



## Cyclical Behavior of Banks Capital and Countercyclical Buffer of Basel III: Empirical Study on Palestinian Banks

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### Abstract

In this paper, we investigate the countercyclical buffer addressed in the Basel III framework. The 'countercyclical buffer' targets at the extenuation of the supposedly harmful behavior of bank capital. The size of the buffer after the stepwise growths during the application stage finally reaches 2.5%. Therefore, the presented focus is on understanding to what extent does an increase in capital reserves affect the Palestinian economy. This paper uses mostly annual data by GDP as a deputation for the commercial cycle over the period 1996 – 2014. The analysis shows that the countercyclical buffer does not affect the Palestinian economy, which identifies a defining pro-cyclical behavior of Palestinian banks' capital.

**Keywords:** Basel III, Business cycle, Capital buffer, Autoregressive Distributed Lag Model (ADL), Countercyclical buffer.

### Introduction

In socioeconomics context, the banks are playing a very significant role since banking sector is considered one of the main elements to strengthening confidence in the state's policies and caring for the economic interests. There is an ever developing literature on the pro-cyclical

impact of banking arrangement. For instance, Basel II agreement, applied in 2007, has support discussion on the cyclicity of regulation and the probability that regulation increases business cycles. The financial crisis in 2008 was barely the first in history [1-3]. For this reason the Basel Committee on Banking Supervision (BCBS) revised the regulatory framework in Basel III [4]. The International Monetary Fund (IMF), the Bank for International Settlements (BIS), and the Group of Twenty (G-20) support this method and made an instruction proposal on the 20 July 2011 so as to provide a probable legal framework for the states that follows Basel III [3-6]. The outline should be comprehensive at the latest in 2018 [7-9]. The resolution that the committee suggests is dual: a capital preservation buffer which can be accessible to under certain conditions and the outline of a ‘countercyclical buffer’ [10, 11]. The latter is proposed to guarantee that banking sector capital requirements take account of the macro-financial atmosphere in which banks function” [4, 12]. The countercyclical buffer will be applied by the state jurisdictions [13]. The extreme size of that buffer after stepwise growths during the application stage and will finally be 2.5%. It will be exciting to observe the international uniformity of this approach [6, 14]. In addition excessive on- and off-budget leverage, the quality of the capital basis and inadequate liquidity buffers, Basel Committee is addressing the pro-cyclical influence[4]. It tries to resolve the regulatory paradox that a lowest capital requirement is slightly useless for extenuating risks when there are approvals if the requirement is not met [10, 12]. Stringent lowest capital requirements can in chance upset the economy further (through lower bank lending) which could open up to more difficulties for the banks a vacuum circle with an instability of the banking system as a significance [4, 15]. Basel II was connecting capital requirements with management risks and those risks are in repetition related to the business cycle. In an economic depression, loans are more likely to get relegated (i.e., creating at least mark-to-market losses) and are more likely to lead to non-payment than a drop in retrieval rates. Important banks might involuntarily stagnate their loan portfolio in a stagnation [16] - hence the passive influence on the economy. According to Basel III approach [4, 6], the assets risk weighted average (RWA) calculated as:

$$RWA = K \times 12.5 \times E \quad (1)$$

where E is the exposition at default (EAD) 12.5 being the reverse of the capital adequacy should be at least 8%, and K being the capital requirement [17, 18]. Especially the latter is calculated out of the loss given default (LGD), the possibility to default (PD) and thus susceptible to cyclicity Calculated as:

$$K = [LGD * N [(1-R) ^ (-0.5) * G (PD) + (R / (1-R)) ^ (0.5) * G (0.999)] - PD * LGD] * (1 - 1.5 * b (PD)) ^ (-1) * (1 + (M - 2.5) * b (PD)) \quad (2)$$

$$R = 0.12 * (1 - \text{EXP} (-50 * PD)) / (1 - \text{EXP} (-50)) + 0.24 * [1 - (1 - \text{EXP} (-50 * PD)) / (1 - \text{EXP} (-50))] \quad (3)$$

$$b = (0.11852 - 0.05478 * \ln (PD)) ^ 2 \quad (4)$$

with R: correlation, N: normal cumulative distribution function, M: maturity, b smoothed regression and G: inverse cumulative distribution function.

To develop the model above, we have taken 84 firms derived from a portfolio of a large Palestinian bank. According to Basel III simplification any company was 90 days or more due [19, 20]. It has considered as a default the company's allocation in the data input is shown in Table 1.

**Table 1. Data input for Palestine SMEs.**

	Number	Percentage
Good firms	76	90.5%
Defaults	8	9.5%
Total	84	100%

Following Edward I. et al (2005) [21], the research used logit and probit regression to predict PD. This research made appropriate dependent variable (default/non-default), through the state of every company at the end of the following financial year [3, 22, 23]. It applied a stepwise variable based on a likelihood-ratio investigation with the important level set at 20%. From twenty variables eight has been chosen. These variables are shown in Table 2.

The result of our new model that it creates 9 rating level each rate has PDs ranging from 0.025% to 16%. For every level, the PDs are created by separating of by the number of the project at every level. We had created the rating level to obtain the PD value closest to the one presented by bond equal PD distributions.

**Table 2. Data of measured the variables inter to final model.**

Debt/Equity
Bank debt/(Total assets - Bank debt)
Long term liabilities/Total assets

Economic value added/Total assets

Cash/Total Assets

Tang. Assets/Total Assets

Accounts payable/Total assets

Long-term bank debt/Bank debt

Moreover, we create the cumulative weighted average (10.7%) as a capital requirement for all SMEs as retail in Palestine. The results in Table 3 show the probability of default (PD) for all the companies classified as follow:

**Table 3. PD & Cum.weighted.**

Rating	PD	LGD	Rsme	b	Ksme	Weight	Cum.weigh.Ksme
AAA	0.025%	45%	0.23850	0.328178	0.0120520	0.01205	0.015%
AA	0.045%	45%	0.23733	0.292323	0.0169120	0.01691	0.043%
BBB	0.42%	45%	0.21727	0.174986	0.0558505	0.05585	0.355%
BB	0.99%	45%	0.19314	0.137895	0.0786608	0.07866	0.974%
BB-	1.88%	45%	0.16687	0.113037	0.0953923	0.09539	1.884%
B+	2.98%	45%	0.14704	0.096706	0.1075184	0.10751	3.040%
B	5.80%	45%	0.12660	0.075348	0.1309133	0.13091	4.754%
B-	10.02%	45%	0.12080	0.059803	0.1592059	0.15920	7.288%
CCC	16.00%	45%	0.12004	0.047921	0.1848727	0.18487	<b>10.706%</b>

PD= probability of default, LGD = loss given default (LGD), Rcorp. = Correlation =  $0.12 * (1 - \text{EXP}(-50 * \text{PD})) / (1 - \text{EXP}(-50)) + 0.24 * [1 - (1 - \text{EXP}(-50 * \text{PD})) / (1 - \text{EXP}(-50))]$ , (b)corp. = Maturity adjustment =  $(0.11852 - 0.05478 * \text{LN}(\text{PD})^2)$ , Kcorp. = Capital requirement =  $[\text{LGD} * N[(1-R)^{-0.5} * G(\text{PD}) + (R / (1-R))^{0.5} * G(0.999)] - \text{PD} * \text{LGD}] * (1 - 1.5 * b(\text{PD}))^{-1} * (1 + (M - 2.5) * b(\text{PD}))$ , where M is the number of years for each firm.

The banking organization itself shows pro-cyclicality [2, 24] and time-varying capital requests may lead to an extenuation of such difficulty if banks are permitted to pull on their buffers when in requisite [18]. In this paper, we will answer this question: is the cyclical behavior appropriate indicator to Palestine bank sector? We answered this question through

explained the influence of macroeconomic shocks on the capital and reserves of Palestine banks from 1996 until the end of 2014 that was mentioned to the Palestinian Monetary Authority annual report. In other words, we use an assessment of economic capital of the banks. Several experimental business cycle investigated exactly appraisal the surplus capital buffer the buffer that outstrips the minimum regulatory requirement [13, 15]. The literature differentiates between long- and short-sighted banks [2]. However, restricted banks will not build up supplementary capital reserves through an improvement of the economy so as to take benefit of business opportunities, onward seeing banks will do so [15, 25]. Elsewhere, the Basel III structure some local methods stand up with the cyclicity most conspicuously Spain, which introduced effective provisioning in the year 2000 [15, 26]. Contrary to capital buffers pointing at unanticipated losses, provisions have to safeguard banks against anticipated losses. It builds on the credit stock and its deviation.

We supplement to the literature in two methods: first, we supplement another part of experimental proof about the pro-cyclical behavior of banks. Second, we examine the data on a higher regularity with Autoregressive Distributed Lag (ADL) method. This lets us to evaluate the direct influence of shocks and the timing of capital modifications. Moreover, our dataset contains the most current financial market crisis. In our combined data we perceive a pro-cyclical behavior of the Palestine banking sector: banks increase their capital base in an economic downturn and the bad conditions in Palestine territories especially after Israeli aggression on Gaza in summer 2014. The banks also did this to the Apartheid Wall in the West Bank and during the siege of the Gaza Strip since 2007.

## **Data and Methodology**

Most experimental studies that examine the behavior of capital reserves as a task of the business cycle use Gross Domestic Product (GDP) as delegation for the cycle. The problematic with GDP is that it is commonly only combined per quarter and in fact most studies even only use the yearly aggregate. This has, among other reasons, to do with the availability of budget data. The Palestine offers yearly budget. The data represent all yearly financial institutions in Palestine.

ADL model is more appropriate when dependent variable depends on its previous value ( $y_t - 1$ ), current value of an independent variable ( $x$ ) and on its previous value ( $x_{t-1}$ ). A simple ADL (1, 1) can be described as:

$$y_t = m + \alpha_1 y_{t-1} + \beta_0 x_t + \beta_1 x_{t-1} + \gamma y_{t-1} + u_t \quad (5)$$

where  $y_t$  is stationary dependent variable.  $x_t$  is stationary independent variable.  $\alpha$ ,  $\beta$  and  $\gamma$  are parameters.  $u_t$  is an error term which has a zero mean, constant variance and serially uncorrelated. Being uncorrelated with  $u_t$  and given values of  $x_t$  allows us to use ordinary least square (OLS) estimates in our analysis. To find the effect of capital on cyclical behavior, we have estimated following model:

$$GDP_t = m + \alpha_1 GDP_{t-1} + \beta_0 CAD_t + \beta_1 CAD_{t-1} + u_t \quad (6)$$

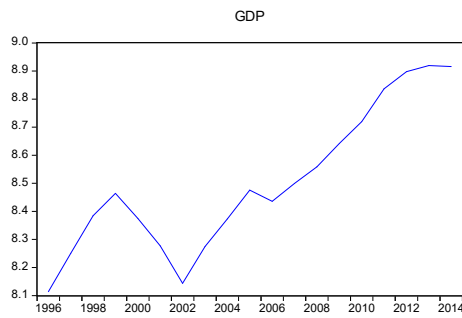
## Results

We have applied ADL to find the relationship between cyclical behavior of the economy and change in reserve capital. We have used GDP as a proxy to measure cyclical behavior of Palestinian economy. Descriptive statistics of the given variables have presented in Table 4. Mean values of the GDP, capital reserve ratio (CAD) and CPI are 8.5030, 0.1443 and 3.8972, respectively. Standard deviation of the mentioned variables suggests a small variation in the given data set. As we have taken annual data from 1996 to 2014, we can observe a significant difference between maximum and minimum values of the variables.

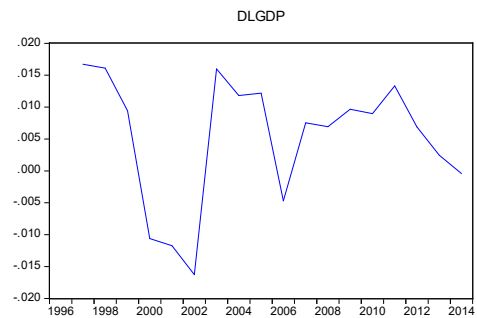
Autoregressive Lag Model suggests that the variables used in the model should be stationary. The variables included in our model have the time series properties. We have observed that the mean of the interested variables is not constant over time or in other words they are not stationary. To make them stationary, we have taken their log difference. We can observe the behavior of GDP before and after taking the log difference of the data in Figures 1, 2 and 3.

**Table 4. Descriptive statistics.**

	<b>GDP</b>	<b>CAD</b>	<b>CPI</b>
<b>Mean</b>	8.5030	0.1442	3.8972
<b>Median</b>	8.4641	0.1485	3.3250
<b>Maximum</b>	8.9196	0.2440	9.8300
<b>Minimum</b>	8.1138	0.0640	1.1800
<b>Std. Dev.</b>	0.2562	0.0647	2.1440

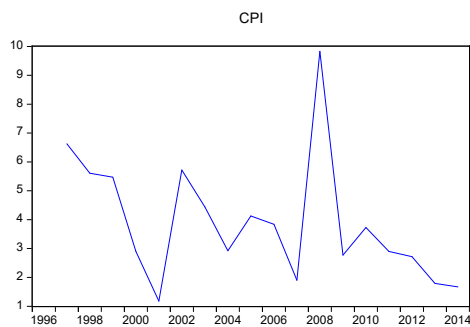


(a)

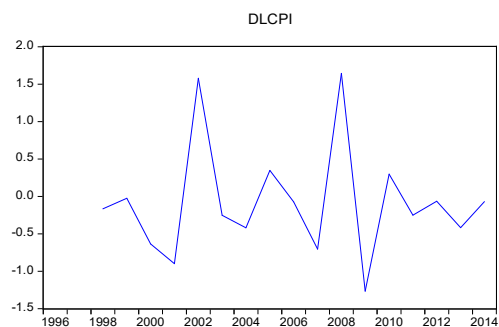


(b)

Figure 1. Behavior of GDP over the time. (a) GDP; (b) DLGDP.

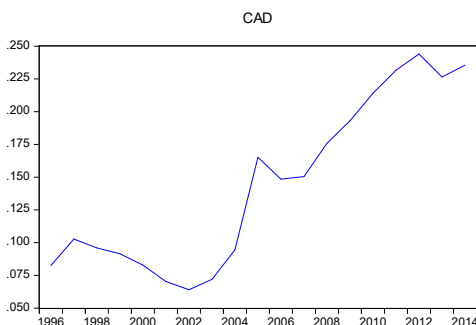


(a)

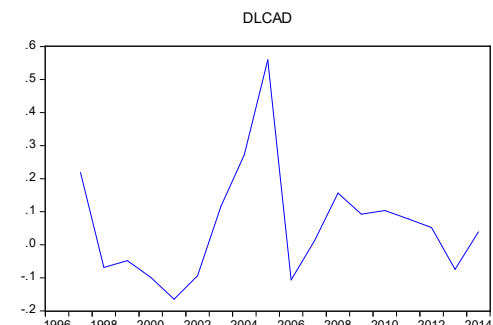


(b)

Figure 2. Behavior of CPI over the time. (a) CPI; (b) DLCPI.



(a)



(b)

Figure 3. Behavior of CAD over the time. (a) CAD; (b) DLCAD.

Results of the ADL are reported in Table 5. Two panels **A** and **B** have been created in Table 5. First panel **A** has been created to report the results of the regression where GDP used as a dependent variable. Results of the panel **A** suggests that GDP depends positively and significantly on its own lag. Moreover, CAD has also positive and significant effect on dependent variable GDP. According to this regression, GDP does not depend on its own lag. R-square of panel **A** is 95.11%. F-statistic is also significant which advocate the significance of the model.

**Table 5. Regression results.**

<b>A. GDP as dependent variable</b>				
<b>Variable</b>	<b>Coefficient</b>	<b>Std. Error</b>	<b>t-Statistic</b>	<b>Prob.</b>
<b>C</b>	4.3418	1.3625	3.1864	0.0066
<b>GDP(-1)</b>	0.4568	0.1707	2.6754	0.0181
<b>CAD</b>	1.9721	0.6899	2.8582	0.0126
<b>CAD(-1)</b>	0.1267	0.9741	0.1300	0.8983
<b>R-squared</b>	0.9511			
<b>F-statistic</b>	90.944			
<b>Prob. (F-statistic)</b>	0.0000			
<b>B. CPI as dependent variable</b>				
<b>Variable</b>	<b>Coefficient</b>	<b>Std. Error</b>	<b>t-Statistic</b>	<b>Prob.</b>
<b>C</b>	5.6112	1.8745	2.9933	0.0104
<b>GDP(-1)</b>	-0.1224	0.2581	-0.4744	0.6431
<b>CAD</b>	17.342	25.154	0.6894	0.5027
<b>CAD(-1)</b>	-27.983	26.223	-1.0671	0.3053
<b>R-squared</b>	R-squared	0.1411		
<b>F-statistic</b>	F-statistic	0.7123		
<b>Prob. (F-statistic)</b>	Prob(F-statistic)	0.5618		

In panel **B**, we have reported the results of the regression where we have used the CPI as our dependent variable. We are not able to interpret the results of panel **B** as we have not found any variable significant in this regression. R-square of this regression is very low. Moreover, F-statistic also suggests that this model is not significant.

## Conclusions

The econometric consequence proposes the presence of nearly pro-cyclical behavior of Palestinian bank capital from 1996 through to the end of 2014. As Palestinian economy In this study, we have not used the conventional variables that are related to the banking sector specifically. Instead, we have used Gross Domestic Product (GDP) as our dependent variable



to find the impact of bank capitalization on macroeconomic conditions of Palestinian economy

Most of the time, countercyclical buffer is used as an instrument to keep business cycle in line. Basel III presents new concepts that allow for more flexibility of the capital buffer and set a rule that every national jurisdiction has to determine their business cycle according to their state of the economy. As the conditions of Palestinian economy do not remain stable from time to time, so the banking authorities have decided to do not reduce the capital requirement as to hold back the sanctioned by authorities and the capital market. We can also observe the same phenomenon in Basel III where it allows for more flexibility of the capital buffer. Results of this study have shown that increase in capital reserves for the Palestinian banking sector cannot affect in GDP of the economy. Moreover, this study answers the research questions that the cyclical behavior is an appropriate indicator for Palestinian banking. Therefore, we propose the new concepts (Countercyclical Buffer) for Palestine Monetary Authorities (PMA) to approve it to develop credit risk management systems for Palestinian banks.

Results and discussion provide helpful guidelines for banks to improve some understanding on regulatory reforms intended to preserve confidence in its financial system, and preventing future financial crisis.

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