

Determinants of Bounced Checks in Palestine

By
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Abstract

The aim of this paper is to identify the determinants of the supply of bounced checks in Palestine, issued either in the New Israeli Shekel or in US dollars. Recently, the supply of bounced checks increased dramatically in Palestine, making it urgent to conduct such a study to analyze the situation and propose appropriate solutions to this phenomenon. Two types of explanatory variables are identified. One are structural, and the other are under the control of the banking system. An econometric model is proposed in this paper, which shows the impact of the explanatory variables on the supply of bounced checks. On the other hand, the model have all necessary characteristics to predict correctly bounced checks. Some corrective actions can be taken to avert a financial crisis are proposed in this paper in case actual bounced checks are consistently and persistently higher than those predicted by the model.

Keywords: Bounced Checks, Econometric Prediction, Banking System, Central Bank.

JEL Classifications: G01, G32, G21.

I. Introduction

A bounced check is a check returned unpaid after presentation at the bank in which it was drawn. According to the Palestine Monetary Authority (PMA) instruction number 2 of 2017, banks operating in Palestine must return the checks unpaid if (1) lack of sufficient funds in the drawer's account to cover the amount, (2) the drawer balance is reserved for legal reasons, (3) write over the date on the check, (4) not to sign the amendment or correction written on the check, and (5) different signature. In this paper, it is assumed that all bounced checks are checks without cover or provision. The other categories are left to be part of the regression intercept or regression residual¹.

This paper aims to identify the variables that determine the supply of bounced checks, either issued in New Israeli Shekel (NIS) or issued in US dollars (USD). The importance of this paper comes from the fact that the empirical research fails to cover previously in Palestine, and thus this paper is quite innovative.

¹ Regression residuals will be examined for any econometric anomalies by diagnostic tests.

The literature on bounced checks is few with varied concerns. As an example, Fusaro (2004, 2007, 2008, and 2009) and Fusaro and Ericson (2010) major concern was about overdraft protection. Erdem and Tugcu (2015) argument was to find evidence for bad ethics (return of checks) and its impact on economic growth. They found that bad ethics adversely affect growth.

This paper follows the footsteps of Azar et al (2017) paper. Their purpose was to identify the variables that determine or explain the supply of bounced checks in Lebanon whether denominated in Lebanese pounds or in US dollars. They found that four variables help in explaining the supply of bounced checks. Two of these variables are structural like the number of bounced checks and the total value of cleared checks, which are not under the control of banks. The other two variables are controllable, which are the amount of loans extended and the interest rate on Lebanese pounds.

This paper is organized as follows. In section II, a brief overview of the evolution and developments of the supply of bounced checks in Palestine during the study period. It also investigates the relation between bounced checks and some economic and financial variables in a descriptive manner. Section III identifies the explanatory variables to the supply of bounced checks and presents the theoretical model. Section IV provides the estimation results, which divided into two parts. The first studies the USD bounced checks and the second studies the NIS bounced checks. The last section concludes.

II. The evolution of Bounced Checks in Palestine

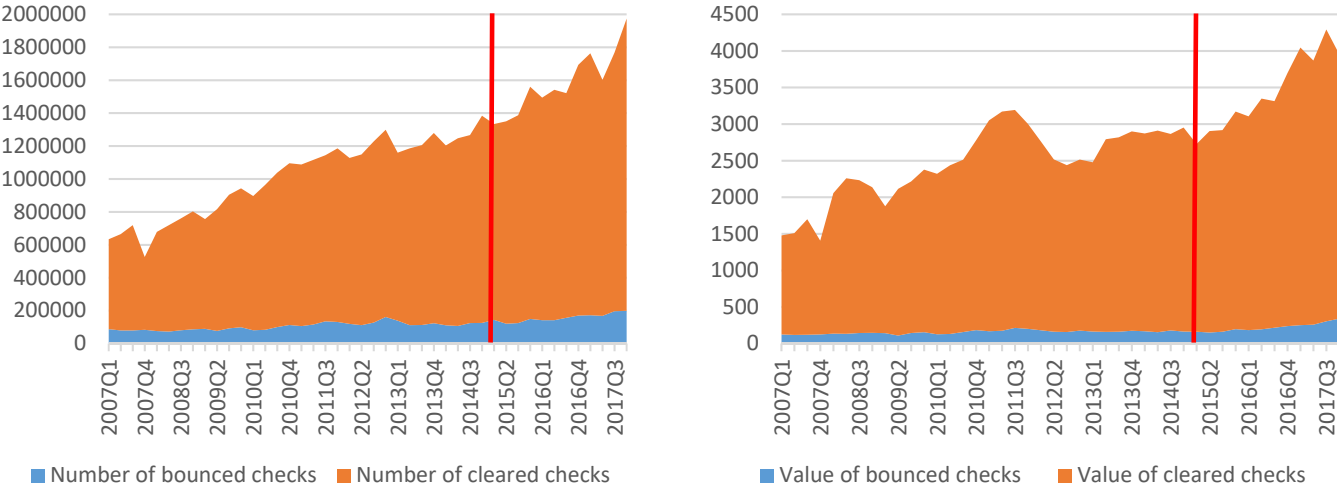
Data, published by PMA, show that number of cleared checks in all currencies (NIS, USD, Jordanian Dinar (JOD), and the Euro (Eur)) reached 1,777,264 check during the 4th quarter of 2017. Out of those checks 198,611 were bounced. Regarding the values of cleared and bounced checks, by the 4th quarter of 2017 the values of cleared checks amounted to USD 3.6 billion, out of those USD 341.5 million were bounced.

During the study period (2007Q1 – 2017Q4), the average annual growth rate of the number of cleared checks reached 10.1 percent and reached 11.5 percent in terms of value. On the other hand, data show lower rates for bounced checks. The average annual growth rates of bounced checks reached 6.9 percent in terms of number and 9.6 percent in terms of value.

However, for the purpose of the analysis, if we split the study period into two: one before 2015 and the other since 2015, we find that before 2015 the growth rate in the number of cleared checks reached 9.7 percent on average annual bases, while the value of those checks grew by 11.6 percent on average annual bases. Regarding bounced checks, they grew by only 3.2 percent in terms of number and by 5.2

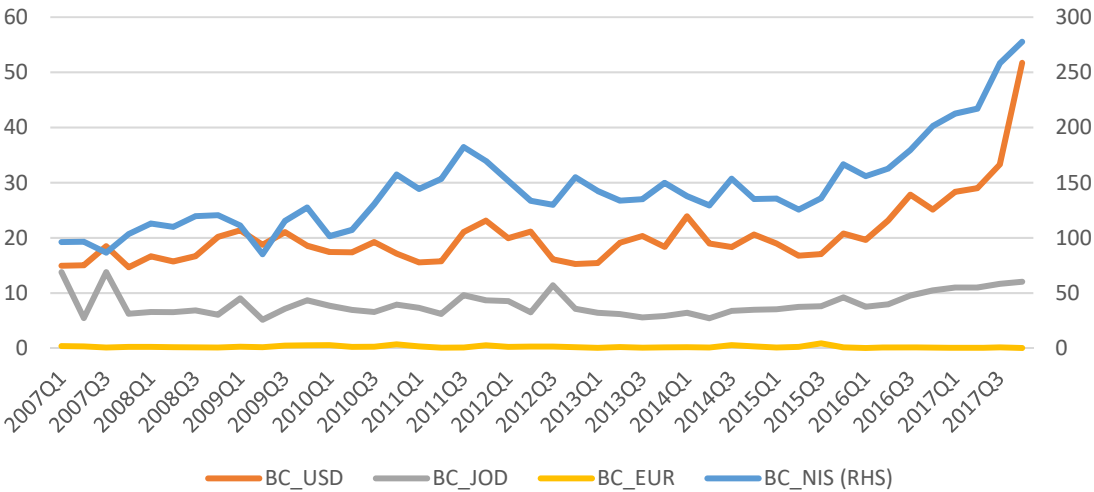
percent in terms of value on average annual bases. From the other hand, if we have a look at the past 3 years (2015Q1 – 2017Q4), we notice that the situation has reversed. The growth of bounced checks is much higher than the growth in cleared checks in terms of number or value. Number of cleared checks grew by 11.2 percent on average annual bases, and the value grew by 11.1 percent on average annual bases. But, bounced checks grew by 16.7 percent in terms of number and by 21.3 percent in terms of value on average annual bases.

Figure1: Cleared checks and bounced checks (2007Q1 – 2017Q4)



Regarding bounced checks by currency, data show that the value of bounced checks in NIS and USD increased dramatically after 2015, while the value of bounced checks in JOD and EUR did not increase much.

Figure 2: The supply of bounced checks by currency (2007Q1 – 2017Q4)



According to the geographical location, data show that the value of bounced checks in the West Banks (WB) is much higher than the value of bounced checks in Gaza Strip (GS). On the other hand, we see that the supply of bounced checks increased dramatically in both regions recently.

Figure 3: The supply of bounced checks by location (2007Q1 – 2017Q4)

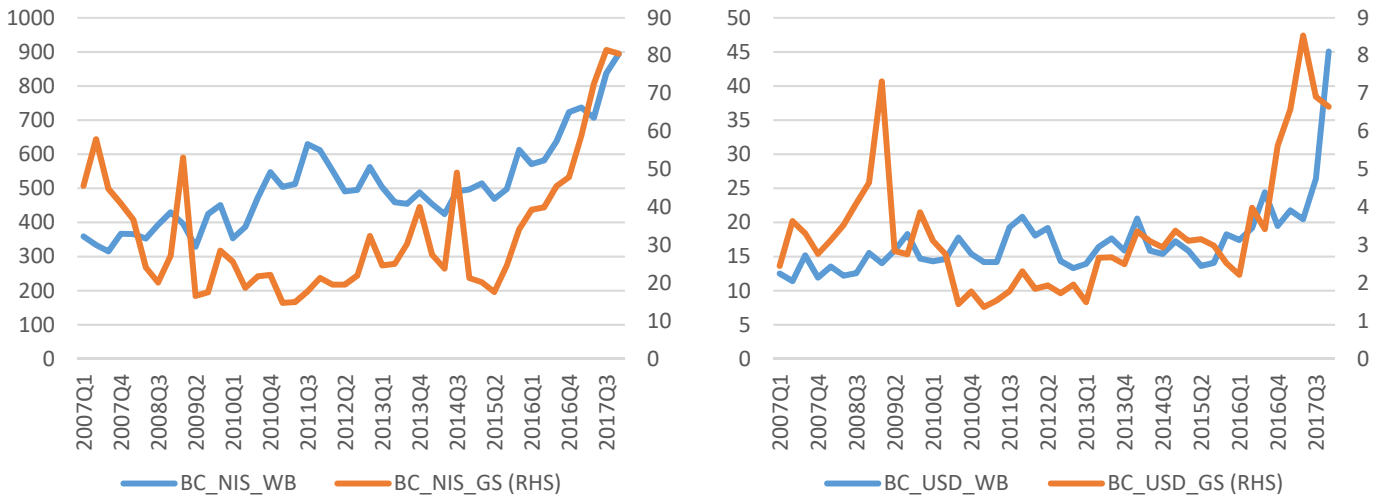
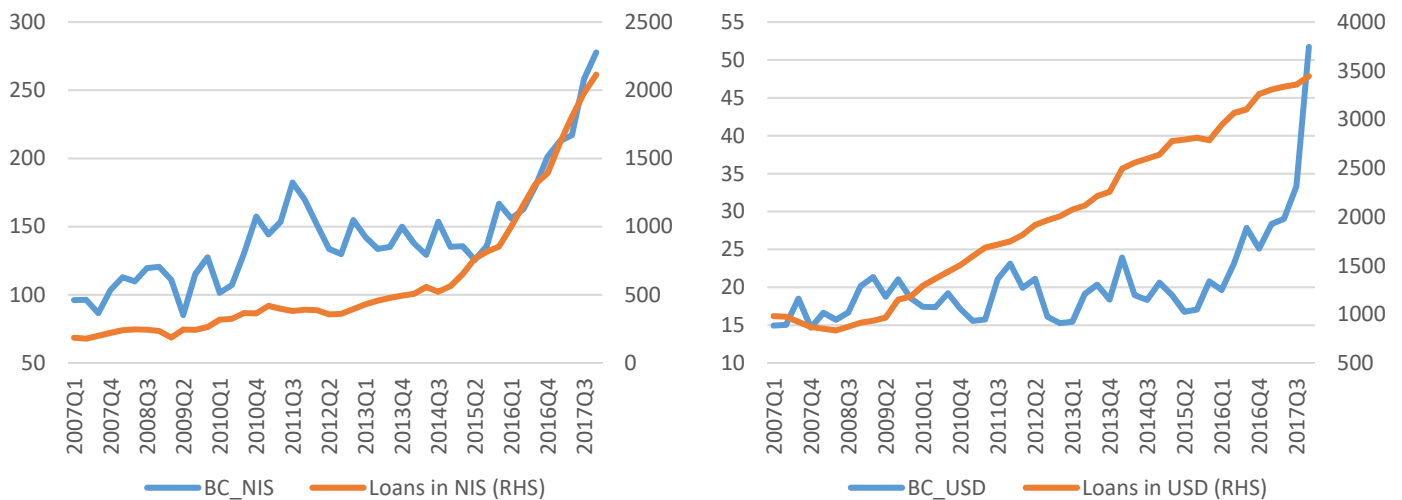


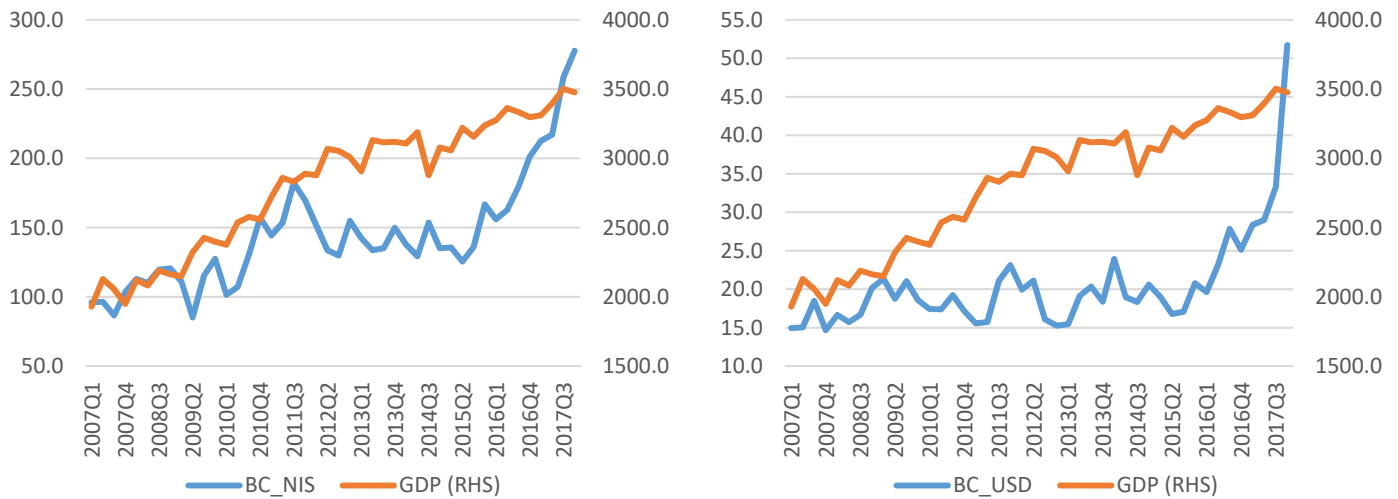
Figure 4 below shows an important issue that relates the supply of loans with the supply of bounced checks. The left chart shows a high correlation between the supply of loans in NIS and the supply of NIS bounced checks, while the right chart shows no significant correlation between the supply of loans in USD and the supply of USD bounced checks. This relation will be analyzed deeply in the next sections of this paper.

Figure 4: The supply of bounced checks and loans (2007Q1 – 2017Q4)



Regarding the evolution of economic conditions and the supply of bounced checks, figure 5 shows that there is a negative relation between both of them especially when we talk about the supply of NIS bounced checks. Further analysis will be conducted in the next sections.

Figure 5: The supply of bounced checks and economic conditions (2007Q1 – 2017Q4)



III. The Model

This section will focus in identifying the determinants of the supply of bounced checks in Palestine.

There are (no) potential determinants of the supply of bounced checks. The model will take the log-log functional form². Thus, estimated coefficient are interpreted as elasticities. The definition, the theoretical relation with the dependent variable, and the expected impact signs are listed below.

- Loans provided to the private sector. Since borrowing is considered as a substitute for issuing bounced checks, the relation ought to be negative, implying that more loans provided to the private sector reduced the incentives to write checks without enough provision. The relationship would be negative if more loans provided to the private sector lead to increase in deposits, and thus more liquidity and extra fund in the pockets of bank clients and thereby reduces the propensity to issue bounced checks.

On the other hand, if loans are extended to big corporations and wealthy individuals, then smaller corporations and less wealthy individuals resort to the issuance of bounced checks to compensate for the unavailability of funds. Moreover, if loans and borrowings are high, many borrowers reach

² The dependent and explanatory variables are in natural log.

the ceiling of their debt capacity, and in order to stretch their liquidity constraint, they resort to the issuance of checks that they know will bounce.

Therefore, the effect of loans to the private sector on the supply of bounced checks is ambiguous, and the expected sign on loans is an empirical question.

- Weighted interest rate on NIS. A higher interest rate makes borrowing relatively more costly in NIS, and makes borrowing in USD relatively less costly, which encourages the issuance of NIS bounced checks. This variable can be proxied either by taking the interest rate on deposits, or loans, or the gap between both. The relationship between this variable and the supply of NIS bounced checks is positive, and the sign is expected to be positive. On the other hand, the relationship between this variable and the supply of USD bounced checks is negative, and the sign is expected to be negative.
- Weighted interest rate on USD. A higher interest rate makes borrowing relatively more costly in USD, and makes borrowing in NIS relatively less costly, which encourages the issuance of USD bounced checks. This variable can be proxied in the same way as in the previous point. The relationship between this variable and the supply of USD bounced checks is positive, and the sign is expected to be positive. On the other hand, the relationship between this variable and the supply of NIS bounced checks is negative, and the sign is expected to be negative.
- The total value of cleared checks. This is scale variable and measures the total pool of checks out of which a certain portion will bounce. The sign of this variable is expected to be positive. However, this variable can be considered a proxy for all transactions carried out in the economy (GDP). According to this, the sign of this variable is expected to be negative (better economic conditions reduces the supply of bounced checks). Thus, the relationship between this variable and the supply of bounced checks is ambiguous. In the Palestinian case, using checks in transactions is not widely used, so the sign of this variable is expected to be positive.
- Total number of cleared checks. If the average amount of bounced checks is stable and varies little, a bigger number of bounced checks will lead to a higher value of bounced checks. So the relation is expected to be positive.
- Liquidity. Higher liquidity in terms of deposits and/or currency will to make firms and individual wealthier and thus, bounced checks diminish. As no measure of money supply in Palestine, bank deposits are taken as a proxy for that.
- Economic growth (GDP growth). As the economy grows, the supply of bounced checks will decrease, i.e., negative relationship. In the cases of economic recession or slowdown, income,

production, and sales are expected to decline which leads to the inability of individuals and companies to meet their obligations towards banks' checks.

The regression equation will take the following functional form for the market of NIS bounced checks:

$$bc_{NIS} = \alpha_0 + \alpha_1 loans_{NIS} + \alpha_2 i_{NIS} + \alpha_3 i_{USD} + \alpha_4 cc + \alpha_5 bc_n + \alpha_6 deposits + \alpha_7 GDP + \epsilon$$

Where bc_{NIS} is the total value of NIS bounced checks (the dependent variable), α_0 to α_7 are the coefficients to be estimated, and the regression residual is ϵ . A similar regression is estimated for the market of USD bounced checks and will take the following functional form:

$$bc_{USD} = \beta_0 + \beta_1 loans_{USD} + \beta_2 i_{USD} + \beta_3 i_{NIS} + \beta_4 cc + \beta_5 bc_n + \beta_6 deposits + \beta_7 GDP + \epsilon$$

Where bc_{USD} is the total value of USD bounced checks (the dependent variable), β_0 to β_7 are the coefficients to be estimated, and the regression residual is ϵ .

IV. Empirical Results

Table 1 presents the empirical results of the estimation of the supply of NIS bounced checks in Palestine. Three regressions are carried out. The first one (Model I) includes all seven explanatory variables identified in the previous section. Model II excludes number of bounced checks. Model III excludes GDP from Model II. All variables are in natural log in order to remove heteroscedasticity, to avoid skewness in the distribution, and to achieve linearity in the parameters. Coefficients on the natural log scale are directly interpretable as elasticities.

Table 1: Estimation of the supply of NIS bounced checks using OLS method

Explanatory Variables	Model I	Model II	Model III
Constant	1.6332 (1.6012)	6.3511 (4.7181)	5.8361 (4.6525)
Loans in NIS ($loans_{NIS}$)	0.3154 (5.5127)	0.5402 (6.9717)	0.5471 (7.0826)
Interest rate on NIS (i_{NIS})	0.0424 (2.0554)	0.0912 (3.1372)	0.0747 (3.0508)
Interest rate on USD (i_{USD})	-0.1055 (-4.2829)	-0.1431 (-4.0735)	-0.1267 (-4.0228)
Value of cleared checks (cc)	0.2220 (4.1060)	0.3098 (4.0224)	0.3015 (3.9334)
Number of bounced checks (bc_n)	0.7236 (11.6107)		
Deposits ($deposits$)	-0.4155 (-2.5166)	-0.6825 (-2.9008)	-0.8332 (-4.4632)

Gross domestic product (<i>GDP</i>)	-0.6547 (-4.0752)	-0.2370 (-1.0517)	
Adjusted R-square	0.89	0.77	0.77
Akaike info. criterion	-1.9065	-1.1858	-1.1922
F-Statistic	152.7464	75.2180	89.9647
Number of observations	132	132	132

The sample size is from January 2007 until December 2017. t-statistics are in parentheses.

In model I all variables are statistically significant. When removing number of bounced checks variable in Model II, all variables continue to be statistically significant except for GDP. Therefore, this variable is omitted from Model III of table 1. Adjusted R-square is high in the three models ranging from 0.77 (model II and Model II) to 0.89 (Model I). According to this and to the Akaike information criterion (the lowest value with -1.9065), Model I considered to be the best one and thus, the analysis will focus on it.

The signs of the coefficients in Model I are in accordance with expectations. Loans in NIS have a positive relationship with the value of NIS bounced checks. A one percent increase in loans in NIS increases the value of NIS bounced checks by 0.3 percent. A one percent increase in the interest rate on NIS increases NIS bounced checks by 0.04 percent. A one percent increase in the interest rate on USD decreases NIS bounced checks by 0.1 percent. A one percent increase in the value of cleared checks increases NIS bounced checks by 0.2 percent. A one percent increase in the number of bounced checks increases NIS bounced checks by 0.7 percent. A one percent increase in the liquidity (deposits) decreases NIS bounced checks by 0.4 percent. Moreover, a one percent increase in GDP decreases NIS bounced checks by 0.7 percent.

Table 2 provides the results of the estimation of the supply of USD bounced checks in Palestine. Three regressions are carried out. Model IV includes all seven explanatory variables described in the previous section. Model V excludes GDP. Model VI excludes GDP and the number of bounced checks. All variables are in natural log.

Table 2: Estimation of the supply of USD bounced checks using OLS method

Explanatory Variables	Model IV	Model V	Model VI
Constant	-10.7050 (-3.5481)	-7.9213 (-5.2851)	-5.1962 (-3.8110)
Loans in USD ($loans_{USD}$)	-0.6486 (-2.6402)	-0.4578 (-2.7285)	-0.2972 (-1.7509)
Interest rate on USD (i_{USD})	0.2115	0.1825	0.1818

	(4.2222)	(4.3425)	(4.1274)
Interest rate on NIS (i_{NIS})	-0.1305 (-2.7989)	-0.1201 (-2.6331)	-0.0984 (-2.0752)
Value of cleared checks (cc)	0.4089 (3.4154)	0.4287 (3.6232)	0.5467 (4.5817)
Number of bounced checks (bc_n)	0.4933 (3.6773)	0.4914 (3.6613)	
Deposits ($deposits$)	0.5783 (1.9729)	0.5857 (1.9977)	0.6374 (2.0769)
Gross domestic product (GDP)	0.5554 (1.0629)		
Adjusted R-square	0.48	0.48	0.43
Akaike info. criterion	-0.2878	-0.2939	-0.2071
F-Statistic	18.3491	21.1970	20.7158
Number of observations	132	132	132

The sample size is from January 2007 until December 2017. t-statistics are in parentheses.

All explanatory variables in Model IV are statistically significant except for GDP, and carries the wrong expected sign. Therefore, this variable is excluded from Model V of table 2. Adjusted R-square is relatively low ranging from 0.43 (Model VI) to 0.48 (Model IV and Model V). According to the Akaike information criterion, Model V is the best and the analysis will focus on it.

In Model V, all explanatory variables are highly significant and the coefficients have the expected sign except for deposits. The results show that a one percent increase in loans in USD decreases the value of USD bounced checks by around 0.5 percent. A one percent increase in the interest rate on USD increases the value of USD bounced checks by around 0.2 percent. A one percent increase in the interest rate on NIS decreases the value of USD bounced checks by around 0.1 percent. A one percent increase in the value of cleared checks increases the value of USD bounced checks by around 0.4 percent. A one percent increase in the number of bounced checks increases the value of USD bounced checks by around 0.5 percent. A one percent increase in liquidity (deposits) increases the value of USD bounced checks by around 0.6 percent.

The two models (Model I of table 1 and Model V of table 2), that were statistically well supported are now compared. The elasticity effect of respective loans is 0.32 for Model I and -0.46 for Model V, which means that the response of bounced checks for more loans is more elastic for the model in USD relative to the model in NIS and on the opposite direction. This implies that USD loans considered being a substitute for issuing bounced checks. In Palestine, the use of the USD is mainly for durable transactions

like land, residential and commercial properties, and cars. Thus, firms and individuals resort to borrowing instead of issuing checks and vice versa. While the NIS is used for nondurable transactions, and thus borrowing is not considered as a substitute for issuing checks. Model I shows that the relationship between bounced checks and loans extended in NIS is positive. There are two possible reasons for that: The first is that more loans in NIS is not creating more deposits in NIS. The other reason is that the high borrowing and loans in NIS led many borrowers to reach the ceiling of their debt capacity, and in order to borrow more, and stretch their liquidity constraint; they resort to checks that they know will bounce.

The elasticity on the interest rate on NIS has a different sign in both models and takes the following two values 0.04 (Model I) and -0.12 (Model V). Also, the elasticity on USD has a different sign in both models and takes the following values -0.11 (Model I) and 0.18 (Model V). It seems that the elasticity of interest rates is more responsive in the USD market than that in the NIS market.

The scale effect on bounced checks, as proxied by the value of cleared checks, is 0.22 in the NIS market compared to 0.43 in the USD market. Number of bounced checks has the following elasticities: 0.72 in the NIS market (Model I) and 0.49 in the USD market (Model V). Both variables have close effects and on same direction.

Regarding liquidity effect on bounced checks, as proxied by the total value of deposits, is -0.42 in the NIS market and 0.59 in the USD market. The effect is close in both markets but on different directions. The effect of liquidity supposed to be negative on bounced checks, which is the case in the NIS market, but surprisingly it is not the case in the USD market. Looking at the GDP, which is omitted from Model V, we find that it has the right expected impact on the supply of bounced check. The economic situation is an important determinant of bounced checks in the NIS market, but this is not the case in the USD market.

As a conclusion, it seems that both markets (NIS bounced checks and USD bounced checks) are partially segregated. The two markets have the same financial behavior regarding loans and interest rates, but they react differently against the economic situation (liquidity in the goods and services market and the economic activities). It is right that Models I and V are chosen in the analysis but the models in table 1 have a close value for coefficients and the same is for the Models in table 2.

V. Conclusion

This paper studies the determinants of the supply of bounced checks, whether dominated in NIS or USD. It was found that there are two types of variables that help in explaining the supply of bounced checks: the first are structural like the value of cleared checks, number of bounced checks, and GDP. Those variables are not under the control of the banking system. The second type of variables are controllable, like the supply of loans and the interest rate. Reducing the supply of loans in NIS or increasing the supply of loans in USD will reduce the supply of NIS bounced checks, as loans extended in NIS play a negative effect on the market of checks and loans extended in USD play a positive effect on the market of checks. One should know that the share of NIS checks is around 75 percent of total value of cleared checks and more than 80 percent of the supply of bounced checks. Another feature is that interest rates play a mixed role in the supply of bounced checks. From one hand, interest rate on NIS has a negative effect on the market of NIS checks (increase in NIS interest rate increases the supply of NIS bounced checks). But, on the other hand, it plays a positive effect on the market of USD checks. Another result of the paper is that interest rates have a stronger and clearer effect on the USD-denominated check market than on the NIS-denominated check market.

On the other hand, the paper showed that the economic conditions have a clear impact on the market of checks. Which leads to the need to have a balance between the economic and financial cycles so that if there is a decline in economic conditions, the banking system should curb growth in financial activity in terms of reducing the volume of lending in NIS, and reduce the grant of checkbooks. Such remedial action should be enough to avert the crisis and should be used cautiously, because it may scare away depositors.

This paper open the floor for further studies and researches on the market of checks on Palestine. one limitation of the analysis is that bounced checks includes not only the checks returned without sufficient balance, but also the other types like wrong signature, or because of legal reasons.

The two models estimated in the analysis can be used to predict a normal (potential) value of bounced checks, given the magnitude of explanatory variables. Comparing the normal value with the actual one, if there is a persistent overshooting then corrective actions can be forthcoming to prevent financial crisis.

References

- Azar, S., Elfakhani, S., and Abdallah, K. (2017), The economics of bounced checks in Lebanon. *International Journal of Economics and Financial Issues*, 7(1), 106-114.
- Erdem, E., Tugcu, C. (2015), Business ethics and economic growth: An empirical analysis for Turkish economy. *International Journal of Business and Economic Sciences Applied Research*, 8(3), 7-12.
- Fusaro, M. (2004), Check Bouncing Goes Mainstream: An Empirical Study of Bounce Protection Programs. PhD Dissertation, Northwestern University.
- Fusaro, M. (2007), Are Bounce Check Loans Really Loans? Theory, Evidence and Policy. Mimeo, East Carolina University, Department of Economics.
- Fusaro, M. (2008), Hidden consumer loans: An analysis of implicit interest rates on bounce checks. *Journal of Family and Economic Issues*, 29(2), 251-263.
- Fusaro, M. (2009), The rank, stock, order and epidemic effects of technology adoption: An empirical study of bounce protection programs. *Journal of Technology Transfer*, 34(1), 251-263.
- Fusaro, M., Ericson, R. (2010), The welfare economics of “bounce protection” programs. *Journal of Consumer Policy*, 33(1), 55-73.