

# The Impact of Introducing the Electronic Cheques Clearing (ECC) on the Value of Cheques Presented for Clearing and Returned Cheques in Jordan

Mahmoud F. AL-Refai<sup>1</sup> & Sahem A. Nawafleh<sup>2</sup>

<sup>1</sup> Department of Banking & Finance, Faculty of Administrative and Financial Sciences, Petra University, Amman, Jordan

<sup>2</sup> Department of E-Business & Commerce, Faculty of Administrative and Financial Sciences, Petra University, Amman, Jordan

Correspondence: Sahem A. Nawafleh, Department of E-Business and commerce, Faculty of Administrative and Financial Sciences, Petra University, Amman, Jordan. E-mail: snawafleh@uop.edu.jo

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## Abstract

This study aims to measure the impact of introducing the Electronic Cheques Clearing (ECC) system in the Central Bank of Jordan on the value of Cheques Presented for Clearing and Returned Cheques. The study analyzed the difference between two samples' averages: the first one, addresses the changes before the introduction of the (ECC), while the other is after the introduction of the (ECC) to determine if there is a difference in the value of cheques presented for clearing in the Central Bank of Jordan after the introduction of the electronic clearing system, and whether there was a difference between the value of returned cheques after the introduction of this system.

The study found that there is a significant difference between value-mean of cheques presented for clearing before the introduction of the electronic clearing system and value-mean of cheques presented for clearing after the introduction of the system. It was also found that the existence of significant difference between value mean of returned cheques before the introduction of the electronic clearing system and value mean of returned after the introduction of the system.

Through the derived results in this study, it is clear that the use of an electronic clearing system as an alternative to the manual clearing system has contributed to the increase in the value of checks presented for clearing and increase the value of returned checks.

**Keywords:** electronic cheques clearing, cheques presented for clearing, returned cheques

## 1. Introduction

Many economic and administrative decisions depend mainly on information, its accuracy and the speed in which it is obtained. Because checks are deemed one of the most important tools that have been used historically since the late nineteenth century in payment implementation between various parties whether in trade or on consumer level, the Central Bank of Jordan (CBJ) moved a step in enhancing dependence on information through check electronic clearing system introduction as an alternative to checks manual clearing system.

Information plays a major role in economics and specifically in finance. Due to this role that technological devices play in providing the information fast, the (CBJ) has coped with the technological importance that the globe witnesses, thus, it introduces the system of the Electronic Cheques Clearance (ECC) (Najeb Masoud, 2013).

The ECC is the state-of-the-art interbank cheque clearing solution that has replaced the manual cheque clearing solution in Jordan. It is an image-based, cost-effective, cheque clearing and settlement solution, where the original paper cheques are transferred to scanned images in order to be presented electronically through the secured communication channels from the member bank in which they are deposited to the member on which they are drawn resulting in a faster access to funds, lower transportation expenses and increased cheque trust. (Jae & Michael, 2001).

ECC calculates the multilateral net clearing position and sends to the Settlement System of (CBJ) for settlement of the net clearing position of the direct member. The Central System of the clearing mechanism lies at Jordan Clearing House Limited (Jae & Michael, 2001).

The study shows the impact of such development on different aspects, and to what extent does it contribute to increase the value of the presented electronic checks and the decrement of the value of the returned checks through studying the main change in the value before and after introducing such system.

Such development is worth thesearch in order to evaluate its advantages which we expect to see in the results. The study aims to measure the impact of electronic checks clearing system introduction in the (CBJ) on the value of the checks presented for clearing and returned checks through testing the major changes that occurred on some checks clearing signals, specifically the checks presented for clearing and the returned checks.

The rest of the paper is organized as follows. Section 2 provides an overview of the Electronic Cheque Clearing (ECC). Section 3 provides an overview of the literature and section 4 describes the data, empirical model and the methodology used; Section 5 discusses the empirical results while section 6 concludes the study.

## 2. Electronic Cheque Clearing (ECC)

The (CBJ) has deployed an (ECC) system to streamline the Jordan move toward electronic banking. The deployment reflects the banking industry's commitment to the digital cheque clearing process (Central Bank of Jordan, 2007).

Since all of the Jordancheques and transactions are processed at CBJ's clearing house, the bank had implemented an image-based automated cheque clearing system in 1997. However, with a substantial increase in volume of cheques from its 25 member banks and 700 branches across Jordan, the financial institution was unable to scale up with its existing dated solution (Central Bank of Jordan, 2007).

The CBJ receive on average between 50,000 to 100,000 cheques daily. During the peak times, such as the end of the month, the cheques for salary slips, rentals and annual payments increase to about 150,000 daily. The manual system could only process a limited volume of cheques and had some deficiencies. Although electronic image-based cheque clearing was invented in 1996, CBJ's plans received an impetus after the successful implementation of a similar ECC solution by the Qatar Central Bank three years ago (Central Bank of Jordan, 2007).

Furthermore, Jordan's initiative also received a boost when the US government approved a Cheque Clearing Act for the 21st Century Cheque 21 Act. Although the US Act is not completely applicable to Jordanian banks, the Jordanian government, has recently passed similar electronic transaction legislation, which legally validates an electronic document. This convinced CBJ to go ahead with its digitizing plans (Central Bank of Jordan, 2007).

Electronic clearing is defined as information exchange process (which includes data, images and checks symbols) by electronic means through electronic clearing unit at the (CBJ) and determination of net balances resulting from this process at a specific time (Association of Banks in Jordan, 2009).

Over the last years this service has been developed continuously, where manual clearing service was provided up to July 1997, and moving to automated clearing up to July of 2007, at which time the (CBJ) moved to provide this service to electronic clearing on daily basis. Checks collection applied at banks level on November fourth of 2007. Checks that are deposited by customers from eight in the morning until twelve o'clock noon are collected in the same working day and allow the customer to withdraw the amount in the next working day, while checks that are deposited after twelve o'clock noon will be collected in the next working day session.

The aim of checks electronic clearing is to stop dealing with paper checks for clearing purposes at the depositing stage in banks, and to collect checks in the same day in all parts of the Jordan, and to increase confidence in checks as fulfillment tool.

The application of electronic clearing system is expected that both banks and customers obtain many benefits, banks know in prior specified time the bank's financial situation, and the optimum use of funds at banks, and get information, accurate statistics for checks, accurate and fast archiving system, minimizing transfer paper checks risk to and from banks, and access to checks copies and data through electronic clearing system quickly and easily. The system works 24-hours and therefore there is plenty of time to send checks whatever their number is. On the other hand customers can collect the check in the same depositing day, and have the knowledge if the check is accepted or rejected in the same day, and enter the check in the beneficiary's account in the same day or the next working day, and increase confidence in checks and dealing with.

To achieve the goals of this study, the researcher used all the information given by secondary resources of the

bank, such as the presented statistical monthly brochures issued by the (CBJ) during the period Nov, 2005-Feb, 2009 (See Table1). The necessary information was all analyzed to achieve the purposes of this study.

The table shows that the value of Cheques Presented for Clearing increased from JD 1984.6 million at the end of November 2005 to JD 2224.9 million at the end of June 2007 before the application of electronic clearing, and increased from JD 2658.7 million at the end of July 2007 to JD 2749.5 million at the end of February 2009 after the application of electronic clearing.

The table show that the value of Returned Cheques increased from JD 52.8 million at the end of November 2005 to JD 78.2 million at the end of June 2007 before the application of electronic clearing, and increased from JD 152.4 million at the end of July 2007 to JD 172.2 million at the end of February 2009 after the application of electronic clearing.

Table 1. Banks clearing before and after ECC

Before ECC				After ECC			
Time	Cheques Presented for Clearing JD Million	Returned Cheques JD Million		Time	Cheques Presented for Clearing JD Million	Returned Cheques JD Million	
Nov-05	1984.6	52.8		Jul-07	2648.7	152.4	
Dec-05	2084.6	67.3		Aug-07	2422.7	132.8	
Jan-06	1977.6	80.4		Sep-07	2347.4	114.2	
Feb-06	2392.5	89.5		Oct-07	2477.2	147.3	
Mar-06	2227.6	58.3		Nov-07	2633.1	143.8	
Apr-06	2010.0	53.8		Dec-07	3092.0	177.2	
May-06	2563.3	66.9		Jan-08	3136.9	141.8	
Jun-06	2190.4	62.2		Feb-08	2963.4	115.2	
Jul-06	2300.1	61.9		Mar-08	3449.6	160.7	
Aug-06	2219.5	64.7		Apr-08	3763.8	169.6	
Sep-06	1992.8	62.6		May-08	3423.7	132.9	
Oct-06	2149.4	67.9		Jun-08	3843.8	194.6	
Nov-06	2279.0	64.9		Jul-08	3747.2	237.0	
Dec-06	2219.3	64.0		Aug-08	3476.0	160.0	
Jan-07	2403.5	90.8		Sep-08	3231.1	187.5	
Feb-07	2456.7	90.7		Oct-08	3182.8	201.2	
Mar-07	2454.8	91.9		Nov-08	3157.9	197.7	
Apr-07	2494.9	92.5		Dec-08	2799.6	226.3	
May-07	2577.8	92.9		Jan-09	2778.7	170.4	
Jun-07	2224.9	78.2		Feb-09	2749.5	172.2	

Source: Central Bank of Jordan, various monthly Issues, 2005–2009.

### 3. Literature Review

It's worth mentioning that part of the previous studies is known as the Event Study. There are many studies in this scope like:

(Cutler, Poterba & Summer's, 1989) discussed the topic of the current political events and their effect on the market signals; where the study showed that the news events took the first place (including both the political and military developments) do explain a big part of the movements of the financial stocks market.

(Leigh et al., 2003) which discusses the effect that the American war against Iraq had on the current prices of oil, as well as the American financial stocks market (S & P) where prices depend on the war effects and movements which in its turn signals that war had increased the price of oil container up to 10 dollars and decreased the level of the American financial stock market approximately 15% from its original value.

Regarding applying the event study on the financial sector, there is a published article found in a website on the internet called (Looksmart, 2003) which discussed expectations of the electronic investment growth value in western Europe to an average of 10.5% where this growth refers partially to the development of the electronic investment, where the most important problems that restrict the process of growth are: the lack of security in the

electronic exchange, the customer's trust crisis, added to the sudden market fluctuations.

(Salaam's, 2003) study the effect of introducing the electronic value trading system on the Amman financial stock market on both the traded value and the market capitalization in it. The study analyzed the differences between two samples: the first studied the changes before introducing the system and the second after introducing it in order to know if there is a real difference between valued traded in the stock market before and after the introduction of the system, and if there is a difference between the market capitalization of the listed financial papers in the stock market before and after introducing the system. The study showed that using the value traded system substituting the manual value traded contributed in increasing the value traded and the market capitalization of the financial papers in Amman stock market. The study claimed that such change resulted from the extent of security and flexibility of the stock market investors as well as providing them with different types of information for intermediates simplifying the process of analyzing the value traded companies faster. This in turn increased the levels of justice, fairness, fastness and easiness in following and applying orders. On the other hand, the system simplifies the control on value traded, spread of information immediately for the internal or external investors which contributes in the depth and flexibility of the market as a whole.

(Ismail & Osman, 2012) aims to determine e-banking usage level among retail banking clients' and to identify the factors that influence the adoption of e-banking in Sudan. The study results indicate that the majority of retail banking industry clients use at least one of the e-banking services. Among all e-banking channels, Automated Teller Machine (ATM) is the most popular channel. The study shows that high-income clients and those who have current account and computer and internet literate are more likely to use e-banking services. However, the study shows that there are no adequate evidence of significant associations between e-banking usage with gender, marital status, education, and occupation. Moreover, the study identified eleven factors that affect the adoption of e-banking in Sudan. These factors include frequent breakdown of ATMs, inconvenient locations of ATMs and Electronic Points of Sale (EPOS), inaccessible internet, lack of means reporting technical problems, unclear legislations protecting e-transactions, slow banks response for correcting erroneous transactions, weak banks' role in raising clients awareness, unclear e-banking guidelines and instructions, frequent power outages, and high e-banking services' fees.

Another study (NajebMasoud, 2013), aims to highlight the impact of adopting electronic trading System on the performance of the Amman Stock Exchange (ASE), where an analysis of the difference between the middle two samples: the first studied variables before the introduction of the system, and the other after they have been inserted, to find out whether there is a significant difference between the size of the stock exchange in trading before and after the introduction of the electronic trading system, and whether there is a significant difference between the market value of securities listed on the stock exchange before and after the introduction of the system. The results of the study show that the use of the electronic trading system as an alternative to the manual trading system has contributed to raise the volume of trading and the market value of the ASE. The study shows that the result of the increase in the degree of transparency and security for traders and investors in the stock market, and give great flexibility and different information to brokers facilitated an analysis of the situation of companies traded faster, which achieved more justice, speed and ease of execution of orders. On the other hand, the system has led to facilitate control over the trading operations and the dissemination of information in real time for both local and foreign investors which contributes to increase the depth and liquidity of the market.

#### **4. Data and Methodology**

In order to achieve the objectives of this study, two declining models describing the relationship between the checks presented for clearing and the returned checks were prepared as (fixed changes) on the one hand, and the existence of the system of electronic clearing as an (independent Change) on the other hand. The independent change was expressed quantitatively by taking the value of (zero) when the system doesn't exist and the value of (1) when the system does exist.

##### *4.1 The Value of the Cheques Presented for Clearing (VCP)*

The monthly value of the checks presented for clearing was used for achieving the objectives of this study, where 20 monthly values were taken as a sample before introducing the system of electronic clearing (Nov, 2005 to July, 2007) And 20 values were taken after introducing the system (July, 2007 to Feb, 2009) (See table 1).

##### *4.2 The Value of Returned Checks (VRC)*

The monthly value of the returned checkers was used for achieving the objectives of this study where 20 monthly values were taken before introducing the system of electronic clearing (Nov, 2005 to July, 2007) and

20 values were taken after introducing the system (July, 2007 to Feb, 2009). (See table 1).

All available information and the resulted outcomes related to the electronic checks clearing at the (CBJ) are used as the research data, while the study sample is two signals which are: the value of the checks presented for clearing and the returned checks through a specific period of time which lasts for 40 months divided into two 20 months periods, one before introducing the system of electronic clearing and the other after introducing it.

The study is based on the following hypotheses:

- There is a significant difference between the values of checks presented for clearing at the (CBJ) before introducing the system of electronic checks clearing and the intermediate value after introducing this system.
- There is a significant difference between the values of returned checks at the (CBJ) before introducing the system of electronic checks clearing and the intermediate value after introducing this system.

For the purposes of this study the following was used:

- Difference between two samples means analysis, data relates to study variables has been used (value of presented cheques for clearing and value of returned cheques) for study period, and then to test whether there is a significant difference between the mean value of presented cheques for clearing before and after system introduction, as well as testing whether there was a significant difference between value mean of returned cheques before and after system introduction. The said test was performed using statistical program SPSS. (Greene, 1998).
- Simple regression equation of first degree was used, to represent the relationship between each of dependent variable (value of cheques presented for clearing), and the independent variable (existence of an electronic clearing system) (Gujarati, 1995).
- Simple regression equation of first degree was used, to represent the relationship between each of dependent variable (the value of returned cheques for clearing), and the independent variable (existence of an electronic clearing system) (Gujarati, 1995).

## 5. Empirical Results

Upon examining the statistical analysis the following results are indicated:

### 5.1 The Impact of Electronic Clearing System Introduction on Value of Presented Cheques for Clearing

The mean value of cheques presented for clearing in the period before electronic clearing system introduction was JD 2260.2 while the mean value of cheques presented for clearing in the period after electronic clearing system introduction was JD 3066.3.

The difference value between value mean of Cheques Presented for Clearing Before (VCP) and mean value of Cheques Presented for Clearing After (VCP) is JD 806.1 million, This difference is statistically significant at a confidence degree of 100%, according to T value (T-Test ) amounting to 7.457. (Table 2)

Table 2. Analysis of the difference between the average of the two samples (before and after the introduction of the electronic clearing system)

Paired samples statistics

		Mean	N	Std. Deviation	Std. Error Mean
Pair 1	VCP before	2260.1650	20	193.0137	43.1592
	VCP after	3066.2550	20	456.3490	102.0427
Pair 2	VRC before	72.7100	20	14.0824	3.1489
	RC after	166.7400	20	33.6588	7.5263

## Paired samples test

Paired Differences		Mean	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference		t	df	Sig. (2-tailed)
					Lower	Upper			
Pair 1	VCP before after -VCP	-806.0900	483.3997	108.0915	-1032.3280	-579.8520	-7.457	19	.000
Pair 2	VRC before after -VRC	-94.0300	31.5495	7.0547	-108.7956	-79.2644	-13.329	19	.000

To connect the significant difference in the value of cheques presented for clearing by introduction of electronic clearing simple linear regression equation was developed to represent the relationship between value of Cheques presented for clearing as dependent variable, and values that express the existence or nonexistence of electronic clearing system, where zero value is representing non-existence, and one value for existence

The simple linear regression equation estimating results is developed from the following equation 1 that shows the value of the t-distribution inside the arc below the value of the correlation coefficient of the independent variable:

$$VCP = 2260 .16 + 806 .09 ECC \quad (1)$$

$$(28.849) \quad (7.276)$$

$$R^2 = 58.2\% \quad F = 52.93$$

Where:

VCP: Value of Cheques Presented for Clearing.

ECC: Existence of Electronic Clearing Cheques with values zero or one.

Regression model suitability test was made to represent the relationship between the two variables, the dependent variable VCP and the independent variable ECC, which is Fisher test (F-Test), and it was found that this model is appropriate at 100% degree of confidence, according to value of (F-Test) amounting to 52.933. (Table 3).

The value of determination coefficient  $R^2$ , (the explained ratio by the independent variable in changes took place in the dependent variable) 58.2%, and this means that the introduction of electronic clearing explains 58.2 % of the difference found in value of cheques presented for clearing in the Central Bank of Jordan, but the changes in value of cheques presented for clearing 41.8% is caused by factors other than the existence of electronic clearing system.

Table 3. Regression analysis between the two variables the value of cheques presented for clearing (VCP) and the existence of the electronic system (ECC)

Variables Entered/Removed<sup>b</sup>

Model	Variables Entered	Variables Removed	Method
1	ECC <sup>a</sup>	.	Enter

a. All requested variables entered.

b. Dependent Variable: VCP.

## Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.763 <sup>a</sup>	.582	.571	350.3632

a. Predictors: (Constant), ECC.

ANOVA<sup>b</sup>

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	6497810.9	1	6497810.9	52.933	.000 <sup>a</sup>
	Residual	4664665.6	38	122754.36		
	Total	11162476.0	39			

a. Predictors: (Constant), ECC.

b. Dependent Variable: VCP.

Coefficients<sup>a</sup>

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	2260.165	78.344		28.849	.000
	ECC	806.090	110.795	.763	7.276	.000

a. Dependent Variable: VCP.

### 5.2 The Impact of Electronic Clearing System Introduction on the Value of Returned Cheques

The mean value of returned cheques in the period before electronic clearing system introduction was JD 72.7 while the mean value of returned cheques in the period after electronic clearing system introduction was JD 166.7.

The difference value between value mean of Returned Cheques Before (VRC) and mean value of Returned Cheques After (VRC) is JD 94.0 million, This difference is statistically significant at a confidence degree 100% , according to T value (T-Test) amounting to 13.329 (Table 2).

To connect the significant difference in value of returned chequesby introduction of electronic clearing, a simple linear regression equation was introduced to represent the relationship between value of returned Cheques as dependent variable, and values that express the existence or nonexistence of electronic clearing system, where zero value is representing non-existence, and 1 value for existence.

Below is the simple linear regression equation 2 estimating results that show the value of the t-distribution inside the arc below the value of the correlation coefficient of the independent variable?

$$VRC = 72.71 + 94.03 ECC \quad (2)$$

(12.604)      (11.525)

$R^2 = 77.8\%$        $F = 132.83$

Where:

VRC: Value of Returned Cheques in the Central Bank of Jordan.

ECC: Existence of Electronic Clearing Cheques with values zero or one.

Regression model suitability test was made to represent the relationship between the two variables, the dependent VRC and independent ECC, which is Fisher test (F-Test), and it was found that this model is appropriate at 100%degree of confidence, according to value of (F-Test) amounting 132.83 (Table 4).

The value of determination coefficient  $R^2$  is 77.8%. This means that the introduction of electronic clearing explains 77.8 % of the difference made in value of returned cheques in the Central Bank of Jordan, but the changes in value of returnedcheques 22.2 % is caused by factors other than existence of electronic clearing system (Table 4).

Table 4. Regression analysis between the two variables the value of returned cheques (VRC) and the existence of the electronic system (ECC)

Variables Entered/Removed<sup>b</sup>

Model	Variables Entered	Variables Removed	Method
1	ECC <sup>a</sup>	.	Enter

a. All requested variables entered.

b. Dependent Variable: VRC.

Model summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.882 <sup>a</sup>	.778	.772	25.7995

a. Predictors: (Constant), ECC.

ANOVA<sup>b</sup>

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	88416.409	1	88416.409	132.834	.000 <sup>a</sup>
	Residual	25293.386	38	665.615		
	Total	113709.80	39			

a. Predictors: (Constant), ECC.

b. Dependent Variable: VRC.

Coefficients<sup>a</sup>

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	72.710	5.769	.882	12.604	.000
	ECC	94.030	8.159			

a. Dependent Variable: VRC.

## 6. Concluding Remarks and Recommendation

The study concluded the following results:

- 1) Acceptance of the first hypothesis for the existence of significant difference between value mean of cheques presented for clearing before the introduction of the electronic clearing system and value mean of cheques presented for clearing after the introduction of the system. The introduction of the electronic clearing system led to an increase in the value of the cheques presented for clearing, and that 58.2% of the increase in the value of cheques presented for clearing resulting from the introduction of the system. Based on this result, the researcher believes that the use of electronic clearing system as an alternative to manual clearing system has contributed in raising efficiency and speed of dealing with cheques, and achieving transparency and security for bank customers.
- 2) Acceptance of the second hypothesis for the existence of significant difference between value mean of returned cheques before the introduction of the electronic clearing system and value mean of checks returned after the introduction of the system. The introduction of the electronic clearing system led to an increase in the value of the returned cheques. Where by 77.8% of the increase in the value of returned cheques resulted from the introduction of the system. Based on this result, the researcher believes that the use of electronic clearing system does not achieve its goals relative to reducing as much as possible of returned cheques, but the increase in returned cheques value can be attributed (after introducing the electronic clearing system) to technical causes related to application since cheques are deemed as returned due to non-clear of cheque copy or having the stamps or error in coding or lack of.

Based on the study results the researchers recommend the following:

- To enhance the use of information technology in the Central Bank of Jordan and banks in line with the needs of customers in those banks, because the study results demonstrate the increased value of cheques



presented for clearing as a result of chequeselectronic clearing use.

- To carry out further studies to determine the impact of replacing the manual clearing system with an electronic clearing system on other indicators relating to cheques, such as the value of returned cheques, returned due to insufficient funds.
- To call the Central Bank of Jordan to overcome the technical problems of the electronic clearing system and not to consider the cheque as returned cheque due to a lack of clarity cheque copy, no stamps, coding error or lack of Alger.
- Call central banks in developing countries in general, and particularly Arab, to follow the example of the Central Bank of Jordan in introducing modern electronic systems for clearing cheques to raise the efficiency of banks.

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