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Business Cycle Decomposition and Its Determinants: An Evidence from Pakistan

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The explanation of the potential sources of economic fluctuations is a key research domain in macroeconomics. The purpose of the study is to identify the potential factors that impose permanent and transitory shocks to the economy. The former effects contribute towards the trend component, whereas later contribute towards the business cycle. We analysed the macroeconomic fluctuations by decomposing time series of gross domestic production (GDP) of Pakistan into the long-run trend and business cycles. The current study is divided into two parts. First, the series of real GDP growth is decomposed into its components via application of Hodrick-Prescott (HP) filter. The turning points chronology of these business cycles is identified by using both HP filter and Markow switching model. Second, the study explored the relationship between components of real GDP growth with macroeconomic variables by using Autoregressive Distributive Lag (ARDL) bound testing approach, so that we can identify the determinants of both short-term (business cycle) and long-term (permanent) fluctuations in the economy. It is found that balance of trade and external debt played important role in business cycle fluctuations. However, trend components of the GDP growth require GDP deflator and FDI additionally for a meaningful explanation. The sample period of the study is from 1951 to 2015. The results of the study would benefit policy-makers by unravelling the characteristics of business cycles.

JEL Classification: E32, E66
Keywords: Business Cycles, Macroeconomy, HP-filter, MS-model, Bound Test

I. INTRODUCTION

The recurrence and intensity of the business cycle fluctuations draw out significant implications for the real economic activity. One characteristic of the business cycle is cycling asymmetry, whereby economy behaves differently in contraction and expansion phases of the business cycle. Understanding business cycle phases and their properties have long been the focus of macroeconomic research which can be traced back to the work of Watson (1986). In the context of US, the National Bureau of Economics and Research (NBER) establishes the dating of turning point at which the shifts between recession and expansion occurred. The growing need for addressing economic vulnerability requires one to understand profoundly the nexus between both short and longer-term sources of fluctuation in the path of economic growth to better inform policymakers on the alternative policy options. This need is acute in the case of Pakistan

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because of two reasons. First, there is a lack of studies examining long-run relationship as well as causality between components of real GDP to deduce economic implications. Second, frequent political regime switches expose the economy to its own risk, which creates room for identifying business cycles for a better understanding of economy-wide movements.

The objective of this paper is twofold. First, is to date business cycle of Pakistan by comparing two alternative methods. We employ Hodrick-Prescott (HP) Filter (1997) and Markov-Switching (MS) model of Hamilton (1989) in this regard. The HP-filter first decomposes series of real GDP growth rate into the long-run trend and the short run or business cycle fluctuations. MS models date the two phases of business cycle i.e. recession and expansion phases. However, MS model further allows estimating transition probabilities between two states and the expected duration of each state. Although a variety of models have been deployed to capture various characteristics of the business cycle as linear models are not able to capture asymmetries [Hamilton (1989)]. Thus, the application of MS model becomes imperative. Second is to identify determinants of transitory and perpetual shocks in the economy. For this purpose, the study estimated both long-term trend and the cyclic component of real GDP growth by using macroeconomic and financial variables. These series are extracted by applying HP-filter on real GDP growth rate.

In this study, the Pakistani business cycle is dated by using MS and HP-filter so that comparison can be made. Mehmood and Arby (2005) used HP-filter for Pakistani business; our results are similar to them. The current study, however, extends the literature by employing MS model. Since there is no official outline or procedure that identifies phases of business cycles, there is an urge to fill this gap by providing a sophisticated statistical model that is aligned with economic theory as well. Another important contribution of the study is to explore potential determinants of cyclical and long-term trend component of the business cycle. Results of the study reveal that external debt, taxes, and balance of trade are crucial in exploring business cycle movements. However, GDP deflator and Foreign Direct Investment (FDI) are additionally required for examining the potential of real GDP growth.

The structure of the rest of the paper is as follows. Section II reviews the existing literature, Section: III is dedicated to describing methodology and data, Section: IV shows the results and Section: V is the conclusion of the study.

II. LITERATURE REVIEW

The literature is quite rich in exploring aspects of the business cycle and their effects on the economy. Canova (1998) use alternative detrending procedures to decompose time-series into its components. Their study classifies the modelling techniques into statistical versus economic models. Aguiar and Gopinath (2007) compare business cycle characteristics of emerging and developed market. The study argued that frequent regime switches in emerging markets increase the frequency of business cycles. More volatile consumption than income and countercyclical nature of trade balance is the most striking feature.

Iacoviello (2015) argued that business cycles are triggered by disruptions in the flow of resources between different agents, thus, they are intrinsically financial instead of

being driven by technological shocks. For this purpose, he considered the transfer of wealth from savers to borrowers, maximum loan to value ratios and changes in the value of asset collateral in a discrete time framework Dynamic Stochastic General Equilibrium (DSGE) model for US for the time period of 1985 to 2010 with three agents, households, bankers, and entrepreneurs. He concluded that under DSGE framework, banks produce significant impacts on the business cycles on the back of its role in liquidity provision.

Moolman (2004) investigated the relationship between business cycles and interest rates using a Markov Switching regime model proposed by Hamilton (1989) for the South African economy for the time period 1978 to 2001. He justified the usage of MS model on account of the non-linear nature of business cycles. The findings of his study suggest that yield spread—model by interest rates—acts as a leading variable for explaining the business cycle movements.

In the context of Pakistan, Mahmood and Arby (2012) attempted to determine the real GDP of the country through the decomposition of historical time series from FY50 to FY10 into its subcomponents. The results indicated various time periods in which the economy is embarked by recessions and expansions. Further, they forecasted that Pakistan economy will enter into an expansionary phase after 2012, a projection which is close to the state of economic development.

III. DATA AND METHODOLOGY

In the seminal work, Burns and Mitchel (1946) provide a standard definition of the business cycle:

> "Business cycles are a type of fluctuation found in economic activity of nations that organise their work mainly in business enterprises: a cycle consists of expansions occurring at about the same time in many economic activities, followed by similarly general recessions, contractions, and revivals which merge into the expansion phase of the next cycle; in duration, business cycles vary from more than one year to ten to twelve years; they are not divisible into shorter cycles of similar characteristics with amplitudes approximating their own."

In order to provide some evidence of the business cycle we mainly use two methods for dating business cycles which are described below.

This section devoted to the sample and the methodology employed in the study. It firstly tells about the sample and variable selection which is followed by the methodologies.

(a) Sample and Variable Selection

The time-series of macroeconomic variables are taken. Since the high frequency of data is not available in Pakistan, the Pakistani business cycle is modelled using real GDP growth rate over the period 1951-2015.

For the next part i.e. to isolate determinants of short and long-term variation in output, the study employed variables namely, taxes, GDP deflator, forex reserves, trade openness, foreign direct investment, balance of trade, and external debt. These variables are observed over 1979-2015. All the data have obtained from Handbook of Statistics on Pakistan Economy 2015 published by State Bank of Pakistan.

(b) Statistical Models

The methodology consists of two steps; first to decompose real GDP growth into its components and date the business cycle, and second to model components with macroeconomic variables.

To dissect output into its components, the study employs two methods i.e. hp-filter and Markov regime switching model. Later, it uses autoregressive distributed lag model.

(1) *Hodrick-Prescott Filter*

We first use Hodrick-Prescott (HP) filter to dissect real GDP growth into its time series components. Existing literature is quite rich and provides ample evidence to the widespread popularity of hp filter in the context real GDP growth decomposition [see Jaimovich and Rebelo (2006); Burnside (1997); Canova (1998) and others].

The series is assumed to be the aggregation of three components, i.e. secular trend, cyclical movements and irregular movements. Since the frequency of time-series is annual so seasonal variations are unidentifiable. The actual filtering methodology disintegrates the cycle by minimising the fluctuations of the actual data around it, therefore, it minimises the following function:

$$\sum[\ln y(t) - \ln y^*(t)]^2 - \lambda\sum\{[\ln y^*(t+1) - \ln y^*(t)] - [\ln y^*(t) - \ln y^*(t-1)]\}^2 \quad \ldots \quad (1)$$

Where y^* is the long-term trend and λ is smoothness parameter. Hodrick and Prescott suggested λ=100 for annual frequency time series. The procedure is repeated again to isolate cyclical variation from irregular variations.

(2) *Markov Switching Regime Technique*

Many macroeconomic time series occasionally exhibit dynamic breaks in their behaviour. Hamilton (1989) first proposed Markov switching model, which is a stochastic regime model, in the context of business cycle dating process. Models like regime-switching allow for nonlinearities by involving the discrete state variable. This framework is particularly useful for business cycle dating process.

Assume that there are two regimes, represented by unobservable process denoted by S_t. If S_t=1, then the process is in regime 1 while S_t=0 means that the process is in regime 2.Following Hamilton (1989), assume that S_t is a first-order Markov-process, which means that current regime (S_t) only depends on the regime of preceding period (S_{t-1}).

$$P\{S_t = j \mid S_{t-1} = i\} = p_{ij} i,j = 0,1 \quad \ldots \quad \ldots \quad \ldots \quad \ldots \quad \ldots \quad (2)$$

Note that, since $p_{01} + p_{00}$=1 and $p_{10} + p_{11}$=1, the transition probabilities are completely defined by p_{00} and p_{11}. The model takes the following form:

$$y_t = \alpha_{S_t} + \sum_{i=1}^{p} \beta_{i,S_t} y_{t-i} + \sigma\epsilon_t \quad \ldots \quad \ldots \quad \ldots \quad \ldots \quad \ldots \quad (3)$$

Where: S_t stands for the state at time t, it takes either 0 or 1;

α_{S_t} stands for the state-specific intercept coefficient;

σ is the standard deviation, which is assumed constant;

β_{i,S_t} shows autoregressive coefficients for lags 1 to p for each state;

ϵ_t are the residuals characterised by a zero mean and variance equal to 1.

The model presented here is characterised by constant transition probabilities and variances in two regimes. Results can also be improved by introducing time-varying probabilities. Recent studies like Moolman (2004), Chauvet and Piger (2005), etc. extended the framework to include time-dependent transition probabilities.

(3) ***Auto Regressive Distributed Lag Model and Bound Test***

Following the empirical literature in demand of exploring potential business cycle determinants, we form a relationship between components of GDP and macroeconomic variables. Separate modelling of the cyclical component would be helpful to identify pro-cyclical and counter-cyclical indicators. Furthermore, modelling of trend components in isolation would also assist practitioners to view long-term growth path.

This paper follows ARDL bound testing approach to test cointegration developed by Pesaran, *et al.* (2001) to analyse factors cointegrated with aforementioned components. The advantage of the approach is that it can be applied irrespective of whether the variables are cointegrated of order zero *I(0)* or integrated of order one *I(1)*. It can be used with the mixture of *I(0)* and *I(1)*. Furthermore, it has better small sample properties. The ARDL bound testing approach involves estimating the following unrestricted error correction model (also called conditional ECM),

$$\Delta y_t = \beta_0 + \sum \beta_i \Delta y_{t-i} + \sum \delta_j \Delta x_{pt-j} + \theta_0 y_{t-1} + \theta_1 x_{pt-1} + \theta_2 x_{pt-2} + \theta_3 x_{pt-3} .. + \mu_t \quad \dots \quad (4)$$

Where Δ is the difference operator; β_0 is constant; β_i and δ_j represent short-run dynamics, and θ's are long-run coefficients. Y_t represents components of GDP and X_t represents macroeconomic variables described above. In previous studies, the optimal lag structure is determined by Akaike Information Criteria, however, due to lack of availability of data the current study can only afford lags not more than two. The current study uses Wald or F-test for the joint null hypothesis H_0: $\theta_0 = \theta_1 = \theta_2 = \cdots = 0$. Since the asymptotic distribution is non-standard in this regard, we will use critical bound values provided by Pesaran, *et al.* (2001). According to Pesaran, *et al.* (2001), if the F-test statistics exceeds upper bound, the null hypothesis is rejected and there is an evidence of the long-run relationship. Alternatively, statistics below the lower bound mean that null hypothesis cannot be rejected. However, if statistics lies between the bound then the results are inconclusive.

The bound testing equation for business cycle and long term component model take the following form:

$$\begin{aligned} GDP_{(cyc)t} = {} & \beta_0 + \beta_1 \Delta GDP_{(cyc)t-1} + \delta_2 \Delta TAX_{t-1} + \delta_3 \Delta DGPDEF_{t-1} + \\ & + \delta_4 \Delta FXRESERVES_{t-1} + \delta_5 \Delta FDI_{t-1} + \delta_6 \Delta BOT_{t-1} + \delta_7 \Delta EXTDBT_{t-1} \\ & + \delta_8 \Delta TRD_{t-1} + \theta_1 GDP_{(cyc)t-1} + \theta_2 \Delta TAX_{t-1} + \theta_3 \Delta DGPDEF_{t-1} \\ & + \theta_4 \Delta FXRESERVES_{t-1} + \theta_5 \Delta FDI_{t-1} + \theta_6 \Delta BOT_{t-1} + \theta_7 \Delta EXTDBT_{t-1} \\ & \theta_8 \Delta TRD_{t-1} + e_t \quad \dots \quad (5) \end{aligned}$$

And,

$$\begin{aligned} GDP_{(trend)t} = {} & \beta_0 + \beta_1 \Delta GDP_{(trend)t-1} + \delta_2 \Delta TAX_{t-1} + \delta_3 \Delta DGPDEF_{t-1} + \\ & + \delta_4 \Delta FXRESERVES_{t-1} + \delta_5 \Delta FDI_{t-1} + \delta_6 \Delta BOT_{t-1} + \delta_7 \Delta EXTDBT_{t-1} \end{aligned}$$

$$+ \delta_8 \Delta TRD_{t-1} + \theta_1 GDP_{(trend)t-1} + \theta_2 \Delta TAX_{t-1} + \theta_3 \Delta DGPDEF_{t-1} + \theta_4 \Delta FXRESERVES_{t-1} + \theta_5 \Delta FDI_{t-1} + \theta_6 \Delta BOT_{t-1} + \theta_7 \Delta EXTDBT_{t-1} + \theta_8 \Delta TRD_{t-1} + e_t \quad \ldots \quad \ldots \quad \ldots \quad \ldots \quad \ldots \quad \ldots \quad (6)$$

Where $GDP_{(cyc)}$ and $GDP_{(trend)}$ is the cyclical and long-term trend components of real *GDP* growth, *TAX* is the growth in taxes, *GDPDEF* is the growth in *GDP* deflator index, *FXRESERVES* is the growth in Forex reserves, *FDI* is the growth in foreign direct investment, *EXTDBT* is the growth in external debt, and *TRD* is trade openness.

IV. EMPIRICAL RESULTS

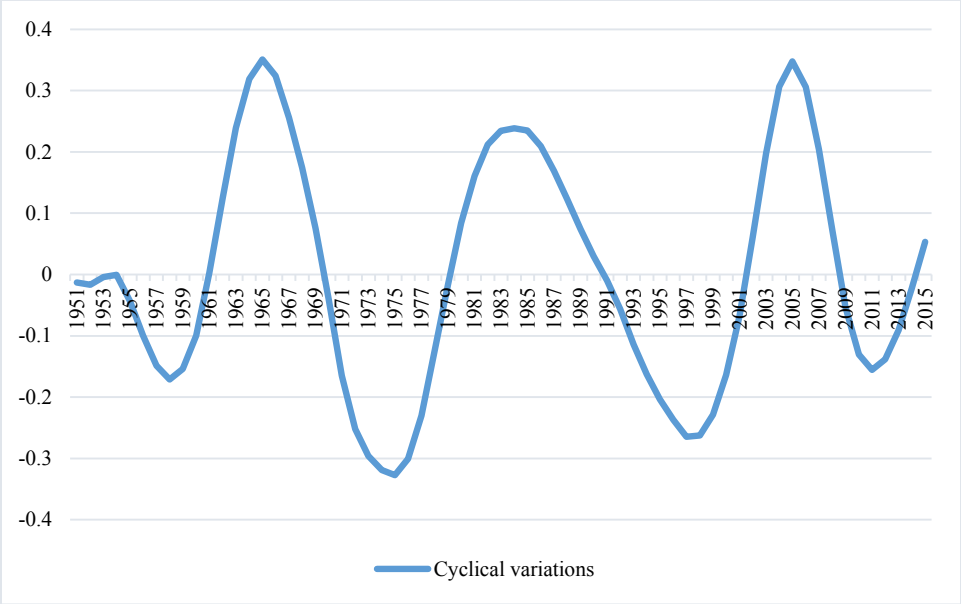
This section provides the empirical estimates of both dating procedures and ARDL estimates. A useful starting point for our empirical analysis would be to disintegrate real GDP growth into its components. These components are needed to be utilised in the subsequent analysis. Techniques are therefore summarised below:

(a) Results of Hodrick-Prescott Filter

We derive business cycle (short-run) and trend (long-run) component of the real GDP in this section which is further used to analyse determinants responsible for both long and short run fluctuations of real GDP.

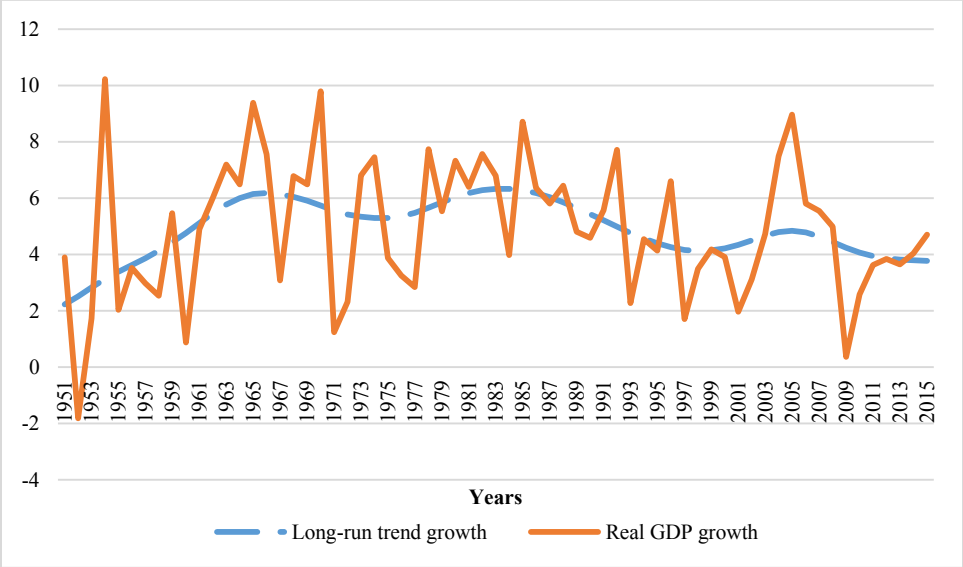
It can be seen from Figure 1 that there exist four business cycles and the fourth business cycle is currently going on. The third business cycle (1985-2005) was the longest among all. Recessions can be seen the result of adverse events. For instance, the 1970s, 1990s and 2006 or later periods are identified as recessions. The separation of East Pakistan, Asian Financial Crisis of 1998 and Global Financial Crisis of 2006-07 could have adversely affected the economy.

Fig. 1. Short-term/ Cyclical Variation of Real GDP Growth



The long-run trend of real GDP growth is illustrated in Figure 2. It is evident from the plot that it first rises sharply till the 1960s and in last two decades real GDP growth is touching its lower potential. Furthermore, deviations between actual and potential real GDP growth are all the time high which indicates alarming conditions in the economy. As in volatile economic conditions, investments seem to be riskier and foreign investors are reluctant to put their money in such economies.

Fig. 2. Long-run Trend and Real GDP Growth



The Table 1 below represents the classification of all four business cycles.

Table 1

Business Cycle	Recession	Trough	Recovery	Peak
First Cycle: 1950-1965	1950-1958	1958	1959-1965	1965
Second Cycle: 1966-1984	1966-1975	1975	1976-1984	1984
Third Cycle: 1985-2005	1985-1998	1998	1999-2005	2005
Fourth Cycle: 2006-	2006-2011	2011	2012-	

Our results of business cycle decomposition using hp-filter are similar to that of Mahmood and Arby (2012). The re-estimation is mainly to compare the cycles by two methods and to separate out components of real GDP growth rate.

(b) Results of Markov Switching Regime Technique

Based on the smoothed probabilities for both regimes (recession and expansion), the current study derived Pakistani business cycle. Following Hamilton (1989), this study utilises Markov regime switching model with four auto-regressive terms i.e. MS-AR(4).

The Table 2 below summarises the results obtained from MS-AR(4). Intercept coefficients in both regimes are highly significant which suggest that two regimes have

highly distinguishable features. As recession and expansion phases are the two extremes of the economy thus possess distinct characteristics. Furthermore, only two auto-regressive schemes are found significant which means that momentum of the real GDP changes after each two-year period. On the other hand, an average duration of the economy to remain in recession and expansion phases are nearly 4.2 and 4.3 years. This is an interesting result, however, showing the vulnerability of the country's economy. Short business cycles show how volatile the economy is. It is an adverse feature of Pakistan's economy which might have brought by frequent political regime switches, terrorist attacks, threats to wars and many others.

Table 2

Maximum Likelihood Estimates of MS-AR(4) Model

	Coefficients			
State Parameters	Regime-1	Regime-2	Transition Probabilities	Estimates
A	6.676***	3.124***	p_{11}	0.761
	Common		p_{12}	0.238
β_1	–0.359*		p_{21}	0.230
β_2	–0.376*		p_{22}	0.769
β_3	–0.215		Expected Duration	
β_4	–0.148		Regime-1	4.2
Log(sigma)	0.375		Regime-2	4.33

*** Significant at 1 percent, ** Significant at 5 percent, *Significant at 10 percent.

Based on the smoothed probabilities for expansion and recessions, the study has figured out business cycles of Pakistan. The results are comparable to those identified in the previous section. However, turning points of the business cycle are different in some cases.

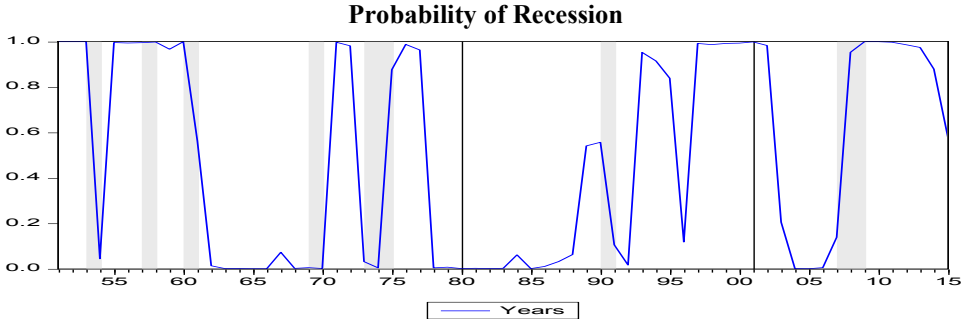
Table 3

Business Cycle Dating Using MS-AR(4) Model

Business Cycle	Recession	Expansion
First Cycle: 1951-1970	1951 – 1961	1962-1970
Second Cycle: 1971-1988	1971-1977	1978-1988
Third Cycle: 1989-2007	1989-2002	2003-2007
Fourth Cycle 2008-	2008-2015	2016-

The Figure 3 below shows the smoothed regime probabilities of recession. The shaded area represents the recession as it corresponds to the high probability of this regime.

Fig. 3. Smoothed Regime Probabilities



(c) Results of ARDL/Bound Test Model

Before modelling time-series, a preliminary step is to check unit root but the Bound testing approach does not require this step. We still reported unit root results in Table 7. The Table 4 and Table 5 below show the cointegration coefficients corresponding to transitory and permanent components of GDP.

Results of business cycle model is depicted in Table 4. It is found that the lag GDP cyclical component emerging as the largest contributing factor for short-term fluctuations. On the other hand, trade openness is found to have negative relationship with business cycle, which is consistent with the fact that increase in trade openness will reduce the volatility in business cycles. Similarly, negative and significant sign of balance of trade is also showing same trend of the said variable as that in long-term. However, the impact of external debt is found non-prevalent in short term. Overall, balance of trade, taxes, and trade openness are found to be cointegrated with cyclical component of GDP growth.

Table 4

ARDL Coefficients of Business Cycle Model

Variable	Coefficients
Δ (GDPCYC(–1))	0.839***
Δ (BOT)	–0.021**
Δ (BOT(–1))	0.034***
Δ (EXTDEBT)	–0.033
Δ (EXTDEBT(–1))	–0.092*
Δ (FDI)	0.002
Δ (FDI(–1))	–0.007
Δ (TAXES)	–0.004**
Δ (TAXES(–1))	0.002*
Δ (GDPDEFLATOR)	0.001
Δ (GDPDEFLATOR(–1))	0.001
Δ (FXRESERVES)	0.009
Δ (TRD)	–0.374***
CointEq(–1)	–0.049***
BOT	1.401*
EXTDEBT	–1.736
FDI	0.027
TAXES	–0.256**
GDPDEFLATOR	0.002
FXRESERVES	0.459
TRD	–7.592**
C	2.433**

*** Significant at 1 percent, ** Significant at 5 percent, * Significant at 10 percent.

The results below in Table 5 represent the long term relationship between GDP Trend and the considered variables. According to the obtained results GDP trend in the previous year has the largest and positive impact on current period's GDP. The positive sign shows that if the GDP is positive in the previous year then there are high chances of the upward trajectory in current year's GDP. The other significant variables of the model are the balance of trade and external debt which are negatively linked with current year GDP. It implies that exposure to international economies may impart a negative impact on country's GDP.

Table-5

ARDL Coefficients of Trend Component Model

Variable	Coefficients
Δ (GDPTREND(–1))	1.045***
Δ (BOT)	–0.055***
Δ (BOT(–1))	0.038**
Δ (EXTDEBT)	0.037
Δ (EXTDEBT(–1))	–0.123*
Δ (FDI)	0.005
Δ (TAXES)	0.004
Δ (TAXES(–1))	–0.006*
Δ (GDPDEFLATOR)	0.0016
Δ (GDPDEFLATOR(–1))	–0.002*
Δ (FXRESERVES)	–0.009
Δ (TRD)	–0.052
CointEq(–1)	–0.046***
BOT	–2.742**
EXTDEBT	3.843
FDI	–0.361**
TAXES	0.236*
GDPDEFLATOR	0.081
FXRESERVES	–0.212
TRD	5.297
C	2.840**

*** Significant at 1 percent, ** Significant at 5 percent, * Significant at 10 percent.

A Table 6 below is devoted to depicting results of ARDL bound test. For both models, it is evident that F-statistics is well above the upper bounds provided by Pesaran, *et al.* (2001). Thus, the model suggests that variables explained above are cointegrated.

Table 6

ARDL/Bound Testing to Cointegration—Results

	Long-term Trend Model		Business Cycle Model	
	27.44		13.85	
F-statistics	Lower Bounds	Upper Bounds	Lower Bounds	Upper Bounds
10%	2.03	3.13	2.03	3.13
5%	2.32	3.5	2.32	3.5
2.5%	2.6	3.84	2.6	3.84
1%	2.96	4.26	2.96	4.26
R-squared	0.99		0.98	

Table 7
Unit Root Test of Augmented-Duckey Fuller
Null Hypothesis; H_o: Unit Root Exist

Variables	ADF Test Coefficients
Balance of Trade	–0.839***
ΔExchange Rate	–3.215*
External Debt	–0.945***
FDI	–0.230*
Foreign Reserves	–1.224***
ΔGDP (Cyclic)	–0.123*
GDP Deflator	–0.650***
ΔGDP Trend	–0.189***
M2	0.205
Remittances	–0.64***
Taxes	–1.04***
ΔTrade Openness	–1.41***

*** Significant at 1 percent, ** Significant at 5 percent, * Significant at 10 percent.

V. CONCLUSION

This paper examines the two business cycle dating methods in order to identify the economic phases of Pakistan. Both approaches figure out four business cycles of Pakistan. We further analyse real GDP growth and its two components. These two components are then estimated with macroeconomic variables through ARDL model in order to analyse sensitivities within each component.

Business cycle volatility reflects country's exposure to the shocks and vulnerability is considered crucial in exploring determinants for a wide range of economic outcome including growth [Solomous, *et al.* (2013)]. The paper has first attempted to compare business cycle identified by two dating techniques. Results for both proposed approaches are similar, however, Markov regime switching model identifies relatively short business cycles. Expected duration for both recession and expansion phases are derived from MS model. Average duration for expansion and recession are 4.3 and 4.2 years respectively. It suggests that although Pakistan's economy does not have intensifying characteristics of recession, however, the frequency of regime switches is high which is endorsed by both dating procedures.

In the second part of the paper, we identified determinants of business cycle. It is found that balance of trade, taxes, lagged external debt and trade openness have both transitory and perpetual but countercyclical effects. This is very much in line with the economic conditions of Pakistan. The potential reason could be the low domestic economic activity in the recessionary period lead much reliance on imports which affects balance of trade, external debt, and broader trade openness facilities in terms of imports. It in turn suggest that there is an open room for export-oriented growth. Moreover, previous year cyclical component of real GDP growth is found significantly pro-cyclical. It suggests that business cycle maintain its momentum for at most one year and the phase reversal may occur in the following year. In explaining potential predictors of long-run trend component of the real GDP growth, the factors are similar to those of cyclical

component. However, lagged GDP deflator and FDI turned out significant in this regard. It suggests that economy is not flexible enough to respond inflationary or deflationary pressure abruptly. This must be the potential reason for the significance of GDP deflator when modelled on long-term component of real GDP growth. Furthermore, surprisingly negative and significant effect of FDI is found for long term GDP growth. It may be because of the fact that poor law and order situation along with high degree of political instability can only attract FDI whose cost exceeds the benefits thus impose detrimental effects on the economy.

In conclusion, Pakistan's economy is overall volatile which is evident from relatively shorter business cycles. Furthermore, asymmetries in the business cycle is not clearly pronounced as for the economy to be growing expansionary phase should last longer than recessionary phase. Moreover, exposure to the international economies are hurting the economy because of its narrow export base and continuous inclination in import reliance.

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