-1} Y_t) \; = \; r'_{Po} A Q e_t \quad \dots \quad (3.45c)$$

$$E_t q_{t+1} - E_{t-1} q_{t+1} \; = \; \acute{r}_q A (Y_t - E_{t-1} Y_t) \; = \; \acute{r}_q A Q e_t \quad \dots \quad (3.45d)$$

Finally, applying the definition of Equation (3.45a-d) in the open economy model, the system of equations described through (3.35-3.39) can be written in innovation as:

$$\varepsilon_t^x = e_t^x - r_x' A Q e_t + \alpha_1 e_t^i - \alpha_1 r_\pi' A Q e_t - \alpha_2 e_t^{po} + \alpha_3 r_q' A Q e_t$$
$$- \alpha_3 e_t^q + \alpha_2 r_{p^*o}' A Q e_t \quad \dots \quad \dots \quad \dots \quad \dots \quad \dots (3.46)$$

$$\varepsilon_t^{\pi} = e_t^{\pi t} - \beta_1 r_{\pi}' AQe_t - \beta_2 e_t^x - \beta_3 e_t^{p^*o} \qquad \dots \qquad \dots \qquad \dots \qquad \dots (3.47)$$

$$\varepsilon_t^o = \tilde{p}_{o,t} \quad \dots \qquad \dots \qquad \dots \qquad \dots \qquad \dots \qquad \dots \qquad \dots \qquad \dots (3.48)$$

$$\varepsilon_t^q = e_t^q + \gamma_1 e_t^i - r_q' AQe_t - \gamma_1 r_{\pi}' AQe_t \qquad \dots \qquad \dots \qquad \dots \qquad \dots (3.49)$$

$$\varepsilon_t^i = e_t^r - \phi_{\pi} r_{\pi}' AQe_t - \phi_x e_t^x - \phi_q r_q' AQe_t \qquad \dots \qquad \dots \qquad \dots \qquad \dots (3.50)$$

To estimate the system of equations we proceed by rewriting the structural model in matrix form as:

$$\Gamma_0 y_t = \Gamma_1 y_{t-1} + \cdots \Gamma_q y_{t-q} + \Lambda_0 z_t + \Lambda_1 z_{t-1} + \cdots + \Lambda_k z_{t-k} + \varepsilon_t, \quad \varepsilon_t \sim (0, D) \quad \dots (3.51)$$

Where $y_t = (x_t, \pi_t, q_t, o_t, i_t)'$ represents the vector of endogenous variables. The vector of exogenous variables includes $z_t = (y_t^*, \pi_t^*, i_t^*)'$ where Γ and Λ are the parameters matrices for endogenous and exogenous variables. Similarly, $\varepsilon_t = (\varepsilon_t^x, \varepsilon_t^{\pi}, \varepsilon_t^o, \varepsilon_t^q, \varepsilon_t^i)$ is the vector of structural shocks and D is a variance-covariance matrix. Multiplying (3.51) by Γ_0^{-1} yields the reduced-form VAR as follows:

$$y_t = A_1 y_{t-1} + \cdots A_q y_{t-q} + B_0 z_t + B_1 z_{t-1} + \cdots + B_k z_{t-k} + e_t \quad \dots \qquad \dots (3.52)$$

The final estimation is carried out in two steps, First, the reduced form VAR is estimated, and the parameter estimates are obtained. In the second step, the rational expectations restrictions contained in (3.46 – 3.50) are imposed on Γ_0 and exclusion restrictions are placed on the exogenous variables in Λ_0. The structural system dictated by (3.51) is then estimated through FIML observing the standard assumptions of normality in structural shocks (disturbances).

4. DATA, VARIABLES, AND EMPIRICAL FINDINGS

The estimation of the core model makes use of Pakistani data that ranges between 1993Q4 and 2016Q2 with a total of 91 observations. The dataset includes five domestic (endogenous) variables, three foreign (exogenous) variables, and three dummy variables. The endogenous variables include gross domestic product (GDP), consumer price index (CPI), international oil price, real effective exchange rate, and money market rate. The foreign (exogenous) variables include US GDP, US consumer price index, and the federal funds rate. The dummy variables are used to filter seasonal variations. The data on all these variables are retrieved from International Financial Statistics (IFS) explorer. Since quarterly GDP data for Pakistan are not available in published form, we have used Kemal and Arby (2005) and Hanif et al. (2013) to construct the required time series. Using quarterly GDP data, the output gap series has been constructed through HP-filter. For robustness, we have also followed an alternative approach suggested by Malik (2007) where potential GDP is estimated by regressing real GDP in log form on its time trend and then subtracted from actual observations. The inflation rate has been calculated as the percentage change in CPI on a year-on-year basis. The real price of oil has been constructed by converting the international oil price into domestic currency price by multiplying the oil price (in US dollars per barrel) with the average nominal exchange rate (Pak. Rupee/US dollar) and then dividing by the general price level. The data regarding the real effective exchange rate and money market rate are directly taken from the IFS, where the money market rate represents the short-term nominal

interest rate. The selection of the sample period is based on the financial sector regulatory reforms initiated in Pakistan in 1993.

The estimation involves estimating the reduced form VAR parameter estimates and the VAR innovations.[4] These are then combined with rational expectation restrictions dictated by the system of equations presented above to estimate the structural system. The statistical fitness of the estimated reduced-form VAR parameter estimates is important for accurate policy inferences (Spanos, 1990), therefore, several tests including pre-estimation tests and post-estimation diagnostic tests have been conducted. As a pre-requisite, the stationarity of the variables has been checked through HEGY test, proposed by Hylleberg, Engle, Granger, and Yoo (1990). This test has been found to have an advantage over the traditional Augmented Dicky-Fuller (ADF) unit root test to test the data before deseasonalisation (Charemza & Deadman, 1997). Canova (2007) and Sims et al. (1990) have argued that the VAR model can be estimated for a consistent parameter even if the variables are found to be non-stationary. Next, the ARDL bound testing approach developed by Pesaran et al. (2001) has been employed to examine the long-run relationship. This test is based on the Wald coefficient test and investigates the joint significance of the parameters of lagged variables. This method has been selected among many others for its flexibility in choosing the lag-length for endogenous variables and its superior performance in the case of small samples.

The results of HEGY test are reported in Table 1. The results show that the existence of unit root at zero-frequency for all endogenous variables cannot be rejected. However, for seasonal frequencies (biannual and annual), there is no indication of the existence of a unit-root in any variable. These results confirm that all variables are integrated of order one [I(1)] that supports the suitability of data series for further estimation.

Table 1

HEGY Seasonal Unit Root Test

Variable	H_0: $\pi_1 = 0$ (Non-seasonal Zero Frequency)	H_1: $\pi_2 = 0$ (Seasonal Biannual)	H: $\pi_3 = \pi_4 = 0$ (Seasonal Annual)
Output Gap	−1.77	−2.67	24.84
	(0.42)	(0.03)	(0.00)
Inflation Rate	−1.69	−5.91	27.35
	(0.78)	(0.00)	(0.00)
Exchange Rate	−0.65	−4.97	33.02
	(0.93)	(0.01)	(0.00)
Oil Price	−1.88	−9.20	32.59
	(0.36)	(0.00)	(0.00)
Interest Rate	−1.84	−7.15	78.30
	(0.20)	(0.00)	(0.00)

Note: Values in parenthesis are simulated p-values.

With intercept, time trend, and seasonal dummies.

[4]There are various methods available to estimate DSGE models and every method has its own limitations and benefits. The Bayesian estimation technique is considered to be the most appropriate one, as indicated by one of the reviewers, but this technique demands an extensive set of information regarding the values of structural parameters and their accurate distributions. Such information is mostly based on micro-based surveys that are hardly available in developing economies, like Pakistan. Even though many authors tend to borrow these values of parameters from research completed in the developed economies, in our opinion it seems inappropriate considering the fundamental structural differences in the developed and the developing economies.

The estimation proceeds with cointegration analysis to confirm the existence of a long-run relationship. The empirical results produced by the ARDL bound testing approach to cointegration are reported in Table 2. The results confirm that there is a statistically significant long-run relationship between endogenous variables and that the endogenous variables are cointegrated.

Table 2
ARDL Bounds Test

Dependent Variable	Independent Variables	F-statistics	Optimal Lag Length	Result
Output Gap	π, opd, q, i	4.09	(4, 1, 1, 0, 0)	Cointegration
Inflation Rate	x, opd, q, i	6.15	(2, 2, 4, 0, 1)	Cointegration
Exchange Rate	x, π, opd, i	4.24	(2, 2, 3, 0, 0)	Cointegration
Interest Rate	x, π, opd, q	4.40	(2, 1, 0, 0, 0)	Cointegration

Where $\pi, opd, q, i, and\ x$ are symbols for the inflation rate, oil price, exchange rate, interest rate, and the output gap.

Critical Value Bounds

Significance Level	I0 Bound	I1 Bound
10%	2.45	3.52
5%	3.25	4.01
1%	3.74	5.06

Note: (Null Hypothesis: No long-run relationships exist).

After confirming the long-run relationship, the VAR model has been estimated. To estimate the reduced form VAR, selection of the optimal lag-length is crucial and various methods have been considered. Whereas LR, AIC, and FPE confirmed an optimal lag-length of 5, the SCI and HQ criteria suggest an optimal lag-length of 4. Due to the fact that at the lag-length of 5 the VAR residuals are free from autocorrelation and ARCH effect, we have opted for a lag length of 5.

4.1. Diagnostics of the Reduced-form VAR Residuals

Several tests have been conducted to examine the autocorrelation, heteroskedasticity, normality, the functional form, and the goodness of fit of reduced-form VAR estimates. The residual diagnostic tests reported in Table 3 are the LM test, the ARCH effect test, Jarque-Bera test, Ramsey RESET test, and R-squared. Besides the high goodness of fit, the results do not reject the null hypothesis of no serial correlation and heteroskedasticity in all cases. Similarly, not only the residuals are normally distributed but it has also been found that none of the equations in the system is misspecified.

4.2. Structural Parameter Estimates

Using the information contained in the reduced-form VAR and the rational expectations restrictions, the SVAR model has been estimated for the economy of Pakistan. Besides offering an explanation about the dynamics of the economy through the Impulse Response Functions (IRF) and Forecast Error Variance Decomposition (FEVD), the present study also assesses the structural parameter estimates to determine the robustness and transparency of the estimates. These results are presented in Table 4.

Table 3

Post-estimation Reduced-form Diagnostic Tests

Test	Equation				
	x	π	opd	q	i
R-square	0.95	0.91	0.96	0.99	0.88
Serial	2.15	0.22	0.79	0.83	0.18
Correlation	(0.12)	(0.79)	(0.46)	(0.33)	(0.83)
ARCH	0.00	0.20	0.37	1.45	1.19
	(0.97)	(0.65)	(0.53)	(0.23)	(0.27)
Normality	2.07	1.14	1.18	1.53	2.16
	(0.39)	(0.56)	(0.12)	(0.46)	(0.09)
Functional Form	0.76	0.05	1.82	1.05	3.56
	(0.32)	(0.95)	(0.08)	(0.31)	(0.07)

Note: p-values are reported in parenthesis.

Table 4

Maximum Likelihood Parameter Estimates

Equation	Parameter	Coefficient	Std. Error	z-Statistic	Prob.
IS Equation	α_1	0.687255	0.183036	3.754747	0.0002
	α_2	–0.038641	0.861719	–0.044841	0.9642
	α_3	0.910442	13.67411	0.066581	0.9469
Phillips Curve	β_1	0.824651	0.035412	23.28710	0.0000
	β_2	–0.266274	0.023022	–11.56624	0.0000
	β_3	0.098225	0.001185	82.90473	0.0000
UIP Condition	γ_1	–0.017783	1.453538	–0.012235	0.9902
Interest Rate Rule	ϕ_π	–0.913302	0.694461	–1.315123	0.1885
	ϕ_x	1.953390	0.159816	12.22271	0.0000
	ϕ_q	–0.170185	0.388343	–0.438233	0.6612

The SVAR estimated parameters recovered through the method of maximum likelihood (ML) facilitate the following interpretation. In the case of the IS equation, although all estimates of the parameters have correct signs, most of them are statistically insignificant. Whereas oil price is negatively associated with output gap and exchange rate appreciation widens the output gap through expenditure switching effect, the outcome suggests that these variables do not play any significant role in influencing the output gap in the short-run. The interest rate is the only important variable that appears to stimulate economic activity in Pakistan. The insignificant role of oil price appears to be a serious concern, but a possible explanation could be that Pakistan switched towards domestic and inexpensive natural gas during the period under consideration which might have cushioned the adverse impact of international oil price shocks. It may be relevant to add that (Blanchard & Gali, 2007; Kilian & Lewis, 2011; Kilian, 2009; Herrera & Pessavento, 2009) have also found similar results for the US economy and Du et al. (2010) did so for the Chinese economy.

For the Phillips curve, representing the supply side of the economy, the parameter associated with forward-looking inflation is highly significant which implies that many firms are forward-looking and future-oriented. This outcome is in-line with Nawaz & Ahmed (2015), who estimated a closed economy model for Pakistan and Gali & Gertler (2007), whose focus was the US economy. The oil price pass-through into the domestic price is captured by β_3, which shows that an increase in the international price of oil significantly inflates the domestic price level. The price-demand relationship represented by β_2 appears with a negative sign which theoretically may appear odd, but this possibility exists when the monetary authority is more inclined towards growth instead of stabilisation. Nawaz & Ahmed (2015) and Akbari (2005) have also found similar results for Pakistan using different methodologies.

Further, the statistically insignificant UIP condition indicates that instead of the interest rate differential, the exchange rate dynamics in Pakistan are driven by some other factors. Among them, pursuing inconsistent policies, poor law and order situation, and an onslaught of terrorism are the major issues that discouraged capital inflow over an extended period. Similarly, the results for the MA reaction function appear to be at odds with the theoretical predictions of (Taylor, 1993; Malik & Ahmed, 2010). The insignificance of inflation and exchange rate parameters implies that neither inflation targeting, nor stabilisation is the prime objectives of the MA. In fact, the MA has been ineffective in anchoring inflationary expectations. This raises concerns about the credibility and independence of the MA.[5] Another important finding is that inflation in Pakistan is not demand-driven. Rather, many supply-side factors are also responsible for price changes as discussed above. Therefore, the adoption of demand management policies alone may not be an effective strategy for controlling inflation.

4.3. Impulse Response Functions (IRFs)

We now report the IRFs with a 95 percent confidence interval for the five structural shocks, i.e. fiscal policy, cost-push, oil price, risk premium, and monetary policy shocks, and these are displayed in Figures 1-5. Each shock is of one standard deviation where the responses show mean reversion, which is the stationarity of the model. The detailed responses are as follow:

4.3.1. *Fiscal Policy Shock*

Most of the developing economies experience low per capita incomes, low savings, and hence low capital formation. Therefore, government spending is often used to stimulate aggregate demand as there is evidence of a complementary relationship between public and private investment. Expansionary fiscal policy is, therefore, considered an effective tool to utilise the idle capacity to boost economic activity in collaboration with the private sector. Panel (a) of Figure 1 displays the impact of a positive shock to government spending on the output gap. The output gap increases when the fiscal policy shock hits the economy and stays above the initial level for two quarters.

[5] Unfortunately, the persistence of budget deficit and the heavy reliance of the Government on domestic borrowings has rendered monetary policy quite irrelevant and redundant. A number of policy measures taken recently clearly demonstrate that the MA is playing a second fiddle to the fiscal authority, and therefore the monetary policy in Pakistan has become subservient to the fiscal policy.

It again goes up in the fourth and eighth quarters and in each case, the expansionary effect lasts for two quarters.[6] These results support the Keynesian notion of crowding-in effect. On the other hand, an increase in government spending results in inflation that lasts for more than a year. The exchange rate does not show any response to a fiscal expansion in the short-run but starts to rise after a lag of one year and continues to appreciate in the longer run. A possible reason could be that fiscal expansion stimulates demand for domestic as well as imported goods that, in turn, puts upward pressure on exchange rate through expenditure switching effect. As a result, the exchange rate appreciates upon impact i.e., the domestic currency depreciates. The MA responses to inflationary pressure and exchange rate volatility in the shape of monetary tightening significantly raise the interest rate. However, this policy remains ineffective at least in the case of exchange rate stabilisation.

Fig. 1. Impulse Response Functions to One Standard Deviation Fiscal Policy Shock

(a) Response of output gap

(b) Response of inflation rate

(c) Response of exchange rate

(d) Response of interest rate
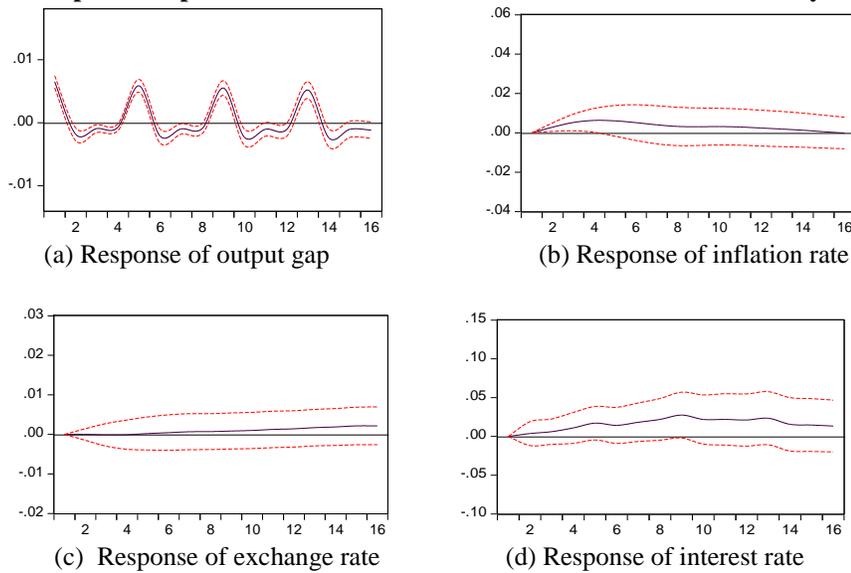
4.3.2. *Cost-push Shock*

Figure 2 displays the estimated IRFs to one standard deviation positive shock to inflation that may be regarded as an adverse aggregate supply shock that leads to an increase in the marginal cost of production. From panel (a) of Figure 2, it is evident that the cost-push shock has an adverse impact on output. It causes output to decrease which remains below its long-run equilibrium level for about four quarters. This shock also results in inflation that lasts for the next one year. The inflationary pressures may be due to excess demand that emerges from short supply. Once the cost-push shock hits the economy and the inflationary pressure sets in, the monetary authority opts for a tight monetary stance that results in an upward shift in interest rate. The interest rate peaks in the eighth quarter and then decreases slowly. It takes almost three years for the interest

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[6]This outcome may not indicate stationarity problem. Instead it may have been due to the procedure adopted in the study for quarterisation of the GDP data.

rate to converge. Finally, the estimated IRFs show that cost-push shock has a negligible effect on the exchange rate. The preceding analysis points to an important policy area. Whereas the optimal response to an adverse supply shock should have been an expansionary, or at least an accommodative monetary stance, instead an aggressive tackling of the situation with a substantial increase in the interest rate has prolonged the recessionary period. This is a classic example of a policy dilemma in developing economies where the central banks put larger weight to stabilisation rather than output growth.

Fig. 2. Impulse Response Functions to One Standard Deviation Cost-push Shock

(a)   Response of output gap

(b) Response of inflation rate

(c)   Response of exchange rate

(d) Response of interest rate
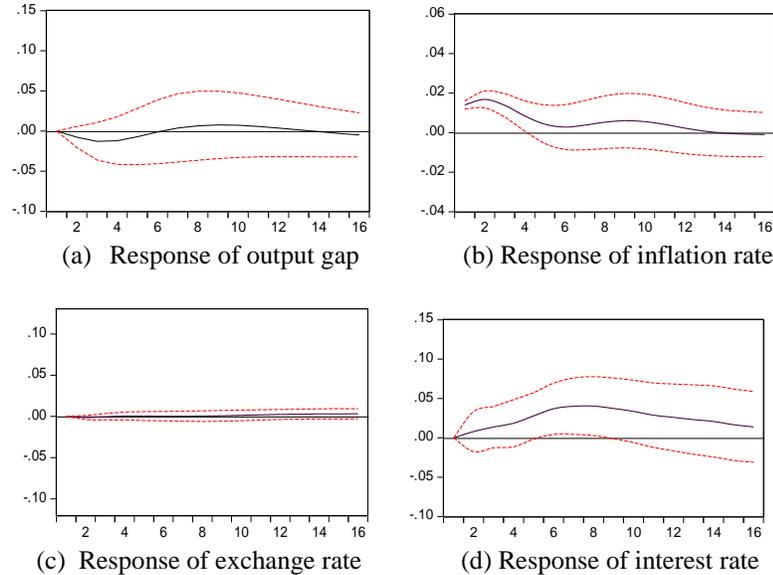
4.3.3. *Oil Price Shock*

Figure 3 shows how an exogenous and unanticipated shock to the real price of oil disturbs the variables in the system. Panel (a) of Figure 3 reports a negative response of the output gap to oil price shock. The output gap declines smoothly and takes three quarters to recover. However, there is a cyclical trend that persists and the output gap perpetually oscillates on the lower side in the long run. This phenomenon has been explained in the literature based on supply, demand, wealth-transfer, and monetary policy channels. The combined impact of these channels is generally negative in the case of an oil-importing economy as has been found by Khan & Ahmed (2012). The inflation rate gradually rises upon impact and stays substantially high for the next six quarters. This result shows that there is a positive and statistically significant relationship between inflation rate and an increase in the international oil price. The exchange rate depreciates marginally in the beginning but recovers significantly after two quarters and the appreciation continues for more than three years. This happens because an increase in international oil price increases the import bill and creates a balance of payment deficit which, in turn, puts significant pressure on local currency *vis-à-vis* the demand for dollars that consequently leads to the exchange rate appreciation. The increasing pressure of oil

price fluctuations on Pakistani rupee is quite evident for the last few years. Since the MA perceives the oil price pass-through into the general price level as a potential threat, it responds to this shock with monetary tightening to anchor inflationary expectations. The outcome highlighted in Figure 3 (d) shows that there is an increase in interest rate. It may be added that even though the contractionary monetary policy successfully reduces inflation, it does so at the cost of lower output.

Fig. 3. Impulse Response Functions to One Standard Deviation Oil Price Shock

(a) Response of output gap

(b) Response of inflation rate

(c) Response of exchange rate

(d) Response of interest rate
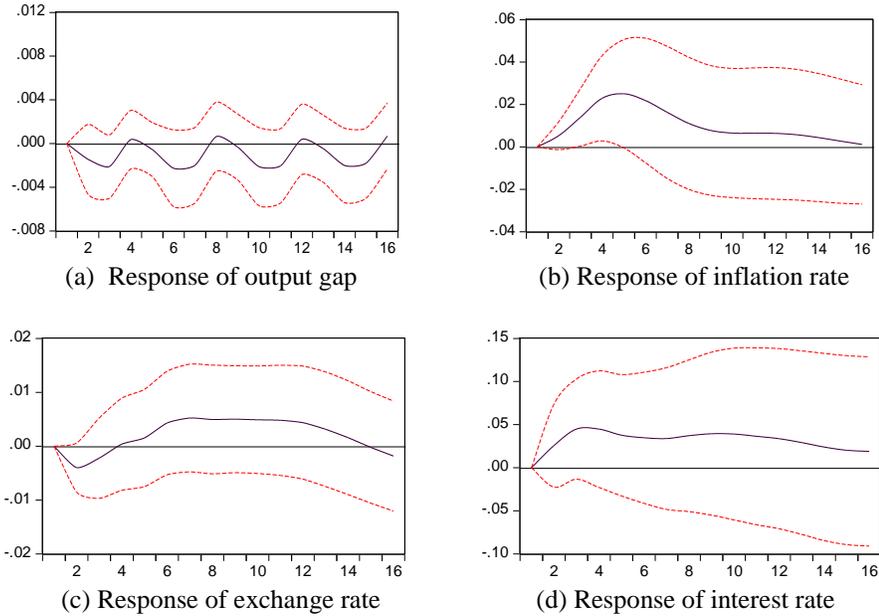
4.3.4. *Risk Premium Shock*

One standard deviation positive shock to risk premium leads to an instantaneous appreciation of the exchange rate that exerts pressure on Pakistani rupee for the entire horizon of four years considered in this study. The combined effect of risk premium and exchange rate appreciation also affects inflation adversely implying that the exchange rate pass-through into domestic inflation is significant. Theoretically, an exchange rate appreciation leads to a rise in aggregate demand due to expenditure-switching effect but the estimated IRFs display that the output gap remains stable for about three quarters and then goes up slightly in the fourth quarter upon impact. The possible reason for this outcome could either be inelastic export demand for Pakistani goods or the supply-side problem may have arisen due to the non-availability of export surplus. The output gap keeps oscillating above the trend line onward. The exchange rate stability is incorporated as one of the primary objectives of the MA for various reasons such as avoiding balance of payment crises, maintaining external debt burden within sustainable limits, and avoiding inflationary consequences. The result indicates that the MA increases interest rate significantly to minimise such adversities. The potential capital flight is also prevented in the process.

Fig. 4. Impulse Response Functions to One Standard Deviation Risk Premium Shock

(a)   Response of output gap

(b) Response of inflation rate

(c) Response of exchange rate

(d) Response of interest rate
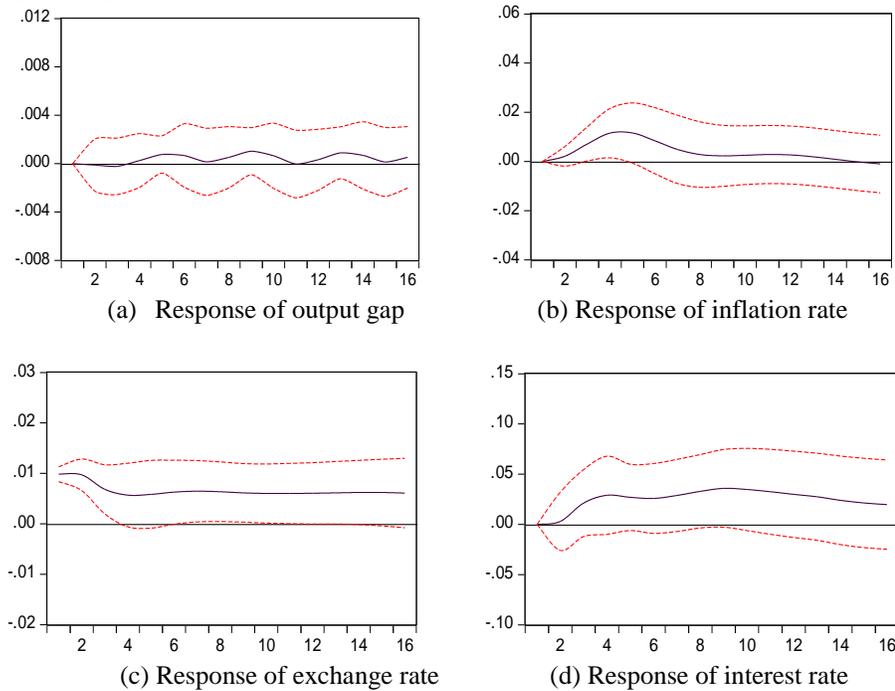
4.3.5. *Monetary Policy Shock*

Figure 5 reports the response to one standard deviation unanticipated positive shock to interest rate over the sixteen quarter horizon. In response to this shock, the output gap initially remains stable and responds with a lag of two quarters. After that, it starts to decline but improves slightly after six quarters when the interest rate reverts to its initial position. However, it stays below its equilibrium level, and the contractionary impact takes fourteen quarters to vanish completely. This clearly shows that monetary policy intervention has a real effect. As far as the response of inflation to monetary contraction is concerned, it has been observed that inflation responds with some delay. This sluggish response can be attributed to nominal rigidities present in the system. The inflation rate starts to decrease after two quarters (six months) and stays below its initial position for about fifteen quarters. The maximum impact of shock has been observed within the span of six and twelve quarters. This result is in-line with Malik (2007), Malik & Ahmed (2010), and Ahmed & Malik (2011). Finally, the contractionary monetary policy stance creates a positive interest rate differential, making domestic financial assets more attractive that induce capital inflow. The result confirms the exchange rate puzzle as Pakistani rupee, rather than appreciating, weakens substantially and this situation persists for about sixteen quarters. This is not surprising as Hnatakovska et al. (2012) also found the exchange rate puzzle for about 80 percent of developing countries in their study. The finding of Javid and Munir (2011) are similar. Besides empirical support, this phenomenon can also be explained theoretically based on a favourable money demand effect and an unfavourable fiscal and output effect.

**Figure 5: Impulse Response Functions to One Standard Deviation
Monetary Policy Shock**

(a) Response of output gap

(b) Response of inflation rate

(c) Response of exchange rate

(d) Response of interest rate
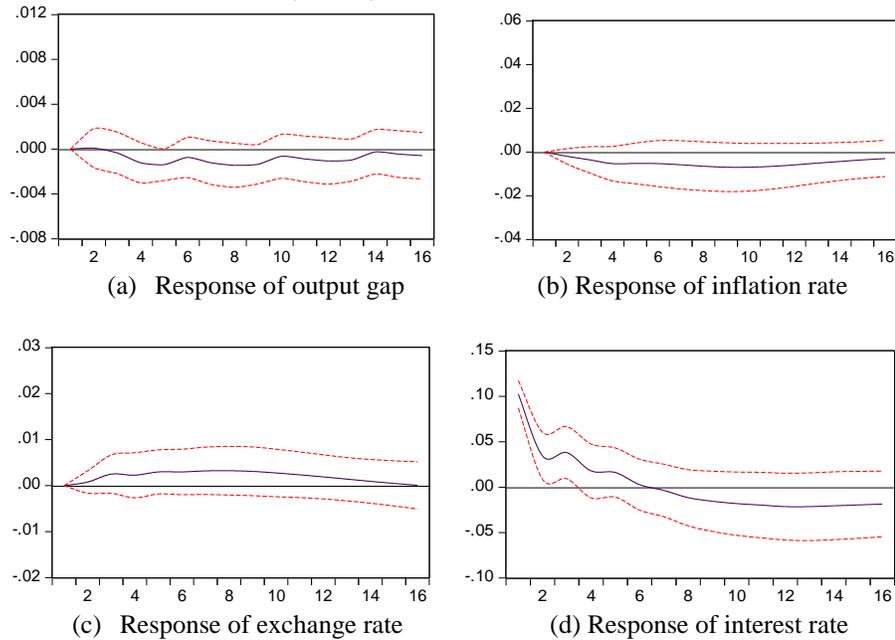
4.4. Forecast Error Variance Decomposition Analysis

The Forecast Error Variance Decomposition (FEVDs) analysis provides an insight into the relative contribution of various shocks at different horizons. It enables us to track down the transmission mechanism through which exogenous (policy and non-policy) interventions spillover into the economy. Table 5 reports the FEVDs results of five variables to five shocks. The five variables include the output gap, inflation rate, oil price, exchange rate, and interest rate. The five shocks pertain to fiscal policy, cost-push, oil price, risk premium, and monetary policy. The time horizon is stretched over 20 quarters.

The results confirm that the fiscal policy shock is the most important driver explaining aggregate variability. It accounts for nearly 57 percent forecast error variance (FEV, hereafter) in the short-run and 54 percent in the long run on the output gap. It means that the government seems to have greater command over manipulating aggregate demand in Pakistan. The cost-push shock is the second important contributor causing variability in the output gap. The share of cost-push shock is around 27 percent in the short run, and with a slight decrease, it contributes around 25 percent FEV in the long-run. The monetary policy ranks third in influencing the output gap, with a consistent contribution of around 16 percent at all horizons. Finally, the share of the remaining two shocks (oil price shock and risk premium shock) is relatively small at all horizons. For an economy that experiences nominal frictions due to multiple reasons, the significance of demand management policies is an interesting outcome that is consistent with the NK literature. It is also worth noticing that fiscal stimulus appears to be relatively more effective as compared to monetary push in influencing aggregate demand.

Table 5

Forecast Error Variance Decomposition Analysis

Series	Period	Structural Shocks				
		Fiscal Policy	Cost-push	Oil Price	Risk Premium	Interest Rate
Output Gap	1	56.76	26.56	0.06	0.05	16.55
	2	56.74	26.55	0.06	0.08	16.55
	3	56.64	26.51	0.09	0.23	16.51
	4	56.33	26.36	0.09	0.78	16.42
	6	56.37	26.33	0.09	0.79	16.40
	8	56.02	26.18	0.15	1.35	16.30
	12	55.74	26.04	0.15	1.82	16.22
	16	54.75	25.58	0.16	3.57	15.92
	20	53.99	25.23	0.16	4.92	15.70
Inflation Rate	1	28.00	19.07	21.78	16.33	14.80
	2	54.03	23.07	5.90	1.76	15.21
	3	48.22	21.56	2.28	14.17	13.74
	4	45.36	20.58	1.59	19.44	13.00
	6	49.82	22.84	0.99	11.72	14.59
	8	37.97	17.29	0.62	32.87	11.23
	12	36.38	16.38	0.48	35.90	10.83
	16	31.82	14.31	0.59	43.76	9.49
	20	31.58	14.22	0.61	44.15	9.42
Oil Price	1	0.00	0.00	100.00	0.00	0.00
	2	0.96	0.34	97.89	0.79	0.00
	3	2.38	1.15	95.42	1.00	0.03
	4	4.26	1.83	92.99	0.79	0.10
	6	7.40	1.96	89.31	0.78	0.52
	8	9.56	1.65	85.52	1.67	1.57
	12	11.62	1.70	77.80	3.69	5.17
	16	11.64	1.81	73.80	4.96	7.77
	20	11.71	2.66	72.04	5.54	8.03
Exchange Rate	1	0.05	0.04	0.10	99.79	0.01
	2	0.03	0.02	0.27	99.66	0.01
	3	0.17	0.07	0.28	99.39	0.06
	4	0.16	0.07	0.24	99.44	0.06
	6	0.23	0.11	0.19	99.38	0.07
	8	0.87	0.44	0.15	98.28	0.23
	12	3.68	1.78	0.13	93.38	1.00
	16	7.05	3.36	0.12	87.48	1.96
	20	8.32	3.94	0.11	85.25	2.32
Interest Rate	1	49.59	24.10	6.04	0.29	19.95
	2	28.19	7.87	5.46	41.84	16.62
	3	24.89	9.20	4.11	50.73	11.04
	4	30.55	11.57	3.47	44.37	10.02
	6	37.97	17.80	1.69	31.67	10.85
	8	45.07	20.91	1.22	19.75	13.03
	12	46.56	21.34	0.66	17.75	13.66
	16	43.54	19.85	0.80	22.95	12.84
	20	43.30	19.74	0.96	23.20	12.77

For the inflation rate, the FEVD analysis shows that the fiscal policy shock is again a dominant factor that explains its FEV. This shock accounts for 28 percent percent of FEV in the short run, that goes up to around 32 percent in the long run. Oil price shock explains around 22 percent variability in the inflation rate within a one-quarter horizon, which decreases sharply to about 0.6 percent in the long run. This result confirms a complete oil price pass-through into domestic petroleum products and consumer prices. The cost-push shock is the third important driver of inflation in the country that accounts for 19 percent of the variability in the short-run that increases to around 23 percent in the medium-run but declines to around 14 percent in the long run. Finally, the risk premium, as well as monetary shocks, also leave an impact on inflation. These findings reconfirm that domestic prices are not only influenced by domestic supply and demand constraints; part of inflation is an imported phenomenon (Naqvi et al. 1983).

In the case of the exchange rate, the risk premium shock is the sole source of variation during the entire horizon. This result implies that the exchange rate in Pakistan is independent of prevailing macroeconomic conditions. And that it is managed through an opaque exchange rate policy. Finally, the fiscal policy shock accounts for around 43 percent to 50 percent of variations in the interest rate at different time horizons. This result reconfirms that notwithstanding its independence, the monetary authority is quietly conceding to fiscal dominance.

5. SUMMARY AND CONCLUSIONS

The present study attempted to understand business cycle fluctuations in Pakistan based on the NKOE model, forward-looking rational economic agents respond to policy interventions introduced to exploit nominal rigidities in the system. An SVAR model has been estimated using time series data covering the period between 1993Q4 and 2016Q2. The contemporaneous structure of the SVAR model has been taken from Khan (2016) and the estimation has involved a two-step procedure proposed by Keating (1990, 2000). The dynamic properties of the economy have been examined and analysed based on IRFs and FEVD.

Based on structural parameter estimates, it has been found that interest rate movements cause the output to decline that, in turn, is responsible for the economic slowdown. Whereas the oil price shocks are one of the major contributors to domestic inflation, a significant number of firms have been found to be more attentive to expected inflation that confirms the New-Keynesian notion of forward-looking behaviour. Finally, the parameter estimates of the monetary policy reaction function confirmed that, contrary to popular perception, stabilisation has never been the prime objective of the monetary authority in Pakistan.

The dynamic response of the output gap supported the crowding-in effect; suggesting that an increase in government spending stimulates economic activity. On the other hand, monetary contraction, oil price, and cost-push shocks cause a sizeable decline in output. Furthermore, in response to an adverse supply shock, monetary contraction reinforces the recessionary impact of the shock. This policy dilemma where an accommodative policy stance would have been an appropriate policy stance is consistent with Bernanke, Gertler & Watson (1997) who argued that the 1970s stagflation was

largely the result of an inadequate policy response to oil price shock. Another important finding of the present study is the reconfirmation of the exchange rate puzzle wherein response to an increase in interest rate, the exchange rate appreciates substantially. The delayed response of inflation to interest rate shock confirms the existence of price and wage rigidities in Pakistan. Meanwhile, it is disturbing to note that the exchange rate policy has largely been ineffective in talking about the balance of payment crisis. The currency depreciation fails to influence aggregate demand via export promotion or import substitution. The FEVD analysis further confirms the anecdotal evidence of fiscal dominance in Pakistan as a major source of variation in aggregate demand, inflation, and interest rate originates from the fiscal policy shock. The monetary policy shocks are also responsible for economic fluctuations but only moderately and with a long lag.

We conclude by acknowledging certain limitations of the study. The foremost being the absence of a well-integrated financial side in the model. The missing link has attracted the attention of macroeconomists only after the financial crises of 2007-08 (Blanchard et al. 2012). Since then the DSGE model has been revised and still being revised where besides macroeconomic stability, the emphasis has also been given to financial stability to have further insights on macroeconomic fluctuations. This extension is still at its nascent stage in Pakistan. The analysis in the present study has been completed with this caveat in mind.

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External Debt and Capital Accumulation Nexus: Evidence from Pakistan

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The rising public debt burden is a common feature of developing countries like Pakistan. This study is an attempt to empirically analyse the external debt and capital accumulation nexus for Pakistan from 1972 to 2016. The ARDL bound testing technique was employed to estimate two models which incorporate different indicators of external debt. Results indicate the existence of a negative relationship between external debt to revenue ratio and stock of capital that supports the debt overhang hypothesis for Pakistan. The debt overhang hypothesis states that large accumulated debt leads to a decrease in overall capital accumulation in an economy. Similarly, other indicators of external debt, namely, external debt service to revenue ratio, external debt to export ratio, and external debt service to export ratio tend to bring a fall in stock of capital in Pakistan. Based on its findings, the study suggests the need for better and productive use of external debt in public sector development projects to foster the capital accumulation process in Pakistan.

1. INTRODUCTION

The continuous increase in external debt burdens of low-income countries is an indicator of economic slowdown and lack of prudent debt management. Inappropriate structural reforms, lack of sustainable macroeconomic adjustment policies, lack of diversified export bases, and political instability are considered main drivers of the higher external debt burden (Zaidi, 2015). The immediate effect of the increasing debt can be observed through the decline in both domestic and the net foreign investment, which further result in lower capital accumulation and output in an economy. Additionally, higher public debt not only crowds out physical capital but also adversely affects human capital accumulation (Serieux & Samy, 2001).

Economic theory postulates that rational borrowings encourage economic growth through capital accumulation and productivity growth. This is because countries at their early stages of development generally tend to have smaller capital stocks with limited and inadequate investment opportunities. As a result, such countries assure higher rates of return on investment (Hameed et al. 2008). However, in the case of developing countries, increasing debt burdens are posing a serious threat to the macroeconomic stability by

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affecting domestic investment and foreign direct investment. Undoubtedly, supplementing resources by foreign economic assistance is important for initiating and accelerating the pace of economic growth, however, a persistent surge in the external debt burden for an extended period can create serious constraints for the economic growth of a country. There is a close relationship between the nature of the debt and economic activity. We can classify debt as productive or unproductive debt. Productive debt is raised for productive purposes and increases the productive capacity of an economy. On the other hand, unproductive debt is not self-liquidating, and does not enhance the productive capacity of an economy. Thus, a debt-financed investment should be productive so that it can earn a higher return than the cost of raising the debt (Adebusola et al. 2007).

Like many other developing countries, Pakistan is confronted with a shortage of financial resources. To manage this problem, Pakistan has been bridging its resource gap through borrowing from external resources. Pakistan has been receiving foreign economic assistance since the early 1950s for development requirements. Foreign aid has played an important role in medium and long-term development programmes in Pakistan. Foreign economic support (loans, credits and grants) is mostly categorised as project aid and non-project aid.[1] The main objective of foreign assistance has been to complement the domestic resources required to accelerate the pace of economic development in the country. The debt burden gradually increased during the 1980s and 1990s. The debt situation in Pakistan reached a vulnerable level in 1999 due to large, and persistent, current account and primary fiscal deficits. These twin deficits resulted in the unstable accumulation of huge total debt. During the first half of the 1980s, domestic debt increased by 8 percent and followed by even a higher rate of 22 percent in the second half of the 1980s (Adnan, 2008). The domestic and external debt situation worsened during the 1990s. The external debt to GDP ratio increased to 43 percent in 1998-99 from 34 percent in 1990-91, while domestic debt grew at 13.7 percent annually during the 1990s (Pakistan, 1999-00).

Pakistan entered the 21st century with the abovementioned severe financial problems. Public debt exceeded revenues by more than 600 percent and was 90 percent of GDP. At the same time, debt repayments accounted for more than half of the current revenues. In 2001, the World Bank declared Pakistan a severely indebted South Asian country. Due to Pakistan's weak financial position, Paris Club members and quasi-London Club rescheduled debt payments several times from 1998 to 2001 (Zaidi, 2015). After 2001, economic and public debt indicators showed some improvement in Pakistan. Unfortunately, this trend could not be maintained for a longer period. In the last few years, Pakistan has witnessed massive fiscal and current account deficits. The expansion of the fiscal and current account deficits resulted in higher borrowing through both internal and external sources to finance these deficits. The domestic and external debt has increased to PKR 3 trillion and PKR 3.4 trillion respectively. The public debt as a percentage of GDP increased to 61.6 percent in FY 2012-13 from 55.2 percent in FY 2006-07. Similarly, public debt as a percentage of revenue during 2016-17 fell to 442.5 percent from 479.2 percent in 2012-13 (Pakistan, 2016-17).

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[1]The main difference between a grant and a loan is repayment. A loan requires you to repay the money you borrow, whereas a grant does not. Grants are, essentially, a gift. In other words, they're non-repayable.

Total public debt stood at PKR 28,607 billion at the end of March 2019, recording an increase of PKR 3,655 billion during the first nine months of the current fiscal year. The bifurcation of this increase is as follows: cumulative increase in debt stock cannot be entirely attributed to government borrowing. External loans are contracted in various currencies; however, disbursements are effectively converted into the PKR. Thus, devaluation of PKR against international currencies can increase the value of external public debt portfolios when converted into the PKR for reporting purposes. This is evident from the fact that increase in external public debt contributed PKR 1,900 billion to the public debt during the first nine months of the ongoing fiscal year, while government borrowing for financing of fiscal deficit from external sources was PKR 524 billion during the said period. This differential mainly occurred due to the depreciation of the PKR against US Dollar. It is worth noting that depreciation of the PKR increases the rupee value of external public debt, however, any such negative impact is spread over many years depending on the life of any given loan and immediate cash flow impact is not significant. On the other hand, fiscal indicators during FY 2018 suggest that total revenue at 15.1 percent of GDP remained below the revised target of 16.0 percent. Both tax and non-tax revenue showed dismal performance, while expenditures increased. Tax revenue reached 12.9 percent of GDP against the target of 13.2 percent of which FBR tax collection remained at 11.1 percent against the revised target of 11.4 percent. Similarly, non-tax revenue reached 2.2 percent against the target of 2.8 percent (PES 2018-19). Over the years, a narrow tax base, numerous concessions and exemptions, tax administration challenges, and weak tax compliance resulted in a low tax to GDP ratio in Pakistan.

Given the above-mentioned background, the present study aims to explore the relationship between external debt and capital accumulation in Pakistan. This exercise will enable us to understand the consequences of various indicators of external debt burden for domestic capital accumulation in Pakistan. Moreover, the findings of the study will suggest suitable measures, such as improvements in governance structure, insuring fiscal transparency and discipline, along with reduction of aid fungibility for enhancing the stock of capital by optimal utilisation of external borrowing. The significance of the study is apparent from the fact that it has endeavored to gauge the relationship between some indicators of external debt burden and capital accumulation in Pakistan.

The study is structured as follows: Section 2 surveys relevant literature; Section 3 presents estimation strategy and data; Section 4 discusses the main empirical results; and Section 5 provides the conclusions.

2. LITERATURE REVIEW

Both empirical and theoretical literature available on the nexus between external debt and capital accumulation confirm the deleterious consequences of external debt for capital accumulation. According to (Krugman, 1988) when debt obligations in a country surpass adequate levels of borrowings, it discourages investment. This also implies that at higher levels of debt burdens, investors would expect lower profits on their investments because they anticipate that to reimburse these outstanding debts, government will increase taxes. Thus, large debt burdens discourage investment and hence affect the capital accumulation process. Similarly, (Agenor & Montiel, 1996) argue that higher debt burdens affect growth through lowering total factor productivity growth.

Few studies have directly analysed the impact of foreign debt on capital accumulation. The findings of (Gong & Zou, 2000) reveal that foreign aid negatively affects capital accumulation in the long run. Whereas, in the short run, the relationship is positive because increase in foreign aid increases investment and capital accumulation and reduces external borrowings. Habimana (2005) investigates the relationship between the higher level of external debt and capital accumulation in Rwanda. The findings reveal a negative effect of external debt on capital accumulation process. It implies that continuous increase in debt burden can result in various macroeconomics effects, including reduction in capital stock via decrease in domestic investment, and lower output level in an economy. (Cohen, 1993; Wagner, 1996; Deshpande, 1997; Elmendorf & Mankiw, 1998; Serieux & Samy, 2001; Were, 2001; Clements et al. 2003) and (Sen et al. 2007) investigate the impact of foreign debt on growth via investment channel which is also called debt overhang hypothesis. All these studies support the existence of the debt overhang hypothesis. Habimana (2003) examines the nature of the relationship between high levels of external debt and capital accumulation in Rwanda. The author estimates two investment equations, including the debt to exports ratios and the debt to revenues ratios as explanatory variables. The debt to revenues ratios are used to capture the "crowding out" effects, while the debt to exports ratios serve to explore the "import compression" effects. The study suggests that debt variables impact significantly and negatively on investment. On the one hand, the debt to revenue ratios have adverse effects on investment. The study also supports the possibility of a disincentive effect through higher taxes on investment returns necessary to service debt, and to handle any increase in the fiscal deficit. The economic indicators show that revenues as a share of GDP have been rising throughout the period under study, associated with a large decrease of the gross domestic investment.

Similarly, (Abdullahi et al. 2016) analyse the impact of external debt to the growth and development of capital formation in Nigeria. Time series data was utilised from 1980 to 2013, employing the Autoregressive Distributed Lag (ARDL) modelling. The ARDL estimation showed the presence of a long run relationship amongst the variables. It was also proved that the variables were independently related in the long run. The impact of external debt on capital formation has been established to be negative and statistically significant while savings came out as the only variable with a bidirectional causal relationship amongst the variables. Interest rate was found to be statistically significant even though weak. The other variables were found to be of unidirectional casual effects. The coefficient of ECM term has the expected sign and is significant at 1 percent. The study suggests that savings should be given priority and encouraged internally to boost the speed of capital growth and formation in the economy.

We have come across quite a few studies which have attempted to investigate investment response to external debt in Pakistan. To this end, (Chishti & Hasan, 1992) analysing the impact of foreign aid (grants and loans) on investment and consumption activities in public sector of Pakistan, show that foreign aid in the form of grant has a modest impact on public investment but foreign aid in the form of loans has a robust effect on public investment in Pakistan. Chaudhry et al. (2009) explore the effects of external debt on saving and investment in Pakistan from 1973 to 2006. The authors find a positive but marginally significant impact of foreign debt on investment levels. The authors are of the opinion that inflows of foreign debt have favourable impacts on investment expenditures in Pakistan.

Jafri and Hira (2012) analyse the impact of external debt service payments on investment. The findings of the study show that debt services to multilateral and private creditors have a significant impact on gross private capital investment in case of Pakistan. Results also suggest that the impact of external debt service payments on investment is dependent on the nature of credit institutions. Debt services to multilateral creditors and other private creditors negatively influence gross private capital investment in Pakistan. However, this situation reverses in case of debt servicing to bilateral creditors.

Ali (2013) focuses on estimating the impact of external debt, foreign direct investment and worker's remittances on domestic investment in Pakistan from 1972 to 2007. The time series analysis reveals a significant investment increasing impact of foreign debt inflows into the Pakistan economy. Although the impact of external debt on domestic investment is positive and significant, the study suggests that foreign debt should be utilised for indispensable purposes.

Zaman and Arslan (2014) analyse the role of external debt on economic growth in Pakistan. The study incorporates gross domestic product (GDP) as a measure of economic growth and gross domestic saving (GDS), gross capital formation (GCF) and external debt stock (EDS) as measures of economic debt. The study employs the OLS regression model along with descriptive statistics over the time series data for 39 years. The statistical findings of the study reveal that gross capital formation (GCF) and external debt stock has a significant and positive effect on Pakistan's GDP while gross domestic saving does not have any significant impact on the GDP of Pakistan.

Undeniably, domestic capital accumulation plays a critical role to determine the trajectory of growth and similarly, foreign debt has a vital role to play in complimenting domestic resources in developing countries to speed up the process of capital accumulation and economic growth. Unfortunately, there is a dearth of literature focusing on the role of various indicators of external debt burden on the process of capital accumulation in a developing country like Pakistan. The present study aims to fill this vacuum in related literature.

3. ANALYTICAL FRAMEWORK

The two-gap model[2] posits that developing economies face two gaps in their economy, which they have to fill. The first gap is between savings and investments in the economy. A developing country starts with very low savings, but then has to engage in a big push by investing heavily. In what ways would countries fill this gap between savings and investments? There is a lot of debate among economists here. However, a dominant view is that developing countries require capital from developed countries in the form of foreign aid, debt or foreign direct investment to close this gap. The second gap corresponds to trade deficit, which is a mismatch between export earnings and import payments. A developing country, by definition, produces only primary goods, whereas it would require large imports of consumer and capital goods. There is obviously a cost differential here because of which, developing countries would necessarily face trade deficit.

[2] See Chenery and Strout (1966).

High debt stocks appear to affect growth through their dampening effects on both physical capital accumulation and total factor productivity (Pattilo et al. 2004). As they suggest, the size of the effects is similar to that of the effect on output growth: on average, for countries with high debt levels, doubling debt will reduce output growth by one percentage point and reduce growth in both per capita physical capital and total factor productivity by almost as much. The debt burden can have a depressing effect on growth through the government budget by crowding out public investment and instigating a reduction in private and total investment and a fall in the productivity of investment (Serieux & Samy, 2001). With this background, we proceed to the nature of the econometric model used in the study.

3.1. Econometric Model

To gauge the effect of external debt on capital accumulation, we estimate two physical capital stock models. These models include debt to revenue ratios and debt to export ratios as explanatory variables along with some control variables. Debt to revenue ratios are used to capture the "crowding out" effects, while the debt to exports ratios serve to explore the "import compression" effects. The model is borrowed from Serieux and Samy (2001), in their study on the nature of the relationship between debt and growth, in a cross section of 53 low and lower-middle income countries from 1970 to 1999, where they estimate an investment equation, a human capital growth equation, and a growth equation. Their investment model is based on a modified version of the accelerator theory. Thus, we specify our econometric models as:

$$KS_t = \alpha_0 + \alpha_1 GDPGR_t + \alpha_2 DR_t + \alpha_3 DSR_t + \alpha_4 INF_t + \alpha_5 LHC + e_t \qquad \dots \quad (1)$$

$$KS_t = \beta_0 + \beta_1 GDPGR_t + \beta_2 DE_t + \beta_3 DSE_t + \beta_4 INF_t + \beta_5 LHC_t + u_t \qquad \dots \quad (2)$$

where, *KS* represents stock of physical capital as percent of *GDP* taken as dependent variable, *GDPGR* denotes growth rate of *GDP* which shows economic growth performance of the economy, *EDR* is external debt to revenue ratio (or external debt as percent of total public revenue), *EDSR* is external debt service to revenue ratio (or external debt service as percent of total revenue), *INF* is consumer price index based inflation rate, *LHC* is natural logarithm of human capital proxied by gross secondary school enrolment, *EDE* is external debt to exports ratio (external debt as percent of export earnings), *EDSE* denotes external debt service to exports ratio (or external debt as percent of export earnings), *e* and *u* are random error terms.

3.2. Data and Estimation Technique

The study covers the years from 1972 to 2016. All the required data have been sourced from the IMF's International Financial Statistic (IFS), Pakistan Economic Survey (various issues), and the World Bank's World Development Indicators (WDIs).

Since data on stock of physical capital are not available in the context of Pakistan, we have generated the absolute stock of physical capital (K) series applying the perpetual inventory method, as Caselli (2005), and Awounang and Foning (2014) did. The perpetual inventory equation is given by:

$$K_t = (1 - \rho) K_t - 1 + I_t$$

where *I* represents gross investment, and ρ denotes the depreciation rate. Since data are fully available for Pakistan ranging from 1972 to 2016, we take 1972 as the reference year (*Yeart_0*) to calculate the initial capital stock as follows:

$$K_{t0} = I_{t0} / (gI = \rho)$$

where, *gI* is the geometric growth rate of the aggregate investment between time t_0 and time $t_0 + t_{44}$. The choice of this formula for calculating the initial capital stock is because it is the expression of the equilibrium capital stock in the Solow growth model. Following Caselli, 2005; Cavalcanti et al. 2011; Awounang and Foning, 2014, the depreciation rate of capital is taken at 6 percent.

The present study employs the autoregressive distributed lag (ARDL) bounds testing technique developed by (Pesaran & Pesaran, 1997 & Pesaran et al. 2001) to empirically estimate models (1) and (2). This technique has many advantages over other co-integration techniques. Firstly, this technique is capable of yielding consistent parameter estimates even in the case of small data set (Mah, 2000). Secondly, this technique provides consistent results, irrespective of the fact that variables are integrated of order I(0), I(1) or fractionally integrated. The ARDL representations of models (1) and (2) are as follows:

$$\Delta KS_t = \gamma_0 + \sum_{i=1}^{p} \gamma_i \Delta KS_{t-i} + \sum_{i=0}^{p} \gamma_2 \Delta GDPGR_{t-i} + \sum_{i=0}^{p} \gamma_3 \Delta EDR_{t-i}$$
$$+ \sum_{i=0}^{p} \gamma_4 \Delta EDSR_{t-i} + \sum_{i=0}^{p} \gamma_5 \Delta INF_{t-i} + \sum_{i=0}^{p} \gamma_6 \Delta LHC_{t-i} + \lambda_1 KS_{t-1}$$
$$+ \lambda_2 GDPGR_{t-1} + \lambda_3 EDR_{t-1} + \lambda_4 EDSR_{t-1} + \lambda_5 INF_{t-1} + \lambda_6 LHC_{t-1} + v_t \quad \ldots \quad (3)$$

$$\Delta KS_t = \delta_0 + \sum_{i=1}^{p} \delta_i \Delta KS_{t-i} + \sum_{i=0}^{p} \delta_2 \Delta GDPGR_{t-i} + \sum_{i=0}^{p} \delta_3 \Delta EDE_{t-i}$$
$$+ \sum_{i=0}^{p} \delta_4 \Delta EDSE_{t-i} + \sum_{i=0}^{p} \delta_5 \Delta INF_{t-i} + \sum_{i=0}^{p} \delta_6 \Delta LHC_{t-i} + \kappa_1 KS_{t-1}$$
$$+ \kappa_2 GDPGR_{t-1} + \kappa_3 EDE_{t-1} + \kappa_4 EDSE_{t-1} + \kappa_5 INF_{t-1} + \kappa_6 LHC_{t-1} + \varepsilon_t \quad \ldots \quad (4)$$

In models (3) and (4), the coefficients attached with difference operators measure short run dynamics, whereas, the terms with first lag capture long run relationship. For checking the existence of long run relationship between stock of capital and all the explanatory variables, we test a separate null hypothesis of no cointegration for models (3) and (4) as:

$$\lambda_1 = \lambda_2 = \lambda_3 = \lambda_4 = \lambda_5 = \lambda_6 = 0$$
$$\kappa_1 = \kappa_2 = \kappa_3 = \kappa_4 = \kappa_5 = \kappa_6 = 0$$

For this purpose, the computed F-statistic from the test is compared with critical bound values from Pesaran et al. (2001). If the null hypothesis is rejected, it will point to the existence of a cointegrating relationship between capital stock and all the regressors given in models (1) and (2). If a long run relationship is established between the variables, next step is to estimate short run dynamics and stability of equilibrium relationship between capital stock and its determinants by means of the following two error correction models:

$$\Delta KS_t = \phi_0 + \sum_{i=1}^{p} \phi_i \Delta KS_{t-i} + \sum_{i=0}^{p} \phi_2 \Delta GDPGR_{t-i} + \sum_{i=0}^{p} \phi_3 \Delta EDR_{t-i}$$
$$+ \sum_{i=0}^{p} \phi_4 \Delta EDSR_{t-i} + \sum_{i=0}^{p} \phi_5 \Delta INF_{t-i} + \sum_{i=0}^{p} \phi_6 \Delta LHC_{t-i} + \varpi ECT_{t-1} + \zeta_t \quad (5)$$

$$\Delta KS_t = \theta_0 + \sum_{i=1}^{p} \theta_i \Delta KS_{t-i} + \sum_{i=0}^{p} \theta_2 \Delta GDPGR_{t-i} + \sum_{i=0}^{p} \theta_3 \Delta EDE_{t-i}$$
$$+ \sum_{i=0}^{p} \theta_4 \Delta EDSE_{t-i} + \sum_{i=0}^{p} \theta_5 \Delta INF_{t-i} + \sum_{i=0}^{p} \theta_6 \Delta LHC_{t-i} + \pi ECT_{t-1} + \zeta_t \quad (6)$$

where, ϖ and π are coefficients of lagged error correction term (*ECT*) in Equations (5) and (6) respectively. From Pesaran et al. (2001) it is evident that the coefficient of lagged ECT specifies the speed of adjustment which is linked to cointegration equation. Hence, lagged *ECT* characterises the feedback of the system in stabilising its disequilibrium. Finally, the validity of the estimated econometric model is checked by means of some important stability and diagnostic tests which are frequently employed in empirical studies.

4. RESULTS AND DISCUSSION

The first step in the ARDL procedure is to test for unit roots to eliminate the possibility of I(2) variables. Because, in the presence of I(2) variables the computed F-statistics provided by Pesaran et al. (2001) are not valid any more since they are based on the assumption that the variables are I(0) or I(1). Consequently, the implementation of unit root tests in the ARDL procedure is necessary to ensure that none of the variables are integrated of order 2 or beyond. For this reason, the present study employs the Dicky-Fuller –Generalised Least Squares (DF-GLS) unit root test to check the stationarity of the time series. The DF-GLS unit root test results are reported in Table 1. Results show that GDP growth rate, inflation and debt service to revenue ratio are stationary at level, whereas, all other variables are non-stationary at level, but they become stationary at first difference. Hence, it confirmed that the regressors in models (1) and (2) have mixed order of integration and none of them is integrated of order two. This outcome makes a reasonable case for using the ARDL technique for getting short run and long run parameter estimates from models (3) and (4).

Table 1

Results of DF-GLS Unit Root Test (1972-2016)

Variable	Level	First Difference	Mackinnon Critical Values for Rejecting the Unit Root Hypothesis (at 5%)	Decision
KS	–1.531	–5.785	–2.137	$I(1)$
GDPGR	–3.596	–	–2.137	$I(0)$
INF	–2.962	–	–2.137	$I(0)$
LHC	–1.17	–7.097	–2.137	$I(1)$
EDR	–1.160	–2.734	–2.137	$I(1)$
EDSR	–2.72	–	–2.137	$I(0)$
EDE	–1.38	–3.512	–2.137	$I(1)$
EDSE	–1.23	–6.758	–2.137	$I(1)$

The computation of the ARDL bounds testing is sensitive with lag length selection. Hence, in the second step, the orders of the lags in the ARDL models (3) and (4) are selected on each first differenced variable using the Schwarz Bayesian Criterion (SIC). Narayan and Narayan (2005) suggests that the SIC is the best for lag selection for the ARDL model with small sample.[3]

[3]The estimation task is executed by using the computer software Eviews 9. Optimal lag length for each time series is selected the SIC with automatic lag selection option.

We reach our decision regarding the presence of the long run relationship between the variables of the specific model with a simple comparison. i.e. the bounds approach compares the calculated F-statistic against the critical values generated by lower critical bound and upper critical bound developed by Pesaran et al. (2001). There is cointegration if the computed F-statistic is more than upper critical bound and no cointegration if the value of the F-statistic remains below the lower critical bound. However, if the sample test statistic falls between these two bounds, the result is inconclusive. All this relates to a situation when the regressors have mixed or of integration like ours. The results of the bounds testing to cointegration are displayed in Table 2. It is obvious that for both the models the calculated F-statistic exceeds the upper bound at 5 percent level of significance, indicating rejection of null hypothesis of no cointegration. Thus, stock of capital forms a long run equilibrium relationship with external debt to revenue ratio, external debt service to revenue ratio, external debt to export ratio, external debt service to export ratio, GDP growth rate, inflation and human capital in the case of Pakistan over the study period 1972 to 2016.

Table 2

Bound Test Results

Estimation	F-Test Statistic	Critical Value (5% Level of Significance)	
		Lower Bound	Upper Bound
Model 3	5.20	2.48	3.67
Model 4	5.79	2.29	3.42

4.1. Short Run and Long Run Estimates of Model (3)

The next task in ARDL bound testing technique is to investigate the extent of the long run effects of explanatory variables on the dependent variable. We now proceed with a discussion of the results of model (3) given in Table 3. The regression coefficient of growth rate of GDP is significantly and positively associated with capital stock, indicating that 1 percent increase (decrease) in economic growth rate will result in 0.311 percent increase (decrease) in capital accumulation in Pakistan. This finding is consistent with the notion of the Accelerator Theory of Investment. The effect of external debt to revenue ratio on stock of capital is significant but negative such that 1 percent increase (decrease) in the former brings a decrease (increase) of 0.08 percent in the latter. It indicates that with increase in debt to revenue ratio, the uncertainty regarding government policies and actions also increases which adversely affects the level of capital accumulation in our economy. Especially, when the government's debt stock increases then such obligations are usually financed through imposing high taxes, which leads to reduction in investment and discourages the capital accumulation process. In such a situation, investors prefer to wait rather than investing in long run projects (Agenor & Montiel, 1996). Additionally, the rapid accumulation of debt over a longer period may also result in massive capital outflows due to the unfavourable policies of government to finance its debt obligations (Oks & Wijnbergen, 1995). The relationship between external debt to revenue ratio and capital accumulation can also be explained through the debt overhang hypothesis, which

Table 3

Long Run Estimates of Model (3)

Dependent Variable: KS	Selected ARDL (1, 1, 1, 2, 1, 1)	
Regressor	Coefficient	t-value
GDPGR	0.311**	2.699
EDR	−0.180**	−2.217
EDSR	−0.703***	−4.301
INF	−0.354***	−3.287
LHC	0.0793**	2.217
C	0.171*	1.834

Note: ***, ** and * indicate that coefficients are significant at 1 percent, 5 percent, and 10 percent levels respectively.

states that rising debt burden leads to decreased investment in the economy (Deshpande, 1997; Fosu, 1999; Chowdhury, 2001). Similarly, the relationship between external debt service to revenue ratio and stock of capital has also emerged as significant and negative. This outcome implies that external debt servicing puts a pressure on the available resources in the country to be diverted towards investment purposes in the economy. Increasing the burden of foreign debt payments limits the financial ability of an indebted nation like Pakistan to allocate sufficient resources for building its stock of physical capital.

The regression coefficient of inflation rate is negative and significant, implying that with 1 percent increase (decrease) in inflation rate, the stock of capital decreases (increases) by 0.354 percent. A high rate of inflation raises the cost of borrowing and thus lowers the rate of capital accumulation. Similarly, higher variations in prices make it difficult for investors to estimate the costs and benefits associated with a particular project which discourages investors to start new and long run projects (Were, 2001). A higher rate of inflation also reduces capital accumulation through its adverse effects on welfare of individuals (Ahmed & Mohamed, 2005). Finally, human capital plays a significant and positive role in the capital accumulation process. However, the magnitude of the long run impact of human capital on stock of physical capital is very small, a 1 percent increase in human capital leads to a 0.079 percent increase in stock of physical capital. The result may be different if we use some other proxy of human capital. Developed human capital is considered a valuable asset for a nation with which the nation can improve its capacity to adopt new technologies and techniques of production (Schutt, 2003; Mohsin, 2005). It also enhances capital accumulation through creating more skills and knowledge related to the availability of investment opportunities in the economy.

Table 4 reports the short run dynamics of the model. In contrast to the long run outcomes, in the short run, we see that only growth rate of GDP, external debt service to revenue and human capital are significant drivers of capital accumulation in Pakistan while the rest of the regressors do not play a role in shaping the behaviour of capital accumulation. The coefficient of lagged error correction term (ECT) is negative and significant which indicates that the long run equilibrium relationship between stock of capital and all the explanatory variables given in table 3 are stable. The coefficient value of lagged ECT is −0.659, implying that reasonably high speed of adjustment towards the long run equilibrium. In other words, it can be stated that in case of any deviation from

the long run equilibrium, almost 66 percent correction will take place in a year to restore the equilibrium position. Moreover, at the bottom of Table 4, results of four diagnostic tests are given which indicate that our estimated model does not suffer from serial correction, heteroscedasticity, functional form and normality issues.

Table 4

Results of the Error Correction Model

Dependent Variable: (ΔKS)	Selected ARDL (1,1,1,2,1,1)	
Regressor	Coefficient	t-value
ΔGDPGR	0.131***	8.882
ΔEDR	−0.010	−1.0787
ΔEDSR	−0.009*	−1.933
ΔEDSR (-1)	−0.006	−0.962
ΔINF	0.059	1.572
ΔLHC	−0.003**	−2.139
ECT (-1)	−0.659***	−5.345
Diagnostic Tests		
$\chi^2_{SC} = 0.129(0.716)$		$\chi^2_{H} = 0.851(0.356)$
$\chi^2_{FF} = 1.688(0.194)$		$\chi^2_{N} = 1.562(0.306)$

Note: ***, ** and * indicate that coefficients are significant at 1 percent, 5 percent and 10 percent levels of significance respectively. $\chi^2_{SC}, \chi^2_{H}, \chi^2_{FF}$ and χ^2_{N} denote LM tests for serial correlation, functional form and normality respectively. The associated p values are in parentheses.

4.2. Short Run and Long Run Estimates of Model 4

The estimated long run results of model 4 are reported in Table 5. All the regressors have been found as significant factors in determining capital accumulation in the long run. The impacts of growth rate of GDP, inflation rate and human capital on capital accumulation are consistent with the previous case of Model 3 as displayed in Table 3. The regression coefficient of external debt to export ratio is significant and negative, implying that external debt to export ratio discourages the capital accumulation process in the long run in Pakistan. This finding suggests that a 1 percent increase in external debt to export ratio will result in nearly 0.27 percent decline in stock of capital.

Table 5

Long Run Parameter Estimates of Model 4

Dependent Variable: KS	Selected ARDL (1,2,1,1,2,1)	
Regressor	Coefficient	t-value
GDPGR	0.419***	3.149
EDE	−0.267***	−2.836
EDSE	−0.143**	−2.249
INF	−0.242***	−3.281
LHC	0.107***	−3.520
C	0.342***	2.863

Note: *** and ** indicate significant at 1 percent and 5 percent levels respectively.

The adverse effect of external debt to export ratio on capital accumulation can be explained through the reduction in the import capacity of capital goods of the government, which is also known as the import compression effect. According to import compression effect, the increasing debt burden decreases the public investment.

For the coefficient of external debt service to export ratio, we also find it significant and negative such that a 1 percent increase (decrease) in debt service to export ratio decreases (increases) stock of capital by 0.143 percent. This finding presents external debt service as an impediment in the way of accelerating capital accumulation process in the long run in Pakistan. Hence, it transpires that external debt has played its adverse role in the capital accumulation process during the sample period of study in the country. This outcome indicates that unfortunately we misused the borrowed funds in non-development projects (Zaidi, 2015). We did not remain successful in making the best possible productive use of the external debt, which resulted in increasing external debt burden on the economy. Hence, the rising debt burden emerged as one of the impeding factors in the way of fostering physical capital accumulation process in Pakistan.

Now we move to short run analysis. From Table 6, it is obvious that the capital accumulation process is only affected by the growth rate of GDP and external debt to export ratio where the former is positively, and the latter is negatively associated with capital stock in the short run. None of the other variables appear as significant factors in shaping the behaviour of stock of capital. The regression coefficient of lagged ECT is in accordance with our prior expectation i.e. it is significant and negative. From the coefficient value of lagged ECT, it can be inferred that in case of an external shock to the long run equilibrium association between stock of capital and all the regressors given in Table 5, the forces of the model correct almost 79 percent disequilibrium every year, indicating a quick restoration. Finally, on the basis of four diagnostic tests, provided at the bottom of Table 6, we can

Table 6

Results of the Error Correction Model

Dependent Variable :(ΔKS)	Selected ARDL (1,2,1,1,2,1)	
Regressor	Coefficient	t-value
ΔGDPGR	0.055[**]	2.143
ΔGDPGR(-1)	0.093	1.361
ΔEDE	−0.086[***]	−5.997
ΔEDSE	−0.137	−1.277
ΔLINF	−0.065	−0.348
ΔLINF	−0.049	−0.784
ΔHC	0.101	1.221
ECT(-1)	−0.792[***]	−4.534
Diagnostic Tests		
$\chi^2_{SC} = 0.902(0.342)$		$\chi^2_{H} = 0.996(0.325)$
$\chi^2_{FF} = 0.341[0.728]$		$\chi^2_{N} = 0.171(0.852)$

Note: ***, ** and * indicate that coefficients are significant at 1 percent, 5 percent and 10 percent levels of significance respectively. $\chi^2_{SC}, \chi^2_{H}, \chi^2_{FF}$ and χ^2_{N} denote LM tests for serial correlation, functional form and normality respectively. The associated p values are in parentheses.

state that our estimated model is not plagued with any of four econometric problems. These outcomes increase our confidence in the overall findings of the estimated model. Finally, CUSUM and CUSUM of squares tests suggest stability of the parameter estimates of the estimated models as their plots remain within 5 percent level of significance (see Figures 1and 2).

Fig. 1. Plots of CUSUM and CUSUMSQ Tests (Model 3)
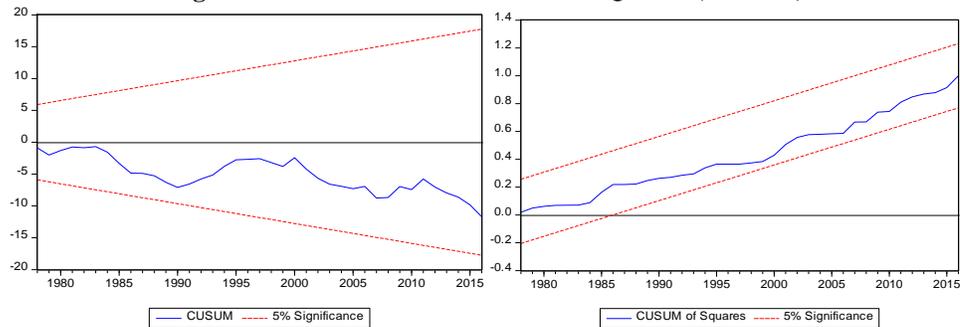
Fig. 2. Plots of CUSUM and CUSUMSQ Tests (Model 4)
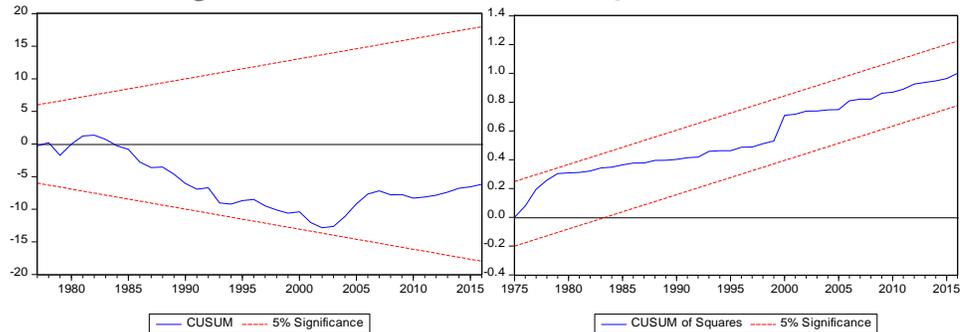
5. CONCLUSION AND POLICY RECOMENDATIONS

This study investigates the implications of external debt for capital accumulation in Pakistan using the annual time series data covering the period from 1972 to 2016. To this end, different indicators of external debt have been used and the ARDL bound testing approach to cointegration has been employed to accomplish the empirical task. The findings of the study indicate that external debt does matter for capital accumulation process in Pakistan as external debt to revenue, external debt service to revenue, external debt to export and external debt service to export ratios have been found significant and adversely related with stock of capital in the long run in Pakistan. Nonetheless, in the short run only external debt service to revenue and external debt to export ratios have emerged as significant determinants of the stock of capital. Similarly, inflation rate tends to bring a reduction while growth rate of GDP and human capital enhance the stock of capital in the long run.

Policy implications of the study are straight forward. Firstly, the need is to formulate and implement a strict legal framework to allocate major chunk of external

debt to public sector development programmes. This action will stimulate business activities in the economy, leading to significant increase in the stock of capital in Pakistan. Secondly, the tax system should be reformed to generate sufficient resources from within the country, which will help in reducing external debt to revenue ratio. A fall in external debt to revenue ratio will induce capital accumulation process. Finally, as human capital has proved a significant driver of capital accumulation, the government should invest in education and skills improvement programmes to enhance the general as well as specific skills of individuals.

To conclude, there is a need to learn from past mistakes and to replace the non-concessional financing with concessional loans and grants to boost investment based on prudent economic projections and keeping in mind the country's vulnerability to shocks. This suggests that even though external financing leads to accumulation of debt, debt should be manageable so that higher growth generates the resources to service it. This should be considered while formulating new borrowing policies in Pakistan. External borrowing can only be beneficial if it generates an adequate increase in a country's capacity to repay including GDP, fiscal and exports revenues in the country.

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Volatility in Discretionary Public Spending and Economic Growth: A Cross Country Analysis

Muhsin Ali and Karim Khan

Volatility in discretionary public spending has diverse implications for the overall economic performance of economies. In this study, we examine the impact of volatile non-systematic discretionary public spending on economic growth. By employing cross-country data of 74 developed and developing economies, we find that volatility in non-systematic discretionary public spending has an adverse impact on economic growth. In particular, such impact is severe in the case of less developed economies. Our findings are robust to the problem of endogeneity. In order to ensure the accuracy of the results, we conduct sufficient sensitivity analysis by incorporating a bunch of potential control variables. In most of the cases, the results with regard to the policy volatility remain intact. This suggests that effective spending rules, i.e. permanent numerical limits, should be imposed on budgetary aggregates to restrain governments from the volatile use of discretionary spending.

JEL Classification: H3; H5
Keywords: Volatility in Discretionary Public Spending, Economic Growth, Effective Spending Rule

1. INTRODUCTION

Since the onset of the 'Global Financial Crisis' (2007-08), researchers and policy practitioners are assessing the overall impact of the crisis and policy prescriptions in this regard. In general, the previous major crises, i.e. the Great Depression and the Stagflation of the 1970s, have profoundly changed both the macroeconomics and macroeconomic policy (Blanchard & Summers, 2017). Similar is the case with the Global Financial Crisis which has redirected interest in the role of macroeconomic policies as stabilising instruments, especially in developed countries (Kawai & Takagi, 2009).[1] In particular, the fiscal policy is back in active fashion after the years when it was believed to be too sluggish and ineffective in addressing the macroeconomic issues.[2] Although the aggressive use of discretionary fiscal policies stimulates economic activities in the short

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[1]This interest incorporates both the monetary and fiscal policies.

[2]For instance, discretionary fiscal measures are used quite often these days. Discretionary fiscal measures are the deliberate response of fiscal authorities to change the size of fiscal instruments for various reasons.

run, there are many concerns regarding the potential medium- and long-term adverse consequences of such policies (de Castro Fernández & Hernández de Cos, 2006; Fatas & Mihov, 2013; Mutuku & Koech, 2014; Surjaningsih, Utari, & Trisnanto, 2012). There are quite a few that analyse the macroeconomic consequences of fiscal instruments, i.e. taxes and government spending (Barro, 1990; Kneller, Bleaney, & Gemmell, 1999; Nworji, Okwu, Obiwuru, & Nworji, 2012; Skinner, 1987; Tanzi & Zee, 1997). Most of this literature takes fiscal policy in the level form while ignoring important aspects of the policy, i.e. fiscal discretion and the volatility associated with such discretionary measures (Albuquerque, 2011; Ali, 2005; Fatás & Mihov, 2007). In many studies, the behaviour of fiscal instruments is seen as volatile in nature (Antonio Afonso & Furceri, 2010; António Afonso & Jalles, 2012; Furceri & Poplawski Ribeiro, 2008). For instance, such volatility is obvious in the case of general government spending and more apparent in its subcomponent−the non-systematic discretionary spending (Furceri, 2007); (Fatás & Mihov, 2003). The non-systematic discretionary expenditures are basically the public expenditures that are not associated with current macroeconomic conditions. These are purely political spending used by politicians for political gains (António Afonso & Jalles, 2012; Fatás & Mihov, 2007).[3]

The volatility in non-systematic discretionary spending cannot be ignored due to its macroeconomic consequences. For instance, the volatility in discretionary fiscal arrangements may adversely affect the decisions of investors and economic agents (Pindyck, 1988), which in turn, might adversely affect the growth pattern (Ali, 2005; Eller, Fidrmuc, & Fungáčová, 2016; Fatás & Mihov, 2007; Fernández-Villaverde, Guerrón-Quintana, Kuester, & Rubio-Ramírez, 2015).[4] Thus, anticipated economic policies and clear rules of the game are of high significance (Pindyck, 1988). However, this does not suggest that discretionary volatility in fiscal parameters is always harmful. In some situations, it might be desirable. For instance, it is optimal, if it is used to smooth out fluctuations in the business cycle (Furceri & Poplawski Ribeiro, 2008). In such situations, discretionary spending shocks are expected to have a positive impact on economic activity (Baddi & Lahlou, 2013; Caldara & Kamps, 2008; de Castro Fernández & Hernández de Cos, 2006; Tenhofen, Wolff, & Heppke-Falk, 2010; Yadav, Upadhyay, & Sharma, 2012). Thus, the literature on the consequences of volatility in discretionary fiscal measures is not in consensus. Evidence from prior studies shows that discretionary fiscal shocks have diverse consequences for different economies – ranging from ineffective, to constructive, to sometimes damaging. In Indonesia, discretionary fiscal shocks stimulate economic growth in the long-run (Surjaningsih et al. 2012). Similarly, in Greece, such a policy not only promotes growth but also encourages private consumption and non-residential investment (Tagkalakis, 2014). Likewise, similar effects of discretionary public spending are observed in India (Yadav et al. 2012), Slovenia (Jemec, Kastelec, & Delakorda, 2011), Kenya (Mutuku & Koech, 2014), Span (de Castro Fernández & Hernández de Cos, 2006), and the US (Edelberg, Eichenbaum, & Fisher, 1999).

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[3]Fiscal rules proponents argue that governments are not benevolent and do not aim to optimise citizens' welfare but aim to be re-elected. Besides, each generation is selfish and does not care about the situation for future generations (Mathieu & Sterdyniak, 2013).

[4]Most of the decisions of economic agents and private investors are partially affected by the government controlled factors. Investors and economic agents, thus react inversely to the volatility and uncertainties related to future trends of fiscal parameters (Ali, 2005).

However, in certain economies, discretionary policies are often seen as ineffective. For instance, in the case of Pakistan, discretionary spending shocks fail to stimulate output and employment (Ismail & Husain, 2012). In Germany as well, discretionary changes do not promote economic activities (Bank, 2011). In general, discretionary fiscal policy is detrimental when it is used independently of fluctuations in the business cycle. For instance, in many regions and countries, it did produce volatility in output and economic instability (Badinger, 2009).

Given the above discussion, the present study continues with this debate. In particular, this study investigates the macroeconomic consequences of volatile non-systematic discretionary public spending. In order to extract the non-systematic discretionary part of public spending, we follow the fiscal rule literature. Fatás and Mihov (2003) offers the fiscal rule to separate the non-systematic discretionary spending part from the total government expenditure. The residual part of the fiscal rule model corresponds to non-systematic discretionary expenditure, which is independent of business cycle fluctuations of the economy. Since non-systematic discretionary spending is the neglected part of fiscal-growth research agenda, this study contributes to existing literature by exploring the growth effects of non-systematic discretionary expenditures. We first examine this impact at the aggregate level, and then at the disaggregated level, for a set of developed and developing economies using their respective discretionary policy volatility. According to the findings, the volatile nature of discretionary spending retards economic growth. This negative impact appears significant both at the aggregate level and the disaggregate level in developing economies. The adverse impact appears significant using a set of control variables, which is shown by the sensitivity analysis. Moreover, we control for the problem of endogeneity by employing the GMM approach and find similar estimates like that of OLS. The rest of the paper is organised into four sections. Section 2 reviews the literature on the issue. Section 3 provides the methodology, estimation procedure, and information about data. Section 4 discusses the empirical findings of the study, while Section 5 concludes the paper.

2. REVIEW OF LITERATURE

There are two strands of research that are related to this study. The first strand examines the implications of the overall government spending volatility while the second strand focuses only on the discretionary part of the volatility in public spending. Here, we are citing both forms of studies, while mainly focusing on the latter part.

Ismail and Husain (2012) study the macroeconomic effects of discretionary fiscal measures for Pakistan's economy. The authors, while employing OLS on differenced time-series data (1971-2010), find no effects of such policy on inflation, output and employment. However, Ali (2005), using the same econometric technique for a panel data (1975–1998) set of 90 economies, observes that discretionary policy significantly hampers economic performance. In the same line, Fatás and Mihov (2003, 2007) inquire the cost of volatile discretionary public spending for a panel set of 91 developed and developing economies for the 1960- 2003 period. The authors employ both the OLS and Instrumental Variables methods (IVLS, GMM) and confirm that aggressive discretionary fiscal measures prompt output volatility and lower economic growth. Whereas, the adverse impact appears more prominent in developing economies exercising

discretionary fiscal policy more aggressively. Following the approach of Fatás and Mihov (2003), Badinger (2009) tries to investigate the link between the discretionary fiscal policy, macroeconomic instability, and inflation volatility in a panel, as well as in a cross-country setting, of 20 OECD countries. The author using different econometric techniques like OLS, 2SLS, GMM, and LSDV finds that such policy significantly incites volatility in output and all components of GDP, except volatility in inflation. Likewise, Sacchi and Salotti (2015) in analysis from 1985 to 2012, confirm that although discretionary fiscal policy triggered output and inflation volatility in OECD economies, when they incorporate fiscal rule in their model, they observe the stabilising effect of the policy (except stabilising the inflation).

Surjaningsih et al. (2012) probe the impact of discretionary fiscal policy on output and inflation level in the case of Indonesia. Applying Johansen Cointegration and Vector Error Correction Model (VECM), the authors observe that in the short-run, government spending shocks positively cause GDP, but taxes lower the economic growth. Nevertheless, in the long-run, they observe the opposite findings for taxes. Likewise, Tagkalakis (2014) studies the impact of discretionary fiscal changes on the economic performance in Greece. The estimates of the VAR model predict that discretionary changes in government expenditure significantly stimulate private consumption, output growth, and non-residential investment. However, such a policy negatively causes residential investment.

Furceri (2007) studies the association between government spending volatility and long-run economic growth in a panel of 116 economies for the 1970-2000 period. The author calculates the cyclical component of public spending through various techniques and then calculates government expenditure volatility through moving average standard deviation. The results of the Fixed Effect Model reveal that government expenditure volatility significantly declines the growth rate. Following Furceri (2007) Afonso and Furceri (2010) examine the impact of government spending and revenue volatility on economic growth in the EU and OECD economies. They apply the same estimation techniques and confirm that both the size and the volatility of government spending and revenue significantly and negatively lower economic growth. Further, Afonso and Jalles (2012) also investigate the impact of financial crises and fiscal volatility on economic growth in a panel of emerging and developed economies from 1970 to 2008. The study uses the Fixed Effect and GMM techniques and supports the results of Furceri (2007) and Afonso and Furceri (2010).

Blanchard and Perotti (2002) attempt to characterise the dynamic economic effects of the US government taxes and spending in the postwar period setting. They use a mixed structural VAR/event study approach and observe that positive government spending shocks stimulate the output. However, such shocks from the revenue side stunt output. Additionally, their findings reveal that both government spending and tax shocks negatively affect investment spending. Similarly, Bank (2011) analyses the impact of discretionary fiscal policy on Germany's economy. The study employs time series data and SVAR approach. The study reveals no association between discretionary fiscal policy and economic performance of the country. However, for the same region and using the same estimation technique, Tenhofen et al. (2010) observe that government expenditure shocks stimulate output and private consumption, while affecting private investment

adversely, albeit insignificantly. Jemec et al. (2011), using the Blanchard and Perotti (2002) SVAR approach, also find that a government spending shock positively affects the components of GDP, while revenue shocks negatively affect investment, consumption, and output. However, following the SVAR technique, Cyrus and Elias (2014) conclude that both the fiscal instrument shocks (taxes and expenditure) stimulate economic growth. Similarly, Easterly and Rebelo (1993) explore the association between fiscal regularities and economic growth performance. They find that (i) poor countries largely depend on trade taxes, while the developed mainly focus on income tax; (ii) fiscal policy of countries is affected by the economy scale; (iii) the investment made in transportation and communication strongly correlated with growth, and; (iv) it observed that it was difficult to isolate the effects of taxation empirically.

Similarly, de Castro Fernández & Hernández de Cos (2006) examine the effects of exogenous fiscal shocks on the economy of Spain. The authors use quarterly data from 1980 to 2004. They note that expansionary public spending shocks in the short-run encourage economic growth, but at the cost of higher public deficit, higher inflation, and lower growth in the medium- and long-term, while taxes insignificantly stimulate output in the short-run but leave a significant negative effect on growth in the medium term. Furthermore, both net government revenue and expenditure lead to a public deficit in the medium term. Using similar data, Edelberg et al. (1999) also study the effects of exogenous government spending shocks on the US economy. They find that in response to positive shocks of government spending, non-residential investment, employment, and output increase. However, residential investment, real wage, and consumption expenditures fall.

To conclude, the literature on overall public spending volatility and economic growth seems to agree that overall public spending volatility harms economic growth. However, the other strand of the literature, which examines the association between discretionary public spending shocks and economic outcomes produces mixed and contradictory results. Some of the studies confirm the stabilising effects of discretionary fiscal changes on the overall economy, while others note the destabilising role of volatile discretionary fiscal policy. Since the findings related to discretionary fiscal volatility are mixed, therefore, the present study investigates the issue using non-systematic discretionary fiscal volatility. To the best of our knowledge, no study is available in existing literature that directly probes the association between non-systematic discretionary fiscal volatility and economic growth. The present study explores this relationship by augmenting the neoclassical growth model to evaluate the actual effects of discretionary fiscal volatility.

3. THEORETICAL FRAMEWORK, METHODOLOGY, AND DATA

In this section, we provide the theoretical framework of our analysis. Also, we discuss here the estimation methodology and data.

3.1. Framework of the Study

A fiscal policy consists of three components (a) the automatic stabilisers component, where the fiscal instruments are designed to automatically respond to the current state of the economy without any intervention by the fiscal authorities, as in

recessionary pressures that public spending automatically increase to boost aggregate demand, and thus correct the direction of macroeconomic variables, while the opposite in case of a boom; (b) the systematic discretionary component, i.e. a systematic and deliberate response of the government to increase or decrease the expenditure level to correct the unfavourable economic environment; and (c) the non-systematic discretionary component, it is the form of government spending that is completely independent of business cycle fluctuations or current state of the economy, rather such spending is used to attain political motives by the political authorities (Fatás & Mihov, 2003).[5] This study focuses on the third component of the fiscal policy. In order to extract the exogenous discretionary part, i.e. a part of government expenditure that is not associated with cyclical fluctuations in the economy, Fatás and Mihov (2003) introduced the following equation:

$$Fiscal\ policy_t = \alpha + \beta\ Economic\ activity_t + \varepsilon_t \qquad \dots \qquad \dots \qquad \dots \qquad (1)$$

Parameter β includes both automatic stabilisers and the discretionary (systematic) response of the government to economic fluctuations, Fatás and Mihov (2003, 2007) interpret the residual term (ε_t) of the fiscal rule as exogenous discretionary (non-systematic) changes in fiscal policy. These exogenous changes in fiscal policy are not related to the current state of the economy, rather such changes are made by the government for political motives.[6] The standard deviation of ε_t refers to the aggressiveness (volatility) of the non-systematic discretionary part of fiscal policy. The higher dispersion of the values of the series of the ε_t from its mean value implies higher volatility of non-systematic discretionary spending. Fatás and Mihov (2003) presented the following full form of the equation:

$$\Delta G_{it,} = \alpha_i + \beta_i\,\Delta G_{i,t-1} + \tau_i\,\Delta Y_{i,t} + \theta_i \sum W_{i,t} + \varepsilon_{i,t} \qquad \dots \qquad \dots \qquad \dots \qquad (2)$$

The subscripts i and t represent country index and time respectively Where G is the log of real government expenditure, Y is the log of real GDP. W Include other control variables, which could influence government expenditure like inflation, inflation square and deterministic component like time trend.[7] ε_{it} is inferred to as quantitative estimates of discretionary policy. The volatility of non-discretionary spending (ε_{it}) is calculated as three-year moving average standard deviation approach ($\delta_{it} = \sqrt{\frac{(\varepsilon_{it} - \bar{\varepsilon}_{it})^2}{n-1}}$). The component δ_{it} is interpreted as the aggressiveness or volatility of discretionary fiscal policy. To examine the effect of volatile non-systematic discretionary spending on economic growth, we incorporate the component in the growth model. We provide some discussion on economic policies and economic growth to see whether economic policies affect the nature of economic growth.

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[5]Similar to this approach Debrun and Kapoor (2010) also discuss the three dimensions of fiscal policy: (a) the automatic stabilisers, (b) cyclical fiscal policy, which reflects the cyclical adjusted balance to the business cycle fluctuations, and (c) the exogenous discretionary changes which capture those cyclical adjusted balances that are not systematically related to macroeconomic conditions of the economy. Thus, their debate actually leads to the same approach as that of Fatás and Mihov (2003).

[6]For detail discussion see also Persson and Tabellini (2002).

[7]Inflation square is incorporated in the fiscal rule model to capture the non-linear association between government expenditure and inflation over time.

3.2. Role of Economic Policies in Growth Regression

The main determinants of economic growth have always been a part of the general debate in the literature. Recently, most researchers follow the agnostic approach, which means including all the potential variables in the growth regression and then examining the robustness of each using different econometric techniques. In their analysis, Levine and Renelt (1992) found that only investment, the initial GDP level, human capital, and openness robustly explained economic growth. However, the policy variables (fiscal policy) are redundant in growth regression. Following growth specification of Levine and Renelt (1992); Ali (2005) also illustrates that policy variables (if measured in the level form), have no significant explanatory role in growth regression. Adopting a very different framework (Bayesian approach) Doppelhofer & Miller (2004) also conclude that policy variables have no significant role in growth regressions. Easterly (2005) and Acemoglu, Johnson, Robinson & Thaicharoen (2003) give a possible interpretation of why policy variables have no role in growth regressisons. They argue that policies are simply the outcome of institutions, and so the main determinants of the differences in cross country growth are differences in their economic institutions. Once the institutions are controlled for the differences, the effect of economic policies turn out to be significant.

Additionally, the main concern in the above studies is the absence of policy volatility in their analysis. All the studies measure policy variables in the level form and ignore the role of volatility or uncertainty in policy variables (Afonso & Furceri, 2010; Albuquerque, 2011; Fatas & Mihov, 2013). Guided by the discussion, we incorporate non-systematic discretionary policy volatility in the growth regression. For this purpose, we consider the following Solow growth model of Cobb-Douglas form:[8]

$$Y_{it} = f(A_{it} K_{it} H_{it}) = A_{it} K_{it}^{\propto_1} H_{it}^{1-\propto_2} \qquad \ldots \qquad \ldots \qquad \ldots \qquad \ldots \qquad (3)$$

The subscripts i and t represent country index and time, respectively. Y_{it} is GDP per capita, K_{it} is total physical capital stock, H_{it} is human capital, and $\propto_1$ and $1-\propto_2$ are their respective shares in production. $H_{it} = e^{\emptyset\, r_{it}}$, where $\emptyset$ is a return to education and r_{it} is the average years of schooling. A_{it} shows the effect of all the o factors on GDP per capita other than that of K_{it} and human capital H_{it}.[9] We can also write Equation (3) as follows:

$$Y_{it} = A_{it} K_{it}^{\propto_1} (e^{\emptyset r_{it}})^{1-\propto_2} \qquad \ldots \qquad \ldots \qquad \ldots \qquad \ldots \qquad \ldots \qquad (4)$$

The motion equations of physical capital stock (K_{it}) and human capital stock (H_{it}) are given as follows.

$$\dot{K}_{it} = s_{iK} Y_{it} - \delta_{iK} K_{it} \qquad \ldots \qquad \ldots \qquad \ldots \qquad \ldots \qquad \ldots \qquad \ldots \qquad (5)$$

$$\dot{H}_{it} = s_{iH} Y_{it} - \delta_{iH} K_{it} \qquad \ldots \qquad \ldots \qquad \ldots \qquad \ldots \qquad \ldots \qquad \ldots \qquad (6)$$

s_{iK} and s_{iH} are the portion of output level, devoted to physical and human capital stocks, respectively.

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[8]Cobb-Douglas production function satisfies basic inada conditions, i.e., $\lim_{k \to o} F'(k) = \infty$, and $\lim_{k \to \infty} F'(k) = 0$, $\lim_{H \to 0} F'(H) = \infty$ and $\lim_{k \to \infty} F'(H) = 0$.

[9]A_{it} is also known as Solow residuals.

After log transformation (4) becomes:

$$lnY_{it} = lnA_{it} + \propto_1 lnk_{it} + (1-\propto_2)\, \emptyset r_{it}\, lne \quad \ldots \qquad \ldots \qquad \ldots \qquad \ldots \qquad (7)$$

As $lne = 1$, so we write the above equation as:

$$y_{it} = lnA_{it} + \propto_1 lnk_{it} + (1-\propto_2)\, \emptyset r_{it} \qquad \ldots \qquad \ldots \qquad \ldots \qquad \ldots \qquad (8)$$

As the preliminary objective of the study is to assess the effect of δ_{it} on economic growth, therefore, for this purpose, we augment the Solow growth model by incorporating δ_{it} and other control variables in the Solow Residual.

$$A_{it} = (\delta_{it}, \sum Z_{it}\,) \qquad \ldots \qquad \ldots \qquad \ldots \qquad \ldots \qquad \ldots \qquad \ldots \qquad (9)$$

Based on an above theoretical growth model, the econometric model of growth to be estimated as follows:

$$y_{it} = \gamma_0 + \gamma_1 K_{it} + \gamma_2 H_{it} + \gamma_3 \delta_{it} + \varphi^\tau \sum Z_{it} + e_{it} \qquad \ldots \qquad \ldots \qquad \ldots \qquad (10)$$

y_{it} is the log GDP per capita, K_{it} is the logarithm of gross fixed capital formation, and H_{it} is the log secondary school enrollment. δ_{it} is the non-systematic discretionary policy volatility, and Z_{it} is the set of control variables, incuding government expenditure, urbanisation, trade openness, the area of a country, conflicts, natural resource rents, the rule of law, government effectiveness, health expenditures, and taxes. e_{it} is the error term.

3.3. Data and Estimation Methodology

We use a panel of 74 countries including both developed, and developing, economies.[10] Given data limitations, we rely on cross-sectional regressions, which are based on both the annual and averaged data. The use of cross-sectional data is justified for various reasons. First, the panel is not balanced, i.e., for some countries, the variables are averaged over longer periods but in other cases, they are averaged over smaller periods. For instance, if a country is either established later or if the data is not available over a long period for it, then we use the data for the available smaller periods. Second, the institutional variables are highly persistent. For instance, the behaviour regarding the discretionary spending policy, which is often assumed as the outcome of political institutions, remains persistent in countries. For instance, it is generally predictable in developed countries, while volatile and unpredictable in developing countries, over the whole period covered. So the unbalanced panel combined with the persistent institutional variables would not add much to the analysis. The selection of countries is data specific, the sample includes all those countries for which the variables of our interest are available.

We employ two different econometric techniques: the Ordinary Least Square (OLS) and Generalised Method of Moment (GMM). Firstly, while assessing the macroeconomic effects of the discretionary policy volatility, we employ the OLS method. The OLS estimates, however, may conceivably be influenced by the problem of endogeneity associated with discretionary policy volatility.[11] As is generally agreed

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[10]Countries list is available in the Appendix in Table A1.

[11]For detailed discussion about the endogeneity of discretionary spending volatility see also Fatas and Mihov (2003).

among the scholars, policies are the outcome of economic and political institutions in a country (Acemoglu, Johnson, & Robinson, 2001, 2005). Therefore, policies could never be dealt with as purely exogenous, rather they have their own data generating process which endogenises their behaviour. As far as the non-systematic discretionary policy is concerned, beyond doubt a political spending policy, it is obviously endogenous in nature because such policy behaviour is exclusively based on the political preferences of the political agents (Albuquerque, 2011). Hence, to tackle the issue of the endogeneity, we proceed to the GMM which is based on instrumental variables approach. We use as instruments the discretionary spending volatility by some institutional variables like the political system or political regime of the country (whether the country has a presidential or parliamentary system), the settler mortality rate, number of elections (legislative and executive elections), and number of government seats.

The political system of a country is typically perceived as an important element in shaping fiscal policy. For instance, under the presidential system, the power regarding various policy options is concentrated in fewer hands and, consequently, the government faces fewer political constraints. This results in significant variation in the policy which is relatively easier as compared to the parliamentary system of government.[12] According to Shugart and Carey (1992), under the presidential system of government, public authorities usually have greater independence and therefore more centralised authority and accountability. So the economic policies are usually effectively formulated and executed without any deferment from the legislature. Likewise, under such a system, the policy could be reversed easily if its outcomes are undesirable from the perspective of society's welfare. However, according to Persson and Tabellini (2001), the presidential system usually operates smaller governments and so they observe a smaller opportunistic electoral cycle.[13] Additionally, the settler mortality rate determines the behaviour of the current economic and political institutions, which, in turn, define the shape of current economic policies (volatility and persistence). The systematic differential in some countries political and economic institutions is mainly attributed to the former 'European Colonisation', started in the 18th century (Acemoglu et al. 2001). The colonisers used to develop an extractive institutional setup in colonies where they faced higher settler mortality rate, while they were more likely to introduce the institutions for protecting private property rights and encouraging investments activities in regions where they could settle. This diversification in the institutional arrangements by the colonisers has diverse consequences for the current institutional set-up of economies, and, therefore, for their current economic policies. The economies which are following volatile economic policies were mostly the part of the extractive institutional setup of the colonisers. Likewise, the economies which are exercising persistent policies were usually part of the regions where the colonisers set up inclusive institutions.

Elections also matter by keeping the policymakers accountable and disciplined (Fatás & Mihov, 2003). The volatile use of policies could question the credibility of political agents. However, it is equally conceivable that the positive effect of elections

[12]According to Sirimaneetham (2006), in the parliamentary system of government, where the government faces several rules and constraints.

[13]Opportunistic electoral cycle arises when political parties in power carry out expansionary fiscal policy at the time when it is considered unnecessary. Such expenditures are used by them to maximise their own preference in term of re-elections. For the detailed discussion see also Nordhaus (1975).

might completely be wiped out by the fairly expansionary fiscal policy to win re-election, or by changing policy directions. The desire for re-election might incentivise the executives to use policy tools in such a way that public spending increases in election years in order to attract the attention of voters. This might be at the cost of potential adverse effects on fiscal sustainability and aggregate macroeconomic stability. In the same way, the number of government seats matters for policy outcomes (Albuquerque, 2011). Higher government seats in the house represent higher government influence over policy alterations. This, in fact, indirectly measures the government concentration ratio. The major share of seats by some ruling parties could enable them to lower the constraints in their favour and manipulate the policy in such a manner that it could maximise their own preferences over the society's interest (in case of selfish incumbents). However, it could also be possible that a higher share of seats by the government could motivate them to produce more persistent economic policies. Given these instruments, we conjecture that the instruments have no direct effect on the economic growth of the countries.

4. EMPIRICAL RESULTS

In this section, we provide empirical results of our analysis. First, we discuss the results of OLS. Secondly we discuss the results of GMM. Table 1 reports the details of the estimates which are obtained through OLS. As is visible, there are eleven different specifications in which we scrutinise the consequences of volatile non-systematic discretionary spending policy for economic growth in the aggregated list of our countries. In the first column, when we regress log GDP per capita on policy volatility. We observe that volatility in non-systematic discretionary spending has a significant negative impact on GDP per capita. The associated coefficient of policy volatility indicates that a 1 percent increase in non-systematic discretionary spending volatility reduces economic growth by 1.55 percent. This finding is consistent with the study of Eller et al. (2016), who also documents the unfavourable impact of discretionary fiscal policy on economic growth. The reason for the adverse impact is that most of the decisions of economic agents and private investors are partially affected by government-controlled factors. Investors and economic agents react inversely to the volatility and uncertainties related to fiscal parameters (Ali, 2005). Generally, this disparaging impact generates aggregate output volatility, which in turn lowers the average growth level (Fatás & Mihov, 2007). In order to check the robustness of this relationship, from Regression 2 onwards, we do sensitivity analysis which incorporates all the plausible covariates which might have effects on economic growth.

It is pertinent to mention that with the inclusion of new regressors in growth regression, the influence of policy volatility appears to decline, however, its sign and significance remain intact in all specifications. For instance, with the addition of log capital formation in Regression 2, the negative effect of discretionary policy volatility on growth declines to 0.97 percent. However, the associated coefficient is still significant at 1 percent. Additionally, in the same regression, the log capital formation has a positive and significant impact on economic growth. The coefficient of log capital formation predicts that 1 percent increase in capital formation stimulates economic growth by almost 0.31 percent. This finding is also in line with Ndambiri et al. (2012) and supported

Table 1

OLS Regression; Dependent Variable Log GDP Per Capita

Variables	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
Discretionary Policy Volatility	-1.548***	-0.972***	-0.584***	-0.359*	-0.425**	-0.346*	-0.336*	-0.340**	-0.271**	–	–
	(0.148)	(0.212)	(0.165)	(0.200)	(0.185)	(0.178)	(0.173)	(0.164)	(0.092)		
Log Capita Formation		0.307***	0.105	0.158**	0.119**	0.215***	0.241***	0.241***	0.361**	0.175***	0.344***
		(0.0673)	(0.0716)	(0.0641)	(0.0568)	(0.0628)	(0.0546)	(0.0589)	(0.169)	(0.037)	(0.071)
Log Secondary School Enrolment			1.279***	1.179***	0.851**	0.690**	0.511*	0.509*	0.283***	0.129*	0.241***
			(0.250)	(0.225)	(0.355)	(0.344)	(0.293)	(0.285)	(0.061)	(0.071)	(0.021)
Log Govt: Expenditure				0.951***	0.773**	0.561*	0.713**	0.726**	0.071*	0.317***	0.751**
				(0.344)	(0.309)	(0.300)	(0.288)	(0.310)	(0.038)	(0.019)	(0.371)
Log Urbanization					0.710	0.746	0.838**	0.841**	0.241**	0.277*	0.373*
					(0.478)	(0.458)	(0.388)	(0.391)	(0.132)	(0.118)	(0.201)
Log Openness						0.515**	0.213	0.211	0.041***	-0.029***	0.083**
						(0.233)	(0.225)	(0.292)	(0.011)	(0.003)	(0.041)
Log Area							-0.153***	-0.158**	-0.104**	-0.175**	-0.113**
							(0.0551)	(0.0709)	(0.039)	(0.085)	(0.051)
Log Natural Resource Rent								-0.00681	-0.126	-0.113*	-0.061
								(0.128)	(0.083)	(0.062)	(0.263)
Conflicts									-0.415**	-0.417**	-0.271
									(0.167)	(0.183)	(0.185)
Government Effectiveness									0.0732**	.032***	.125***
									(0.015)	(0.001)	(0.001)
Rule of Law									0.131*	0.261*	0.196**
									(0.072)	(0.139)	(0.092)
Log Health Expenditure									.031***	0.068	0.241***
									(0.011)	(0.155)	(0.017)
Taxes									-0.104	-0.052*	0.103**
									(0.244)	(0.021)	(0.049)
Developing Dummy*Policy Volatility										-0.241**	
										(0.114)	–
Developed Dummy*Policy Volatility										–	-0.083
											(0.173)
Constant	1.25***	2.985	1.920	-1.882	-1.823	-5.196**	-2.729	-2.681	1.941**	2.955	-3.173**
	(0.273)	(1.884)	(1.458)	(2.047)	(1.744)	(2.132)	(2.082)	(2.168)	(0.793)	(1.793)	(1.644)
Observations	74	74	74	74	74	74	74	74	74	74	74
R-squared	0.588	0.677	0.812	0.835	0.856	0.867	0.880	0.878	0.893	0.899	0.90

Robust standard errors in parentheses. *** $P < 0.01$, ** $P < 0.05$, * $P < 0.1$.

by theory, which suggests that higher availability of capital per worker enhances the growth pace. Similarly, with the inclusion of log secondary school enrollment in Regression 3, the negative effect of volatile discretionary spending policy further declines to 0.58 percent. However, as in the earlier two models, the coefficient remains significant at 1 percent. Similar to the positive impact of capital formation on economic growth, school enrollment also promotes economic growth. This finding is consistent with Hanushek, Jamison, Jamison & Woessmann (2008), who also discuss the positive effects of education on economic growth via cognitive skill development. Furthermore, with the addition of log of the government expenditure as an additional control variable in Regression 4, the negative impact of policy volatility on economic growth falls to 0.36 percent, which is still significant at 10 percent level of significance. Likewise, the other two covariates, government expenditure also encourages economic growth at 1 percent level of significance. This finding is supported by the Blanchard and Perotti (2002). Generally, government spending promotes growth through public investment and social expenditure, which dominates the crowding out and rent-seeking phenomena (Kelly, 1997).

Similarly, we control the growth regression for urbanisation, openness, the area of the country, and natural resources rent in Regressions 5, 6, 7 and 8, respectively. After controlling for these factors, though the negative magnitude of policy volatility falls from 0.42 percent to 0.34 percent, the effect is still significant in all specifications. In Regression 8, we observe that a 1 percent rise in discretionary policy volatility reduces economic growth by 0.34 percent. In the same regression, besides the capital formation, secondary school enrolment, and government spending, openness of economies and urbanisation also positively cause economic growth. However, the area of the country and natural resource rent adversely affect growth. The estimated coefficient associated with trade openness, though insignificant, is compatible with Levine and Renelt (1992).

Trade openness allows the utilisation of comparative advantage, quick diffusion of knowledge and technology, increasing the return to scale and exposure to competition. All these factors in turn positively affect economic growth. Similarly, the urbanisation estimate is supported by Turok and McGranahan (2013), as such a process leads to market and infrastructure investment. The negative impact of country area is supported by the Alouini and Hubert (2012) study. Although, a larger country enjoys a greater endowment of resources but also suffers from larger transportation and management costs which significantly lower economic growth. Similarly, the negative effect of natural resource rent on economic growth is in line with Sachs and Warner (2001). The advocates of resource curse provide various explanations that ineffective policies regarding exports and wealth creation by some governments turn the blessing of natural resources into a curse. Finally, after including all potential covariates as depicted in Regression 9, the negative effect of policy volatility drops to 0.31 percent. However, the associated coefficient is significant at 5 percent. Additionally, similar to Regression 8, all the previous covariates have the same effect on growth: among the new covariates, government effectiveness, rule of law, and health expenditure have a positive significant effect, while taxes have negative growth consequences. The positive effects of effective government policies is in line with Alam, Kiterage, and Bizuayehu (2017).

The improvement in the effectiveness of government is multidimensional, encompassing civil and public service qualities, the independence of authorities from political pressures, execution and preparation of quality policies and government's commitment to its policies (Kaufman, Kraay, & Mastruzzi, 2008). The improvement in all these dimensions surely promotes economic growth. Similarly, rule of law and health expenditures also positively and significantly cause economic growth as observed in Ozpolat, Guven, Ozsoy, and Bahar (2016), and Piabuo and Tieguhong (2017) respectively. Similar to the effectiveness of government, the rule ranges from trust in rules of society, efficient contract enforcement, the efficiency of courts, property rights, and trust in the courts and police. Improvement in all these institutional dimensions stimulates economic growth. Since expenditure on health provides healthy and efficient workers, it also stimulates economic growth. The negative effect of taxes on economic growth is supported by the study of Surjaningsih et al. (2012).

Nevertheless, in our analysis, such an effect is insignificant. It is fascinating to note that, in all specifications, the results imply that any unnecessary volatile public spending policy will significantly harm economic growth.

To make sure that results are not driven by a set of particular economies, we control the regression for developing and developed countries with the same control variables. Thus in Specifications 10 and 11, we introduced the interaction terms for developing and developed economies with their respective policy volatility. The coefficient of the interaction term in Regression 10 predicts that in comparison to developed economies, a unit increase non-systematic discretionary policy volatility in developing economies significantly retards economic growth by 0.24 percent.[14] However, the coefficient of the interaction term in Regression 11 suggests that in comparison to developing economies, policy volatility reduces economic growth in developed economies by almost 8 percent, however, not significantly.[15] This finding is in line with Fatás and Mihov (2003), who also reach to the same conclusion. This could be due to the fact that developed economies usually operate under strict fiscal rules,[16] thus it is not possible for the policymakers to use volatile or aggressive discretionary spending policies (Rodriguez, Tokman, & Vega, 2007). In fact such rules effectively bring economic stability which stimulates economic growth (Larraín & Parro, 2008). In contrast, in developing economies, uncertainties and volatility are usually observed to be higher (Fernández-Villaverde, Guerrón-Quintana, Rubio-Ramírez, & Uribe, 2011). Thus, any volatility in policies which is not linked to the business cycle or the current state of the economy can cause further uncertainty and volatility (Fatás & Mihov, 2003). Alternatively, in developing economies, volatile discretionary policies intensify macroeconomic uncertainty which in turn adversely affects the decisions of economic agents, resulting in negative consequences for economic outcomes.

[14]In developing economies, taxes and openness significantly reduce economic growth, while health expenditures insufficiently promote growth. Taxes in these economies create distortions (Marrero & Novales, 2005), higher inefficiency in production lower their comparative advantage (Hunt & Morgan, 1995), and inefficient allocation of health funds does not improve their citizens' health (O'Donnell, 2007).

[15]Unlike developing economies, in developed economies, natural resource rent and conflicts could not significantly retard economic growth, while taxes in such economies have a positive effect on economic growth. All such effects are contributed to efficient institutional setups (Acemoglu et al. 2003).

[16]A fiscal rule imposes a long-lasting constraint on fiscal policy through numerical limits on budgetary aggregates. Fiscal rules typically aim at correcting distorted incentives and containing pressures to overspend, particularly in good times, so as to ensure fiscal responsibility and debt sustainability.

Although, the OLS results are congruent with our conjecture, the findings of OLS could be questioned because of the endogenous behaviour of discretionary policy volatility. The endogenous behaviour of discretionary policy arises due to two reasons; (a) discretionary spending directly depends on the political preferences of political agents, and (b) the reverse causality, running from GDP per capita to policy volatility. Figure 1 endorses that economies where GDP per capita is high (developed), policy volatility is low and the opposite is true for low GDP per capita economies (developing).

Fig. 1. Discretionary Policy Volatility and Log GDP Per Capita
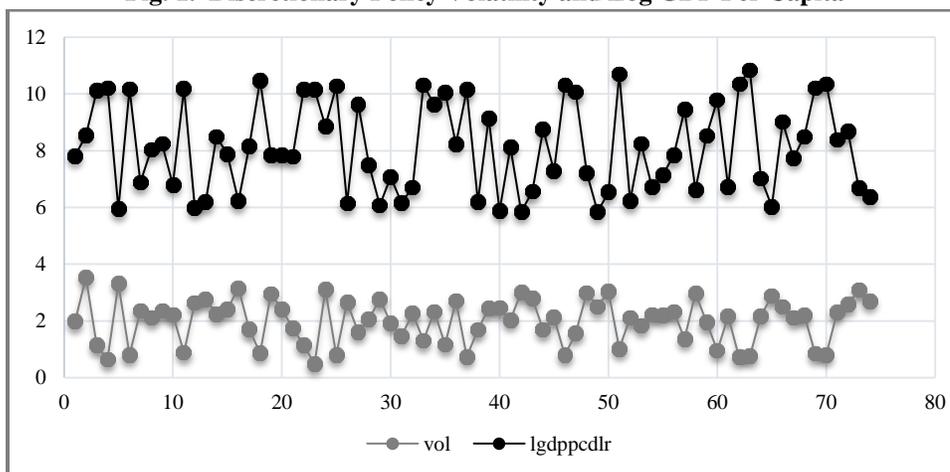
Additionally, we also apply the Durban-Wu-Hausman test to check the endogenous behaviour of discretionary policy volatility. Table 2 represents the findings of the test.

Table 2

Durban-Wu-Hausman Test for Endogeneity of Discretionary Policy Volatility

Ho: Variables are Exogenous		
Robust score chi2(1)	12.1565	p = 0.0005
Robust regression F(1,46)	32.1573	p = 0.0000

Since, the probability value (0.0005) is significant, i.e., lower than 0.1, therefore, we reject the null hypothesis and conclude that discretionary policy is endogenous in nature. In the presence of such possibility, the OLS estimates are expected to be biased. In order to overcome the problem of endogeneity, we proceed to the approach of GMM.[17] We employ the political system, settler mortality rate, number of elections, and government seats in the house as instruments for policy volatility. The corresponding results of GMM are reported in the following Table 3.[18]

[17]We also use the Hausman m-statistic test which suggests that GMM results are more consistent than OLS estimates. The results of test are reported in appendix in table A3.

[18]We conducted Sargent test of over-identification restriction for the exogeneity of the instruments, which confirms the exogeneity of instruments in all the specifications of GMM. The results of test are reported in appendix in table A3. We have also reported the 2SLS results in the appendix in table A2.

Table 3

GMM Regression; Dependent Variable Log GDP Per Capita

Variables	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
Discretionary Policy Volatility	-2.271***	-2.221***	-1.254***	-0.902**	-0.763**	-0.601*	-0.661***	-0.645***	-0.608***	–	–
	(0.211)	(0.177)	(0.466)	(0.431)	(0.355)	(0.311)	(0.012)	(0.026)	(0.210)		
Log Capita Formation		0.316***	0.098*	0.111***	0.049*	0.165*	0.205***	0.173**	0.193***	0.283*	0.291*
		(0.001)	(0.053)	(0.041)	(0.026)	(0.088)	(0.061)	(0.081)	(0.076)	(0.157)	(0.159)
Log Secondary School Enrolment			0.761***	0.652*	0.454*	0.217***	0.184	0.138***	0.107*	0.119*	0.221***
			(0.019)	(0.347)	(0.235)	(0.013)	(0.337)	(0.014)	(0.059)	(0.065)	(0.087)
Log Govt: Expenditure				0.293**	0.622**	0.466*	0.477***	0.751*	0.522*	0.325**	0.728**
				(0.139)	(0.288)	(0.249)	(0.118)	(0.413)	(0.277)	(0.161)	(0.349)
Log Urbanization					0.401***	0.657	0.803**	0.855***	0.873**	0.203*	0.477*
					(0.012)	(0.391)	(0.399)	(0.214)	(0.433)	(0.109)	(0.263)
Log Openness						0.206*	-0.131	-0.287*	0.628*	-0.141**	0.189*
						(0.113)	(0.079)	(0.153)	(0.348)	(0.067)	(0.105)
Log Area							-0.187*	-0.290**	-0.251*	-0.133*	-0.134
							(0.098)	(0.137)	(0.137)	(0.073)	(0.372)
Log Natural Resource Rent								- 0.361	- 0.408**	-0.324	- 0.067
								(0.217)	(0.201)	(0.261)	(0.211)
Conflicts									-0.236	-0.233*	-0.149
									(0.162)	(0.125)	(0.093)
Government Effectiveness									0.113*	0.098***	0.251*
									(0.061)	(0.013)	(0.135)
Rule of Law									0.261***	0.193*	0.108***
									(0.072)	(0.106)	(0.013)
Log Health Expenditure									0.031*	0.138	0.061*
									(0.044)	(0.086)	(0.034)
Log Taxes									-0.152	-0.083***	0.124*
									(0.293)	(0.032)	(0.068)
Developing Dummy*Policy Volatility										-0.291***	–
										(0.031)	–
Developed Dummy*Policy Volatility										–	-0.167
										–	(0.353)
Constant	10.221***	8.12***	1.485	2.652**	1.133	-0.755	1.772***	3.201	4.193	1.696	-3.203
	(1.99)	(2.688)	(1.711)	(1.291)	(0.962)	(2.693)	(0.538)	(4.178)	(3.973)	(3.308)	(2.405)
Observations	67	66	62	59	59	57	55	55	53	51	51
R-squared	0.512	0.527	0.543	0.570	0.611	0.677	0.701	0.722	0.755	0.841	0.826

Robust standard errors in parentheses. *** P < 0.01, ** P < 0.05, * P< 0.1.

In Table 3, in all specifications (except #11) the non-systematic discretionary policy volatility negatively and significantly causes economic growth and thus supports the initial findings of OLS. As is obvious from the table, the univariate regression, depicted in Specification 1, reveals that a 1 percent upsurge in discretionary spending volatility retards economic growth by 2.27 percent at the 1 percent significance level. Though the associated coefficient of policy volatility is higher in magnitude than OLS estimate, however, Fatás and Mihov (2003) observed the same nature about instrumental variables approach in their analysis.[19] In order to conduct a sensitivity analysis, we proceeded in the same way as we did in the case of OLS. Alternatively, even in the case of GMM, we intended to check that the results were not driven by the control variables. In this regard, including the log capital formation and log secondary school enrollment in Regression 2 and 3, we observed a reduction in the magnitude of policy volatility, as its inverse impact on growth was now 2.22 percent and 1.25 percent, respectively, yet the coefficient was still a significant 1 percent. Likewise, with the inclusion of the log of government expenditure, the inverse impact of policy volatility on economic growth declined to 0.90 percent, however, still remaining significant. In the same way, with stepwise regression, the inclusion of other covariates like urbanisation, openness, the area of the countries, natural resources rents, and conflicts, do not reverse the significant adverse effects of policy volatility on economic growth. Nevertheless, similar to the OLS method, the downward trend in the coefficients of policy volatility are observed in each successive regression. From Regression 4 to 8, the total negative effect of policy volatility falls from 0.76 percent to 0.64 percent, respectively.

Finally, in Specification 9, after the inclusion of all the potential covariates in growth regression, the negative impact of policy volatility on economic growth remains 0.60 percent which is significant at 1 percent level. Again, in Regression 10 and 11, we introduced the interaction terms for developing and developed economies with their respective policy volatility. Similar to OLS findings, the discretionary policy volatility in developing economies negatively and significantly reduced economic growth as compared to developed economies. In developing economies, a 1 percent rise in policy volatility retards economic growth by 29 percent at 1 percent level of significance, while the policy volatility in developed economies reduces economic growth, but not significantly.

4. CONCLUSION AND POLICY IMPLICATIONS

The study is motivated by literature that seeks the macroeconomic consequences of policy volatility. It examines the economic cost associated with volatile use of non-systematic discretionary public spending. The analysis is carried out for the representative sample of the world and also for a different class of countries. The findings reveal that volatility in non-systematic discretionary spending significantly retards economic growth. The adverse impact of policy volatility remains robust to a set of potential covariates and the problem of endogeneity associated with discretionary spending policy.

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[19]In their instrumental variable approach, estimates coefficients are 15 percent higher than OLS estimates. For more detail see also Card (1993) and Ashenfelter and Zimmerman (1997).

        The analysis at a disaggregated level suggests that discretionary spending volatility significantly discourages the economic growth in developing economies, but not in developed ones. The possible explanation for this finding is that developed economies usually operate under strict fiscal rules, thus it is not possible for policymakers to use volatile or aggressive discretionary policies. In contrast, in developing economies, uncertainty is usually prevalent. Thus, any volatility in policies which is not linked to the business cycle or the current state of the economy further stimulates the uncertainty. Alternatively, in developing economies, the volatile discretionary policies intensify macroeconomic uncertainty, which in turn adversely affects the decisions of economic agents, resulting in negative consequences for economic outcomes. As a policy recommendation, it is suggested that prudent policies should be devised in order to constrain governments from the use of volatile discretionary fiscal policies. For instance, one such restriction could be the introduction of effective government spending rules, i.e., placing long-lasting numerical limits on budgetary processes, so that public officials are unable to cross a defined threshold level in spending while making fiscal decisions.

Appendix Table A1

Countries Included in the Sample

1	Algeria	38	Kenya
2	Argentina	39	Korea, South
3	Australia	40	Madagascar
4	Austria	41	Malaysia
5	Bangladesh	42	Mali
6	Belgium	43	Mauritania
7	Bolivia	44	Mexico
8	Botswana	45	Morocco
9	Brazil	46	Netherlands
10	Cameroon	47	New Zealand
11	Canada	48	Nicaragua
12	Central African Republic	49	Niger
13	Chad	50	Nigeria
14	Chile	51	Norway
15	Colombia	52	Pakistan
16	Congo, Democratic Republic	53	Panama
17	Costa Rica	54	Papua New Guinea
18	Denmark	55	Paraguay
19	Dominican Republic	56	Peru
20	Ecuador	57	Portugal
21	El Salvador	58	Senegal
22	Finland	59	South Africa
23	France	60	Spain
24	Gabon	61	Sri Lanka
25	Germany	62	Sweden
26	Ghana	63	Switzerland
27	Greece	64	Syria
28	Guatemala	65	Togo
29	Guinea	66	Trinidad and Tobago
30	Honduras	67	Tunisia
31	India	68	Turkey
32	Indonesia	69	United Kingdom
33	Ireland	70	United States
34	Israel	71	Uruguay
35	Italy	72	Venezuela
36	Jamaica	73	Zambia
37	Japan	74	Zimbabwe

Table A2

2SLS Regression; Dependent Variable Log GDP Per Capita

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
Discretionary Policy Volatility	-2.326***	-2.292***	-1.139**	-0.939**	-0.626*	-0.636*	-0.694**	-0.894**	-0.891**	–	–
	(0.309)	(0.496)	(0.476)	(0.474)	(0.381)	(0.363)	(0.345)	(0.400)	(0.441)		
Log Capita Formation		0.279***	0.00439	0.0398	0.0502	0.0964	0.185**	0.214***	0.232*	0.194***	0.315***
		(0.043)	(0.100)	(0.102)	(0.0791)	(0.0881)	(0.0848)	(0.0811)	(0.125)	(0.081)	(0.002)
Log Secondary School Enrolment			0.965***	0.964***	0.644	0.556	0.260	0.108	0.103*	0.128**	0.208*
			(0.266)	(0.240)	(0.415)	(0.402)	(0.305)	(0.284)	(0.054)	(0.063)	(0.106)
Log Govt: Expenditure				0.446	0.506	0.375	0.744**	0.875**	0.314*	0.715**	0.961***
				(0.433)	(0.386)	(0.338)	(0.368)	(0.372)	(0.174)	(0.312)	(0.211)
Log Urbanization					0.829	0.863	1.037**	1.125***	0.631**	0.498*	0.618**
					(0.574)	(0.568)	(0.450)	(0.386)	(0.291)	(0.286)	(0.310)
Log Openness						0.277	-0.0391	-0.587	-0.277*	-0.316	0.258*
						(0.258)	(0.269)	(0.384)	(0.119)	(0.193)	(0.142)
Log Area							-0.207**	-0.311***	-0.351***	-0.201*	-0.108
							(0.0924)	(0.115)	(0.085)	(0.108)	(0.211)
Log Natural Resource Rent								- 0.435**	- 0.174	-0.361***	- 0.203
								(0.206)	(0.382)	(0.031)	(0.322)
Conflicts									-0.156*	-0.172**	-0.196
									(0.083)	(0.088)	(0.155)
Government Effectiveness									0.193***	0.063*	0.137***
									(0.001)	(0.034)	(0.015)
Rule of Law									0.373*	0.211**	0.151**
									(0.196)	(0.104)	(0.072)
Log Health Expenditure									0.104**	0.112	0.031***
									(0.052)	(0.096)	(0.011)
Log Taxes									-0.266***	-0.153***	-0.094**
									(0.011)	(0.014)	(0.041)
Developing Dummy*Policy Volatility										-0.331***	–
										(0.061)	
Developed Dummy*Policy Volatility										–	-0.187
											(0.281)
Constant	12.87***	12.12***	6.485**	4.101	1.099	-0.472	1.135	3.201	1.981**	1.396	-2.421**
	(0.764)	(3.876)	(2.909)	(3.821)	(3.146)	(3.693)	(3.588)	(4.178)	(0.987)	(1.091)	(1.044)
Observations	49	48	47	47	47	47	47	46	45	45	45
R-squared	0.513	0.532	0.565	0.620	0.742	0.746	0.766	0.769	0.801	0.845	0.832

Robust standard errors in parentheses. *** P < 0.01, ** P < 0.05, * P< 0.1.

Table A3

Results of the Sargan Test for Over-Identifying Restrictions
and Hausman m-statistic Test

Sargan Over-Identifying Restrictions Test Ho: Instruments are Valid		Hausman m-statistic Test Ho: OLS Estimates are Efficient	
Specification	P-Values	Specification	P-Values
1	0.673	1	0.011
2	0.611	2	0.047
3	0.281	3	0.009
4	0.194	4	0.006
5	0.097	5	0.006
6	0.144	6	0.037
7	0.172	7	0.016
8	0.093	8	0.045
9	0.154	9	0.050
10	0.082	10	0.022
11	0.088	11	0.015

Table A4

Definition of Variables

Variable	Definition	Source
GDP Per Capita	GDP per capita is gross domestic product divided by midyear population. GDP is the sum of gross value added by all resident producers in the economy plus any product taxes and minus any subsidies not included in the value of the products. It is calculated without making deductions for depreciation of fabricated assets or for depletion and degradation of natural resources. The data are averaged over 1960-2015.	WDI
Discretionary Policy	Government expenditures which are not associated with the business cycle fluctuations. It is calculated through moving average standard deviation approach for each county. The data are averaged over 1960-2015.	Fatas and Mihov (2013)
Urbanisation	It is the urban population as a percentage of the total population. The data are averaged from 1960 to 2015.	WDI
Conflicts	This is a dummy variable, which either takes the value 1 or 0. It takes 1 if at least internal conflicts have occurred since 1960 in the country, 0 otherwise. The data spans are from 1960 to 2014.	PRIO
Government Expenditure	General government final consumption expenditure includes all government current expenditures for purchases of goods and services. It also includes most expenditures on national defense and security but excludes government military expenditures that are part of government capital formation. The data are averaged over 1960-2015.	WDI
Trade Openness	Trade is the sum of exports and imports of goods and services measured as a share of the gross domestic product. The data are averaged over 1960-2015.	WDI

Continued—

Table A4—(*Continued*)

Capital Formation	Gross fixed capital formation (formerly gross domestic fixed investment) includes land improvements (fences, ditches, drains, and so on); plant, machinery, and equipment purchases; and the construction of roads, railways, and the like, including schools, offices, hospitals, private residential dwellings, and commercial and industrial buildings. Net acquisitions of valuables are also considered capital formation. It are averaged over 1960-2015.	WDI
Resources Rents	It is measured as the percent share of natural resources exports (including agricultural and raw material exports, fuel exports, food exports, and ores and metals exports) in GDP, averaged from 1960 to 2000.	WDI
Secondary School Enrollment	It is the proportion, regardless of age, to the population of the age group that officially corresponds to the level of education shown. The data are averaged over 1960-2015	WDI
Area	It is the total Area in square kilometers. The data are averaged from 1960 to 2015.	WDI
Political System	This is a dummy variable which takes either the value of 1 or 0. It takes 1 if a country has a presidential system or monarchy system and 0 if the country has a parliamentary system or the system where the president is selected by the parliament. We averaged the data, closer the value to 1 indicates that the country faces more presidential years, while the value closer to 0 implies that the country has more years of the parliamentary system. It is averaged over 1975-2015.	DPI, World Bank
Settler Mortality Rate	Log of the mortality rate faced by the European settler at the time of colonisation. The data is averaged for the mortality rate faced by the European settler at the time of colonisation. The data is taken in 2012.	Acemoglu and Robinson (2001)
Government Seats	This is the averaged data of a total number of seats held by all government parties. It is averaged over 1975-2015.	DPI, World Bank
Elections	The elections include two different election series; the legislative elections and executive elections. This is a dummy variable takes the value of 1" if there was a legislative election in this year and 0 otherwise, similarly, it takes the value of 1 if there was an executive election in this year and 0 otherwise. We averaged this data, so closer the value to 1 indicate the country has experienced more the legislative and executive elections while closing the value to 0 implies that country has experienced a minimum number of elections. It is averaged over 1975-2015.	DPI, World Bank
Government Effectiveness	The quality of public services, the quality of the civil service, and the degree of its independence, the quality of policy formulation and implementation. It is averaged over 1975-2015.	DPI, World Bank
Rule of Law	Confidence in the rules of society, law, and order, the efficiency of the judicial system, the quality of contract enforcement, property rights and trust in police and the courts. It is averaged over 1975-2015.	DPI, World Bank
Taxes	Tax revenue refers to compulsory transfers to the central government for public purposes. Certain compulsory transfers such as fines, penalties, and most social security contributions are excluded. Refunds and corrections of erroneously collected tax revenue are treated as negative revenue. It is averaged over 1975-2015.	WDI
Health Expenditure	Level of current health expenditure expressed as a percentage of GDP. Estimates of current health expenditures include healthcare goods and services consumed during each year. This indicator does not include capital health expenditures such as buildings, machinery, IT and stocks of vaccines for emergency or outbreaks. It is averaged over 1975-2015.	WDI

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Does Gold Act as a Hedge or a Safe Haven? Evidence from Pakistan

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This paper seeks to determine whether in Pakistan gold protects investors against the risks associated with the exchange rate, oil shocks, and stock returns by testing the hedging and safe haven properties of gold returns for the period from August 1997 to May 2016. The analysis has been done to understand the relationship between moderate (normal) and extremely tumultuous conditions through least squares and DCC-GARCH models. The key results indicate that gold acts as a hedge against exchange rate risk only whereas it acts as a safe haven in terms of the risks associated with the oil, exchange rate and stock market shocks—thereby indicating that investors can potentially invest in gold to hedge against losses emanating from the exchange rate, while they may avoid potential losses originating from turmoil conditions in terms of the exchange rate, oil, and stock markets.

JEL Classification: E32, F31.
Keywords: Gold Returns, Safe Haven, Hedge, DCC GARCH

1. INTRODUCTION

Financial markets and instruments tend to grow rapidly both in volume and value (Baur & Lucey, 2010). This growth nevertheless comes with risks from the financial system, which at the same time drag the investors not only to hedge their investments but look for safe havens to avoid losses in case of extremely tumultuous conditions. Baur and Lucey (2010) specified that the investment vehicles that could act as a hedge (safe haven) are expected to have a significant negative relationship with other investment vehicles in normal conditions. This paper, thus, not only tries to understand the nature of the correlation of gold returns with oil, exchange rate, and stock returns in normal conditions but also under extremely tumultuous conditions for a developing country such as Pakistan—a country with relatively less developed and relatively volatile equity market (Qayyum & Kemal, 2006). There are very few studies that study the relationship between gold returns and risk. See, for example, Gürgün and Ünalmış (2014) and Iqbal (2017). Moreover, this analysis is important for a developing economy like Pakistan as the

political and economic conditions of developing economies tend to be different from those of advanced economies, which also implies different risk and return profiles (Yusof & Majid, 2007).

We primarily focus on understanding the nature of the co-movements between the financial variables in normal and under extremely tumultuous conditions as the investors' reaction to gains and losses tends to be asymmetric (Kahneman & Tversky, 1979). For example, investors are usually more sensitive to losses than gains. Duxbury and Summers (2004) also emphasise that in general, financial agents prefer avoiding losses. Pointing to this phenomenon, Ang et al. (2005) noted that investors usually switch abruptly between assets under extreme conditions.

We consider gold as a leading candidate in the case of Pakistan as it has received extensive attention in the financial news (see, for example, Anand and Madhogaria, 2012; Beckmann & Czudaj, 2013; Beckmann et al. 2015). Adding gold to various hypothetical portfolios increases the average return and decreases standard deviation (Jaffe, 1989). Precious metals also performed very well during extreme market movements, which make them a candidate for providing a hedge against such conditions (Hillier et al. 2006). Baur and Lucey (2010) tested whether gold is a hedge or a safe haven and their findings suggest that gold serves a hedge against stocks in normal conditions and as a safe haven in extremely tumultuous stock market conditions. Baur and McDermott (2010), while examining the role of gold as a safe haven for major developed and emerging countries concluded that although gold is not a hedge or a safe haven for emerging stock markets, it is both a hedge and a safe haven for the U.S. and European stock markets.

Given the dearth of such literature for Pakistan, we test the relationship of gold returns with oil returns, using the real effective exchange rate and local gold prices (instead of international gold prices). We use the DCC-GARCH framework to investigate multivariate time-varying relationships. The results of our analysis indicate that gold acts as a hedge against exchange rate risk only. It plays the role of a safe haven against oil return, stock returns, and exchange rate return risks. We, therefore, conclude that investment in gold may hedge against losses, especially during declining oil, stock or foreign exchange market conditions.

The remainder of the paper is organised as follows: Section 2 briefly reviews the literature. Section 3 explains the data, its sources and stationarity properties while Section 4 introduces the econometric techniques. Section 5 discusses the results. Finally, Section 6 concludes the paper.

2. LITERATURE REVIEW

The literature is rich in exploring various dimensions of the relationship of gold with many important variables. For example, Wang and Lee (2011), Lucey et al. (2006), Faff and Hillier (2004), and Dooley et al. (1995) explored the impact of macroeconomic variables such as the exchange rate, interest rate, and output on gold prices whereas Aggarwal et al. (2014) and Koutsoyiannis (1983) attempted to predict y prices of gold. Smith (2002), Basu and Clouse (1993), and Tschoegl (1980), on the other hand, tested the market efficiency of gold. Beckmann and Czudaj (2013), Worthington and Pahlavani (2007), Levin et al. (2006), Ghosh et al. (2004), and Kolluri (1981) examined the effectiveness of the hedging property of the gold against inflation.

To answer whether gold returns act as a hedge and a safe haven against oil, stock, and exchange rate returns, Kaul and Sapp (2006), Michaud et al. (2006), Ciner (2001), Upper and Bundesbank (2001), Jaffe (1989) and Sherman (1986) studied the correlation between gold and other asset returns such as stocks, bonds, oil, and exchange rate. Several studies such as Baur and Lucey (2010) and Baur and McDermott (2010) explored the relationships while making explicit some definitional issues pertaining to a safe haven and hedge properties.

Reboredo (2013a) tested the role of gold as a hedge or safe haven against oil while Reboredo and Rivera-Castro (2014), tested the role of gold as a hedge and a safe haven against US dollar fluctuations. Reboredo (2013b) explored the hedging and safe haven properties of gold against the exchange rate. Recently, Iqbal (2017) focused on the hedging property of gold in a panel of countries, including Pakistan. His specification, however, does not account for an important variable, i.e. the impact of oil shocks, which is considerable in the case of Pakistan as it affects the overall macroeconomic activity and thereby macroeconomic variables.[1] We, thus, focus exclusively on Pakistan's case with an enriched macro-econometric specification by accounting for the role of the oil shocks and conduct the study using the latest available data. This also allows us to take into account structural breaks as it may have implications for the results.

3. THE DATA

The data on gold prices, stock prices, oil prices, and the real effective exchange rate covers the period from August 1997 to June 2016. The returns are calculated for each variable by taking the log difference and then multiplying the difference by 100. Equities are represented by closing prices of the KSE 100 Index, which are taken from the official website of Pakistan Stock Exchange (PSX) and are adjusted for both splits and dividends. Following Ciner et al. (2013), the real exchange rate has been used to measure the hedge and safe haven properties of gold against currency since the real exchange rate tells how much of goods and services in the domestic country can be exchanged for goods and services in a foreign one. The data of the real effective exchange rate has been obtained from the International Financial Statistics (IFS). The real effective exchange rate indicates the value of the local currency (PKR) against the basket of foreign currencies. It is measured in such a way that increases in the exchange rate indicate an appreciation of Pakistani currency. The data on gold is collected from the World Gold Council website and oil prices are taken from futures prices of the Brent crude oil contracts traded on the International Commodities Exchange (ICE).

Table 1 reports descriptive statistics and ADF test results.[2] The mean values in Table 1 indicate average monthly returns of the underlying variables. The average monthly stock returns, as measured by the KSE 100 Index closing prices, are the highest followed by returns on gold, whereas returns on the exchange rate are the lowest. Since the average monthly return on the exchange rate is positive, it indicates that, on average,

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[1]Basher and Sadorsky (2006) conducted an analysis to determine the effect of oil price shocks on emerging stock markets, including Pakistan. Their findings indicate significant effect of oil price shocks on stock market returns in the context of Pakistan as well. In the wake of their study, we investigate whether oil price and gold price returns are associated as well in normal and average conditions.

[2]We ran Augmented Dickey–Fuller (ADF) test to test the stationarity of the data in order to avoid spurious results. The results indicate that all variables are stationary after taking the first difference.

Table 1

Descriptive Statistics and ADF Test for Returns

	Exchange Rate	Gold	Oil	Stock
Mean	0.025%	1.020%	0.834%	1.282%
Std. Dev.	1.582%	3.908%	9.431%	8.860%
Skewness	–0.475	0.354	–0.709	–1.201
Kurtosis	4.999	4.018	3.739	8.124
Jarque-Bera	46.12***	14.52***	24.09***	301.6***
ADF test (level)	–1.668	–.055	–1.664	1.727
ADF test (1st difference)	–11.959***	–14.23***	–9.569***	–15.901***

Note: Jarque-Berra tests the normality of the data. The ADF test (level) and ADF test (1st difference) examine the stationarity of data at the level and the first difference respectively. ***, ** and * respectively indicate the significance at 1 percent, 5 percent and 10 percent levels.

the Pakistani currency is appreciating against a basket of currencies. Although oil markets show a low level of returns, its volatility as can be observed from the corresponding standard deviation is the highest, followed by the volatility in stock returns, hence indicating that both oil and stock markets are highly volatile in the context of Pakistan.

The skewness results for normality indicate that except gold returns, all others are negatively and significantly skewed, and large kurtosis coefficients indicate that the distribution of all the asset returns is non-normal (also see Jarque-Bera statistics).

Figure 1 presents conditional variances of gold, the exchange rate, oil, and stock returns. The latter were highly volatile during 1998–2000 and 2008–2010, which corresponds to the military takeover in Pakistan and the financial crisis. In contrast, gold returns in these periods tended to be relatively stable. Exchange rates exhibited relatively high volatility as compared to gold during 1997–2001, in 2008, and recently in 2014. Oil returns were relatively stable, however, they became higher after 2008 for almost two years and jumped again in 2014.

Fig. 1. Conditional Variances for Returns

Gold Returns

Stock Returns

Exchange Rate Returns
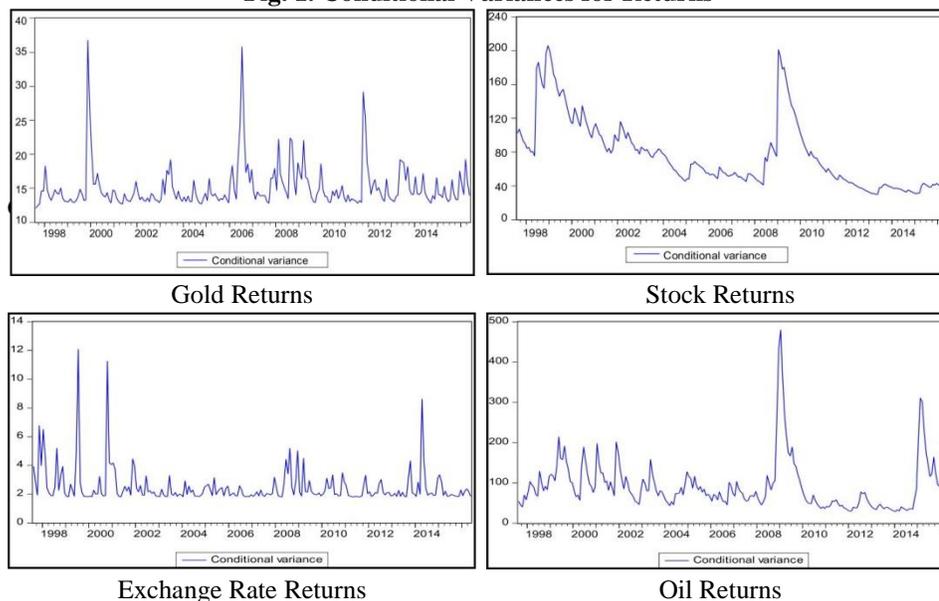
Oil Returns

Figure 1 presents the conditional variances in gold returns, exchange rate returns, oil returns and stock returns.

4. ECONOMETRIC METHODOLOGY

The main purpose of this study is to determine whether an investment in gold can protect from losses due to normal and extreme price changes in the exchange rate, oil or stock markets. The relationship during normal price changes tests the hedging property of gold, whereas the relationship during extreme price changes tests the safe haven property of gold. For this purpose, we use the following econometric approaches.

4.1. Least Squares Method

Consistent with Baur and Lucey (2010) and Ciner et al. (2013), we specify the following model:

$$r_{gold,t} = a + b_1 r_{stock,t} + b_2 r_{stock,t(q20)} + b_3 r_{stock,t(q10)} + b_4 r_{stock,t(q5)}$$
$$+ c_1 r_{opric,t} + c_2 r_{opric,t(q20)} + c_3 r_{opric,t(q10)} + c_4 r_{opric,t(q5)} + d_1 r_{erate,t}$$
$$+ d_2 r_{erate,t(q20)} + d_3 r_{erate,t(q10)} + d_4 r_{erate,t(q5)} + e_t \quad \ldots \quad \ldots \quad (1)$$

Where $r_{gold}, r_{stock}, r_{opric}$ and r_{erate} denote the gold, stock, oil and exchange rate returns, respectively. The terms with parameter $b_1, c_1,$ and d_1 test the hedging relationship of gold with stock, oil and exchange rate returns, respectively. In addition, the rest of the parameters test the safe haven dynamics where dummy variables have been created for interaction with respective variables. For example, $r_{stock,t(q20)}, r_{stock,t(q10)},$ and $r_{stock,t(q5)},$ are lower 20 percent, 10 percent and 5 percent quintiles for stock returns, respectively. To create these quintiles, dummy variables have been introduced where the dummy is equal to one if returns are respectively in the lowest 20 percent, 10 percent, and 5 percent threshold, and zero otherwise.

If there is a significant negative relationship of stock, oil and exchange rate returns with gold returns, investors may buy gold and prevent themselves from losses. However, if there is a nonsignificant negative relationship, the purchase of gold in such adverse conditions would have no benefit to the investors.

4.2. DCC- MGRACH Model

The aforementioned macro-econometric model (Equation 1) helps determine the nature of the relationship that holds in normal conditions. In the light of the possibility of structural breaks—which, if they exist, may potentially affect the results and change the nature of the relationship. We also try to determine whether there are some sub-periods for which the relationship between gold returns and other assets is negative, which changes thereafter and vice versa. For this purpose, we use the time-varying correlation measurement for understanding the time-varying relationship by using a dynamic conditional correlation (DCC) multivariate GARCH model proposed by Engle (2002).

The DCC-MGARCH approach has been widely used in the literature to find out the relationship between stock prices (Bali and Engle, 2010; Cai et al. 2009) and bond prices (Antonakakis, 2012), which is discussed below. The main advantage of the DCC approach is that it simultaneously focuses on time-dependent correlation and volatility of

n assets' returns. As specified in Lean and Teng (2013), the DCC-MGARCH model is based on the return series $r_{i,t}$ with the time-varying covariances, variances, and means for asset i at time t for which equations are given below:

$$r_{i,t} = \mu_{i,t} + \varepsilon_{i,t}, \text{ and } \mu_{i,t} = E(r_{i,t}|\Psi_{t-1}) = E_{t-1}(r_{i,t}), \varepsilon_{i,t}|\Psi_{t-1} \sim N(0, H_t).$$

The symbol Ψ_{t-1} indicates the information given in the last period. In the above expression $H_t = D_t R_t D_t$, shows the conditional variance-covariance matrix H_t, also known as conditional correlation estimator. D_t indicates the (n x n) diagonal matrix of conditional standard deviations at time t which is time-varying in nature. The mean equation derived from the GARCH (1, 1) model produces this conditional standard deviation for the asset returns. The conditional standard deviation for univariate GARCH (1, 1) is $D_t = \text{diag}(\sqrt{h_{i,t}})$, where $h_{i,t}$ denotes the conditional volatility for asset return i at time t since the conditional volatility is time-varying in nature. Hence, the expression $D_t = \text{diag}(\sqrt{h_{1,t}}, \dots, \sqrt{h_{n,t}})$ denotes D_t for a multivariate model, where $h_{i,t} = \tau_i + \alpha_i \varepsilon_{i,t-1}^2 + \beta_i h_{i,t-1}$. In the given expression, τ_i, α_i and β_i respectively indicate constant term, ARCH effect, and GARCH effect. If the coefficient of β_i is positive, it indicates that there is a persistent positive change as well as volatility clustering. A combination of α_i and β_i denotes that the volatility shock is persistent.

A conditional correlation matrix which is time-varying in nature is denoted by R_t where the conditional correlation coefficients of R_t are as follows:

$$R_t = diag[Q_t]^{-1} Q_t d^t iag[Q_t]^{-1} \text{ ,}$$

Where a conditional covariance matrix is:

$$Q_t \equiv [q_{ij}]_t = (1 - \alpha_{dcc} - \beta_{dcc})\bar{Q} + \alpha_{dcc}(\varepsilon_{t-1}\varepsilon'_{t-1}) + \beta_{dcc}Q_{t-1}.$$

where, $\bar{Q}$ denotes the unconditional covariances of the standardised errors matrix, which is an ($n \times n$) symmetric positive definite matrix, and $\varepsilon_t = (\varepsilon_{1,t}, \dots, \varepsilon_{n,t})'$ is the standardised residual terms. If the covariance is positive, it indicates that given variables move in the same direction, whereas if it is negative it indicates that the given variables move in the opposite direction. Positive covariance implies that the tested variables were strongly linked and moved in the same direction and vice versa.

Engle (2002) followed a GARCH (1, 1) process for any two asset returns to estimate the time-varying conditional correlation($q_{ij,t}$):

$$q_{ij,t} = \bar{\rho}_{ij} + \alpha_{dcc}(\varepsilon_{i,t-1}\varepsilon_{j,t-1} - \bar{\rho}_{ij}) + \beta_{dcc}(q_{ij,t} - \bar{\rho}_{ij}),$$

In the expression given above, the unconditional correlation between $\varepsilon_{i,t}$ and $\varepsilon_{j,t}$ is denoted by $\bar{\rho}_{ij}$. $\rho_{ij,t} = \frac{q_{ij,t}}{\sqrt{q_{ii,t}q_{jj,t}}}$ is the correlation estimator. The following equations, therefore, show the computation of conditional correlation between $r_{i,t}$ and $r_{j,t}$.

$$q_{ij,t} = E(\varepsilon_{i,t}\varepsilon_{j,t}|\Psi_{t-1}) = \frac{E(\varepsilon_{i,t}\varepsilon_{j,t}|\Psi_{t-1})}{\sqrt{E(\varepsilon_{i,t}^2|\Psi_{t-1})E(\varepsilon_{j,t}^2|\Psi_{t-1})}}$$

$$= \frac{E(r_{i,t}r_{j,t}|\Psi_{t-1})}{\sqrt{E(r_{i,t}^2|\Psi_{t-1})E(r_{j,t}^2|\Psi_{t-1})}} = Corr(r_{i,t}r_{j,t}|\Psi_{t-1}) = \rho_{ij,t} = [R_t]_{ij},$$

Where the conditional correlation between asset return i and j at time t is $[R_t]_{ij} = \rho_{ij,t}$. The correlation estimator $\rho_{ij,t}$ for DCC (1, 1) can therefore be written as follows:

$$\rho_{ij,t} = \frac{(1-\alpha_{dcc}-\beta_{dcc})\overline{q}_{ii} + \alpha_{dcc}\varepsilon_{i,t-1}\varepsilon_{j,t-1} + \beta_{dcc}q_{ij,t-1}}{\sqrt{(1-\alpha_{dcc}-\beta_{dcc})\overline{q}_{ii} + \alpha_{dcc}\varepsilon_{i,t-1}^2 + \beta_{dcc}q_{ii,t-1})((1-\alpha_{dcc}-\beta_{dcc})\overline{q}_{jj} + \alpha_{dcc}\varepsilon_{j,t-1}^2 + \beta_{dcc}q_{jj,t-1})}}$$

If the α_{dcc} and β_{dcc} are significant, as it indicates that DCC-MGARCH estimators are time-varying and dynamic. α_{dcc} indicates that standardised residuals are persistent from the last period since it indicates the volatility impact in the short-run. β_{dcc} indicates the shock impact in the long run where it indicates that the conditional correlation process is persistent. The coefficient of $\rho_{ij,t}$ indicates the strength of correlation whereas its sign shows the direction of correlation. If the value of $\rho_{ij,t}$ is positive, it indicates that the asset returns are positively correlated, whereas if its value is negative it indicates that the asset returns are negatively correlated; hence one asset can hedge against another one.

5. DISCUSSION OF RESULTS

Table 2 presents the findings related to the hedge and safe haven properties of gold against stocks, oils and exchange rate returns. Gold acts as a hedge and safe haven against these variables if the coefficients are negative and significant. The parameters b1, c1 and d1 test the hedging properties of gold whereas the rest of the parameters test the safe haven properties of gold against other variables. Safe haven properties of gold are tested at lower 20 percent, 10 percent and 5 percent quintiles as indicated with each coefficient in parentheses. The coefficients of stock returns are negative for all the parameters but are insignificant except for the 5 percent quintile, which shows that gold plays its role as a safe haven against stock returns, especially when the stock returns are lower than the 5 percent threshold. The results for oil returns are consistent with stock returns in the sense that they are negatively significant for 5 percent quintile only, implying that gold plays its role as a safe haven against oil returns when oil returns are lower than the 5 percent threshold. Finally, the coefficients of exchange rate returns indicate that gold prices increase significantly when there is a decrease in the exchange rate since the results are negatively significant for overall returns as well as for lower 10 percent and 5 percent quintiles in case of the exchange rate returns. Overall, these findings indicate that gold can hedge exchange rate risks only. In terms of the safe haven properties of gold, our results depict an interesting picture. Gold plays its role as a safe haven against all the variables while the impact being more pronounced in terms of the exchange rate risk.

Next, using the DCC GARCH framework, we examine dynamic correlations. Table 3 presents the results of the GARCH (1,1) and DCC models. The first three rows indicate the results of GARCH (1,1) for the variance equation whereas the last two rows indicate the DCC output. The GARCH results indicate that the constant coefficients of the mean equation are mostly insignificant, whereas the significant results for most of the other coefficients indicate that the equations are well specified.

Table 2

Estimation Results

		Coefficients	t-statistics
Stocks	b1 (hedge)	–0.021	–0.43
	b2 (20%)	–0.041	–0.26
	b3 (10%)	–0.02	–0.2
	b4 (5%)	–0.28	–1.69*
Oil	c1 (hedge)	0.079	1.67*
	c2 (20%)	0.001	0.01
	c3 (10%)	0.075	0.61
	c4 (5%)	–0.168	–1.77*
Exchange Rates	d1 (hedge)	–0.71	–2.65***
	d2 (20%)	0.61	0.83
	d3 (10%)	–0.32	–1.72*
	d4 (5%)	–0.63	–2.02**

Note: The results in this table examine the hedging and safe haven properties of gold with returns on other assets. ***, ** and * indicates the significance at 1 percent, 5 percent and 10 percent levels, respectively. b1, c1, and d1 are the parameters for testing hedging dynamics, whereas the rest of the parameters test safe haven dynamics that is how gold behaves in extremely turmoil conditions for oil, stock and exchange rate returns. 20 percent, 10 percent and 5 percent, indicate that the parameters are in 20 percent, 10 percent and 5 percent quintiles.

Table 3

GARCH (1,1) and DCC(1,1) Results of Gold and Other Asset Returns

$$\sigma^2_{i,t} = \gamma_0 + \gamma_1 \sigma^2_{i,t-1} + \gamma_2 \varepsilon^2_{i,t-1}$$

Coefficients	Oil	Stocks	Exchange Rate	Gold
γ_0	5.78	2.21	1.68***	14.89*
	(1.31)	(1.38)	(3.11)	(1.81)
γ_1	0.22***	0.07***	0.25***	0.13
	(3.22)	(3.66)	(2.79)	(1.45)
γ_2	0.73***	0.89***	0.07	–0.12
	(9.69)	(26.15)	(0.32)	(–0.20)
A	–0.038	0.026	–0.0405***	–
	(–1.546)	(0.511)	(–9.93)	
B	0.592	0.786***	-0.841***	–
	(0.965)	(3.24)	(-9.68)	

Note: Values in parentheses indicate t -statistic. ***, ** and * respectively indicate the significance at 1 percent, 5 percent and 10 percent levels.

The alpha DCC term indicates that in the short run there is no persistent relationship of gold with oil and stocks. The beta DCC shows that the conditional correlations process persists in the long run between gold and stock, and gold and exchange rates, where it is highly significant for the latter. Thus, we may conclude that the hedging (diversification) effect of gold against stocks and exchange rates are highly significant and persistent, but the same cannot be said for oil returns.

Figure 2 presents the dynamic conditional correlation of gold returns with stock, oil and exchange rate returns.

**Fig. 2. Dynamic Conditional Correlation**
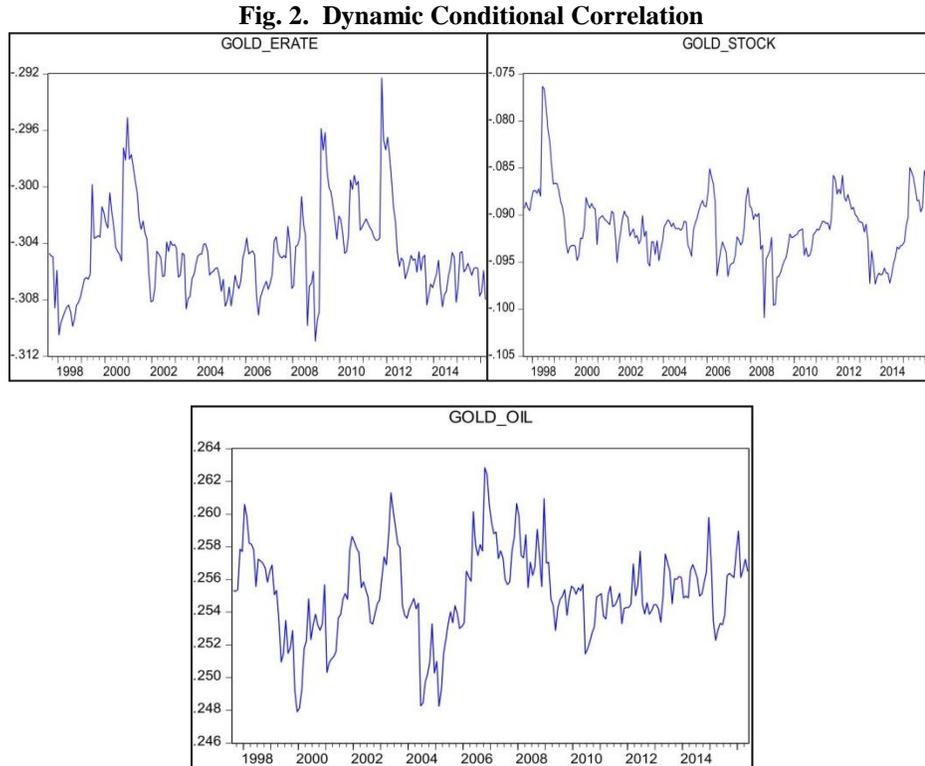
Figure 2 presents the dynamic conditional correlation of gold returns with stock, oil and exchange rate returns. The results indicate that the correlation between gold and exchange rate returns is negative and is around –0.31, with slight changes observed during higher volatility regimes, which justify the hypothesis that gold acts as a hedge against exchange rate returns. This correlation slightly increased during the Asian financial crisis and after the 2008 global financial crisis.

Likewise, the correlation between gold and stock returns is negative but the strength of the correlation is lower, which is around –0.09. Moreover, the correlation between these two returns further decreased during the Asian financial crisis. This change in the correlation of gold returns with stock and exchange rate returns during high volatility periods indicate that the correlations are sensitive to shocks. Finally, the correlation between gold and oil returns can be seen as positive for the whole sample indicating that gold cannot hedge against oil returns.

The possible reason for gold to play its role as a safe haven is that, in developing nations, gold has been more attractive than bonds, stocks, and bank deposits. People in developing nations usually consider gold a better choice for investment (Anand & Madhogaria, 2012). The findings of this study that gold plays the role of a safe haven against stock returns are consistent with the findings of Baur

and Lucey (2010) but against the findings of Ciner et al. (2013). The findings that gold is a hedge and a safe haven against the exchange rate are consistent with the findings of Ciner et al. (2013). A negative relationship between gold and exchange rate indicates that gold can hedge against exchange rate risk (Ciner et al. 2013). Finally, for oil returns as a case, this study provides results that are consistent with the findings of Reboredo (2013a) where he tested the role of gold as a hedge or safe haven against the oil by using a copulas-based approach and analysed that gold does not play its role as a hedge against oil price movements, however, it plays its role as a safe haven against oil price movements.

6. CONCLUDING REMARKS

This paper tests the safe haven and hedging properties of gold with oil, stock, and exchange rate returns in the context of Pakistan. Baur and Lucey (2010) state that an asset is a safe haven if it is negatively correlated or uncorrelated with another asset or portfolio of assets in extremely turmoil conditions and as a hedge if it is negatively correlated or uncorrelated with another asset or portfolio of assets in normal conditions.

We use the least square and DCC GARCH econometric estimation approaches to test the hedging and safe haven properties of gold with the exchange rate, oil, and stock market returns. In the least square, gold returns are regressed on overall stock, oil, and exchange rate returns and on 5 percent, 10 percent and 20 percent lower quintiles for each explanatory variable. To account for the time-varying correlation, DCC GARCH proposed by Engle (2002) is used in this study.

The results from the least-squares indicate that gold returns serve as a hedge against exchange rate risk only whereas it serves as a safe haven against oil returns, stock returns, and exchange rate returns' risk. We, therefore, conclude that there exists a stronger safe haven relationship of gold with foreign exchange markets than with the stock and oil markets. It may thus be suggested that choosing gold as an investment alternative, investors can avoid severe losses associated with foreign exchange, oil or stock markets.

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Exchange Rate Misalignment and Economic Growth in Pakistan: The Role of Financial Development

Zainab Jehan and Iffat Irshad

This study endeavours to examine empirically how real exchange rate (RER) misalignment affects economic growth in Pakistan. In this regard, we have not only estimated the direct impact but also the indirect impact of misalignment on economic growth by using the financial development channel. We have used time series data ranging from 1980 to 2016 to carry out the empirical analysis. After testing the time series properties of the selected variables, we computed long run equilibrium RER later used to calculate RER misalignment. Finally, we estimated the impact of misalignment on per capita economic growth, both direct and indirect. Our results reveal an adverse impact of RER misalignment on economic growth. However, we report that financial development helps in minimising the adverse impact of RER misalignment, though not fully eliminating it. Based on the empirical findings, the study suggests that exchange rate policies need to be managed more cautiously. Moreover, the financial sector development needs to be strengthened which may help in fully alleviating the adverse impact of RER misalignment on economic growth.

JEL Classification: F31, GOO, O47

Keywords: Real Exchange Rate Misalignment, Financial Development, Economic Growth, FMOLS

1. INTRODUCTION

Exchange rate misalignment and exchange rate volatility have become two important considerations while formulating exchange rate policy since the new era of exchange rate arrangements. Therefore, policy makers stress the importance of aligning actual exchange rate closer to the long run equilibrium exchange rate. The persistent failure to meet this objective may lead towards the incidence of exchange rate misalignment, which is largely reported as detrimental for macroeconomic performance.

Theoretically, real exchange rate (RER) misalignment may occur due to changes in macroeconomic or structural factors. Macroeconomic induced RER misalignment is a consequence of inconsistencies between macroeconomic policies, particularly monetary policy, and nominal exchange rate. An expansionary monetary policy, for instance, generates a higher increase in domestic prices as compared to world prices, and thus leads to real exchange rate appreciation. This, eventually, diminishes foreign reserves, expands foreign borrowings, and intensifies black market activities. On the other hand, structural misalignment occurs when RER does not immediately respond to changes in its determinants (Edwards, 1988).

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Empirically, the existing body of research has widely recognised that exchange rate management is one of the most important channels through which economic policy affects the economic performance of an economy (Cottani et al. 1990). Particularly, the link between exchange rate misalignment and economic growth is widely examined for both large and small open economies. In this regard, the pioneering work is done by Edwards (1988), which empirically proves the adverse impact of RER misalignment on economic growth. Evidence from the developing world specifically supports the view that RER behaviour and economic growth are strongly related (Cottani et al. 1990; McPherson, 1997; Eichengreen, 2008; Rodrik, 2008; Rapetti et al. 2011; Ndlela, 2012; Jordaan & Eita, 2013; Bannaga & Badawi, 2014; Ali et al. 2015; Akram & Rath, 2017). Several studies, employing data for a larger set of countries, have also provided consistent results (Dollar, 1992; Ghura & Grennes, 1993).

Furthermore, some studies test the existence of possible asymmetries in the misalignment-growth relationship such as (Razin & Collins, 1997; Aguirre and Calderon, 2005; Gala, 2008; Rodrik, 2008; MacDonald & Vieira, (2010); Abida, (2011); Bhalla, (2012); Akram & Rath, 2017), among others. In particular, an overvalued exchange rate negatively affects economic performance by restricting economic activity, instigating balance of payment emergencies, and stimulating rent-seeking and black market practices (Rodrik, 2008). In contrast, exchange rate undervaluation helps to boost exports, increase employment and achieve higher economic growth (Rodrik, 2008 & Bhalla, 2012). Additionally, another strand of literature has proved that exchange rate misalignment in either form is harmful for economic growth (Sekkat & Varoudakis, 2000; Masunda, 2011; MacDonald & Vieira, 2010) conclude that the adverse impact of RER misalignment is higher for developing and emerging economies than developed countries.[1]

The recent surge in empirical literature, however, is to identify factors that help in plummeting and/or alleviating the unfavourable impact of RER misalignment on macroeconomic performance, specifically economic growth. In this regard, the role of financial development has gained considerable attention. Empirical studies have shown that financial development can limit the adverse impact of RER fluctuations on economic growth (Aghion et al. 2009; Elbadawi et al. 2012; Sekkat, 2012). For instance, financial development enhances economic growth by increasing financial resources and improving the efficiency of financial markets. Furthermore, financial development can provide better hedging tools to safeguard against the uncertainty attached with RER fluctuations and/or misalignment (Abu-Bader & Abu-Qarn, 2008).

Pakistan, being a small open economy, has witnessed misalignment in exchange rate due to both structural and macroeconomic factors. Exchange rate policies pursued by the country have contributed in an important way in determining the extent and span of misalignment in the exchange rate. Exchange rate policies have maintained a depreciated exchange rate most of the time in Pakistan, though the country has also experienced some episodes of appreciation with respect to equilibrium exchange rate (Debowicz & Saeed, 2014; Hyder & Mehboob, 2005).

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[1] In addition to economic growth, Nabli et al. (2003) and Ebaidalla (2014) have shown the misalignment of exchange rate also deteriorate export performance of a country.

Historically, factors that have contributed towards an overvalued exchange rate in Pakistan are weakening of the US dollar against other currencies, current government expenditures, and deteriorating terms of trade, among others (Hyder & Mahboob, 2005). The episodes of undervalued exchange rate relative to equilibrium exchange rate during the 1980s (1982 onwards), in contrast, occurred due to appreciation of the US dollar against other major currencies, high domestic inflation relative to trading partners, abandoning of fixed exchange rate system, and trade liberalisation. During the 1990s, the exchange rate was kept undervalued mainly to combat the adverse impact of inflation on real exchange rate. In addition, Hyder and Mahboob (2005) document that during the managed and flexible exchange rate regimes Pakistan experienced not only a lower degree of exchange rate misalignment but also the variations in misalignment were less during these regimes in comparison to the fixed exchange rate regime. Recently, massive undervaluation in PKR was observed and the exchange rate has reached PKR154/$ from historically low rates of PKR18.60/$ in 1988. Insufficient foreign exchange reserves and the escalation of current account deficit are the prominent reasons behind the weakening PKR position against the US dollar.

Thus, it is evident from the above discussion that the relationship between RER movements and economic growth proves to be an important issue from both positive and normative perspectives. Although, there is ample evidence on estimating the equilibrium real exchange rate (Chishiti & Hasan, 1993; Afridi, 1995, & Siddiqui et al. 1996) and computing real effective exchange rate misalignment (Qayyum et al. 2004; Hyder & Mehboob, 2005; Janjua, 2007; Debowicz & Saeed, 2014; Hamid & Mir, 2017 & Bhatti et al. 2018) for Pakistan, these studies are confined only to computation and/or presentation of the trends of RER misalignment in Pakistan over different time periods. These studies conclude, at large, that Pakistan has experienced various episodes of undervaluation and overvaluation. However, the literature is scant on estimating the impact of RER misalignment on economic growth of Pakistan. Notably, there is only one study by Zakaria (2010) which has empirically tested the impact of RER misalignment on economic growth of Pakistan and concludes that undervaluation promotes economic growth in Pakistan. Bhatti et al. (2018) only provide evidence that real effective exchange rate misalignment granger cause economic growth in Pakistan.

A review of existing literature for Pakistan shows that a large body of literature has focused on either computing equilibrium RER or calculating RER misalignment. A dearth of literature on estimating the macroeconomic implications of RER misalignment for Pakistan reflects a gap in existing literature. For instance, only two studies examine the impact of RER misalignment on economic growth. Specifically, Zakaria (2010) has focused on estimating the impact of RER undervaluation on economic growth while Bhatti et al. (2018) have reported pairwise granger causality between RER misalignment and economic growth. No study explores the role of different moderating and/or mediating channels in the RER misalignment-growth relationship. To bridge this gap, this study primarily aims to empirically examine the role of a moderating channel in the RER misalignment-growth relationship. Firstly, we examine the direct impact of RER misalignment on economic growth. Secondly, we estimate the indirect/conditional impact of RER misalignment on economic growth by using the moderating role of financial development. As emphasised by literature such as Aghion et al. (2009), Elbadawi et al.

2012 & Sekkat, 2012), financial development helps in mitigating the adverse impact of exchange rate fluctuations by providing better hedging facilities, and improving the efficiency and transmission mechanism of financial markets. Pakistan's financial sector is still in an embryonic stage although it has gone through various regulations and modifications. Therefore, it is pertinent to examine the role financial development plays in the misalignment-growth relationship. Finally, by using direct and indirect impact, the overall/total impact of misalignment on economic growth is estimated at various percentiles of financial development. Our analysis will be helpful in identifying the importance of financial development in controlling the harmful impact of RER misalignment on economic growth.

To carry out an empirical analysis, the study utilises time series data from 1980 to 2016. RER misalignment is computed by employing the Behavioural Equilibrium Exchange Rate (BEER) approach developed by Clark and MacDonald (1998) whereas, the Fully Modified OLS (FMOLS) approach is employed to empirically estimate the direct and indirect impact of RER misalignment on economic growth. The findings of the study state that RER misalignment hampers while financial development triggers economic growth of Pakistan. Moreover, the adverse impact of misalignment diminishes with the help of financial development. Therefore, financial development proves an important channel through which misalignment fallouts for economic growth can be controlled. Our findings are consistent with existing literature which supports the moderating role of financial development in misalignment-growth relationship. Being a developing country, Pakistan still needs to focus on its financial sector development so that the exchange rate can be kept closer to its equilibrium and its fallouts on economic growth can be mitigated.

The rest of the study is organised as follows: Introduction is followed by Section 2 which explains the analytical framework employed to carry out the empirical analysis. Section 3 presents the findings of the study with a detailed discussion. Finally, Section 4 concludes the study with some policy recommendations.

2. METHODOLOGY AND DATA

The empirical examination comprises two steps: first step explains the computation of RER misalignment while the growth impact of RER misalignment is estimated in the second step.

2.1. Computation of Real Exchange Rate Misalignment

Exchange rate misalignment is the persistent departure of the observed exchange rate from the long run equilibrium exchange rate.[2] Therefore, to compute exchange rate misalignment, it is important as a first step to calculate the equilibrium exchange rate.

Broadly, there are three main approaches available to measure exchange rate misalignment, (i) Purchasing Power Parity Approach, (ii) Fundamental Equilibrium Exchange Rate Approach developed by Williamson (1994), and (iii) Behavioural Equilibrium Exchange Rate (BEER) Approach developed by Clark and MacDonald

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[2] The long run equilibrium exchange rate is that rate which is compatible with the simultaneous achievement of external and internal equilibrium.

(1998). This study employs BEER approach developed by Clark and MacDonald (1998) for estimating the equilibrium exchange rate as it is suggested by recent literature for computing equilibrium exchange rate (e.g. Aguirre & Calderon, 2005; Hyder & Mehboob, 2005; Sallenave, 2010; MacDonald & Vieira, 2010; Abida, 2011 & Ndlela, 2012, among others). This approach works as follows:

    (i)   Real exchange rate is estimated against the fundamental determinants of RER.

   (ii)   The estimated coefficients from the regression in the first step and the permanent components of the determinants of RER are used to compute equilibrium RER.

  (iii)   RER misalignment is computed as the difference of the observed real exchange rate from the computed equilibrium RER.

In pursuance of Step 1 above, the following model adapted from Berg and Miao 2010; Naseem et al. (2013); Conrad & Jagessar, 2018) has been estimated including both domestic as well as external factors determining equilibrium exchange rate:

$$LRER_t = \beta_0 + \beta_1 G_t + \beta_2 RIRD_t + \beta_3 TO_t + \beta_4 GC_t + \beta_5 NFA_t + \mu_t \qquad \dots \quad (1)$$

where, *t* is the time period from 1980–2016. $LRER_t$ shows log of real bilateral exchange rate. The US dollar is used as a benchmark currency considering its significance as the vehicle currency in international exchange. Moreover, the foreign exchange of Pakistan is denominated in terms of dollar which justifies the use of USA dollar as the benchmark currency; We use CPI of Pakistan and the USA to convert nominal exchange rate in to real. $[RER = NER * (\frac{CPI^{usa}}{CPI^{pak}})]$. G_t is log of real gross domestic product per capita; $RIRD_t$ indicates short term real interest rate (rir) differential of Pakistan and the USA $(rir^{pak} - rir^{usa})$. As per standard practice, the interest rates are made real by using the inflation rate of the respective countries. The study uses money market rates as the short-term interest rate; TO_t represents trade openness (sum of exports and imports as a percentage of GDP); GC_t is the government consumption expenditure as a percentage of GDP; NFA_t indicates net foreign assets as a percentage of GDP; μ_t is error term.

GDP per capita is expected to cause depreciation in real exchange rate. On the other hand, the impact of trade openness depends on whether it leads to increase exports or imports. Therefore, TO may lead to appreciation or depreciation of RER. The impact of government expenditure depends on the composition of government expenditure. Higher consumption from the tradable sector would create disturbance in current account and depreciates the domestic currency and vice versa. Net foreign assets are expected to affect exchange rate through current account channel, for instance, an increase in foreign reserves leads to appreciation in the domestic currency and vice versa (Lane et al. 2004, & Mariano et al. 2016). Finally, the impact of real interest rate differential depends on whether the differential is positive or negative. A positive interest rate differential is expected to attract more foreign capital thus creating domestic currency appreciation, whereas depreciation of the same is expected due to the negative interest rate differential.

After obtaining these estimates, the above model is fed with the stable/equilibrium values of the determinants of real exchange rate (obtained from HP Filter) to attain the

equilibrium real exchange rate. Following Toulaboe (2006) and Nouira and Sekkat (2012), real exchange rate misalignment is thus computed as follows:

$$Mist_t = \frac{RER_t - EERER_t}{EERER_t} \ X \ 100 \qquad \ldots \qquad \ldots \qquad \ldots \qquad \ldots \qquad \ldots \qquad (2)$$

where, $Mist_t$ represents Misalignment of RER, RER_t is the Observed RER, $EERER_t$ shows Estimated Equilibrium RER.

2.2. Impact of RER Misalignment on Economic Growth

By following Conrad and Jagessar (2018), Akram and Rath (2017), and Naseem et al. (2013)[3], we have estimated the unconditional impact of RER misalignment on economic growth as follows:

$$G_t = \alpha_0 + \alpha_1 LEMP_t + \alpha_2 LGFCF_t + \alpha_3 LTO_t + \alpha_4 GSSE_t + \alpha_5 LRER_t + \alpha_6 Mist_t + \mu_t \qquad (3)$$

As explained above, in addition to estimating the direct/unconditional impact of RER misalignment on economic growth, this study also attempts to estimate the indirect/conditional impact of RER misalignment on economic growth. The existing literature on RER-growth relationship has pondered on some transmission channels which affect the exchange rate and growth relationship (Razin & Colins, 1997; Bhalla, 2012; Levy-Yeyati & Sturzenegger, 2007; Rodrik, 2008). One of the possible channels is the financial sector development which may influence the impact of RER misalignment on economic growth. Therefore, we take financial development to examine its role as a moderator in misalignment-growth relationship. (Schumpeter, 1911; McKinnon, 1973 & Shaw, 1973) have developed the models in which they have shown the importance of financial development in explaining economic growth through innovations and identification and funding productive investment. Moreover, McKinnon (1973) and Shaw (1973) argue that financial development causes increase in savings and capital accumulation that, in turn, lead to economic growth. These growth-enhancing effects of financial development can be strong enough to surpass the adverse effects of RER fluctuations (RER volatility and/or RER misalignment) on economic growth. Moreover, financial development can provide better hedging tools to safeguard against the uncertainty attached with RER fluctuations and/or misalignment (Aghion et al. 2009; Elbadawi et al. 2012, and Basirat et al. 2014). To test whether financial development actually plays this moderating role, the interaction of RER misalignment and financial development has been introduced in model 3, the model then takes the following form:

$$G_t = \gamma_0 + \gamma_1 LGFCF_t + \gamma_2 LEMP_t + \gamma_3 LTO_t + \gamma_4 GSSE_t + \gamma_5 LRER_t$$
$$+ \gamma_6 Mist_t + \gamma_7 FD_t + \gamma_8 Mist * FD_t + \varepsilon_t \qquad \ldots \qquad \ldots \qquad \ldots \qquad (4)$$

Where '*t*' represents time period (1980 to 2016); G_t is the log of real gross domestic product per capita; $LEMP_t$ shows log of employment; $LGFCF_t$ Is log of gross fixed capital formation; LTO_t indicates log of trade openness; $LRER_t$ shows log of real bilateral exchange rate (Rs/US$); $GSSE_t$ represents human capital measured through gross secondary school enrolment rate; $Mist_t$ indicates RER misalignment (in percent); FD_t is

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[3]These Studies, however, have taken growth of GDP per capita while we proceed by taking log of GDP per capita

the financial development which is captured through domestic credit to private sector (as % of GDP);

$Mist * FD_t$ is the interaction of RER misalignment and financial development. The interaction term captures the moderating role of financial development in this model. In other words, it indicates the growth impact of RER misalignment through the channel of financial development. μ_t and ε_t are error terms. All variables are taken in constant dollar form with 2010 as the base year. In Eq. 4, γ_6 and γ_7 capture the direct effect of RER misalignment and financial development on economic growth, respectively. Whereas, γ_8 captures the indirect effect of RER misalignment on economic growth, considering the level of financial development.

Real Exchange rate misalignment is expected to retard economic growth. There are many channels through which exchange rate misalignment transmits the harmful effects on economic growth. For instance, a misaligned exchange rate adversely affects the tradable sector and its relative competitiveness thus causes output to decline (Aguire and Calderon, 2005). Moreover, exchange rate misalignment can also lead to sub-optimal allocation of resources across sectors by giving wrong signals based on the distorted relative prices of tradables and non-tradables and consequently may harm the economy (Razin & Collins, 1999). Based on theoretical foundations, financial development, GFCF, level of employment, and the level of education are expected to boost economic growth while trade openness may trigger or hamper the process of economic growth.

The study covers the period from 1980 to 2016. For empirical analysis, the study has accessed data form various data sources namely, World Development Indicators (WDI) published by World Bank (2018), data on the employment level is obtained Penn World Tables 9.0, and Pakistan Economic Survey (2018). The data on interest rate is accessed from International Financial Statistics (2018) published by IMF.

Before empirical proceedings, it is important to test the stationary properties of the time series as it helps in adopting the appropriate econometric technique for estimation. For this purpose, the study uses the most widely recommended test for the order of integration: the Augmented Dickey Fuller (ADF) test. Moreover, for robustness, we use a more efficient test of unit root, Dickey Fuller-Generalised Least Square (DF-GLS) developed by Elliott, Rothenberg and Stock (1996) for the order of integration. This test is more powerful in terms of testing the unit root properties. One of the advantages of this test is that it locally de-trend the data series to efficiently estimate the deterministic parameter of the series and use the transform data to perform the usual ADF test.

Next, to establish econometric relationship among the selected variables, the present study employs the Fully Modified Ordinary Least Squares (FMOLS) technique to estimate Equilibrium RER as well as direct and indirect impact of RER misalignment on economic growth (Equation 1, 3 & 4). FMOLS, proposed by Phillip and Hansen (1990), is a semi-parametric approach to co-integration. One of the prerequisites of the FMOLS is that it is used to estimate the single equation co-integration relationship with the combination of variables that are integrated of order one. Particularly, the dependent variable should be I (1). One of the important properties of FMOLS is that it caters the problem of possible endogeneity in the model which makes it more relevant in our case.[4]

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[4] For robustness, we have also estimated our models by employing an alternate technique i.e. Dynamic OLS (DOLS). The results from DOLS are reported in the Appendix.

3. DISCUSSION OF RESULTS

3.1. Descriptive Statistics

The descriptive statistics presented in Table 1, The RER misalignment values, highlight that the extent of negative misalignment (–59.26), on average, remains greater than the positive (26.41 percent). The largest spell of overvaluation was experienced post 2001 by the country due to huge inflow of capital after the initiation of war on terror. However, the positive misalignment is experienced for a longer time span in the selected time period of the study. By looking at the exchange rate movements, we can observe that the lowest rate is 40.86 while the highest is 113.24, in real terms. Interestingly, the minimum and maximum values of equilibrium RER remain higher than the actual RER. The real GDP per capita growth is 6.7 percent, on average with a minimum value of 6.3 and a maximum of 7.1. This indicates nearly stagnant economic growth over the sample period.

Table 1

Descriptive Statistics

Variable	No of Obs.	Mean	Std.Dev.	Min	Max
G	38	6.738	0.213	6.321	7.108
GFCF	38	16.114	1.668	12.521	19.235
GC	38	11.227	2.064	7.781	16.785
GSSE	38	26.510	8.349	16.956	46.109
LRER	38	4.329	0.241	3.701	4.729
TO	38	33.542	3.269	25.306	38.909
FD	38	23.501	3.956	15.386	29.786
NFA	38	1.521	4.985	–6.578	11.561
RIRD	38	–1.193	3.375	–8.655	4.439
Mist	38	18.407	29.548	–59.264	26.412
Mist_FD	38	–3.865	6.899	–15.931	6.386
LEmp	37	3.552	0.296	3.097	4.053

Notably, the level of financial development proxied by domestic credit is very low, indicating that the country needs to focus more on improving the level of financial development. Interestingly, on average, the real interest rate differential is negative indicating that the US real interest rate remains higher than Pakistan.

3.2. Unit Root Tests

The unit root test is applied on two sets of variables: (a) the set of variables that are used to measure real exchange rate misalignment (b) variables required to estimate the misalignment impact on economic growth. The unit root estimates are presented in Table 2. Both the test statistics (ADF and DF-GLS) confirm that the selected set of variables are integrated by order of one.

Table 2

Unit Root Estimates

Panel A: Estimates of Unit Root Test for Regression 1 (First Stage)

Variable	Levels		First Difference		Order of Integration
	ADF	DF-GLS	ADF	DF-GLS	
IR	−2.011	1.968	−7.089***	−7.217***	I(1)
	(3.51)	(−3.190)	(−3.496)	(−3.184)	
NFA	−2.352	−1.742	−6.419***	−6.515***	I(1)
	(−3.491)	(−3.167)	(−3.494)	(−3.171)	
GC	−2.060	−2.062	−7.269***	−7.204***	I(1)
	(−3.491)	(−3.168)	(−3.492)	(−3.171)	
G	−2.435	−1.349	−6.359***	−6.444***	I(1)
	(−3.490)	(−3.167)	(−3.492)	(−3.171)	
LTO	−1.973	−2.091	−7.929***	−6.756***	I(1)
	(−3.502)	(−3.190)	(−3.504)	(−3.190)	
Panel B: Estimates of Unit Root Test for Regression 3&4 (Second Stage)					
Mist	−2.430	−1.999	−6.051***	−6.123***	I(1)
	(−3.511)	(−3.190)	(−3.504)	(−3.190)	
LRER	−1.177	−1.312	−6.775***	−6.778***	I(1)
	(−3.491)	(−3.167)	(−3.492)	(−3.171)	
G	−2.435	−1.349	−6.359***	−6.444***	I(1)
	(−3.490)	(−3.167)	(−3.492)	(−3.171)	
LGFCF	−1.298	−0.969	−4.952***	−3.593**	I(1)
	(−3.508)	(−3.190)	(−3.511)	(−3.171)	
LTO	−1.973	−2.091	−7.929***	−6.756***	I(1)
	(−3.502)	(−3.190)	(−3.504)	(−3.190)	
LEMP	−2.598	−2.016	−7.312***	−7.302***	I(1)
	(−3.492)	(−3.171)	(−3.494)	(−3.174)	
FD	−2.917	−1.549	−6.194***	−6.296***	I(1)
	(−3.491)	(−3.167)	(−3.492)	(−3.171)	
Mist_FD	−2.561	−2.191	−6.161***	−6.282***	I(1)
	(−3.511)	(−3.190)	(−3.504)	(−3.190)	
GSSE	−0.865	−1.201	−4.784***	−4.896***	I(1)
	(−3.515)	(−3.190)	(−3.516)	(−3.190)	

Note: ***, ** refers to 1 percent and 5 percent level of significance.

3.3. Equilibrium Real Exchange Rate

The estimates of real exchange rate are presented in Table 3. The results depict expected signs and portray significant impact of selected indicators on real exchange rate. We have used the coefficients of these variables and their trend components to compute the equilibrium exchange rate. Finally, substituting the values of actual exchange rate and equilibrium exchange rate in Equation 2 generates a measure of real exchange rate misalignment.

Table 3

FMOLS Estimates of Exchange Rate Determination

Variable	Coefficient	t-stat	P-Value
G	0.917***	8.168	0.000
RIRD	–0.026***	–3.787	0.005
NFA	0.048***	6.503	0.000
TO	0.945***	5.039	0.000
GOV	–0.032*	–1.857	0.070
C	–4.731***	–5.928	0.000

Note: *, ***, indicates level of significance at 10 percent and 1 percent levels.

Figure 1 plots both real exchange rate and the estimated equilibrium exchange rate where the difference between these two is identified as real exchange rate misalignment. It is evident from the figure that the two lines do not overlap each other signifying that the real exchange rate in Pakistan has always remained misaligned, either in the form of overvaluation or undervaluation. A positive value shows undervaluation while the negative value shows overvaluation in the actual exchange rate.

Fig. 1. Trends of Actual and Equilibrium Real Exchange Rate in Pakistan
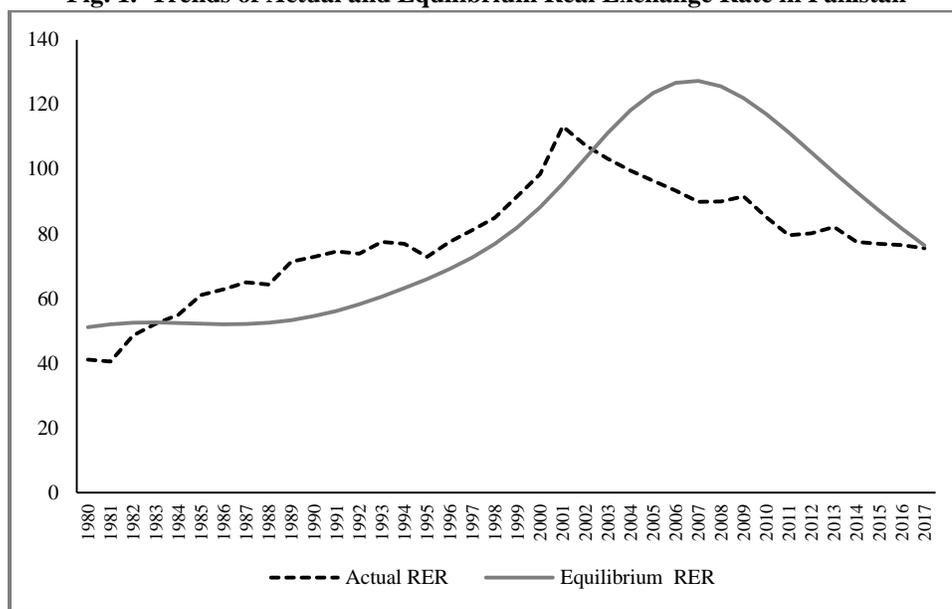
As is depicted in Figure 1 above, the real exchange rate of Pakistan has remained overvalued until 1982. However, it remained undervalued from 1983 to 2000 and it has remained overvalued. The magnitude of undervaluation is less as compared to the magnitude of overvaluation.

Furthermore, Figure 2 displays the trends of RER misalignment of the PKR against the US dollar. As mentioned above, on average, misalignment appears as 18 percent during the selected period. The main reason for the overvaluation of the PKR,

before the adoption of flexible exchange rates regime in 1982, is the overvaluation of the US$. In the early 1980s, the US increased its interest rate in order to reduce its large budget deficits, which resulted in capital inflow and overvaluation of the US dollar. As the PKR was linked to the US dollar, it was also overvalued. This has further resulted in a decrease in Pakistan's competitiveness in the international market.

Fig. 2. RER Misalignment
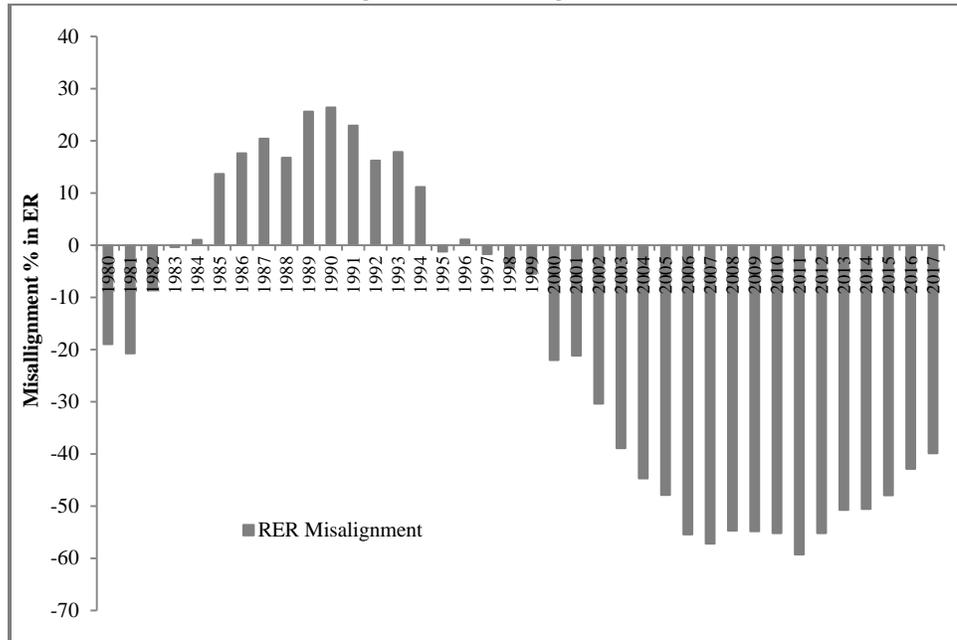
Later, in order to maintain international competitiveness and to reduce the resulting trade deficit, in 1982 the State Bank of Pakistan adopted the floating exchange rate regime, although it was controlled floating where the PKR was tied to a band of trade weighted currencies. Thus, it resulted in the devaluation of the PKR. From the 1990s to 2000, the depreciation in the PKR was observed in order to combat the inflationary pressure on RER (Janjua, 2007).

From 2001, the PKR remained overvalued. This estimate is consistent with a recent study by the IMF (2012) that reports that the Pakistani currency has appreciated by more than 17 percent, which is higher than that of the currencies of other countries in the region. The authors argue that the poor export performance and dependence of the economy on remittances for maintaining the reserves position at a sustainable level are indications of the prevalence of overvaluation of the PKR.

3.4. Growth Impact of RER Misalignment

Table 3 reports both the direct and indirect impact of RER misalignment on economic growth. Column 2 displays the direct impact while Column 3 demonstrates the indirect impact of misalignment on economic growth by using the financial development channel.

It is evident that all the estimates presented in Table 4 are statistically significant and carry expected signs. As emphasised by Neoclassical growth models, labour and capital are the two important factors of production in growth models. Therefore, to incorporate this aspect of the production function, we use both employment level (a measure labour input), and GFCF (a measure of physical capital stock), in order to check their significance in economic growth for Pakistan. The estimates in both specifications reveal a statistically significant and positive impact of both factors of production on GDP per capita of Pakistan. This finding aligns with existing literature such as Toulaboe 2006; Abida 2011 & Masunda 2011, among others. Moreover, the study has also incorporated the role of secondary school enrolment, which demonstrates a positive and significant impact on economic growth. Barro (1991) undoubtedly emphasises the vital role of human capital for growth through its positive effect on productivity and, thus, on economic growth.

Table 4

Growth Impact of Misalignment: Direct and Indirect Impact

Dependent Variable: Log of GDP Per Capita	Model 1		Model 2	
Variable	Coefficient	P-Value	Coefficient	P-Value
LRER	0.042***	0.000	0.148***	0.000
	(0.008)		(0.009)	
Mist	−0.134***	0.000	−0.078**	0.019
	(0.006)		(0.031)	
FD	0.002***	0.000	0.006***	0.001
	(0.000)		(0.000)	
Mist*FD	–	–	0.004***	0.004
			(0.001)	
LGFCF	0.309***	0.000	0.170***	0.000
	(0.014)		(0.020)	
LEMP	0.441***	0.000	0.615***	0.000
	(0.018)		(0.019)	
LTO	−0.098***	0.000	0.120***	0.000
	(0.009)		(0.010)	
GSSE	0.005***	0.000	0.003***	0.000
	(0.000)		(0.000)	
R-Squared	0.956		0.982	

Note: **, *** indicates level of significance at 5 percent and 1 percent level of significance. Values in parenthesis are standard errors.

The significant role of trade in growth has been advocated by both trade and growth theories. The empirical literature, however, has provided mixed findings. The positive role of trade in economic growth has been documented by various studies such as (Cottani et al. 1990; Aguirre and Calderon, 2005; Béreau et al. 2009; Dufrenot et al. 2009 & Abida, 2011, among others). In contrast, another strand of literature provides empirical evidence for the unfavourable impact of trade on growth. Trade may lead to lower economic growth, particularly in developing countries. For Pakistan, our findings suggest a favourable impact of trade openness for per capita GDP growth (Model 2).

Our findings regarding the impact of RER on economic growth are in line with theoretical expectations where an increase in RER is expected to increase exports, employment, and thus economic growth, by making exports relatively cheaper in the international market. This result is also consistent with the findings of other studies like (Eichengreen, 2008; Rodrik, 2008 & Rapetti et al. 2011, among others).

In contrast to RER, misalignment in RER appears detrimental for economic growth in both specifications. This finding is statistically significant at a conventional level and in accordance with our theoretical expectations. Theoretically, misalignment distorts relative prices, which, in turn, lead to sub optimal allocation of resources and thus retards economic growth. In addition, investment decisions and the capital accumulation process is also sensitive towards the deviation of exchange rate from its equilibrium point. As investment is an important contributor to growth, exchange rate misalignment reduces economic growth by distorting investment. Similar findings are reported by (Edwards, 1988; Ghura & Grennes, 1993; Aguirre & Calderon, 2005; Toulaboe, 2006; Rodrik, 2008; Eichengreen, 2008L; Berg & Miao, 2010; Abida, 2011; Ndlela, 2012; Bannaga & Badawi, 2014; Akram & Rath, 2017; among others).

This finding supports the argument that exchange rate policy significantly affects economic growth particularly in developing countries like Pakistan. Thus countries, which are able to maintain their actual exchange rate closer to equilibrium, do witness a higher per capita growth.

In addition to management of exchange rate, the level of financial development also determines economic performance. An improved financial sector not only helps to channel resources into more efficient uses through innovation, and by introducing new financial services, but also creates new opportunities for savers and lenders. Consequently, it leads to higher economic growth. Levine (1997) describes the importance of financial development as an excellent predictor of not only economic growth but also of capital accumulation and technological change that further accelerates economic growth. Our findings also suggest a significant contribution of financial development in economic growth.

We now discuss the moderating role of financial development between misalignment-growth relationships. The coefficient of the interaction term of RER misalignment with financial development, capturing the indirect effect of misalignment on economic growth by using the financial development channel, is positive as shown in Regression 4. This finding implies that the level of financial development in Pakistan is helpful in transforming the adverse impact of misalignment into favourable for GDP per capita. The impact, however, is very small. This finding suggests that as the level of financial development increases, the adverse impact of RER misalignment on economic growth reduces. This further suggests that Pakistan still needs to improve the structure, performance, and efficiency of the financial sector in order to benefit from it.

For a better understanding of the role of financial development in the misalignment-growth relationship, by following Aghion et al. (2009), we have computed the impact of RER misalignment on economic growth at various levels of financial development.[5] These levels are determined by using the percentiles of financial

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[5] This is done by taking the first derivate of Equation 4 with respect to FD and substituting the values of FD at different percentiles.

development. Figure 3 depicts that at the lowest level of financial development (10th percentile), the impact of misalignment remains negative. However, as we move to the higher percentiles of financial development, the growth impact of misalignment becomes positive. This finding is supported by the existing studies of a similar nature such as (Aghion et al. 2009; Sekkat, 2012 & Elbadawi et al. 2012). These studies have also proved that financial development limits the adverse impact of RER fluctuations on economic growth by providing protection through better hedging tools against RER risks.

Fig. 3. Marginal Effect of Misalignment on Economic Growth
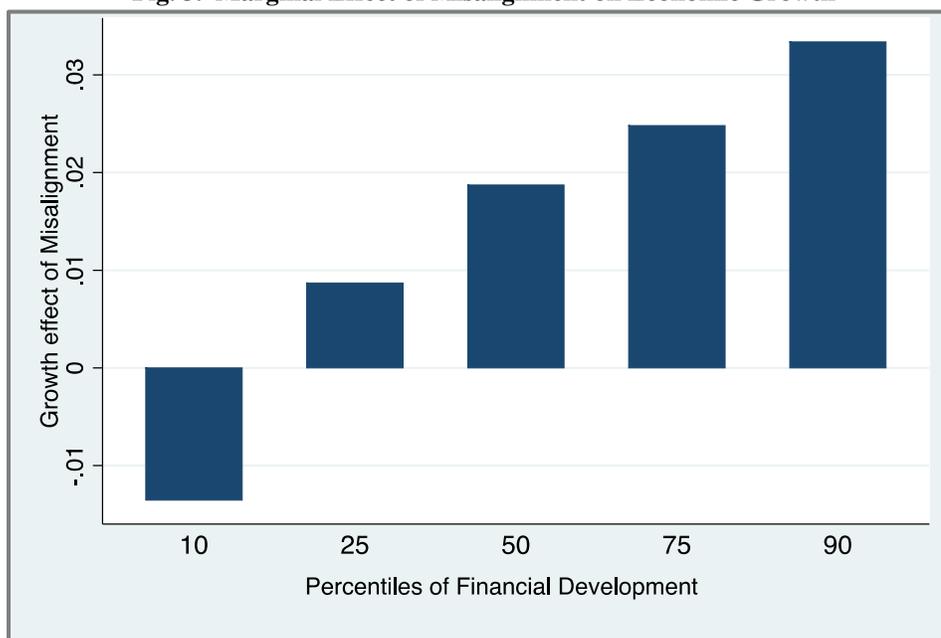
In conclusion, our findings are new in terms of their contribution to the existing stock of empirical literature on various aspects of exchange rates, particularly for Pakistan. The above findings suggest that exchange rate policies need to be managed more cautiously to keep the actual exchange rate closer to its long run equilibrium exchange rate. Moreover, the stabilising role of financial development is required to be more rigorous to combat the adverse impact of RER misalignment.

4. CONCLUSION AND POLICY RECOMENDATIONS

The era of flexible exchange rate system has been challenging for policy makers on various grounds. These challenges include controlling exchange rate volatility and maintaining the actual exchange rate closer to its long run equilibrium. Therefore, much literature is devoted to providing theoretical background and empirical evidence on underlying causes of exchange rate fluctuations and their impact on economic growth.

This study aimed to provide some new evidence on exchange rate misalignment for Pakistan, an important dimension of exchange rate management. The findings of our study reveal an adverse impact of misalignment while a favourable impact of financial

development on economic growth was observed. For the indirect impact, we have used an interaction term of RER misalignment and financial development. The coefficient of this interaction term appears as positive. Therefore, we conclude that the level of financial development transforms the negative impact of RER misalignment into positive for economic growth in Pakistan. However, when we combine the direct and indirect impact, the overall impact is still negative. This finding implies that the financial sector development, in Pakistan does require improvements to help to eliminate the unfavourable impact of RER misalignment on economic performance.

Based on empirical findings, the study suggests a cautious management of exchange rate policies that can help the actual exchange rate to remain closer to its equilibrium point thus reducing its adverse impact. It is indeed a hard challenge for a country like Pakistan, which undergoes various economic and political glitches that impede successful implementation of market oriented exchange rate policies. Moreover, exchange rate is mostly set to cover an ever-increasing current account deficit. Pakistan needs to review the existing exchange rate management and adopt measures that not only reduce the extent of misalignment but also support the process of economic development.

To strengthen the role of financial development, the country should improve the domestic banking system, develop capital markets, and introduce new and advanced financial instruments. The financial system must be improved so better hedging facilities are available to investors. This helps in boosting investor confidence and triggers economic growth.

Keeping in view the current economic situation and exchange rate fluctuations in the country, our study is timely and relevant. Pakistan is facing an extreme undervaluation of the PKR against the US dollar due to both economic and political factors. This current wave of exchange rate misalignment has serious socioeconomic and political implications by creating uncertainty in the economy. For instance, it has not only reduced domestic investment but also restrained foreign direct investment. Investment decisions are on hold. Consumer preferences between saving and consumption are changed because investor and consumer confidence is shattered. A decline in overall economic activity is evident. On the external sector, the exchange rate undervaluation has led to an increasing current account deficit due to huge increase in import bills and mounting external debt.

Notably, the financial markets and financial institutions in Pakistan do not encompass appropriate hedging tools to safeguard against massive fluctuations in exchange rate and/or against speculative attacks. The structure and efficiency of financial systems in Pakistan must be improved to make them more predictive and responsive towards fluctuations in financial indicators. Additionally, a large proportion of the foreign exchange inflow/outflow is not documented; therefore, policy-makers must streamline the process of currency inflow and outflow. This will help in minimising the exchange rate fluctuations.

Finally, the importance of a credit channel is empirically verified as a significant transmission mechanism. However, due to less advancement in our financial markets, information asymmetry, adverse selection and moral hazard problems are common which reduces the effectiveness of this channel. To improve the functioning of the credit channel, regulation of financial services, and transparency and accountability of financial markets are critical aspects to ponder.

Table A1

Growth Impact of Misalignment: Direct and Indirect Impact (DOLS)

Dependent Variable: Log of GDP Per Capita	Model I		Model II	
Variable	Coefficient	P-Value	Coefficient	P-Value
LRER	0.479***	0.000	0.292*	0.086
	(0.082)		(0.039)	
Mist	–0.083**	0.019	–0.407**	0.052
	(0.028)		(0.033)	
FD	0.004***	0.054	0.009**	0.042
	(0.002)		(0.001)	
Mist*FD	–	–	0.014**	0.036
			(0.001)	
GFCF	0.225**	0.017	0.180	0.171
	(0.075)		(0.049)	
LEMP	–0.075	0.685	–1.586*	0.071
	(0.178)		(0.178)	
LTO	0.037	0.734	0.042	0.133
	(0.104)		(0.009)	
GSSE	0.027***	0.001	0.025*	0.064
	(0.006)		(0.002)	
R-Squared	0.999		0.999	

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Assessing the Role of Money versus Interest Rate in Pakistan

ZAFAR HAYAT and MUHAMMAD NADIM HANIF

We have empirically examined the role of monetary aggregate(s) *vis-à-vis* short-term interest rate as monetary policy instruments, and the impact of State Bank of Pakistan's transformation into the latter on their relative effectiveness in terms of inflation in Pakistan. Using indicators of 'persistent changes' in the underlying behaviours of variables of interest, we found that broad money consistently explains inflation in (i) monetary (ii) transitory and (iii) interest rate regimes. Though its role has receded while moving from the transition to the interest rate regime, the interest rate instrument seems to be positively related to inflation, a phenomenon commonly known as price puzzle. In light of these findings, we recommend that the role of money should not be completely de-emphasised.

JEL Classification: E31, E52.
Keywords: Monetary Policy Instruments, Price Puzzle, ARDL, Pakistan

1. INTRODUCTION

Although the debate about the choice of an appropriate monetary policy instrument is well known, it is far from being settled. The main instruments over which disagreements have persisted are the price, interest rateand quantity of money.[1] While there is a consensus that both cannot be used simultaneously at the same time to influence the target variables (Turnosky, 1975), studies concluded differently on their relative effectiveness as monetary policy instruments. For example, Sargeant and Wallace (1975) argued that reserve money is a better instrument as compared to the interest rates because the latter suffers from the problem of equilibrium indeterminacy. Similarly, Bhattacharya and Singh (2007) found that money maximises welfare in the presence of real shocks.[2] Gordon (1979) on the other hand concluded in favour of the superiority of the interest rate over monetary instruments for Canada. Similarly, Atkeson et al. (2007) found that the interest rates have a natural advantage over money instruments.

[1]Atkeson et al. (2007) accounts for exchange rate as one of the instruments in addition to interest rates and money.

[2]It may be noted that they also found that in the presence of nominal and relatively small shocks instead of money, interest rate instruments are better.

Research has also indicated that a combination policy (a certain mix between interest rates and money), as given in Poole (1970) instead may be a better option. He created a theoretical framework for a combination policy. However, his static unified framework only allows answering the underlying question of the relative effectiveness of monetary policy instruments in terms of output rather than the inflation, taming which is the prime objective of most of the central banks today.[3]

Monetary policy practices at the State Bank of Pakistan (SBP), the country's central bank have varied over time (see Hanif, 2014 for details). Historically, money played an important role as a monetary policy instrument. The focus nevertheless has now shifted to the interest rate and currently, an interest rate corridor system is in place effective from August 2009 (Hussain, 2009; Khan, 2010 and Hanif, 2014). Whether this transition of the SBP from an increased focus on money to the use of interest rate as an instrument of monetary policy has been effective; and should the former be completely deemphasised *vis-à-vis* the latter are crucial questions yet to find research-based answers. It is also important to ascertain if the transformation of Pakistan's monetary policy's focus from targeting monetary aggregates to the active use of short-term interest rates has any bearing on their relative effectiveness in terms of inflation over time in the country.

To the best of our knowledge, this is an unexplored research area. In a related attempt, Ali and Ahmad (2014) explored the relative performance of inflation, and price level targeting regimes under alternative monetary policy instruments, and found money as a better performer relative to the interest rate for Pakistan. Their analysis, however, is based on calibrating their model while using parameters from Din and Khan (2011), which used the annual data from 1972–2009. Neither their focus was nor could their study, by construct, observe the evolution of the relative role of money and interest rate—especially in the context of SBP's transition from the former to the latter—which was completed by 2009. It, therefore, did not take into account the full-fledged interest rate regime. Most recently Ahmad et al. (2016) theoretically evaluated the role of money in propagating business cycle fluctuations in Pakistan and found that cash base economy models under money growth rule perform well as compared to the cashless economy models with the Taylor type rule.

In contrast to the aforecited literature, we use; (i) the framework used by Hayat et al. (2016) to extract indicators of persistent changes in the variables of interest to be able to closely observe the most relevant underlying relationships and, (ii) apply the ARDL approach to estimate such relationships.

The results indicate that money remains a consistent performer *vis-à-vis* interest rate but its role has been receding with an increased focus of the SBP on the interest rate as a monetary policy instrument. Nevertheless, there is evidence of a positive relationship between the interest rate and inflation, which is indicative of the possibility of a price puzzle. Therefore, it may be advisable for the SBP not to completely de-emphasise the use of money as an instrument of monetary policy (*vis-à-vis* interest rate) as it has been significantly effective in taming inflation in the country.

We organise the structure of the remainder of our paper as follows. Section 2 lays down a methodological framework for the generation of indicators of persistent changes

[3]Woglom (1979) and Benaive and Richard (1983) are among others who have worked along similar lines.

in variables of interest. Section 3 discusses the testing and estimation strategy, specifies the model, highlights data. Section 4 brings forth the results and discussion while Section 5 examines the soundness of the generated indicators for the analysis and robustness of the results. Section 6 concludes the paper.

2. METHODOLOGICAL FRAMEWORK

In order to examine the relative importance of money versus interest rate as monetary policy tools as well as their evolution over time, following Hayat et al (2016), we first generate indicators representing persistent variations in variables of interest and then use them to estimate their long-term relationships through the ARDL approach (see next section). This is important because only a small fraction of variations in monetary policy instruments may tend to relate to a small fraction of variations in target variables (such as inflation and/or real economic growth) given that the central bank may not necessarily exercise full control over the variations in monetary policy variables especially broad money. This postulation, as a starting point, is consistent with Bullard, 1999; Uhlig, 2005 & Hayat et al. 2016. We derive indicators of persistent variations from (a) growth in broad money, (b) market interest rate, (c) inflation, and (d) the real GDP growth rate in two steps as follows.

In the first step the Hodrick and Prescott (1997) filter—henceforth HP filter—is applied to decompose the observed series (X_t) into its permanent long term path (Xl_t) and the transitory fluctuations (Xf_t). The Xf_t are obtained by subtracting the long-term path from the observed time series X_t such that $Xf_t = X_t - Xl_t$. In the second step, we apply the HP filter to Xf_t to extract its permanent part (Xfl_t), which is the indicator of persistent variations in X_t. One may ask about the justification of the use of the HP filter. First, our choice of this filter is driven by the fact that the filter allows the trend to vary over time and hence the magnitudes of deviations, which may better represent policy responses (variations) in the underlying policy as well as goal variables (Hayat et al. 2016). Second, double HP filter outperforms other detrending and smoothing methods in turning point signal stability, i.e. identifying turning points quickly (Nilsson & Gyomai, 2011), which reflect structural changes and hence regimes. This feature is important because our purpose is to observe the evolution of money and interest rate instruments across different regimes: (i) monetary (ii) transitory and (iii) interest rate regimes.

For all the four variables—broad money growth, interest rate, inflation and real GDP growth rate—we, therefore, apply the two-step procedure to obtain our desired indicators of persistent variations as follows.

2.1. Indicator of Persistent Variations in Broad Money Growth

In the first step, the HP filter is applied to decompose the observed series of growth in $M2$ (denoted by $\dot{m2}_t$) over time into its long-term growth path $\dot{m2l}_t$ and the fluctuations around it $\dot{m2f}_t$, such that:

$$\dot{m2}_t = \dot{m2l}_t + \dot{m2f}_t \qquad \text{for } t = 1, \dots\dots, T.$$

In the second step, the HP filter is applied to $\dot{m2f}_t$ to obtain its long-term trend path, which corresponds to persistent variations, denoted by $\dot{m2fl}_t$ such that:

$$m\dot{2}f_t = m\dot{2}fl_t + m\dot{2}ff_t \quad \text{for } t = 1, \dots \dots . T,$$

$$\Rightarrow m\dot{2}fl_t = m\dot{2}f_t - m\dot{2}ff_t \quad \text{for } t = 1, \dots \dots . T.$$

Where $m\dot{2}fl_t$ is the desired series representing persistent variations in broad money growth.

2.2. Indicator of Persistent Variations in Interest Rate

Similarly, the HP filter is applied to decompose the interest rate (i_t) over time into its long-term path and the fluctuations around it. In the first step:

$$i_t = il_t + if_t \quad \text{for } t = 1, \dots \dots . T.$$

In the second the HP filter is applied again to if_t to obtain its long-term path of our interest ifl_t as follows:

$$if_t = ifl_t + iff_t \quad \text{for } t = 1, \dots \dots . T.$$

$$\Rightarrow ifl_t = if_t - iff_t \quad \text{for } t = 1, \dots \dots . T.$$

2.3. Indicator of Persistent Variations in Inflation

The two-step strategy of application of HP filter is also employed to generate indicators of inflation and real GDP growth as follows:

$$\pi_t = \pi l_t + \pi f_t \quad \text{for } t = 1, \dots \dots . T,$$

where π_t is the inflation rate in time t. The πl_t is its long-term path in time t and πf_t represents the fluctuations around πl_t over time. In the first step, the HP filter is applied to π_t to obtain πl_t and πf_t. In the second step, the HP filter is applied to πf_t to obtain its long-term path such that:

$$\pi f_t = \pi f l_t + \pi f f_t \quad \text{for } t = 1, \dots \dots . T.$$

$$\Rightarrow \pi f l_t = \pi f_t - \pi f f_t \quad \text{for } t = 1, \dots \dots . T.$$

Where, $\pi f l_t$ is the desired inflation indicator.

2.4. Indicator of Persistent Variations in the Real GDP Growth Rate

Likewise, the strategy of the application of the two-step HP filter is used to obtain the real GDP growth indicator. Firstly, the time series of the growth in real GDP $(\dot{y}_t)$ is decomposed into its long-term growth path $\dot{y}l_t$ and the fluctuations around it, i.e. $\dot{y}f_t$ such that:

$$\dot{y}_t = \dot{y}l_t + \dot{y}f_t \quad \text{for } t = 1, \dots \dots . T.$$

Secondly, the HP filter is applied to $\dot{y}f_t$ to obtain its long-term path as:

$$\dot{y}f_t = \dot{y}fl_t + \dot{y}ff_t \quad \text{for } t = 1, \dots \dots . T.$$

$$\Rightarrow \dot{y}fl_t = \dot{y}f_t - \dot{y}ff_t \quad \text{for } t = 1, \dots \dots . T.$$

Where, $\dot{y}fl_t$ is the desired real growth indicator.

3. ESTIMATION APPROACH, MODEL SPECIFICATION AND DATA

We use the autoregressive distributed lag (ARDL) bounds testing and estimation approach to cointegration proposed by Pesaran and Shin (1999) and Pesaran et al. (2001) to obtain long-run parameter estimates. The estimators of the ARDL are super-consistent for long-run coefficients and it performs particularly well in small samples without losing long-run information. The ARDL approach allows the selection of optimal dynamic models. Since Pesaran and Pesaran 1997; Pesaran & Shin 1999 reported that the SBC is a consistent model selection criterion in small samples and that it selects a relatively more parsimonious model (Enders, 1995), we use the SBC. The ARDL works even in the presence of endogenous regressors irrespective of the order of integration (1 or 0) of explanatory variables (Pesaran & Pesaran, 1997; Pesaran & Shin, 1999).

Operationally, the ARDL is a two-stage procedure. The first stage is to test for the existence of cointegration by computing the *F*-statistic. Since the asymptotic distribution of this *F*-statistic is non-standard, Pesaran et al. (2001) tabulated two sets of appropriate critical values for I(0) or I(1), for different numbers of regressors (k) with and without intercept and trend. If the computed *F*-statistic falls outside the band for respective critical values of I(0) or I(1), cointegration exists. If it falls within that band then the result of the inference is inconclusive. In the second stage, long-run coefficients are obtained, provided the cointegration is established in the first stage. In general form, the error correction version of our ARDL model may be given as:

$$\Delta \pi fl_t = \emptyset_0 + \sum_{i=1}^{p} \emptyset_i \Delta \pi fl_{t-i} + \sum_{j=0}^{q1} \emptyset_j \Delta m\dot{2}fl_{t-j} + \sum_{k=0}^{q2} \emptyset_k \Delta ifl_{t-k}$$
$$+ \sum_{m=0}^{q3} \emptyset_m \Delta y\dot{f}l_{t-m} + \gamma_0 \pi fl_{t-1} + \gamma_1 m\dot{2}fl_{t-1} + \gamma_2 ifl_{t-1}$$
$$+ \gamma_3 y\dot{f}l_{t-1} + \epsilon_t \quad \dots \quad \dots \quad \dots \quad \dots \quad \dots \quad \dots \quad (1)$$

Where πfl, $m\dot{2}fl$, ifl, and $y\dot{f}l$ are inflation, broad money growth, interest rate and real GDP growth indicators, respectively. The Δ denotes the first difference operator and ϵ is the error term.

We use the quarterly data series from Q1-1974 to Q2-2015. The main variables are expressed in terms of a year on year (YoY) change in CPI inflation, real GDP and broad money—which allows us to control possible seasonality—while the call money rate (as a proxy of policy rate) is in levels. The data for broad money growth and call money rate is taken from SBP. Since the policy rate remained constant from 1977 to 1990 (Figure 1), as an alternative, we, therefore, used the call money rate. The call money rate closely mimics the behaviour of the policy rate.[4] The correlation coefficient between the policy rate and call money rate is 0.95.

The inflation data has been obtained from the national statistical agency, the Pakistan Bureau of Statistics (PBS). National income accounts are complied by the PBS only on an annual basis; we, therefore, use the quarterly GDP data for Pakistan for the fiscal years 1973–2012 estimated by Hanif et al. (2013). Since they quarterised the data only until 2012, we extended their data set up to 2015 while using the proportions therein, based on the latest available annual data from the PBS for the period 2013–2015. It may be noted that for the entire series to be consistent, we transformed their series from 1974 to 2012 on the new base year, i.e. 2005–2006.

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[4] We use the nominal interest rate as the SBP uses nominal rather than real interest rate in its policy messages, and it is the nominal rate that is used/quoted by the banking system in its transactions.

Fig. 1. Call Money Rate and Policy (Discount) Rate
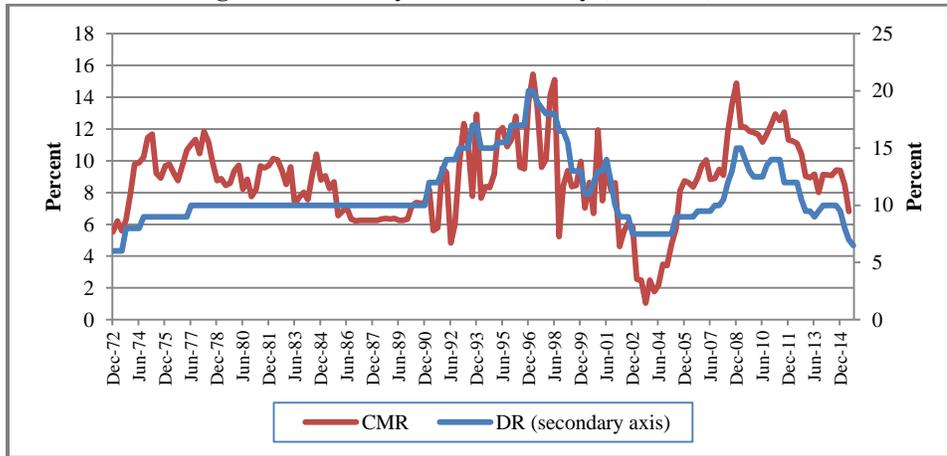
In order to be confident whether our generated 'indicators' represent the behaviours in the respective base variables, and to make sure that it might not have led to a considerable loss of information, we checked their correlations with their respective base variables and cycle series. Figure 2 shows that by and large, double filtering has not led us to lose significant information as exhibited by correlation coefficients with respective base and cycle variables, especially in case of inflation and interest rate indicators. Instead, it seems that rather the noise part has been purged, which may not necessarily be representing policy-induced actions and responses in goal variables as all the shocks may not be treated to be representing informed policy actions or responses (see Hayat et al. 2016).[5] For example, the correlation between the base variable CPI inflation and its cycle series (CPIT) is 0.71 and that of CPI inflation and our generated indicator is 0.63 (see Figure 2).

Fig. 2. Correlation of the Base Variable with Respective Cycle Series and Generated Indicators
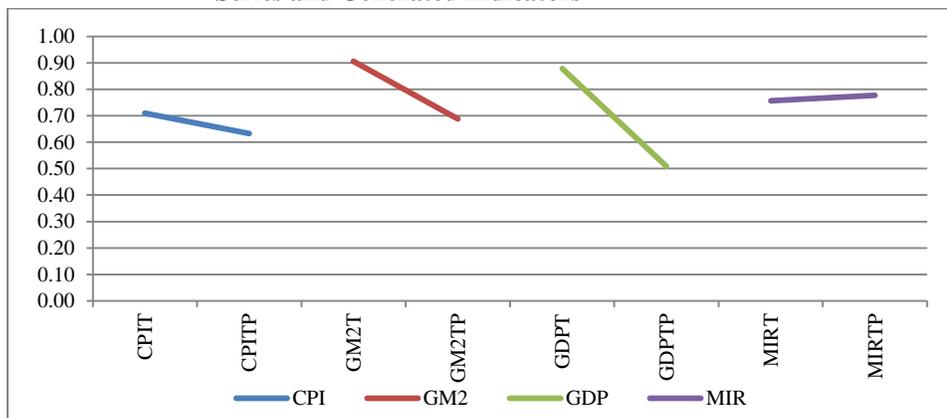
[5]A true test to this effect nevertheless would be for the indicators to yield intuitive results as against the base and cycle series (see Section 4 and 5).

4. RESULTS

4.1. Model Selection, Diagnostic and Cointegration Tests

Given the lack of theoretical guidance as to what should be the appropriate maximum lag length in a particular situation, we relied on a general-to-specific approach for the imposition of optimal lag lengths. We started with 10 quarters as the maximum lag length in case of the full sample and kept reducing unless we could pick a cointegrating model with no issues of serial correlation, heteroscedasticity, and estimated coefficients' stability. This allowed for up to two and half years, reasonable transmission time for the effects of monetary policy instruments at least in the case of Pakistan (considering past research in this area like Khan, 2008). In the case of sub-samples, any maximum allowable lag length (lower than 10) was tried during the selection process. We used the SBC model selection criterion as it selects the most parsimonious model.

For the model in equation (1), the null hypotheses of the non-existence of a long-run relationship is given by $H_0: \gamma_1 = \gamma_2 = \gamma_3 = 0$ against the alternative $H_1: \gamma_1 \neq 0$, $\gamma_2 \neq 0$, $\gamma_3 \neq 0$. The F–statistics computed for the joint significance of γ_1, γ_2 and γ_3 for the full (1974–2015) and subsamples (1974–1995, 1995–2009 and 2009–2015) are 10.99, 17.51, 9.35 and 162.67 respectively. All these computed statistics exceed the corresponding critical value bands of Pesaran et al. (2001) for unrestricted intercept and no trend at a 1 percent level, leading us to reject the null of the non-existence of a long-run relationship. This implies that the decision to proceed with computing long-run coefficients is conclusive and there is no need to know the cointegration rank (Pesaran & Pesaran, 1997). The long-run parameter estimates are obtained subsequently.

Although we are mindful of the possibility of endogeneity, we have confidence in our estimates as the ARDL methodology we used works well even in the presence of endogenous regressors irrespective of the order of integration [I(1) or I(0)] of explanatory variables (Pesaran & Pesaran, 1997; Pesaran & Shin, 1999). Alternative methodologies to minimise the extent of possible endogeneity are 2SLS and GMM, which, however, require identification of 'instrumental variables'. Generally, it is hard to find 'instrumental variables' for the variables in the equation to be estimated. In those cases, suggestion in the empirical literature is the use of lagged variables. In this study, the way we have developed each indicator, it in itself is like an instrument for the underlying variable. And that the use of the lagged values of these indicators in the ARDL modeling reduces the chances of endogeneity in our estimation.

4.2. Money Versus Interest Rate—Regime-wise Results

Since our objective is to assess if the SBP should place an increased emphasis on interest rate compared to the broad money and whether the transformation in the focus of Pakistan's monetary policy from the latter to the former has had any bearing on their relative effectiveness in terms of inflation, we analyse sub-periods that correspond to i) monetary targeting regime (1974–1995), ii) transition period from monetary targeting to interest rates as monetary policy instruments (1995–2009) and iii) an interest rate regime (2009–2015).[6] Furthermore, as a cross-check, we used the Bai Perron test (1998) for the

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[6]See Hanif (2014) for a discussion on key developments in these phases.

identification of multiple breakpoints and found supporting evidence that breaks occurred in 1995 and 2009 (Appendix 1). Further supporting evidence of these breaks can also be had from the cointegration graph for our full sample model (see the first panel of Appendix 2).

The results indicate that a clear picture cannot be seen when the estimations are carried out for the full sample from 1974 to 2015 as neither money nor interest rate has a significant role in explaining inflation in Pakistan (Table 1, column (a)). This may be because during the entire sample period, the SBP's monetary policy preferences in terms of use of instruments have varied, obscuring the results for the overall sample. This, however, is not the case when we subsequently observe the results for the specific regimes.

Table 1

Long-run Estimates

Variables	Full Sample 1974-2015 (a)	Monetary Regime 1974-1995 (b)	Transition Period 1995-2009 (c)	Interest Rate Regime 2009-2015 (d)
ifl	0.39	0.16	1.06	0.61
	[0.12]	[0.67]	[0.00]***	[0.00]***
$m\dot{2}fl$	0.08	0.95	1.26	0.60
	[0.57]	[0.02]**	[0.00]***	[0.00]***
$\dot{y}fl$	–0.81	–5.93	–1.37	–1.70
	[0.09]*	[0.04]**	[0.00]***	[0.00]***
a	0.01	0.14	0.05	–0.07
	[0.38]	[0.01]	[0.05]	[0.00]
$ECT(-1)$	–0.003	–0.004	–0.02	–0.35
	[0.00]***	[0.00]***	[0.00]***	[0.00]***
ARDL	(8,3,6,4)	(8,1,5,8)	(5,2,5,0)	(2,0,2,2)
COIN	1%	1%	1%	1%
DW	1.86	2.10	2.03	2.18
R^2	0.99	0.99	0.99	0.99

This table reports the long-run coefficients and the P-values. The latter are reported in brackets. ARDL shows the order of the lags of the selected models whereas COIN stands for cointegration. ***, ** and * indicate significance at 1 percent, 5 percent and 10 percent level, respectively.

The supply-side effects of real growth seem rather visible, which tend to reduce inflation. This result is consistent with Hayat et al. (2016) which founded an inverse relationship between the real growth and inflation indicators using the annual data from 1961 to 2010. Although the question may remain that whether the real activity indicator used is proxying the supply or demand side of the economy. We advocate the former because the real growth in GDP is used rather than nominal. Furthermore as is visible from column (b) through (d) in Table 2, the magnitude of the effect of the real growth on inflation decreases, which make sense only when real growth represents an increased supply of goods and services—as the average real growth witnessed in the sample period used in columns (b) (c) and (d) are 5.60, 4.47 and 3.41 respectively.

During the monetary targeting regime, the role of money in explaining inflation is both significant and quantitatively large as against interest rate (Table 1, column (b)). This result is consistent with a range of studies that have found brad money an important determinant of inflation in Pakistan such as Chaudhary & Ahmad, 1996; Price & Nasim, 1999; Kemal, 2006; Khan & Schimmelpfennig, 2006; Serfraz & Anwar, 2009 & Hayat et al. 2016. A straightforward policy implication for the SBP from these results is that money plays a significant role in explaining inflation and, therefore, it may be used as an effective monetary policy instrument to tame it. It is, however, interesting to note that interest rate whilst being insignificant during the monetary targeting regime, grew in significance during the transition period to the interest rate regime (Table 1, column (c)).

Under the interest rate regime, both money and interest rate played a significant role in explaining inflation; however, the quantitative effect of the latter is more pronounced in this regime as compared to the transition regime. On the other hand, the quantitative effect of broad money receded *vis-à-vis* the interest rate instrument during the transition period. These results imply that the shift in focus from monetary aggregates towards interest rate as a monetary policy instrument has had implications both for the relative importance and significance of the two monetary policy instruments.

When taken in isolation, although the interest rate instrument grew in significance during transition and interest rate regimes, it may not effectively guide the monetary policy as it brings forth an important monetary policy issue for the SBP, commonly known in the literature as 'price puzzle', wherein interest rate and inflation are positively related.[7]

The price puzzle issue is non-trivial as it renders the interest rate instrument ineffective [vis-à-vis the broad money instrument in conducting monetary policy], which is the main policy tool currently used by the SBP. We, therefore, suggest that money should not be deemphasised.

5. SOUNDNESS OF INDICATORS AND ROBUSTNESS CHECK

To check whether our generated double-filtered indicators have allowed us to obtain intuitively consistent approximations of the underlying phenomena, we did the estimations both using the base data and cycle series. The results obtained using base data (Table 2)—although not as intuitive as the results obtained from our double-filtered indicators—by and large, provide support to our mainstream results as compared to the results obtained by using cycle series (Table 3).

All the mainstream models obtained using double-filtered indicators not only fits the data well but also approximate cointegrating relationships as compared to the models that instead uses the variables in base and cycle form. The results obtained by using cycle series are highly inconsistent. They largely depict incorrect signs and do not pick the breaks, thus failing to track the evolution in the relative role of money versus interest rates. On the contrary, the results obtained using the model with generated indicators better identify the breaks in a cointegrating relationship (see Appendix 2).

[7] Javid and Munir (2010) also found similar results. Felipe (2009), Naqvi and Rizvi (2010) also pointed to this issue while examining the suitability of adoption of inflation targeting for Pakistan.

Table 2

Long-run Estimates Using Base Data

Variables	Full Sample 1974-2015 (a)	Monetary Regime 1974-1995 (b)	Transition Period 1995-2009 (c)	Interest Rate Regime 2009-2015 (d)
i_t	0.62 [0.01]**	0.33 [0.34]	1.53 [0.00]***	1.41 [0.00]***
$\dot{m2}_t$	0.44 [0.01]**	0.26 [0.12]	0.20 [0.51]	0.24 [0.46]
$\dot{y}_t$	0.01 [0.98]	–1.07 [0.02]**	1.79 [0.15]	–0.39 [0.54]
a	–3.71 [0.25]	8.04 [0.08]	–16.49 [0.02]	–7.14 [0.23]
$ECT(-1)$	–0.22 [0.00]***	–0.29 [0.00]***	–0. 29 [0.11]	–0.67 [0.05]*
ARDL	(7,0,7,1)	(8,0,3,3)	(7,5,8,5)	(2,0,0,0)
COIN	1%	2.5%	Nil	Nil
DW	1.99	2.01	1.98	2.26
R^2	0.90	0.86	0.98	0.83

This table reports the long-run coefficients and the *P*-values. The latter are reported in brackets. Nil means no cointegration. ARDL shows the order of the lags of the selected models whereas COIN stands for cointegration. ***, ** and * indicate significance at 1 percent, 5 percent and 10 percent level, respectively.

Table 3

Long-run Estimates Using Cycle Data

Variables	Full Sample 1974-2015 (a)	Monetary Regime 1974-1995 (b)	Transition Period 1995-2009 (c)	Interest Rate Regime 2009-2015 (d)
if_t	–0.31 [0.22]	0.09 [0.82]	0.33 [0.32]	–0.68 [0.49]
$\dot{m2}f_t$	–0.15 [0.18]	–0.20 [0.18]	0.23 [0.35]	–0.29 [0.46]
$\dot{y}f_t$	–0.01 [0.93]	–0.57 [0.08]*	0.22 [0.64]	1.85 [0.18]
a	–0.05 [0.81]	–0.10 [0.83]	0.03 [0.95]	–0.34 [0.52]
$ECT(-1)$	–0.46 [0.00]***	–0.34 [0.00]***	–0. 28 [0.04]**	–0.55 [0.01]**
ARDL	(8,3,6,1)	(5,0,3,0)	(5,0,0,1)	(2,1,0,1)
COIN	1%	Nil	Nil	Nil
DW	1.98	1.95	1.70	2.30
R^2	0.84	0.80	0.88	0.67

This table reports the long-run coefficients and the *P*-values. The latter are reported in brackets. Nil means non-existence of a cointegrating relationship. ARDL shows the order of the lags of the selected models whereas

COIN stands for cointegration. ***, ** and * indicate significance at 1 percent, 5 percent and 10 percent level, respectively.

As far as the robustness is concerned, our results are largely robust to alternative specifications for almost all the sample sizes. First, we dropped the real growth indicator and estimated the model for all the regimes. Second, we ran the regressions for interest rate and broad money indicators both individually and in combination which led us to conclude in favour of our main findings.[8] Since we also found evidence of a structural break in 1982–83 (Appendix 1), we controlled for it through dummy variable and re-estimated our models (a) and (b) in Table 1 just in case the results turn out to be different than without controlling for the structural break. Our inference from the new results obtained, however, remained unaltered.[9]

6. CONCLUSION

Pakistan's monetary policy has evolved over time. The evolution of the relative role of money and interest rate is examined across three distinct phases of monetary policy experience in Pakistan, i.e. regime of targeting monetary aggregates, a period of transition towards interest rate and interest rate regime. A framework was created that allowed the generation of indicators to capture persistent variations in underlying variables. Broad money is found to consistently perform *vis-à-vis* interest rate throughout the entire spectrum in controlling inflation in the country. Its quantum effect, however, started receding during the transition period and almost equalised the interest rate instrument during the interest rate regime. The role of the interest rate is found to be puzzling as it is positively and significantly related to inflation. The use of the interest rate by the SBP, therefore, may not be effective unless this puzzle is explored and addressed. Since broad money is still effective, its role should not be completely deemphasised.

APPENDIX 1

Bai-Perron Multiple Break Points Test

| Breaks	F-Statistic	Critical Value	Break Year(s)
1*	41.8	18.26	1982
2*	55.89	14.45	1983, 1991
3*	56.67	12.16	1983, 1991, 2005
4*	61.99	10.56	1983, 1989, 1995, 2006
5*	56.68	8.71	1983,1989,1995,2002, 2008

[8]For brevity purposes, these results however are not reported and may be obtained from the corresponding author if needed.

[9] These results are not reported and may be obtained from corresponding author upon request.

*denotes significance level at 1 percent. A trimming level of 15 percent was used and the maximum breaks allowed were 5. The critical values are that of Bai and Perron (2003).

APPENDIX 2
Supplementary Material

Graph of Base Variables (GCPI is Inflation, GM2 is Growth in Broad Money, and MIR is Market Interest Rate)
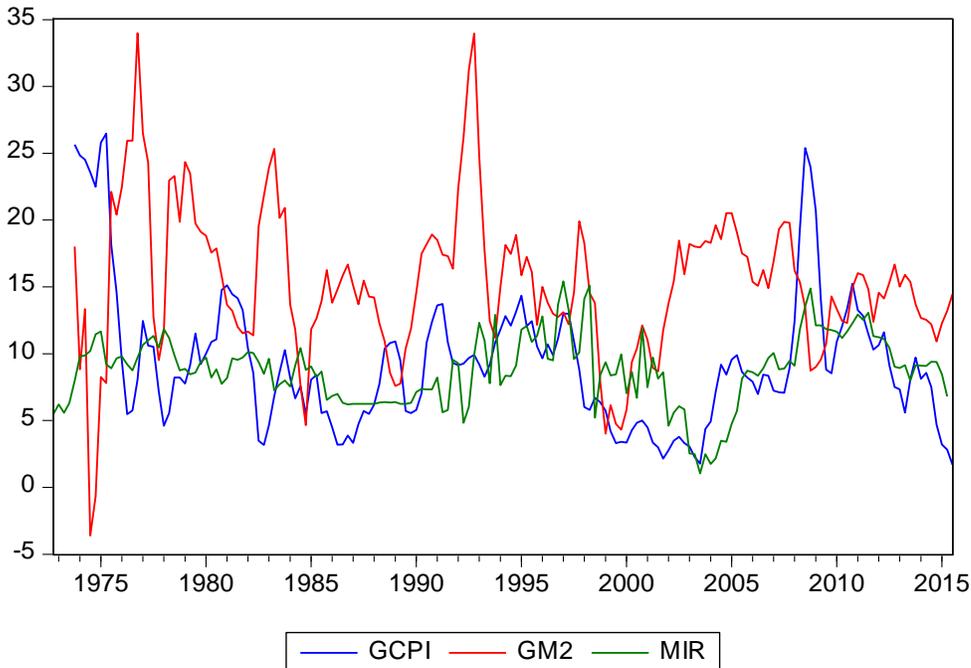
Descriptive Statistics of the Base Variables

	GCPI	GM2	MIR
Mean	9.361266	15.30568	8.844052
Median	8.606444	15.00142	8.936667
Maximum	26.48080	33.99265	15.42333
Minimum	1.780676	–3.617128	1.050000
Std. Dev.	5.121828	5.568757	2.607813
Skewness	1.391459	0.245834	–0.292618
Kurtosis	5.340424	4.615676	3.544695
Jarque-Bera	92.00458	19.84619	4.447716
Probability	0.000000	0.000049	0.108191
Sum	1563.331	2556.049	1476.957
Sum Sq. Dev.	4354.698	5147.834	1128.914
Observations	167	167	167

Unit Root Tests of Base Variables

Table: Stationarity Properties of The Variables

Variables	ADF		PP	
	Level	First difference	Level	First difference
GCPI	[0.01]**		[0.01]**	
GM2	[0.00]***		[0.00]***	
MIR	[0.06]*	[0.00]***	[0.00]***	

This table reports the *P-v*alues of the Augmented Dicky–Fuller (*ADF*) and the Phillips–Perron (*PP*) tests in brackets. ***, ** and * indicate that the series are stationary at the 1 percent, 5 percent and 10 percent level of significance respectively.

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Commentary

Agriculture in Pakistan: A Revisit

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I started studying the structure and performance of Pakistan's agriculture in the early 1960s. Sadly this sector of the economy is still in a precarious state. I think the blame rests with the state, its policies and agents, more than the vagaries of nature. But the good news is that we can influence public policy far more than the moods of nature. The basic challenges for the agriculture sector in Pakistan are to:

- meet the changing consumer preferences and dietary habits induced by income growth and urbanisation;
- conserve land and water resources in the face of the not-too-certain but potentially serious consequences of climate change;
- absorb the rapidly rising cost of inputs (particularly energy) and maintain farm profitability;
- involve small farmers and livestock holders in a diversified and commercial agriculture;
- open new investment opportunities in the rural non-farm economy to provide jobs to the landless rural labour; and
- integrate into the global (and increasingly competitive) markets for food and industrial raw material.

But these challenges also offer new opportunities and incentives to make the agriculture sector a vibrant partner, if not leader, of the national economy. There are numerous policy issues given the multiple and competing interests of stakeholders, including small and large landowners and livestock holders, landless tenants and labourers, private market intermediaries (traders, processors and manufacturers), consumers, not-for-profit private organisations, and the public sector departments and agencies. I can identify four major policy issues.

(1) Productivity and quality of land and water resources.
(2) Production and distribution of crop seeds and livestock breeds.
(3) Transfer and adoption of productivity-enhancing and profitable technology—biotechnology in particular since it reduces dependence on input-intensive technology and protects the environment and quality of the resource base.

    (4) Market structures (supply chains) and government regulations for markets of fruits, vegetables and livestock and their products.

        The policy framework that I suggest is premised on three propositions. *First*, we should use a 'farming systems' approach, in which crops and livestock are viewed as two interdependent parts of the production regime adapted to the changing resource endowment and markets. *Second*, small farmers (landowners and tenants) and livestock holders are the key players—small-scale agriculture supports the livelihoods of a majority of the rural poor—whose integration in the rapidly-expanding commercialised agriculture is an essential part of the transformation process. Needless to add, the economic survival of small farmers depends on their livestock and wage labour. *Third*, the agencies of the state should be in the business of protecting property rights that are well defined; investing in public goods (infrastructure and support services); regulating the marketplace for quality and safety for producers and consumers; maintaining an efficient and fair regime of taxation; and providing support (safety-net) to the disadvantaged and vulnerable individuals or groups by income, gender, age, or skills. *The business of state is not to throttle private initiative and innovation by myriad controls and distort the signals for efficient production and distribution of goods and services.*

        It is widely recognised that the average yield levels of crops and livestock products in Pakistan are far lower than what can be achieved. And the disposal of what is produced on the farm is based on an agriculture marketing system which tends to penalise both producers and consumers. In the context of designing and implementing policies for an inclusive and sustainable process of agricultural growth in Pakistan, it seems fair to take into account at least five conditions.

    (1) It is essential that the national and provincial research systems produce, convert and adapt the best scientific knowledge that exists nationally and internationally.

    (2) The stock of tested knowledge and technology should be transferred to farmers and holders of livestock in packages that raise the efficiency levels of their resources and farm profits: *profitability of new technology is the ultimate test of how well it is adopted by ordinary farmers, given their conditions and resource constraints of ordinary farmers.* Needless to add, farmers, no matter how small or resource-constrained, are quite receptive to profitable technology no matter where and how they happen to find it.

    (3) Farmers should have an environment in which their rights to property and resources are well protected; they have fair access to well-regulated and competitive markets for buying farm inputs and services and sell their products; they are supported by the state—three levels of government and other agencies—with (a) good quality of physical and social infrastructure (public goods) and (b) macroeconomic policies and regulatory regimes that are well-designed for proper (non-distortionary) incentives and fairly enforced to maintain confidence.

(4) Since a vast majority of farmers and livestock holders are small and they contribute a significantly large proportion of food and other agricultural products in the country, they should be provided fair access to resources and a plain (fair) playing field for participation in the marketplace. Their integration in the rapidly-growing commercial environment—there are good participatory models available for this purpose—will contribute not only to the well-being of these groups but also to other economic and social goals at the local, provincial and national level.

(5) Given the concern with issues of environmental degradation, food safety and health the world over and the more open and competitive international markets, it is absolutely essential to (i) wean the farmers away from dependence on input-intensive technology and wasteful management practices and (ii) put in place and enforce rules and regulations that maintain proper incentives for private initiative, innovation and investment, reduce space for rent-seeking and penalise perverse behaviour (pollution and free-riding). Price-distorting and inequitable (generalised) subsidies, which drain public resources with high opportunity cost, are not part of the emerging regime for international trade in agricultural goods. Government policy must shift from providing subsidies on farm inputs to investment and support for research and extension services, market infrastructure and information, electrification, and value-addition in crop and livestock products.

I should add three notes of caution here. *First*, on some issues the existing information is quite good but on others it is either incomplete or of uncertain quality. Some 'facts' (data) or propositions will have to be tested (researched) and validated to arrive at reasonable conclusions about change. Almost all of the statistics on economic and social indicators are produced by one or another government agency at the federal or provincial level. These agencies have almost unchallenged (if not unchallengeable) control of the information and data they possess. An associated and necessary aspect is the secrecy with which the monopolist protects the numbers (data) with impunity. In fact, it is secrecy that empowers the holders of information. A third reason is the dubious competence and lack of rigour with which the data are gathered, processed and disseminated.

Second, it is not a good idea to make drastic or large-scale changes of which the consequences are not well known or well tested on a small scale: do not through the baby away with the bath water! But this is not a signal to do nothing since the cost of doing nothing or procrastinating can be enormous if not disastrous. Suffice is to say that the power of vested interests (and special interest groups) to resist change should not be underestimated, especially in a predominantly patron-client social system.

Third, the issues discussed in this paper are limited in number and on each issue the focus is on only those aspects that are considered worth exploring for further research and action by policy-makers and their agents.

Let me now turn to what I consider are the important issues for public policy to improve the performance of agriculture in Pakistan.

Agricultural Land

(1) Good farmland should be protected from its less agreeable alternative uses, especially around the periphery or in close proximity of the urban centres, by proper and enforceable zoning regulations.

(2) Legislate private right to the ownership of agricultural land and enter into official record the title of the legitimate owner. It is absolutely essential to involve all stakeholders in the land survey (using the GIS) needed to resolve the competing claims on land in the existing land record.

(3) It is important to find out why the pilot projects on the computerisation of land record have not produced the anticipated results. What lessons have been learnt? Once the digitised land record is completed, do away with the 'patwari' system in the provinces.

(4) Protection of land quality should be high on the policy agenda: change the distorted price signals and similar policies that encourage farmers to use the input-intensive technologies. We know that the zero tillage, green manuring, composting and crop rotation help improve the structure and fertility of soils.

Irrigation Water

(1) Put in place a regulatory framework for the use of groundwater and enforce the rules to avoid overexploitation of the aquifer. Why not vest the ownership of groundwater with the state and give fair access to individuals on demand.

(2) What lessons have been learnt from the farmer-controlled canal irrigation system and how they have been incorporated in the new canal command areas? How does the new system compare with the government-controlled centralised canal irrigation system?

(3) Introduce on a pilot basis a volume-based system of irrigation water supply starting at the tail-end of watercourses.

(4) Management of water at the farm level must be improved by testing and disseminating technologies that take into account the economic and technical constraints of farmers and the small farmers in particular. Are the small farmers too far behind the large farmers in the adoption process? What are the major reasons? How can their constraints be alleviated?

Crop Varieties and Livestock Breeds

Given the importance of good seeds for crops and their limited use, the regulatory framework should create incentives for breeders in the private and public sectors and private suppliers of seed (produced locally or imported) and regulate the quality and safety aspects of seeds available to farmers in the marketplace. Too many controls create plenty of room for perverse (rent-seeking) behaviour. Give incentives to the private sector to invest in the projects of breeding, feeding and veterinary services for livestock. Given the success of genetically-modified organisms in many countries, should we not focus the knowledge of biotechnology on crop varieties for higher yield levels, greater resistance to pests and weeds, better adaptation to climate change, and lower dependence

on inputs and resources? In a similar way, this technology should be used to improve the breeds of animals for milk and meat.

Agriculture Research and Extension Services

(1) Since good research and extension services are important for the growth of a productive agriculture and farm income, and given the widespread doubts about the effectiveness of the existing agriculture research and extension services, it would be interesting to estimate the rate of return on public sector investment in these activities. Has the service been worth the public money spent on it?

(2) How can (or should) the universities, provincial research and extension establishments and the private sector improve their collaboration to develop synergies?

(3) The attempt to 'corporatise' the provincial research institutes should be done with great care because of the unresolved issues about the transfer of assets and liabilities and the selection of research staff.

(4) Is the bifurcated system of extension service in crops and livestock the best way to transmit new technologies and messages to the farmer? Should the extension system not transform itself into a specialised service given by both the public and private sectors? Should the system not use a localised adaptive-research method in which the service interacts with the farmer through focus groups (e.g. Farmer Field Schools or Village Organisations) served by skilled professionals with the support of teams of research specialists? Why not move to a digitised information system between specialists and farmers?

Markets for Agriculture Products

(1) The government's monopoly on markets (*mandis*) for agriculture produce (e.g. fruits and vegetables) should be terminated and the private sector be allowed to establish regulated markets to reduce the number of intermediaries and their margins. The government should concentrate on providing a fair playing field to the buyer and seller and regulate the quality, grades, and safety of the produce.

(2) A similar approach is needed in the selling and buying of live animals and slaughter of animals. Government should not own the *mandis* for live animals and abattoirs, but regulate them well: let the private sector do its business. In fact, the government should give material incentives and facilities to the livestock holders and private investors to develop livestock pockets in the rural areas where the animals are kept by millions of small livestock holders.

(3) Finally, governments should not be capping the price of milk or meat in the urban areas since it either raises the price, or reduces the supply, or encourages malpractices (adulteration, etc.).

Information and Data

(1) Since government agencies collect and keep almost all of the information and data related to various aspects of crops, livestock and irrigation, it is necessary

to improve their quality by involving other stakeholders in the planning, designing and collection processes. Data verification should be a continuous process.

(2) Government should remove all legal and administrative barrier for access to information and data—make them available on demand—which are of public interest.

The Economic Analysis of Law in Pakistan[1]

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One of the most important functions of law is to assign rights and liabilities in such a way that disputes do not arise. The failure to prevent disputes in a society indicates that the structure of the law is inefficient. Since the focus of law and economics is on efficiency (see Box 1) and how people respond to incentives, one way to carry out the economic analysis of the law is to use the framework of market capitalism. Driven by the idea of the invisible hand, the fundamental point of capitalism is that individuals should be able to use their capital freely, without the state's interference. It implies that individuals' legal ability to move capital should be frictionless.

Box 1: The Economic Analysis of Law

Law and economics, also known as the economic analysis of law, focuses mainly on two things. First, the theoretical analysis focuses on efficiency. Law and economics stresses that markets are more efficient than courts. Second, law and economics emphasises on incentives and people's responses to these incentives. Law and economics is more likely than other branches of legal analysis to use empirical or statistical methods to measure individuals' responses to incentives. The private legal system must perform three functions, all related to property and property rights. First, the system must define property rights (property law). Second, the system must allow for transfer of property (contract law). Finally, the system must protect property right (tort and criminal laws). A legal system should provide clear definitions of property rights. Ideally, efficiency implies that, in a dispute regarding the ownership of a right, the right should go to the party who values it the most. According to the economic analysis of law, the characteristics of efficient property rights are universality (everything is owned), exclusivity (everything is owned by one agent), and transferability. Law and economics can also explain the results of inefficient property definitions. Most of the doctrines of contract law seem consistent with economic efficiency. Law and economics study of contract law has shown that, in general, it is efficient for parties to be allowed to write their own contracts, and under normal circumstances, for courts to enforce the agreed-on terms, including the agreed-on price. The courts will generally not enforce contracts if performance would be inefficient, but, rather, will allow payment of damages. Contracts and contract law are also designed to minimise problems of opportunism.

Source: Adapted from Rubin, P.H. "Law and Economics". The Library of Economics and Liberty < https://www.econlib.org/library/Enc/LawandEconomics.html>

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[1]This brief draws heavily on the PIDE Seminar: Law and Economics by Feisal Naqvi. January 22, 2020.

Looking at the available evidence, it emerges that the law-economics nexus in Pakistan can be discussed with a focus on land, which still is the most important form of capital in the country. Therefore, if we talk about the ability to move the capital, it means the ability to deal with land in Pakistan. Unfortunately, Pakistan's laws, especially those related to the land, are not well informed by economic theory, resulting in inefficiencies, among other things. The reasons are both historical and religious.

The main issues and problems identified in concerning law and economics in Pakistan are (i) Identification of the ownership of land; (ii) informalities in the land-related transactions; (iii) complications in the laws; (iv) overwhelming and needless litigation; and (v) economic inefficiencies created by the taxation structure and other aspects of commercial law.

I. ABSENCE OF RECORDED TITLES

The basic land-related issue in Pakistan is the identification of the ownership of land since it is not definitively known who owns the land. This issue has arisen because of the absence of a centralised system of recorded titles. The state neither records the title nor does it provide a guarantee to the title. It only records who has the possession and who is liable to pay land revenue tax. Even the land records that exist are incomplete. The gaps exist for historical reasons. The rulers of the Subcontinent, including the Sultans of Delhi, the Mughals, and the British relied heavily on land revenue tax to run the state. This is the reason that the Punjab government department that deals with the land is called the "Board of Revenue". Although the original land revenue tax system was abolished in 1977, the structure remains the same.

(i) The Registry System

The way land records are structured has important consequences for economic efficiency and the functioning of the legal system. In case of a land dispute between two parties, it is up to the concerned parties to settle the dispute and establish the title in different ways. One way to establish the title is through a registry. An individual can have the title just because they got the registry from someone else who, in turn, might have got it from someone else and so on, creating a long chain. The chain system is problematic because if someone loses one link of the chain, it can result in the loss of the possession.

The registry system is only evidence of the title. A registry, therefore, is liable to be challenged easily. Moreover, the registry rules allow anyone to register, in theory, anything; the registrar does not have the authority to decline. The lacunae in the system become clearer when compared to systems in place in other countries. In the US, for example, a property is either recorded or it does not exist as far as the state is concerned. The state does not recognise unrecorded liens and guarantees decentralised titles. There is no equivalent of this in Pakistan for the real estate.

II. INFORMALITY

The problems are accentuated when the land-related transactions are conducted outside the registry framework, which itself is incomplete.

(i) Oral Transactions

For example, oral transactions are still valid in Pakistan whereas, in England, the oral sales were banned in 1604 by the Statute of Elizabeth. The problem with oral transactions is, of course, there is no written record.

(ii) Earnest Money (بیعانہ)

Similarly, the earnest money, which is an agreement to sell, is an unregistered document. The informality in the transaction leaves room for both the parties, the buyer and the seller, to renege on their promise if the price changes. Since there is no documented proof of the payment of the earnest money, the matter goes immediately into the disputed question of fact. A solution to this problem is, and this is where government intervention might be useful, is to use escrow methods. In the US, for example, when an agreement is reached, the amount of the sale is deposited in a bank. Once an agreement is reached, the bank releases the money subject to the clearance of the title and other procedures.

(iii) Equitable Mortgages

In Pakistan, the system of "equitable mortgage" is still in place, which is an unrecorded document. It means that the registry-holder, even if the property is in someone else's possession, can claim an equitable mortgage. The problem is that if a property that has changed ownership thrice or four times and if one of the title deeds is missing, there is no way to know where that title deed is and whether the property is pledged with a bank or not. Therefore, there is no good reason to still have equitable mortgages.

(iv) The Power of Attorney

There are problems even with the registered documents. For example, even though the power of attorney is a registered document, the related procedural issues are not transparent because the power of attorney does not have to be registered where the property is located. For example, someone in Karachi, who has the power of attorney of the property located in Lahore, might use it illegally.

III. COMPLICATED LAWS

Besides land title being incomplete and unregistered legal documents, even the laws related to the land that are formal and recorded, are complicated.

(i) The Law of Preemption (حق شفعہ)

One such complication arises from the right of preemption for rural land. According to this law, if someone decides to sell a property, their neighbor has the right to buy the property at the demanded price. Although it is very hard to prove the right of preemption as the person claiming the right first has to make an oral offer before making a formal offer, it wastes valuable time.

(ii) Will

The absence of wills in Pakistan creates further complexity, especially for rural areas where there are joint landholdings. In rural areas, the land splinters by the operation of law the moment someone dies because there is no formally recognised system to establish inheritance. Therefore, the heirs have to go to the court to establish inheritance, which results in needless litigation.

(iii) Benami Law

The Benami law (which in English law is called a "resulting trust") has added another layer of complexity. For example, someone who buys property but registers it in someone else's name can claim ownership even after a long time has elapsed. However, it is very difficult to prove that the payment was made by someone other than the titleholder. The Benami law is problematic because according to this law a Benami property can be confiscated. In other countries, such as in India, according to the 1996 Benami Act, the property belongs to the person in whose name it is registered. There is no need for the state to get into who has kept the land as a Benami property. The state should not concern itself with who paid the money.

(iv) The Rent Laws

Economic inefficiencies also occur because of the rent law. The problem arose from the 1959 West Pakistan Urban Rest Restriction Ordinance, which was applied nationally. Under this law, every lease deed was a lease forever. Once, a property was rented, the only way the tenant could be forced out was if it could be proved that the tenant had defaulted. Although it is a factual thing, every factual thing needs to be proved in the court. In Punjab, after a law was passed in 2008, landlords are now allowed to get rid of the tenant on the day the lease ends, provided the lease is registered. In KP and Sindh, however, the same problem persists. Informal estimates show that from 2000 to 2005, 6% of all the Supreme Court judgments dealt with rent. In Karachi, for example, the landlords are interested in renting out the property only to multinationals and foreigners because it is hard to get the property vacated once locals occupy it. The average time to get rid of a stubborn tenant is about 10 years.

IV. NEEDLESS LITIGATION

A dire consequence of the complexities arising from the unclear and complicated laws is that everything needs to be proved in a civil court. Consequently, civil courts deal with an enormous amount of useless litigation every day, which should not exist otherwise. According to one estimation, the civil litigation in Pakistan is about 60-70 percent land-related. Even about 40-50 percent of criminal litigation is also land-related, most of which is avoidable. To make matters worse, most of the land litigation lasts for generations.

The situation calls for the establishment of clear property rights so that the courts' interference is minimized. In every society, certain types of cases would inevitably arise, such as murder, robbery, or kidnapping but land-related issues are largely avoidable. For example, in Punjab, all the rent-related litigation has ended after 2008 after the

promulgation of the rent law. The result is that now people are willing to build houses to rent out, which has a huge multiplier in terms of economic activity. It is a trend that was not prevalent before the 2008 legislation.

Another factor contributing to an overwhelming amount of litigation is that Pakistan's justice system is understaffed. According to a crude estimation, the lower judiciary consists of 5000 judges and the superior judiciary has only 120 to 130 judges.

(i) The System of Appeals

A part of our legal system, which is also a remnant of the colonial heritage, is the extent to which verdicts can be appealed. In colonial times, the British judge had the discretion of what he wanted to take up. However, the difference is that at that time, the cases were limited in number. In the US, all the cases that go to court are normally decided by a jury. The decision of a jury is final and mostly cannot be appealed. In Pakistan, there have been no juries since 1953, and every decision is made by the judge who also has to justify his decision with reasons. However, the verdict is challenged from one judge to another creating a tall pyramid. In the US, for example, the pyramid is small, in which there are about a million cases at the lower level, about 1000 cases at the middle tier, and only 10 cases at the supreme court level. The US Supreme Court takes up about 80 cases a year. On the other hand, in Pakistan, the Supreme Court takes up to 5000 cases a year, the Lahore high court 100,000 cases a year, and more than a million cases remain pending in the lower court.

(ii) Judges' Discretion

Currently, the problem is that the judges take up all the cases. The case that cannot be appealed, can be revised, and the cases that cannot be revised, can be writ. Such a problem arises because there are no bright-line rules (see Box 2) in Pakistan. In the absence of bright-line rules, any verdict or decision can be challenged. The problem is further accentuated if the judge does not have time to decide or stay orders are obtained (see Box 3). The result is massive pendency because of two factors. Firstly, our system produces a lot of litigation, which should not arise, to begin with. Secondly, even when the cases are decided, they do not achieve finality.

Box 2: Bright-Line Rules

A bright-line rule is a clearly defined rule or standard in the US, composed of objective factors, which leaves little or no room for varying interpretation. The purpose of a bright-line rule is to produce predictable and consistent results in its application. Or, objective rule that resolves a legal issue in a straightforward, predictable manner. A bright-line rule is easy to administer and produces certain, though, arguably, not always equitable results.

Source: < https://www.definitions.net/definition/bright-line+rule>

Box 3: The Politics of a Stay Order

In Pakistan people engage in civil litigation for tactical reasons; they obtain a stay to bring the opposing party to the negotiating table. This has interesting implications for the politics at the bar council level. The president of a bar association, for example of the Lahore Bar Association, can charge 2 million rupees a case because being the president of the bar, increases the ability to obtain a stay in a case. This implies that the system is distorted at a functional and foundational level.

V. COMMERCIAL LAW

Other than in Karachi, the commercial law cases are very few in Pakistan for mainly two reasons. Firstly, the legal system of Pakistan is obsessed with the land as even commercial cases are judged through the lens of the land. Secondly, the commercial laws in Pakistan are such that the private sector's risk and economic efficiency aspects are not taken into account.

(i) Taxation

One of the problems arises from our taxation structure. In most countries, the legislature sets import duties. In Pakistan, on the contrary, the law operates in reverse. A look at the central excise or the sales tax acts reveals that the laws operate mostly based on exemptions. For instance, everything is taxed at 100 percent but certain exemptions are given, which are controlled by the FBR. However, the exemptions can be changed overnight, through a statutory regulatory order (SRO). This again exists for historical reasons, where the taxation has historically remained with the bureaucracy and the taxation even today is run by the FBR.

The problem with this practice is that the relationship between risk and reward is not understood by the bureaucrats. Because the taxation is operated through executive action, which can change overnight, people quite often find themselves in a situation where the tax rate is changed after they have started a venture. For example, according to Section 31A of the Customs Act, the "rate of duty is the rate when the goods land", which is quite puzzling because it increases the risk of businessmen if the rate is changed before the goods land. It is also applicable to sales and other taxes. Due to uncertainty created by such laws, foreign investors are also reluctant to bring in the FDI in Pakistan. The bureaucracy does not understand the private perception of risk.

(ii) Limited Liability Companies (LLCs)

In terms of law and economics, a limited liability company (LLC) is one of the most foundational legal reform. In an LLC, the liability of shareholders is minimized because it lets a businessman invest in a venture and limits the loss than can be incurred. In Pakistan, however, the concept of LLC has been tampered with. Till 2004, in Pakistan's prudential regulations there was a clause that required every director of a company to give a personal guarantee, which defeats the purpose of an LLC. In short, businessmen can be liable for any default of a company.

(iii) Commercial and Institutional Arbitration

The arbitration law in many countries of the world these days is plug and play. This means that a law can be picked up from one area and applied to the area where the law is needed. In Pakistan, firstly, there is no institutional arbitration. Secondly, according to the 1940 Arbitration Act, even after a party gets an award, the opposing party can take it to the civil court. Thus, the process starts all over again because everything is liable to be appealed.

(iv) Alternative Corporate Structures

In Pakistan, there is a need to move from traditional business organization structures to alternative structures that make it easier for people to organise without going through the whole hassle of a company. Currently, the requirements for a company and its management are overwhelming, and most businessmen do not want to deal with such procedures. Therefore, what is needed is to come up with simpler mechanisms for formalisations. One such option is a limited partnership, which started in England circa 1930s and is present in India for almost 30 years now.

The difference between a general partnership and limited partnership is that in general partnership, every partner is liable for all the debts of a partnership. On the other hand, in a limited partnership, there is one general partner who is fully responsible while everyone else is a limited partner whose liability is liable only to the extent of their share in the company. The difference between a limited partnership and a company is that the partners do not have to file accounts every year. The Securities and Exchange Commission of Pakistan (SECP) has allowed limited partnership. However, such partnerships are not being used because the accounts need to be filed every year, defeating the purpose of a limited partnership.

(v) Bankruptcy Law

Capitalism, in essence, is a marriage between capital and entrepreneurs. If the marriage fails, it needs to be ended. In other words, the entrepreneurs have the option of bankruptcy if the venture fails. However, in Pakistan, bankruptcies are almost non-existent. Although there is an option of filing for bankruptcy, not many companies opt for it because there is no benefit for the entrepreneur in filing for bankruptcy. Thus, there is a need to introduce easy bankruptcy rules in Pakistan, such as in the US where benefits are given to the entrepreneur, subject to certain laws. In the present situation, once a company fails there is no recourse for the businessman other than to destroy it, which destroys valuable resources.

Policy

Doing Taxes Better: Simplify, Open and Grow Economy[1]

MUHAMMAD NASIR, NASEEM FARAZ, and SABA ANWAR

All experts agree on:

Simplifying taxes, reducing costs of excessive documentation, opening the economy for high growth and employment. Taxes too will then Increase.

Box 1: The principles of tax policy

Transactions must be allowed to grow while collecting taxes. All taxes will create dead weight losses and market distortions. Good policy must seek to minimise these.

A tax effort that kills transactions is self-defeating. More transactions mean higher economic growth and employment, which in turn will generate sustainable streams of revenues.

Fairness: No one group should be seen to be bearing more taxes than others. This does not mean redistribution cannot be achieved through tax policy, but it must have an explicit and well thought out plan.

Certainty: Since taxes distort prices and market activity, there must be certainty in policy for people to build businesses. Frequent and arbitrary taxes are harmful for growth.

Efficiency: The process of collection should not involve further losses and transaction costs on economic agents. One inefficient manner in which government taxes people is through the use of excessive regulation such as curbing economic activity or state ownership of market resources and activities.

Convenience: Excessive documentation requirements also add to the tax burden to hurt growth and employment. Taxes and their administration should not be onerous especially in the daily activities of people where the bulk of the economy lies.


Taxes have been the cornerstone of IMF-led adjustment programs for Pakistan for over four decades. During this period, long term growth and productivity have declined while the tax policy has become more contentious and fragmented. Measures multiply as unrealistic targets are chased with mini budgets every quarter. The following arose from a high-level conference arranged by PIDE to outline future directions in tax policy.[2]

Illusive Targets: Chasing Tax GDP Ratio through Arbitrary Measures

For decades now, the policy has given priority to increasing the tax-to-GDP ratio leaving growth and employment to an outcome perhaps of some projects funded by the Public Sector Development Programs (PSDP).[3] Expenditures are never reviewed or rationalised for efficiency. Public sector employment is guaranteed, and annual wage increases are held sacrosanct while operational expenditures are regularly cut. Arbitrary and frequent tax changes have created an environment of uncertainty while cuts in operational expenditure have led to "austerity."

Increasing the tax-to-GDP ratio regardless of how this has become the cornerstone of policy. The narrative that the government and donors have established is that Pakistan has a tax-to-GDP ratio lower than some other countries. Box 2 shows the tax-to-GDP ratio for a select group of countries. It clearly shows that even in advanced countries, this ratio can vary by as much as 15 percentage points. Pakistan's tax-to-GDP ratio of 14 percent is not very low as compared to other countries of the region: Sri Lanka (13 percent), India (18 percent), and Bangladesh (8.5 percent).

Box 2:Tax-to-GDP Ratio

Country	Ratio
Germany	41
Sweden	46
UK	39
US	27
China	30
India	18
Pakistan	14
Bangladesh	8.5
Sri Lanka	13
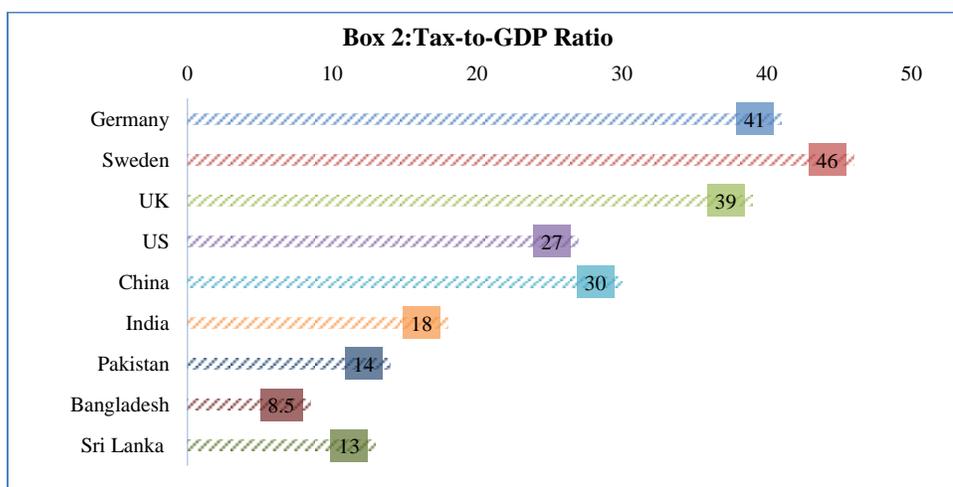
Source: IMF.

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[2]The Pakistan Institute of Development Economics (PIDE) organised a conference on the state of tax policy in Pakistan on March 11, 2020. The focus of the conference was to generate a debate on shifting the paradigm of tax policy and administration to make it growth oriented. The discussion focused on issues in tax and tariff policies, along with examining the role of automation and documentation in promoting growth and competitiveness.

[3]PIDE has already developed a book (Haque et al, 2020) as well as a policy viewpoint on the subject to note that our growth policy remains framed in the now obsolete Haq/HAG model.

https://forms.gle/UCqHjnwU4AZPPYXRA

https://pide.org.pk/pdf/Policy-Viewpoint-11.pdf

Tax Policy is Killing Transactions

Most experts are of the view that Pakistan's tax policy is not based on well-known and clear principles (See Box 1).[4] Section 5 of the Federal Board of Revenue Act legitimises a Tax Policy Board/Committee to sketch tax policy independent of FBR. Unfortunately, that board convened only once after reconstitution. The finance bills that continually add ad-hoc tax measures in frequent mini-budgets have developed a complex tax system that confounds the principles of rational tax policy.

Box 3: Are we a tax cheating nation?

The gathering challenged the prevailing official narrative of tax cheating nation. In the current withholding tax regime, every mobile phone user (i.e. 90 percent of population) is paying income tax in withholding form. This narrative appears to be unique to Pakistan. Countries such as Indonesia with a lower tax-to-GDP ratio does not accuse its citizens of tax cheating. It is strange indeed that even as FATF and international community are breathing down our neck our officials are claiming that their policy and administration is not at fault; it is the people who are cheats.

Data shows that policy consistently pushes for an unrealistic tax-to-GDP ratio, setting FBR to chase the number with arbitrary measures that kill transactions. The current target of the IMF for a tax-to-GDP ratio of 16.7 percent by FY 2021-22 is unrealistic and cannot be achieved without enhancing the taxable capacity of the country. Yet curiously the design of the target and measures to achieve it have stifled economic activity. As in the rest of the world, for revenues to increase we need economic growth. Yet policy is killing transactions through arbitrary taxes and the costly documentation drive.[5]

Arbitrary Minibudgets and Fragmented Sales Tax have Increased Uncertainty

Not only is our tax policy not based on conceptual clarity but it is also being changed continuously to meet unrealistic targets. The tax rates are high and keep changing several times a year through exemptions and SROs in mini budgets. The uncertainty due to continuous tax changes is a huge drag on investment which, as a percentage of GDP, is already among the lowest in the world.

Similarly, the sales tax base is fragmented with services subject to taxes at the provincial level and goods at the federal level. There is also a variation in rates (from 1 percent to 17 percent), in addition to several exemptions. The standard rates on services also vary between provinces. In Balochistan and KPK it is 15 percent, in Punjab it is 16 percent, and in Sindh it is 13 percent. Such fragmentation and exemptions also add to the existing uncertainty.[6]

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[4]See Haque Macroeconomic Research and Policy Making: Processes and Agenda https://www.pide.org.pk/pdf/Macroeconomic-Research-and-Policy-Making-Processes-and-Agenda-Dr-Nadeem-ul-Haque.pdf

[5]See Haque, N Kill Transactions, Kill Economic Growth https://medium.com/@nadeemhaque/kill-transactions-kill-economic-growth-5b45ae75abc1

[6]See Huzaima & Ikram, Overcoming fragmented tax system, *Business Recorder*, October 19, 2018.

Tariff Policy has Strangled Competition and Growth

Openness has been seen to be important for growth. In the 1970s Pakistan adopted the local industry protection policy while Chile and Turkey liberalised their economies. The countries that adopted openness – Turkey and Chile — saw sustained growth and their manufacturing sectors developed. Turkey even joined the European Customs Union in 1995. These countries are now exporting value-added goods like machinery and automobiles. Similarly, Vietnam started liberalising in 1986. They started rationalising tariffs and went for privatisation. In 1995, their exports were equal to that of Pakistan, which are now ten times higher in 2020. Since we did not lower tariffs, we could not integrate into the global value chain.

Box 4: Regional Comparison of Effective Tariff Rates	
Country	**Average Effective Tariff Rate**
Pakistan	11.2
Malaysia	4.5
China	5.2
Sri Lanka	7.0
India	7.5
Bangladesh	10.6

Source: World Tariff Profiles 2018 by the World Trade Organisation.

Pakistan, on the other hand, continued to follow the policy of protectionism. The average effective tariff rate in Pakistan is the highest in the region (see Box 4). With high protection, competitiveness and quality are virtually eroded. Protectionism, especially for the manufacturing sector, is the standard policy of the government. Manufacturers enjoy exemptions and concessions on the import of these items, which if imported by others are liable to duties and other charges. Consequently, the local manufactures neither developed their capacity nor upgraded technology to improve quality for their captive market. Unprecedentedly high (52-90 percent) duties on raw material reduce the share of manufactured goods to 0.15 percent in Pakistan as compared to 25 percent and 50 percent in India and Vietnam respectively.

Excessive Documentation is Killing Economy

Not only is the tax system complex, but the cost of compliance is also high. Taxpayers are also discriminated based on being filer and non-filer. Higher taxes, narrow base, differential treatments, and exemptions become hurdles in achieving growth and employment and block the flow of revenue.

Box 5: Withholding Tax and Revenue Earning

[VALUE] WHT

45 WHT

[VALUE]% of Total WHT Revenue by 23 WHT

[VALUE]% of Total WHT Revenue by 45 WHT

No of Withholding Taxes (WHT)   % of WHT Revenue
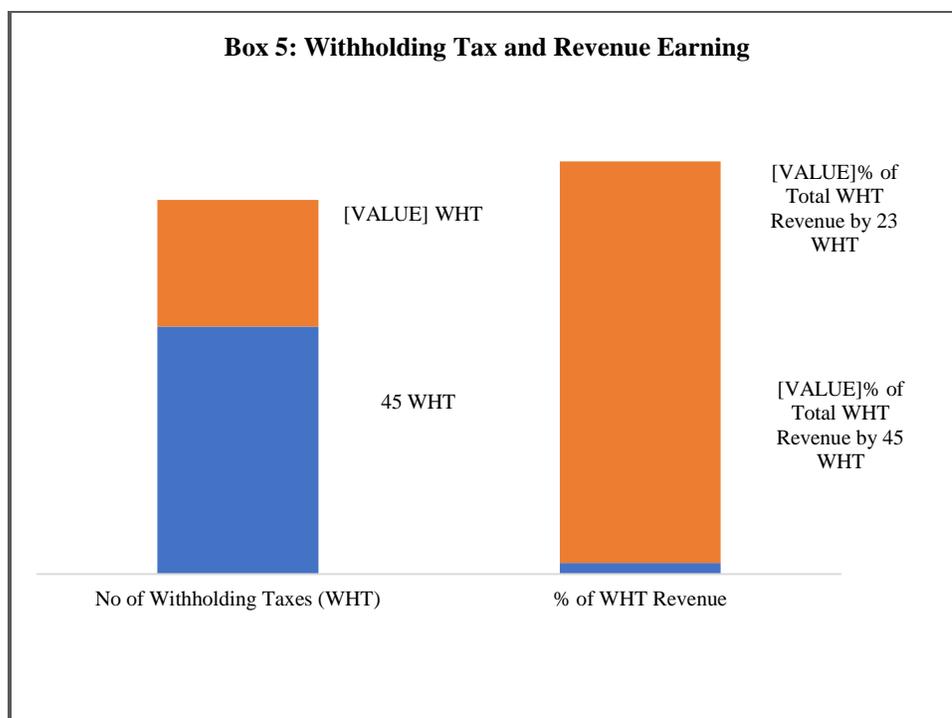
The withholding regime is imposing costs on business and individuals. 66 withholding taxes furnish almost 3/4th of direct tax revenues. However, 45 of these withholding taxes provide only 2 percent of the revenues (see Box 5).[7] About 70 percent of tax revenue is collected through withholding tax agents such as banks, utilities, and telecos, placing the burden of collection on these businesses and increasing their costs. While these withholding taxes may provide an easy source of revenue collection for the Federal Board of Revenue (FBR), they make the tax system incredibly complex for the taxpayers. This also questions the role of FBR as a tax collecting authority.

The current documentation drive would prove ineffective and rather counterproductive in the presence of the high cost of compliance. This cost consists of the number of hours required for record-keeping, tax planning, and forms completion and submission. It takes around 577 hours (per year) to complete the tax payment process in Pakistan compared to the world average of 108 hours. Adding this to the high number of payments (47) tremendously increases the average tax burden in the country.[8] The high compliance cost imposed on businesses being unpaid tax collectors for the government is the very reason for tax non-compliance. In such an unconducive environment, the current documentation drive would kill transactions—and with it any hopes of increasing economic growth and sustainable revenue streams.

[7]Kardar, S. H. and Pasha, H. A. (2020). "Tax reform agenda", presented at PIDE One Day Conference on 'Doing Taxes Better: Shifting the Paradigm of Tax Policy and Administration' held on March 11, 2020.
   [8]http://documents.worldbank.org/curated/en/143331468313829830/pdf/886380WP0DB20100Box3 85194B00PUBLIC0.pdf

Box 6: Cost of compliance to complete international transaction			
	Pakistan	India	Korea
Imports			
No of Hours (TEU)	216	85	7
Days (TEU)	9	3.5	0.3
Cost (TEU)	400	366	342
Exports			
No of Hours (TEU)	113	64	14
Days (TEU)	5	3	0.6
Cost (TEU)	406	270	196

Note: The twenty-foot equivalent unit is an inexact unit of cargo capacity.

An intriguing example of a high compliance cost for meeting the documentary requirements can be observed in Customs. To complete an international trade transaction, we require more than 400 hours (17 days). India and Korea, on the other hand, require 270 and 194 hours, respectively (see Box 6 for details). Hence, reduction in transaction time should be an important objective.

The price of tax collection is also very high in Pakistan (see Box 7). The cost of collection (CoC) has sharply increased over time. It has increased from Rs. 16 billion in 2014 to Rs. 25 billion in 2018, representing a 36 per cent increase in cost during a short span of 5 five years. Higher CoC leads to lower benefit of revenue collection. Nearly 80 per cent of CoC is distributed in the form of wages of the tax collection staff. Tax expenditures have been estimated in a study by FBR to be about 1.2 trillion rupees, about 4 percent of GDP. There is an urgent need to reduce these for many reasons.

Box 7: Cost of Tax Collection 2001-2018 (Rs. Billion)
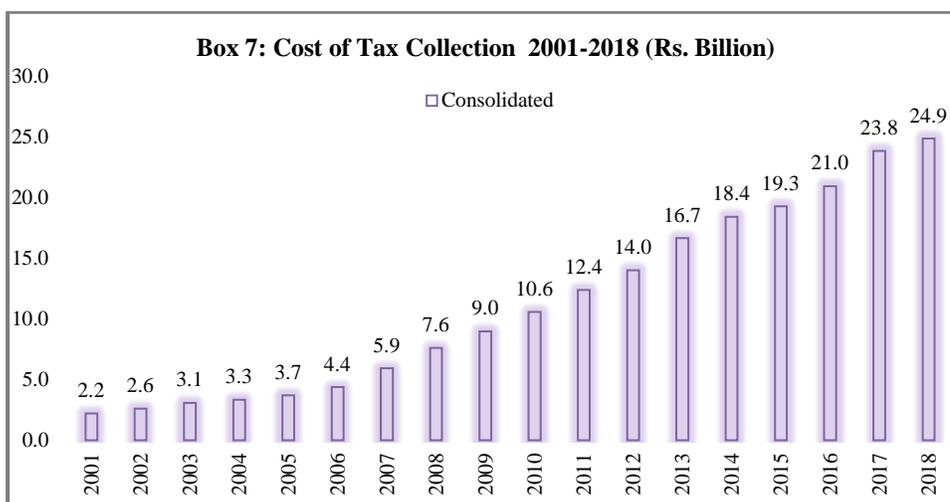
The tax administration model operates with outdated departmental manuals and outmoded information technology (IT) platform that relies on pirated systems and software. Advance countries are using business intelligence (BI) and artificial intelligence (AI) tax solution technologies for compliance and reducing human interaction in tax filing and tax analysis.

Making Policy Pro-Growth is the Way Forward

The policy should facilitate transactions to help grow the economy. Hence, it should be simple, efficient, and convenient, and help create a conducive environment for the economy to grow. Some reforms that have been recommended in this regard are as follows:

(1) *The tax reforms call for* broad-based, low rate simple taxes.[9] It is suggested that there should be a simple and predictable income tax regime. Those withholding taxes that contribute only meagerly but have a higher cost of collection (compliance cost) should be abolished. Moreover, the average tax burden should be lessened by decreasing the compliance cost through reduction in documentation requirements. This would a better approach to encourage entrepreneurship and get sustainable revenues than some crude documentation drive.

(2) *GST harmonisation* should be a priority. Several options are available to choose from.

    (a) The first best solution requires a constitutional change to address this issue.

    (b) The second-best option could be agreements for collection and enforcement and harmonisation between provinces. The provinces can maintain tax powers to change some elements of tax bases (e.g. rates between certain limits).

    (c) The third option can be to harmonise international tax bases and those elements of the sales tax that may affect the allocation of the tax. The sales tax rates of any activity taxed on origin basis should be equal in all provinces.

Where the sales tax applies on destination base, it is not necessary to have a full harmonisation of the rate, but it is necessary to establish limits to avoid spillovers when cities of different jurisdictions are close to each other.

(1) *As per the NFC awards,* the federation is responsible to provide revenues to the provinces irrespective of their contribution in the total tax revenue collection. The provinces contributed only 8 percent of the total tax revenues in the second half of 2019.[10] This further strains the fiscal space of the federation. It was suggested that provinces should have the exclusive right to levy indirect taxes on goods and services within their respective physical boundaries. The federal government should have the exclusive right to levy a tax on all kinds of income, including agricultural income. A serious debate on this issue is still required.

(2) *The existing tax system is a four-tiered appeal system* which is hopelessly redundant, painfully unproductive, and marred with inefficiency and inordinate delays. There is a need for a complete restructuring of the tax

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[9]Huzaima Bukhari & Dr. Ikramul Haq. (2016), Towards Flat, Low-rate, Broad and Predictable Taxes, Islamabad: PRIME Institute

[10]Ministry of Finance, Fiscal Operations, July to December 2019-20.

justice system so that fiscal disputes between the state and taxpayers get settled within a year at most. The existing Inland Revenue and Customs Tribunals should be merged and renamed as the National Tax Court. If the National Tax Court is established, there will be a drastic reduction in litigation.[11]

(1) ***The culture of SROs is unconstitutional*** and hence should be completely abolished. The 2013 ruling of the Supreme Court of Pakistan states that "Parliament/Legislature alone and not the Government/Executive is empowered to levy tax". The sectors supporting education and health can be exempted.

(2) ***The SRO's were ruled out in 2013 by law*** but they were "tariffied" or transformed into tariffs under Fifth Schedule. The Fifth Schedule has exemptions/concessions for importing plants, machinery, and inputs for pharma, poultry, dairy, home appliance, and textile sectors, and imports under Auto & Aviation policies. To become an active player in the global value chain, Pakistan should minimise the loops in the form of concessions and exemptions regime. SROs also maintain a distinction between commercial importers and local manufacturers.

(3) ***Unlike other countries, the tariff instrument*** has been used in Pakistan for revenue generation rather than growth and industrialisation. This short-sighted policy raises conflict of interests as tax collecting authority would always prefer high tax rates. There is a dire need for the tariff policy to be designed around "facilitation of transactions" or "growth". The rationalisation of tariffs should be a phased process.

   (a) First phase—revise duty tariffs with more reliance on domestic taxes.
   (b) Second phase—clear sectoral policies should be developed and tariffs be aligned with those sectoral policies. The exemptions should be merit-based only.
   (c) Third phase—once the tariff policy is in place, all the exemption schemes to be phased out.

(1) ***The electronic declarations*** and documents submission, digital signature communications, and web-based Tracking and Audit Trails (TAT) are the necessary reforms that can serve the purpose of enhancing the efficiency of the tax administration.

(2) ***The digitisation of the tax system*** and one-window environment would lower the business cost. It must be online with imaging and digital signatures. Minimal human interaction would lead to a transparent system and maintain an efficient economic environment. In this regard, instead of having several agencies for documentation, a one-window operation can increase the efficiency of the tax administration. For working in an integrated environment, digitisation and data-driven system are inevitable.

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[11]Bukhari Huzaima, Need for National Tax Court, *Pakistan Enigma of Taxation*, published by LAP LAMBERT Academic Publishing (December 30, 2011).

(3) ***There is a need for reforms in the regulatory framework*** on data sharing of public and private sector agencies with FBR. The availability and sharing of data could increase compliance by covering a variety of sources of income before filling of tax returns. For instance, banks maintain a registry of each customer and transaction. State Bank records this data. The government should sit together with public and private agencies to formulate a plan to configure this data with FBR. The data sharing between institutions would also provide a mechanism to bring in non-filers into the system, thereby paving the way to end the distinction between filers and non-filers.

Doing Development Better: Analysing the PSDP

Nadeem Ul Haque

The Pakistan Institute of Development Economics (PIDE) organised a conference on the development policy of Pakistan with a focus on planning and public investment policy. At the Conference, a PIDE study entitled, *Doing Development Better*[1] was launched and discussed. The key findings of the conference are listed below:

1. Reviewing the planning and growth history of the country, the PIDE study[1] pointed to the need to reassess the planning framework that has been in use for the last six decades. Mahbub ul Haq[2] and the Harvard Advisory Group (Haq/HAG) led by Gustav Papanek put in place the Haq/HAG model of development, which Pakistan has been following since the First Five-Year Plan. Key features of this model are:

   - A focus on building physical infrastructure through discrete projects.
   - Planning to develop a medium-term budget to finance the sectoral hardware.
   - Seeking foreign projects for meeting the financing gap in the plan, given an expected shortfall in domestic savings.

   This approach has led to:

   - An excessive focus on "brick and mortar" development (see Box 1).
   - Fragmented projects as planning was overtaken by repeated Balance of Payment (BoP) crises and resort to IMF programs.
   - Weakening standards on project development implementation and cost control with increased politicisation of public investment.

2. The econometric and other evidence (see Box 2) shows that public investment does not drive either economic growth or private investment. Projects appear to be creating assets that are either not being managed for maximum return or are poorly selected to reap the return that should not have been expected.

3. The development experience[3,4] has shown that there is a need to change the Haq/HAG[2] model, which was based mainly on 'hardware' creation. The 'software' of growth—productivity, management, policy, innovation, and institutions—are now seen to be the prime movers of growth and development.

4. The PIDE study also shows the importance of developing a coordinated and well-researched national development strategy for economic growth and development. This strategy should be based on detailed and well-researched sectoral strategies for

enhancing productivity, developing markets and better asset creation and management.

5. To develop a growth strategy for all the levels of government, the Planning Commission must play a coordinating role, leading with research to develop well-thought-out initiatives for reform and deregulation. National debate and several challenge initiatives through the PSDP can help achieve a coherent and coordinated growth effort across the country. This process will also serve to coordinate several donor efforts that are underway but appear to have limited impact in the absence of an integrated approach.

6. The Conference also endorsed the need to return to diligent standards of earlier days by making cost-benefit analysis (CBA) central to the growth policy. The planning process (the PC approval system) continues to enjoin CBA, the funding of feasibilities, approvals at the high-level fora, completion reports and monitoring, and evaluations. The lack of capacity and political imperatives have attenuated the system to a point where the system seems to be measuring only inputs i.e., investments made. Assets, when created, are more expensive than they should be and the returns on them are seldom evaluated or maximised. It is not surprising that the return on public investment is low and not contributing to growth.

7. Consideration needs to be given to moving from a system of only measuring inputs to monitoring and maximising returns. The Ministry of Finance has developed a Medium-Term Budget Strategy (MTBS) based on the Results-Based Management (RBM) Framework. Developing an RBM framework also seems to be the cornerstone of the Prime Minister's vision. The Framework of Economic Growth (FEG) approved by the National Economic Council in 2011 and 2012 had also suggested using the RBM to maximise returns and growth.

8. The adoption of an RBM based planning system would allow a medium-term rolling budget to be integrated into a growth framework. Such a move would also allow the investment and current budget to be consolidated to let the concerned agencies and ministries use all resources to deliver the desired results for growth and development.

9. Asset management for maximum returns remains a major concern for productivity and growth. Studies show that PSDP creates more assets than can be productively managed. Some examples are universities with buildings but lacking in faculty; stadiums without active sports; underutilised training academies, convention centres, and expo centres; roads that do not generate returns to cover maintenance; and airports and train stations that do not exploit their commercial potential.

10. Consolidation of the development and current budgets and moving to the RBM will allow asset utilisation plans to be developed and managed.

11. Development of asset registers to allow government balance sheets to be clarified and strategies to develop assets better.

12. If the PSDP approach is to be used to create assets, returns would be maximised if we regard the allocations from the PSDP to be a loan to the concerned project. The loan along with the expected rate of return would be required to be paid back with any subsidies intended by the government being taken into account as they accrue.

13. A combination of these proposals could be refined to incentivise ministries and agencies to prioritise management plans for optimising returns. This will be an

important part of a much-required strategy to accelerate productivity and growth in the country.

14. In keeping with the FEG, the discussion noted that the way forward has to be based on reform and deregulation to accelerate productivity, private investment, and entrepreneurship. The move away from an input-based, project approach to an RBM and asset management approach will foster these important market-based outcomes. This will need detailed policy and reform work to foster innovation and entrepreneurship.

The PIDE conference was a much-needed review of the growth system in Pakistan and it put forth several very useful ideas for rejuvenating the growth architecture of the country. Potential growth and productivity have both been on the decline for the last four decades as the struggle for adjustment has put the needs of stabilisation above growth. There is an urgent need to accelerate growth sustainably. To do this the Haq/HAG approach must seriously be re-evaluated to shift the paradigm of our growth policy.

The Conference took up this challenge earnestly. To develop a serious growth effort in the country, indigenous policy analysis and formulation capacity will have to be built up, and reliance on fragmented donor studies will have to be reduced. A recent PIDE study[10] on the state of research in Pakistani universities also points to the need to link universities into a research nexus that supports growth in the country. Like in advanced countries, a serious public policy research network will have to be developed in the country to contribute to a detailed R&D for policy and reform.

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Box 1: Sectoral Share in the PSDP
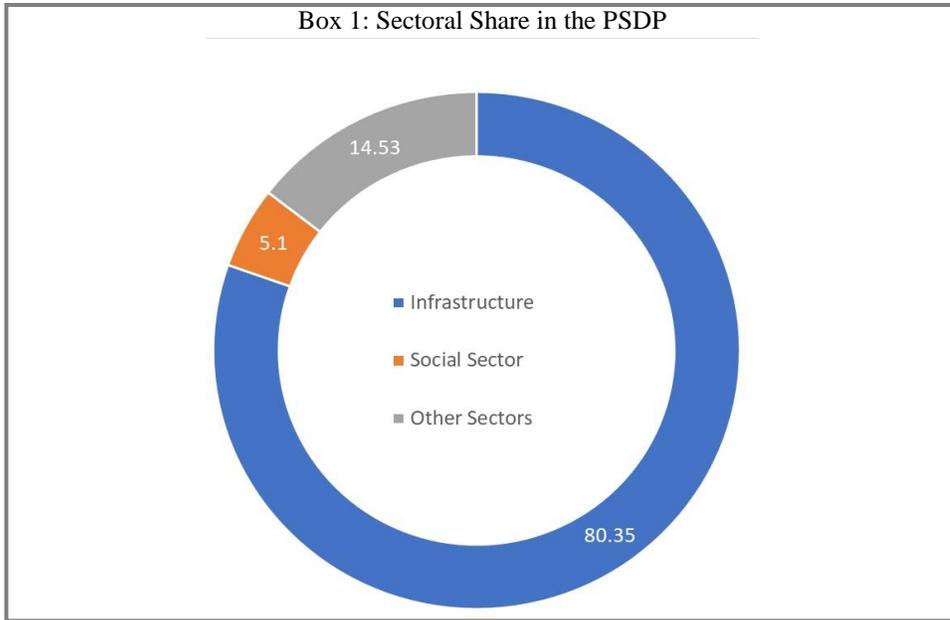
Source: N. Haque, et al., 2020.

Box 2: Impact of Public Investment on Growth from Recent Research	
Papers	**Result**
Bint-e-Aijaz, Maryam and Nazima Ellahi (2012)[5]	Negative impact on the growth rate, mainly investing in the sectors, which are unproductive and inefficient.
Ghani, Ejaz and Musleh-ud-Din (2006)[6]	Public investment has a negative, but insignificant, impact on growth.
Khan, M. Tariq Yousuf and Komei Sasaki. (2001)[7]	Sufficiently large during the early period but decreases over time.
Elahi, Nazima and Adiqa Kiani (2011)[8]	Role of public investment is negligible due to its inefficiency.
Saghir, Rabia and Azra Khan (2012)[9]	Government development expenditures have an insignificant impact on growth.

Analysing the National Tariff Policy

Usman Qadir[1]

INTRODUCTION

Customs Tariff

What is the role of import tariffs in a modern economy? Tariffs may seem an easy source of revenue, but they do have real consequences for the economy. The use of tariffs makes imported goods more expensive. It can be used as a means to prevent the exchange rate from fully adjusting to market value reducing incentives for export while increasing incentives for import substitution. Tariff policy can thus affect the product mix of country, including its direction of industrialisation, which in the complex globalised world of today determines its place in the global value chain.

Under the Federal Government Rules of Business, 1973, the Customs Tariff Policy and protection regime is the mandate of the Ministry of Commerce. However, over the years, except for trade defence measures, the Federal Board of Revenue (FBR) had assumed an overwhelming role in tariff setting. As a result, tariff became one of the primary tools for raising revenue rather than for protecting local industries or promoting international trade.

In order to bring better balance in tariff setting policies, recently the government decided to set up a Tariff Policy Board (TPB) chaired by the Commerce Minister/Advisor, with Minister for Industries and Production, Secretary Finance, Secretary Revenue, Chairman FBR, Secretary Commerce, Secretary Board of Investment, and Chairman NTC as its members. A Tariff Policy Centre (technical) has been created in the National Tariff Commission, which will hold consultation with stakeholders, analyse the proposals, and formulate Tariff Policy to be submitted to the Tariff Policy Board.

With this new set-up, it is hoped that the Tariff Policy Board will be able to develop a coherent vision for tariff policies and clearly lay out important tariff policy goals.

Need for a National Tariff Policy

The National Tariff Policy 2019-24 has identified several issues in the existing tariff regime. Traditionally, Statutory Regulatory Orders (SROs) that grant exemptions to

specific industries have been the key source of deviations from MFN tariff rates. These exemptions greatly complicate the reporting and analysis of the country's tariff profile (level and structure of tariffs). They also do not affect the customs duty rate reported in the tariff schedule[2]. Moreover, since the exemptions are applied for specific instances or use cases of products, in principle two customs duties rates can apply to the same product being imported[3] for different uses.

Issues in the existing tariff regime

- Focus on tariffs as a revenue tool has:
  - created distortions
  - eroded competitiveness
  - increased cost of inputs
- High tariffs have:
  - Created inefficiencies in manufacturing sector
  - Anti-export bias
  - Burden of protection on consumers
  - Incentive of smuggling, under-invoicing, mis-declaration of goods
- Excessively complex tariff structure due to:
  - Multiple duty slabs
  - High tariffs
  - Concessionary SROs
  - Regulatory duties
- Differential tariffs imposed for same inputs used by multiple industries – creates anomalies and discrimination
- Regulatory duties imposed have made tariff structure inconsistent and unpredictable

Source: Government of Pakistan (2019). "National Tariff Policy 2019-24", Section 4.

There is also substantial positive escalation evident in Pakistan's tariff profile, with the tariff rate increasing as the level of value addition of the product increases. WTO's Trade Policy Review of 2015 attributed this to a policy preference for protecting the domestic industry (the infant industry argument). Finally, the report has also identified that average tariffs for specific industrial and even agricultural products are higher than the average for the sector overall. As pointed out in both the NTP 2019-24 policy and the WTO Review, the large gap between average bound and applied tariff rates reduces predictability and consistency in the country's tariff regime.

Pakistan started the liberalisation process in the 1990s but there have also been many reversals. Most of the reforms done during 1997-2002, were reversed following the 2008 global financial crisis. Moreover, the signing and implementation of various bilateral preferential trading agreements (with China, Sri Lanka, and other South Asian economies) have resulted in growing complexity of the tariff system, rather than simplification.

[2]*Source:* WTO (2015).
[3]*Source:* Pursell, Khan and Gulzar (2011).

According to Nasir (2020), the high incidence of taxes on imports creates an incentive for importers to under-declare, mis-declare, and resort to smuggling. International research by Fisman and Wei (2004) has argued that increasing tariffs by 1 percent will lead to a 3 percent increase in evasion. In the case of Pakistan, revenue loss to the national exchequer from tariffs is considered to be substantial. Qureshi and Mahmood (2016) have pegged the loss at USD 21.1 billion for the period 1972 to 2013, while National Tariff Commission's PTA Report estimated that smuggling was 43 percent of total market demand and exceeded official (regular) imports. These are substantial losses that the domestic economy is ill-equipped to bear for much longer.

Against this backdrop, it is expected that the new National Tariff Policy will be able to address these issues so that the domestic economy can benefit from having a tariff regime that is uniform and low, and relatively free of distortions.

Guiding Principles and Salient Features of the Policy

The National Tariff Policy 2019-24 was approved in November 2019 and was the result of a year-long consultative effort by the Ministry of Commerce. The guiding principles of this policy include the intent to reorient tariffs as an instrument to promote trade and remove an anti-export bias in policy. Furthermore, tariffs will no longer be used as a means of generating revenue for the government.

Guiding Principles of NTP 2019-24
• Abandoning revenue generation as a tariff policy agenda and policy goal   • Recognising the use of tariffs as an instrument of trade policy and promotion   • Focusing on removing anti-export bias in tariff regime

The policy has laid out a tariff reform agenda that is designed to promote trade through an efficient allocation of resources, remove distortions in the domestic economy, and create a competitive environment for domestic industry. This is in line with the recommendations made by a 2018 World Bank Report on leveraging private sector growth in Pakistan by promoting trade and investment competitiveness (Rocha and Varela, (2018). The new policy has identified this as being accomplished through the principles of cascading tariffs, strategic protection, and import substitution, which are not new nor are they without their pros and cons, as discussed below.

A Critical Review of the Policy

The National Tariff Policy seeks to rationalise tariffs by continuing with some of the past practices such as cascading tariff, protection of domestic industries, and strategic protection. Given that the policy seeks to move away from previous policy imperatives, it is important that to the extent possible, these policies are phased out over time. Given that the past efforts have had limited success, the NTP should follow the trends prevailing in successful exporting countries.

Over the past several decades, tariffs were frequently raised to benefit local producers by artificially raising the prices of imported goods above domestic prices. It

was expected that this rise in prices should encourage local production of otherwise imported goods. However, the experience was that these increases in tariffs made the local industry inefficient and unable to compete in the international markets.

The NTP specifically lists three principles that will be retained to benefit the local industry. Each of these principles and how they can defeat the purpose of tariff reforms is discussed below.

Cascading: While the principle of cascading is important to promote domestic value addition, care must be taken to avoid providing too much protection to downstream industries. Previously, too much protection through cascading was provided to key sectors that failed to grow and stagnated with weak productivity growth because of weak incentives to become competitive.

While the Pakistan Business Council (PBC) in its presentation to the government on "Make in Pakistan", proposed cascading tariffs as necessary for reviving the manufacturing sector, this view does not take into account consumer welfare. For this reason, the government should research the efficacy of cascade tax for not just the domestic industry, but also for the domestic consumers, in keeping with the objectives of the NTP 2019-24.

> A cascaded tax or tariff ends up being a tax on top of a tax. That being the case, a tariff cascade would have a compound effect, with the final rate being higher than the initial rate charged upstream.

Thus, a cascaded tariff structure is not a panacea for boosting the domestic manufacturing sector. Rather, tariff cascading may promote rent-seeking, reduce productivity, and hurt consumer welfare by restricting market competition. It is thus important to rethink the imposition of a cascaded tariff structure and introduce a tariff policy that not only provides the right incentives to producers but also promotes the interests of the consumers.

Quite often cascading creates other anomalies. Often finished product for one industry is a raw material for another. For example, if the cascading principle is applied to the raw material of steel sheets and finished machinery, tariff rates on machinery would have to be enhanced. Another example is of paper which currently is subject to high tariffs. In terms of cascading, books made from paper would have to be subjected to even higher tariffs. High tariffs on essential goods such as machinery and books would create serious problems for other sectors. Thus, the cascading principle does not work in most of the cases.

> Other countries such as the East Asian Tigers also adopted protectionist measures early in their development, but these measures were for a short predetermined period. In case of Pakistan, once an industry is given protection for a certain period, it is not easy to lower the protection rates. As a result, such industries have remained infant for decades. They could only cater to domestic demand through high tariffs and not be able to export.

Protection for Import Substitution: The level of protection to import-substituting industries need to be properly rationalised to balance the interests of consumers and producers. Tariff reduction will have a benefit for consumers through lower price of imports and access to a greater variety at lower prices, and this should be highlighted by the government. If the domestic market continues to be closed to imports by prohibitively high tariffs, it is likely that the tariff jumping investments would create wasteful excess capacity as has happened in the past. Such misallocation of resources hampers productivity and stunts overall economic growth. Pakistan's experience is that whichever industry was given high protection, it never became competitive. Auto, sugar, and paper industries are some of the examples.

Strategic Protection: The Policy mentions that strategic protection will be provided to domestic industries to protect them from foreign competition. It will be offered to industries in the infancy stage to lower the cost of doing business and is planned to be time-bound and phased out to encourage competition. However, our past performance in this regard is not promising. Industries are still receiving handouts from the government, and timelines are easily revised on one pretext or the other. Unless effectively implemented, this is going to create an additional drain on our already limited resources.

It is not clear how the domestic industries will be selected for protection. In this context, it is important to spell out at the outset clear guidelines on how and what industries will be provided strategic protection. Moreover, improving, or at the very least maintaining quality, must also be a requisite for protection. In the past, such initiatives have merely contributed to rent-seeking while failing to establish a strong and competitive industrial sector.

Competitive import substitution is going to be encouraged under the policy, but again the policy document is light on the modalities of how it will all work, not to mention the fact that it becomes hard to justify how the tariff structure is being simplified and prone to fewer distortions. In the past, SROs have been used in addition to tariffs to achieve protectionist goals. How will this work when certain industries are receiving strategic protection while others are benefiting from competitive import substitution, and all are going to be subject to different time bounds?

Fig. 10. Coverage of ACD and RD by Tariff Lines
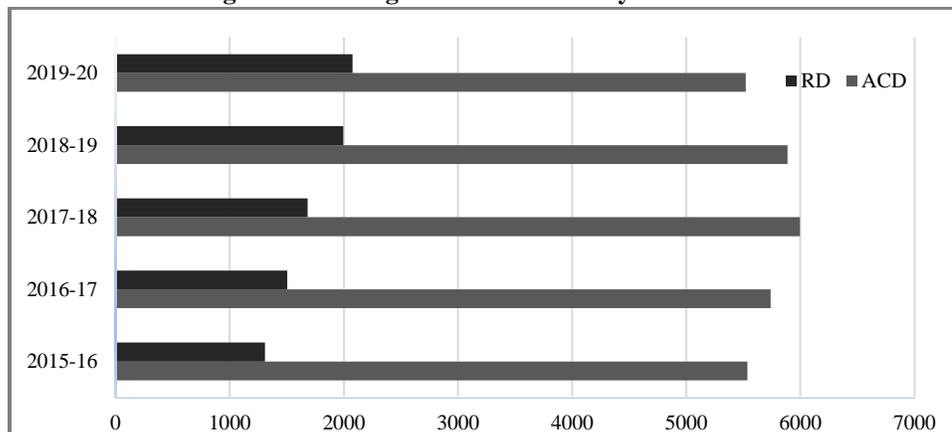
Source: Nasir (2020).

Various interest groups exert pressure on the government to impose additional customs duty (ACD) and regulatory duty (RD) on imports to discourage competition. These duties introduce anomalies in the country's tariff profile and do not work in the interest of domestic consumers. Instances of these abnormalities have increased in recent years, as evidenced by the increasing number of tariff lines subject to these duties.

Policy Process: The new policies of the government focusing on enhancing exports, encouraging foreign investment, and Pakistan's integration into the global value chain must all stem from a common holistic view and approach so the most efficient and optimal outcome is achieved.

Recommendations

- The policy must now be accompanied with a more concrete action plan that puts all on notice on how to proceed.

- Policy has announced good intentions. But a lot needs to be done to make it happen. We have had tariff liberalisation in the past only to be reversed. We should have a clear plan with timelines and a clear transparent immutable information plan.

- Openness is necessary for local competition. Our National Tariff Policy must be synced with our competition policy at home. This is an important exercise that must quickly be initiated and developed in concrete form.

- Our protection policy has never been clearly enunciated other than to say that it should be temporary. But it has never been as announced. We should now go beyond announcements and actually announce an implementation plan with timelines and with pre-commitment.

- Tax expenditures have not only exacerbated the fiscal problem but also led to local monopolies at the expense of domestic competition. This must be an important part of the NTP going forward. Tax exemptions should not happen!

The Tariff Policy Board will only be successful if the Ministry of Commerce is given the pre-eminent role as has so far been enjoyed by the Ministry of Finance and FBR. Tariffs should be set up to promote exports and making Pakistan a part of Global Value Chain. The role of tariffs for collection of revenue should be limited as is the case in other successful developing countries.

Finally, there is a need for institutionalising proper mechanisms for getting feedback from evidence-based policy research. In this context, it is important to include in the tariff policy board (TPB) relevant experts from the academic community and policy thank tanks who can provide research-based input into tariff policymaking. Also, the inclusion of representatives from the private sector would create stake-holding among the relevant players leading to greater ownership by the market participants.

Conclusion: Will the new policy achieve its goals?

The new National Tariff Policy has laid out a comprehensive tariff reforms agenda to promote an efficient allocation of resources, remove distortions, and create a competitive environment. The policy has highlighted laudable steps including abandoning the revenue generation as a goal of tariffs, recognition of tariffs as instruments of trade policy to promote trade and industrial competitiveness, and the overall thrust on the removal of anti-export bias. However, details are yet to emerge: the policy does not give us clarity on a time frame or a path of implementation. We hope as argued here that some of these details will emerge to lead Pakistan to a consumer-focused export economy away from the current emphasis on *"60-year old infant industries"* at the cost of our own people.

We are glad the policy has clarified issues that academics and researchers had been asking for a long time now. It is time now to move beyond goals and move in the direction of systematically opening out the economy, removing the RDs and ADCs, eliminating the SROs and a rationalising of tariff policy so that protection is temporary and does not become rent-seeking. Until then we can celebrate the policy announcement recognising that many such announcements have not succeeded in policy escaping capture.

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Books

Katy Gardner and David Lewis. *Anthropology and Development: Challenges for the Twenty-First Century*. London: Pluto Press. 2015 (Second Edition). 240 page. Price £24.99 (Paperback).

The book entitled *Anthropology and Development: Challenges for the Twenty-First Century* by Gardner and Lewis (2015) is the second edition of their previous book entitled *Anthropology, Development and the Post-Modern Challenge*, which was published in 1996. This second book incorporates recent issues that emerged since the first edition was released two decades ago. As the world keeps on changing, there are always new pressing issues that exert a significant influence upon development work to which an anthropological perspective has much to contribute.

As discussed by the authors in the Preface of the second edition of the book, the relevance of this book is two-pronged. Firstly, it wants to fill in the void left by the scarcity of published texts addressing views and debates concerning development and anthropology. Secondly, it serves as a personal attempt by the authors to make sense of their seemingly variegated insights and experiences stemming from different roles they assume as anthropologists, researchers, and development practitioners. Taking off from this vantage point, the book offers fresh insights for a range of readers that may include academicians, development professionals, researchers, students, and even laypersons who are simply interested to know about development.

Chapter One ("Understanding Development: Theory and Practice into the 21st Century") tackles two general development theories and the recent global development trends that have unfolded in the past two decades. Chapter Two ("Applying Anthropology") fleshes out the debate on pure versus applied anthropology and gives suggestions on how to make anthropology an applied science, engaged in development through advocacy, protest, and action. Chapter Three ("The Anthropology of Development") walks the readers through a review of the anthropology of D/development (Hart, 2001), which distinguishes Development (post-World War II intervention in the name of "decolonisation") from development (uneven development due to capitalism). Chapter Four ("Anthropologists in Development: Access, Effects, and Control") sets sights on core issues affecting contemporary development such as questions on access, effects, and control. Lastly, Chapter Five ("When Good Ideas Turn Bad: The Dominant Discourse Bites Back") deliberates on concepts that are originally radical with the potential to make a massive impact on society but end up being watered down when introduced into mainstream development, turning them into "buzzwords and fuzzwords" (Cornwall & Eade, 2010).

Broadly speaking, the book treads exquisitely through the intersections of anthropology and development, arguing that anthropology of development is feasible

despite some contested issues. Before the turn of the century, Sachs (1992) and Escobar (1995) predicted development to be on the brink of its death. However, as the authors point out, despite the criticism that anthropology could be hijacked and be utilised as a tool to maintain post-colonial power, development has survived the waves of peril and is still very much alive even up to this date. It is along this vein that the authors propound that since development work continues to persist, the contribution of anthropology in development should carry on as well. Non-involvement is not the only response in the midst of a highly contentious political climate of the development discourse. As such, Ferguson's (1997) description of development as the "evil twin" of anthropology has morphed into what is described by Gow (2002) as the "moral narrative".

The authors maintain the position that the anthropologists, with their training and exposure to anthropological methods, can leave the door wide open to "new ways of seeing and doing" (Gardner & Lewis 2015, p.2) by doing what they are best at – "studying the everyday worlds and cultures of ordinary people across the globe, revealing realities that are otherwise largely ignored" (Gardner & Lewis 2015, p.31). Through the application of anthropology in development, the right questions could be asked, and the oft-marginalised actors and beneficiaries are brought into the centre of the debate. Since a development project/programme follows through a certain timeframe, it may happen that some things could be overlooked. In this regard that an anthropologist could remind the team how development could be interpreted within a nuanced context, embracing the myriad culture-sensitive ways. The anthropologist can bring to light what others fail to see. Given this perspective, the authors are able to show forth the invaluable role of anthropology in the contemporary world of development, a niche that can be sometimes downplayed.

The book tackles critical nodes of discussion in contemporary development literature. To unpack carefully the issues, the authors first trace the historical contours of development from its origin in the Enlightenment period up to the present times. The book then zeroes in on two theories of development that could be viewed to be on the opposite sides of the spectrum, the first one being liberal (modernisation theory) while the latter one being radical (dependence theory). Although understandably, the book is not specifically designed to solely tackle development theories, it may have been better if the authors had also included a brief discussion on non-mainstream and non-Western development theories. Although these theories may drift off from the usual development models that typically go between a capitalist or a socialist track, these may create an impact in the long run on development practice and discourse especially because there is a surge of new powers among the countries that were initially touted to be from the 'South' or the 'Third World'. Examples may include the development model espoused by Mahatma Gandhi of India, who draws inspiration from Hindu principles and advocates a "system of strong self-reliant village units that would avoid the ills of centralisation and excessive industrialisation" (Herath 2009, p.7). I think that by infusing discussion with these, the authors could tap other sources of riches for the development discourse, especially those alternative models and mentalities that are different from the usual discussion of Western hegemonic development, a stance that the authors are critical of albeit not too radically.

A laudable aspect of the book is its macro analysis of development issues with careful regard extended to internationally-encompassing issues, such as sustainable development, migration, conflict, and securitisation (post-9/11 era), global financial crisis, the rise of emerging superpowers like the BRICs, and development trends like philanthropy work, corporate social responsibility, and microfinance. This also resonates with how anthropologists in recent times have started to deal more with macro issues (for example, the works of Aihwa Ong fleshes out ethnography on globalisation in the case of Malay women). Although they take on specific case studies, they locate these within a larger socio-political-economic context through the anthropological lens. As quoted in the Series Preface, it is to study "large issues explored in small places." In doing so, the authors are able to demonstrate how anthropology has also progressed with the changes that have occurred in the 21st century. With the rapidity and magnitude of how change takes place, the anthropology of development has been accommodated in a more welcoming manner into mainstream development.

Not resting upon the discussion on pure theoretical conjectures, the other edge of the book is the fine weaving of theory and praxis. The authors couple the theoretical underpinnings they discuss with concrete case studies and development experiences in order to situate these better within the purview of 21st century development work. Given this style, it makes the book more accessible and understandable to a wider range of readers, especially appealing perhaps to readers whose background may not be academic. It also makes the concepts and thoughts the authors discuss easier to grasp as the examples make these more visual, so to speak. By taking a cue from and interweaving the authors' arguments with the latest ethnographic researches, the authors are also able to demonstrate the extent to which the discipline of anthropology is willing to traverse through in order to keep up with the pace with the world and to study these new frontiers in the development arena.

Another aspect of the book that is commendable is the clarity of the positions the authors assume *vis-à-vis* the development discourse. For instance, they clearly discuss how they deviate from the argument of Sachs and Escobar when the latter argued that development work is just but a means of the developed countries to maintain post-colonial influence among the developing countries. In my perspective, the balanced stance the authors take on – that is, merging anthropology and development – is a more feasible and healthy approach rather than disputing one discipline or the other, thereby creating a clear wedge between the two. In this world whereby the society is highly characterised by hybrid thoughts, syncretism, and interdisciplinarity, it might be better to come up with criticisms that are accompanied by more attainable alternatives because definitely there is much to learn from other disciplines. In doing away with the usual binaries, the authors are able to paint reality that is oftentimes replete with seemingly contrasting ideas but which are highly interconnected. Thus, separating anthropology from development (or vice versa) could lead to a one-dimensional way of seeing things.

One gap that I see in the discussion is perhaps the lack of depth on how new global trends could exert an influence on the development discourse. For instance, the authors only mention the rise of emerging powers such as China, but they do not go in detail on how these could influence the future unfolding of development. Although discussions on development are highly political within the ambit of core-periphery imbalances in which

the so-called Global North plays a central role, it is interesting to read how the rising superpowers, especially those that were categorised before as 'developing', may dictate the future of development. In this way, there is continuity in the discussion on neo-colonialism given the new geographies of power. It would also show how concretely these previously 'victim' countries are fighting for their agency towards autonomy in their decisions and actions.

To conclude, this book is an invaluable resource for anyone interested in 21st development practice and literature/work. The anthropological ponderings offered in this book would entice one to continue with his/her pursuit of development amidst frustrating realities at times. This tightly knit juxtaposition of anthropology and development is a very refreshing one.

Maria Pilar Lorenzo

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**EXTRACTS FROM THE CONSTITUTION OF THE PAKISTAN
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ARTICLE 5
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Bertaud, Alain. Order without Design: How Markets Shape Cities (2018). (p. 3). The MIT Press. Kindle Edition. 2018.

Selected by Nadeem Ul Haque