Business Cycle Fluctuations: why are so undesirable?

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Introduction:

The main focus of macroeconomic policies around the world is the stabilization of business cycles fluctuations. The policy makers, economists, producers and households are all concerned about the swings in economic activities and want to mute them down. The question arises why these fluctuations are so undesirable and everyone is too much worried about them. The main reason behind these concerns is.

1) Business cycle fluctuations lowers the lifetime discounted income/ consumption in the economy.

$$\sum_{t=0}^{n} \beta^t [y_{it} - y_{it}^*] < 0$$

Here β is discount factor, y_{it} and y_{it}^* are per capita income/consumption with and without fluctuations respectively.

2) These fluctuations also affect distribution of income in the society.

$$\sum_{t=0}^{n} \beta^t \left[{y_{it}}/{y_{it}^*} - 1 \right] \neq \sum_{t=0}^{n} \beta^t \left[{y_{jt}}/{y_{jt}^*} - 1 \right]$$

Where $y_{it}(y_{jt})$ and $y_{it}^*(y_{jt}^*)$ are per capita income/consumption of ith (jth) income subgroup with and without fluctuations respectively. This means the impacts on different income groups during expansionary and recessionary phases are different.

3) These negatively affect the long run potential level of the economy.

$$\sum_{t=0}^{n} \beta^t [y_{it}^{f*} - y_{it}^*] < 0$$

Here y_{it}^{f*}/y_{it}^* are per capita potential level of income/consumption with and without fluctuations respectively. This implies the fluctuations also result into lower per capita potential output level of the economy in the long-run.

The first two equations above demonstrate the cost incurred due to asymmetric behavior and impacts of the business fluctuations. The third equation displays their impact on long run potential level of the economy.

The business cycles are defined as "the co movements of a set of variables around their long run trend". In Lucas (1977), the business cycles are defined as "repeated fluctuations of aggregate macro variables

about their trends and the co-movements among these variables". Notwithstanding the simplicity of the concept many challenges have been associated with it.

The first challenge before researchers is to find an answer of question "why these fluctuations occur". Is it a natural phenomenon or a result of our irrational behavior? The economists are at variance with each other. The real business cycle theorists, for instance, believe that technological progress is main driving force behind the business cycles. Keynesians focus is on issues like animal spirits and rigidities, while monetarists consider changes in money supply as source of these fluctuations. Some hold excess speculation or the creation of excess levels of bank capital responsible for generating business cycles.

Second challenge is to answer the question "why these business cycle fluctuations are so undesirable". If everyone equally enjoys during boom period and suffers in the recessionary phase, then there is no need to worry too much about the business cycle fluctuations. If lifetime discounted earnings/consumptions of an individual are same with and without business fluctuations, then stabilization policies- costly themselves- are no more required.

The third challenge is that "whether the economic policies-fiscal or monetary-can (or should) change the course of business cycles". The real business cycle theorists consider business cycle as an efficient response to technology shock. So the stabilization policies are not desirable in this case. The Keynesians stance is that the fiscal policies can be used to soften the fluctuations as well as shorten their duration by changing taxes rates or government spending. The monetarists are also against the use of economic policies and believe that these policies are ineffective and even destabilizing.

The main focus of this study is to investigate; whether the business fluctuations affect long run potential level; and the role and importance of asymmetries in the behavior and impacts of these fluctuations.

The rest of this paper is organized as follows: the next section briefly discusses the cost associated with these fluctuations. In section 3 we talk about asymmetries in the behavior and impacts of these fluctuations. Section 4 reports some empirical findings of the investigation. The last section concludes.

2. Cost of Business Fluctuations:

These business cycle fluctuations can be costly in different aspects. These affect not only the long run growth but also distribution of income and wealth in the economy. This means these fluctuations not only reduce the average aggregate consumption of the household but its impacts may differ across the individuals and across the generations. Though a group of economist does not consider these fluctuations costly but majority of the policymakers and economists now believe that business fluctuations are costly in social as well as in economic terms. Those who believe that business cycle fluctuations are costly argue that the business cycles leave permanent scars on output through their effects on the growth process. Growth related variables, such as investment or R&D expenditures, are pro cyclical. Recessions decelerate or even halt the growth process while recoveries bring the growth rate back to its normal level but below the level had recession not occurred. As a result, output never returns to the trend it was following before the recession started. For example, Friedman (1969) argues that more often output moves below the ceiling of maximum feasible level due to cyclical contractions

and subsequent recovery bring it back to the ceiling again. Similarly DeLong and Summers (1988) considers fluctuations as oscillations of output below its sustainable levels, rather than symmetric movement around a trend[1]. Ramey and Ramey (1991) suggest that uncertainty makes firm to end up with a technology not appropriate for the scale of production it would has to undertake. This would result into inefficient production and hence lower average output.

The business cycles fluctuations also affect different segments of the society differently. The literature on subject suggest that in the contractionary phase unskilled workers and poor suffer more as compared to skilled and well off segment [Baldacci et. al (2002), Dao and Loungani (2010), and Van Dijk (2013)]. For example, change in total factor productivity, as a result of technology shock, alters the capital- labor ratio in production process and may change the distribution of income and wealth in an economy. The other reason, that business cycles have asymmetric effects on the households falling in different income tiers, is that not all individuals can fully insure themselves against income risk. A world where financial markets are incomplete, imperfect, and not all economic agents have access to these markets, accomplished the business cycles fluctuations having long-lasting distributional consequences.

Despite the agreement that business cycle fluctuations are costly, there is lesser consensus on empirical estimates of cost associated with business cycle fluctuations. The main challenge to estimate the cost associated with these fluctuations is it's qualitative nature. The empirical research, analyzing the cost of business cycle fluctuations, can be divided into two categories. The first category validates the existence of cost by investigating empirically the relationship between volatility and growth. While second tries to estimate the cost, in term of consumption lost.

The empirical studies investigating the relationship between volatility and growth [Ramey and Ramey (1995), Kormendi and Meguire (1985), Martin and Rogers (2000), Barro (1991), Alesina et. al (1996), and Judson and Orphanides (1999)] suggest negative impacts of fluctuations on the long-term growth[2]. Fatas(2000) using the Summers-Heston data set for a sample of about 100 countries find negative correlation between the degree of persistence and countries' long-term growth rates. Their regression results show that when volatility increases by one standard deviation the per capita GDP growth rate decreases by about 0.4 percent. Furthermore, the relationship between growth and business cycles is found to be nonlinear i.e. it varies with the level of development.

Lucas (1985) estimated the cost of fluctuations in term of consumptions' fraction an individual should be willing to sacrifice avoiding macroeconomic volatility. In other words, "the fraction of life time consumption required to make an individual just as well off as in the case consumption never departs from its trend". His calculations suggest very small cost in term of individual's lifetime consumption at most one-tenth of one percent. By revising his estimates, later research [Krebs (2007), Schulhofer-Wohl

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[1] Some studies [Caballero and Hammour (1994), Gali and Hammour (1991) and Hall (1991)] postulate that the recessions may result into higher long–term growth. The productivity improves during recession because of high return on research activities than on production activities and leads to higher long–term growth

2   In the opposite direction, various studies argued that business cycles facilitate rather than depress growth. The idea is that firms can take advantage of low productivity in recessionary phase to resume growth-enhancing activities without much loss in output. Jovanovic (2006) argues that volatility is an unavoidable byproduct of growth, so stabilization may curtail growth. Shleifer (1986) argues that volatility may be essential for growth. The reason is that firms invest in developing new technologies because to earn excess profits.

(2008), Krusell et al. (2009)] suggests that the cost of business cycles is significantly larger than what is implied by Lucas.

Lucas apply the representative agent approach to estimate cost but this under estimate the actual cost as aggregate consumption (and the average cost) does not fluctuate very much over the business cycle, so the representative household would not suffer much in this case. Therefore, cost may vary individual to individual depending on his access to credit markets and/or wealth. Some later studies [Krusell et al. (2009)]) try to address this problem introducing heterogamous households in their models. One main issue with Lucas' methodology and the subsequent approaches is that these all estimate the cost of business fluctuation in term of consumption. The individual household suffers also due to volatility in working hours caused by the business cycle. He has to work more hours in good times to save something for the rainy days. Even he works longer hours at lower wage to smooth consumption in recessionary period. Furthermore, the main shortcoming of these approaches is their assumption specific nature (for example the coefficient of risk aversion). The estimation of actual costs associated with business fluctuations is an empirical question. The more accurate estimates can be obtained through structured surveys conducted during different phases of the cycles and from different income groups.

3. Asymmetries:

One of the main reasons that provide support for the use of the stabilization policies is the asymmetric behavior, impacts of the business fluctuations, and reaction of economic agents.

Different types of asymmetries are associated with the business cycles. These includes intera- and inter-cycle asymmetries. This means that not only duration and severity of different cycles are but different phases of the same cycle present quite different features from each other; asymmetric impacts on different economic groups (income, age and sector); asymmetric policy response and their distributional impacts as well as the response of different agents during boom and recession. A number of studies confirming empirically the asymmetries in business cycles of developed countries are available [Belongia(1996), Garcia & Schaller(2002), Lo & Piger, (2005), Peersman & Smets (2005), Ravn & Sola (2004), Senda (2001), and Weise (1999),   Van Nieuwerburgh and Veldkamp(2006) are to name few]. Limited number of studies documenting such asymmetries in emerging economies can also be found in literature [for example Agenor (2001)].

 Some of these asymmetries are discussed in detail in following sub sections.

3.1. Asymmetries over Time

There is great variability in duration of a business cycle and extremely difficult to predict. Also decline/increase in GDP and employment varies significantly during the same phase of different cycles. Minimum fall in GDP was 2.8% (1981-1982) and maximum was 30% (1927-1933) in the business cylcles history of United States. Similarly, minimum and maximum increase in unemployment rate was 4% and 22% respectively during the same recessions.

Moderation of the business cycle has been observed in the U.S economy since 1990s [Kim and Nelson (1999), McConnell and Perez-Quiros (2000) and Simon (2000)]. The volatility of GDP growth has declined to 1.5 percentage points in 1990s as compared to 2.7 percentage points in the 1970s and 2.6 percentage points in the 1980s [Stock and Watson (2003)]. Stock and Watson (2003) provides a comprehensive description of the decline in volatility using a large number of U.S. economic time series. However, their research remains inconclusive on the cause of this moderation; whether it is improved policy or good luck (smaller economic disturbances) that tamed the business cycle. Ahmed et al (2002) tried to explain the role of good policy, good practices, and good luck in reduction of U.S. output volatility using frequency domain and VAR techniques. They assigned lager weight to good-luck as compared to better practices and better monetary policy in explaining the decline of U.S. output volatility.

3.2. Asymmetries during expansions and contractions

It has been observed that the expansionary and contractionary phases of the business cycles also exhibit quite dissimilar features from each other. The falls in growth rate from the trend is drastic and short when an economic boom ends. While recovery is gradual and growth rates does not depart much from trend when a slump ends.

In the words of Keynes "The fact that the substitution of a downward for an upward tendency often takes place suddenly and violently, whereas there is, as a rule, no such sharp turning points when an upward is substituted for a downward tendency". Barlevy (2004) argues that the changes in investment have asymmetric effect on growth. Positive impact of increase and negative impact of same decrease in investment on growth are different due to diminishing marginal impact.

During 1854-1914, US economy suffered 338 months of contraction and enjoyed nearly 382 months of expansion. Similarly, the numbers of months when economy was on down and up turns were 116 and 254 respectively between the First and Second World War (1914-1945) period. However, between 1945 and 2007, expansion months (642) outnumbered the contraction months (104) by a ratio of more than six to one.

Neftci (1984) develop and apply a statistical test to the U.S. unemployment series for the period 1948-81. He finds rapid and pronounced hikes while gradual falls in unemployment rate. Sichel (1993) analyzes postwar quarterly data on unemployment and industrial production. He also confirms that the depth in troughs is much larger than tallness in the peaks.

The literature used a variety of mechanisms to capture the asymmetries in historical data on business cycle. Hansen and Prescott (2000) put constraints on productive capacity so that the recessions deviate to a larger extent from trend as compared to booms. Kocherlakota (2000) and Acemoglu and Scott (1997) utilize the idea of credit constraints and learning-by-doing to introduce asymmetric impacts of shocks in the trough and peak of a business cycle. Williams (2004) investigate asymmetries on the basis of probability of large recessions and booms-the large deviation theory. Van Nieuwerburgh and Veldkamp (2006) introduces the idea of discrepancy in learning process during upturn and downturn. The other segment of literature employs the concept of signals that creates informational gap in good and bad times. Chakley and Lee (1998) argue that the ratio of noise traders increases in bad times.

Similarly, introduction of asymmetric spread of new technologies by Boldrin and Levine (2001), asymmetric costs of technology adoption by Jovanovic (2006) are examples of this strand.

Van Nieuwerburgh and Veldkamp (2006) explain that the changing informational flow about the aggregate technology create asymmetries during boom and recession. Firms abruptly reduce investment projects and labor demand as economy passes the peak because it has more precise estimates of the extent of the slowdown. But when economy passes trough, the noisy estimates about the extent of the recovery restrains the expansion of investment projects and new hiring by the firms. This makes the booms more gradual than crashes.

3.3. Asymmetric impacts on different economic groups

The business cycles fluctuations effect different segments of the society differently. The literature on subject suggests that in the contractionary phase unskilled workers and poor suffer more as compared to skilled and well off segment [Baldacci et .al (2002), Dao and Loungani (2010), and Van Dijk (2013)]. For example, change in total factor productivity, as a result of technology shock, alters the capital- labor ratio in production process and may change the distribution of income and wealth in an economy.

The other reason, that business cycles have asymmetric effects on the households falling in different income tiers, is that not all individuals can fully insure themselves against income risk. A world where financial markets are incomplete, imperfect, and not all economic agents' have access to these markets, accomplished the business cycles fluctuations having long-lasting distributional consequences [Prasad (2013)]. Especially in the emerging and low-income economies, financial markets are underdeveloped, and only a small proportion of the households have access to the formal financial system. Therefore, the aggregate macroeconomic fluctuations have pronounced and long term distributional effects in such economies.

The literature is enriched on the subject where new mechanisms have been explored and more sophisticated arrangements are made. Krebs (2007) argues that cost of the cycle for some subgroups in the population is significantly high as compared to the other. Mukoyama and Sahin (2006) analyze a model incorporating differentiate labor skill and unearth larger costs for the low-skilled workers. Schulhofer-Wohl (2008), considering heterogeneous preference toward risk, does not find significant difference in impacts of cycles on different subgroups. Krusell et al. (2009) finds that the cost of cycles incurred to the poorest, most impatient group is much higher (almost 4 percent of average consumption) as compared to very richest group (2 percent).

3.4. Asymmetric response and distributional impacts of policies

Most economists are now agreed that macroeconomic policy played an important role in moderating the business cycle during post war period. The stabilization policy has not only offset the effects of negative shocks hitting the economy, but also establishes an anchor against these shocks[3]. Since

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[3] Though there is a group of economists that believes in the "bad luck" view that the higher volatility of the exogenous non-policy shocks was main source of high fluctuations of business cycles. (see, for example, Blanchard and Simon 2001, Cogley and Sargent 2005, Kim and Nelson 1999, Kim, Nelson, and Piger 2001, McConnell and Perez-Quiros 2000, Primiceri 2003, Sims and Zha 2006, Stock and Watson 2003).

business cycle fluctuations are costly in term of social welfare. So the macroeconomic policies are essential to improve the welfare of society irrespective the source of the business fluctuations (whether real business cyclists' view holds or opponents). Next question that may arise is that whether these policies are costless? These policies-be monetary, fiscal or other- are costly on their own. The most important is the asymmetric response of policies during boom and recession. The policy makers and even economists are biased toward boom. The only thing worse, they believe, is recession and care less about the boom. This discriminatory stance of authorities during boom and recession is a big sin on its own "because the burst always follows the boom". Had the policies restrained the economy from overheating the business fluctuation would have been more moderate. The prevention is better than cure would be the best policy option. Furthermore, policy choices have distributional consequences as well [Prasad (2013)]. The way policies effect different groups depend on how these policies are designed and implemented.

3.4.1. Fiscal policy and distribution [Laurence Ball et.al (2013)]

Fiscal policy- increase in government spending or tax rate cut- is one of the popular instruments used to pull the economy back from recession[4]. But increase in government spending or tax rate cut today means higher taxes tomorrow. This shifts the burden from current generation to future generation. It has been observed that the public debt has significantly increased during recent recession started in 2007 in many countries. This is partially due to the decrease in tax revenues and partially due increase in fiscal spending to stimulate the economy.

The studies [see for instance, Smeeding(2000), Mulas-Granados(2005), Agnello and Sousa, (2012), and Woo et. al (2013)] those looked at the distributional effects of fiscal consolidation suggest that poverty and income inequality have increased. Ball et.al (2013) used a sample of 17 OECD countries from 1978 to 2009 and found significant distributional effects of fiscal adjustments. Main findings of this study are that the fiscal consolidation episodes have increased inequality over very short term as well as over the medium term; and that the share of wage income as a percentage point of GDP reduced significantly over the long term; the long-term unemployment also rose.

3.4.2. Monetary policy and distribution

Monetary policy is considered a trustworthy shield against macroeconomic shocks in advance economies. However, the role of monetary policy -conventional or unconventional- has increased around the world with the passage of time. It has taken the central stage in macroeconomic stabilization policies in developing economies as well. Nonetheless, its effectiveness and distributional consequences may considerably different for the two types of economies. In the emerging market and less developed economies, financial markets are incomplete and underdeveloped, financial access is limited, and monetary transmission mechanisms are weak. The distributional impact of the monetary policy depends

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[4] The fiscal multiplier for advance economies is significantly larger than unity but for less developed economy is not only insignificant but even negative in many cases (see for example…).

on the relative importance of different channels transmitting its effects (Coibion et. al [(2012)]. The interest rate is the main channel through which monetary policy affects the investment and hence aggregate demand. The changes in interest rate affect borrowers and savers oppositely. The consumption of the net borrowers reduces with increase in interest rate, while the consumption of net savers may increase or decrease depending on the strength of two competing forces- substitution and wealth effect. The changes in interest rate also change the capital-labor ratio and hence the wages of the workers. Furthermore, monetary expansion results into higher inflation that could affect different segments of the society differently. This disproportionately hurt informal sector's workers and low paid workers[5].

The credit channel is another channel through which monetary policy has redistributive effects, by affecting smaller and bigger firms differently. The collaterally constrained small firms suffer more during the contratioary episodes. Domac (1999) finds that in Malaysia small and medium firms suffer more as compared to large firms in case of monetary tightening by central bank.

The other channels through which monetary policy can influence the distribution in the economy are; exchange rate, term spread of interest rate; asset prices; and expectations channel.

The changes in exchange rate induced by monetary policy may reallocate resource from non- tradable to tradable sector. The changes in exchange rate also have redistributive impacts through imported consumption goods as well as imported inputs. These impacts may differ from county to country depending upon the elasticity of substitution between domestic and foreign goods. Furthermore, the changes in exchange rate also affect the domestic agents having debt in foreign currency.

3.5. Asymmetries across the countries

The business fluctuations are not only asymmetric over time but also asymmetric across the countries as well. The duration as well as the extent of the business fluctuations varies country to country depending upon the economic dynamics and the level of development, besides, other factors(for example the nature and/or source of fluctuations). It also depends on readiness and capability of the policy makers to handle the shocks. It is argued that business cycles leave larger and permanent effects on economies growing at faster rate hence losing more during recessions. Fatas (2001) shows that countries with lower long-term growth rates are those facing more volatile fluctuations and that this relationship also nonlinear. Furthermore, the effects are much larger for countries that are poor and/or having lower degree financial development.

4. Empirical evidence:

In this section, we present some empirical evidence in support or against the argument that business cycle fluctuations result into lower long run economic growth, show asymmetric behavior over time and have asymmetric impacts on different income groups of the society.

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[5] Coibion et al. (2012), however, conclude that income inequality increases as result of monetary contraction. Brunnermeier and Sannikov (2012) also suggest that monetary easing stabilize the economy and rebalance wealth after an adverse shock.

Between 1854 and 2007, US economy witnessed a total of 33 expansionary phases and almost same number of recessionary phases. Total number of months during which economy was on upward trend is 1278. On the other hand, all the contractionary phases sum up to 558 months. Maximum period for a single expansion is of 120 months, while minimum is of 12 months. Similarly, maximum and minimum duration of single contraction are respectively of 65 months and of 6 months. It is not only the duration that is asymmetric, the inter- and intra-phase severity also shows huge variance. The Minimum fall in GDP was 2.8% (1981-1982) and maximum was 30% (1927-1933) in the business cycles history of United States. The variance of US GDP growth has reduced from 2.5 in 1970s to 0.4 in 2010s. However, the unemployment have become more volatile over the same period. These clearly show both inter- and intra-phase asymmetries.

Table 1 shows decade wise average level of different variables and their variances. Per capita GDP growth(y) exhibits a declining trend over the decades. Fed rate(r) was high during 1970s-1980s but reduces to below 1 percent in 2010s. The inflation (π) was highest in 1970s due to oil price shock but came down to 2 percent in 2010s. All the three variables show highest volatility in 1970s. The volatility of these variables reduced over time reached its minimum in 2010s. The unemployment rate (u) was high in 1980s and reaches to its highest in 2010s after showing a decline during 1990s. The unemployment rate was less volatile until 1970s. However, its variance increases over time reached to maximum 2000s. Nevertheless, it remained less volatile as compared to other variables.

Table 1: Decades wise Average and standard deviation of Variables								
Decade	Average				Std.			
	y	r	π	u	y	r	π	u
1960s	3.00	4.58	2.77	4.72	2.0	2.0	1.8	1.1
1970s	2.14	7.72	7.86	6.44	2.5	3.1	3.3	1.1
1980s	2.40	9.44	4.74	7.12	2.3	3.0	2.3	1.6
1990s	2.19	4.96	2.80	5.59	1.4	1.0	0.7	1.2
2000s	0.73	2.35	2.39	6.10	1.9	1.8	1.2	1.8
2010	1.36	0.11	2.08	7.68	0.4	0.0	0.8	1.2

Table 2 shows the correlation of per capita GDP growth with fed rate, inflation, unemployment, government spending as a percentage of GDP, and investment as a percentage of GDP over decades[6]. The correlation between per capita GDP growth and fed rate is negative until 1980s but positive aftermath. The correlation between per capita GDP growth and inflation rate is throughout negative. The correlation between per capita GDP growth and government spending as a percentage of GDP is negative. This shows the counter cyclical nature of government spending and hence the fiscal policy. The correlation between per capita GDP growth and investment as a percentage of GDP is negative during 19860s and 1970s, while positive in the following decades.

Table 2: Correlations of PRGDP Growth with other Variables					
Decade	r	π	u	G/Y	I/Y
1960s	-0.27	-0.47	-0.24	-0.55	-0.35
1970s	-0.49	-0.73	-0.33	-0.30	-0.16
1980s	-0.31	-0.39	-0.26	0.08	0.35
1990s	0.00	-0.80	-0.64	-0.21	0.76
2000s	0.24	0.52	-0.42	-0.48	0.19
2010	0.23	-0.90	-0.81	-0.80	0.88

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[6] The correlations do not change much in case lags and leads of the variable are used.

As for as asymmetry in impacts of business cycle fluctuation on different income group is concerned, it is very hard to identify such an asymmetry. The different studies, investigating the asymmetric impacts of business cycle fluctuation on different income group, remain inconclusive. The main problem is the unavailability of required information and qualitative nature of such impacts on its own. However, some studies find that in the contractionary phase unskilled workers and poor suffer more as compared to skilled and well off segment [Baldacci et .al (2002), Dao and Loungani (2010), and Van Dijk (2013)]. Nevertheless, the establishment of such claims are very difficult. To see whether such asymmetries exist, we simply check if any asymmetry in impact of business fluctuations on real wages and employment of different labor skill exists. We divided the labor skill into three groups based on education level. We use quarterly US data form 2001 to 2015 for investigation.

Table 3 presents the variance of employment and wages growth of different groups and their correlations with GDP growth. The low skilled labor(less than high school) is most volatile, while the high skilled labor (bachelor's degree and higher) is least volatile in the group. It holds true for the volatility of wages. However, the volatility in number of persons in each group is much more volatile as compare to the wages in the same group. The correlation between GDP growth and growth in employed person, with one-quarter lag, is positive for all groups and is highest for second group. It is true for the real wages as well. Again, the correlation between wages and GDP growth is low as compared to correlation between GDP growth and growth in employed person. This shows that wages are relatively rigid as compared to number of persons.

Table 3: Correlation of GDP growth with employment and wage growth				
	Persons		Wage	
Education level	**Variance**	**Correlation**	**Variance**	**Correlation**
Less than a High School diploma	5.17	0.12	2.51	0.05
High School/ Some college	2.03	0.34	1.38	0.14
Bachelor's degree and higher	1.74	0.10	1.73	0.08

We analyzed the cross-countries data to find the answer of question whether business cycle fluctuations reduces the long-run growth[7]. We divided countries into three income groups; low- income; middle-income; and high-income group. Table 4 shows that low per capita income group end up, on average, with low and more volatile GDP growth. Similarly, the countries displaying high per-capita income and growth follow relatively stable growth path. The intra-group correlation of per capita income growth with its variance is negative for all groups. The correlation strengthens as we move from low-income to high-income group. The investment is negatively correlated with income growth in low-income group. This Correlation is negative for middle-income and positive for high-income countries, though insignificant in both cases. This support the argument that investment enhance growth only after a threshold level of income is attained. It means that investment boost growth if more skilled labor, capable to transform it into high growth, exists. However, these are simple correlations and do not imply causality.

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[7] A total of 114 countries whose data is available are included in the analysis.

Table 4: Group wise Averages and Correlations of per capita GPD with other variables

Groups	Average			Correlation		
	GDP/PC	GDPG	Std.	SD of Growth	Investment(as % of GDP)	Enrolment Ratio
Low *	425	4.6	17	-0.22	-0.27	0.17
Middle **	2069	5.8	13	-0.25	-0.05	0.16
High ***	20725	5.9	12	-0.34	0.04	-0.15

*Countries far below than the average of all courtiers**Countries closer to average ***Countries far above than average.

To further strengthen our analysis, we regressed GDP per capita (in log form) on investment as percent of GDP (Iy), standard deviation od GDP growth (Sy), enrollment (E) and two interactive dummy variables (D1Iy & D2Iy) for high-income and low-income-group respectively. Y, Iy , E are average values of each country over period 1981-2014, while Sy is standard deviation of each country's GDP per capita growth over the same period.

The results in table 5 below show that high volatility of growth, on average, effects per capita income negatively. This means that countries facing higher business cycle fluctuations end up with low income per capita. The coefficient of interactive dummy variable on investment for high-income countries is positive while it is negative for low-income group. This means that any increase in investment helps only after a certain level of development is achieved. These results support the earlier arguments given above.

Table 5: Estimation Results (dependent variable is GDP Per Capita)

Variable	Model 1	Model 2
I_y	-0.05 (-2.8)	-0.02 (-2.1)
S_y	-0.08 (-4.1)	-0.03 (-2.4)
E	0.02 (3.4)	0.0002 (0.05)
$D1I_y$	-	0.08 (13.8)
$D2I_y$	-	-0.04 (-6.0)
R -squared	0.25	0.82

Note: values in parenthesis represent t-statistics

5. Conclusion

Smoothening the business cycle fluctuations is the main objective of all macroeconomic policies. All economic engineers are in struggle to device mechanism bringing macroeconomic stability. Behind growing concerns about business cycle fluctuations is the belief that these are harmful for the society both in short and long run. These not only negatively affect long-term growth's trajectory but also have distributional consequences as well. However, research remains inconclusive in proving existence of these commonly believed harms to society or otherwise. Furthermore, the question "had macroeconomic policies been successful in muting the business cycle fluctuations" is still awaiting answer. The policies undertaken were mostly reactive in nature rather than proactive due to

unpredictability of fluctuations and existence of multifaceted asymmetries. Moreover, the source of these fluctuations is different every time.

In this study, we analyzed the impact of business cycle fluctuations on long run income growth, on different agents and changes in these impacts over time. We found the evidence of negative impact of these fluctuations on long run economic trajectory. The severity and extent of these fluctuations also varies over time. Some disparities in impact across different income group also exist. However, we could not find any support to the hypotheses that poorest segment of society suffers most because of these fluctuations. However, these results are obtained from simple analysis and a deeper investigation is required to reach any sound conclusion. In this regard, experimental economics' tools may be helpful device. The survey based analysis during different phases of business cycles and repeatedly over time would provide more accurate estimates of cost of business fluctuations to the society.

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