
AN ANALYSIS OF THE FACTORS AFFECTING BANKS` CASH DEMAND: A CASE STUDY OF REFAH BANK

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Abstract:

The present study is an investigation on each of affective factors in cash demand of Refah Bank in Golestan Province. To this end, daily data of the related branches obtained from 15 months, from March 21, 2010 to June 20, 2011, has been used. The information of July month has also been used to test prediction accuracy. As the results of regression test reveal, current account balance, saving account balance, long-term investment account balance, and account balance of other banks in Refah bank affect cash demand of Refah bank significantly and positively while there is no significant relation between short-term investment account balance, account balance of checks issued by other banks and account balance of sold issued checks and cash demand of Refah bank.

Key words: *account balance, cash demand, Refah Bank of Golestan Province*

1. Introduction

Liquidity management of banks is considered as an important element of banking management since if banks` managers are not ready to cope with probable crises of market and its required liquidity, these crises can be led to lack of liquidity and even banks` failure. That is why, the central bank insists to control all financial and credit institutes. Considering the issue of supplying liquidity of branches, liquidity management is of high importance for banks since customers expect to receive their required cash in case of referring to the bank and they will lose their trust to the bank if they are not provided with their needed cash. On one hand, it is costly to provide cash for banks and its stagnancy causes to waste sources and capital. Therefore, the

required cash should be supplied according to the daily needs of branches with lower costs.

The aim of the present study is to identify the affecting factors in cash daily needs of Golestan's Refah Bank for more effective performance of liquidity management of the bank and the possibility of predicting the cash required by the bank. Hence, the main question of the study is that "what are the factors affecting daily cash needs of Golestan's Refah bank and to what extent these factors affect cash demand of the bank?" no macro level study has ever been reported in this scope; so, the findings of this innovative study can provide information for decision making of the managers of Golestan's Refah bank and help them predict cash demand of the bank and its liquidity management.

2. Theoretical framework

There are some theories about the relation of cash and liquidity management in banking industry:

- ✓ Commercial loan theory: according to this theory, overdue loans supply required liquidity of banks automatically, so short-term investment and facilities are the best type of investment and credit endowment. The advocates believe that the sources supplied by current deposits should only be used in short-term loans since they are appropriate for liquidity target. According to the theory, banks should merely pay short-term loans with high liquidity rate.
- ✓ Transferability theory: based on this theory, banks should withhold their cash in the form of first class and instant negotiable short-term securities since in case of any liquidity crisis, these securities can be rapidly sold. According to the theory, banks can meet their liquidity needs in case of having loans and securities which are salable in secondary market.
- ✓ Expected income theory: based on this theory, liquidity needs and loan payment of banks depend on expected income of loaner.
- ✓ Commitment management theory: according to this theory, all required cash should not be kept in bank but some of its part should be supplied from market. In other words, liquidity sources of banks can be include purchasing additional reserves of other banks in the central bank, publishing the license of loan deposits from the central bank, publishing short-term funding bonds, increasing bank capital and supplying credit from global monetary markets.
- ✓ Assets-liabilities management theory: based on this theory, liquidity needs should be adapted with cash sources. Today, banks focus on both assets and liabilities to supply its liquidity needs. This theory emphasizes on quantitative management of liquidity risks and interest rate fluctuation. Accordingly, liquidity risk theory is brought about when there is a difference between the size and overdue of assets and liabilities of bank (study and risk management group of Eghtesad Novin Bank, 2008).

According to the liquidity superiority theory of James Tobin, by the increase of interest rate, cash demand is decreased and the percentage of securities in assets portfolio of investor is also increased. As Tobin believes, transactional demand for money also depends on interest rate. The increase of interest rate makes transactional demand for money more profitable for those who are richer (Tafazoli, 1999).

Friedman also asserted that there is a reverse relation between cash demand and general prices level, i.e. real value of money and demand for money are decreased by the increase of general prices level in order to keep its real value fixed (Tafazoli, 1999).

Miller and Orr claimed that economic enterprises consider a specific level of liquidity flow as their favorable flow. If liquidity flow is placed in a level higher than this favorable level, additional cash is changed into securities but if their cash flow is lower than the favorable level, odd money is compensated by selling securities.

Considering the fact that short-term commitments (such as demand deposits and granting facilities) is a main challenge of bank system, four factors have been identified in occurring liquidity risk in bank system:

1. Outflow of deposits: if bank deposits are not extended in their maturity or bank sources face with negative growth, liquidity risk will be increased.
2. The ability of converting noncash assets to cash: the more the ability of converting assets to higher cash is, the less the liquidity risk will be.
3. In case of high number of investing and lack of changing into liquidity, liquidity risk will be increased.
4. Considering the fact that banks act in two sectors of resources absorption and granting facilities, if the increase of facilities mismatches the increase of sources and anticipating the increase of sources, this gap can be led to the increase of liquidity risk (Jahankhani et

Banks are also exposed to liquidity risk in terms of time. Various types of time changes influencing banks` liquidity risk are as follow:

1. Seasonal changes
2. Periodic changes
3. Fundamental trends
4. Random and irregular short-term movements (LeyliDoust, 2007)

The main objective of the banks` necessity to withhold liquid assets is to ensure anticipated financial flows in order to pay to cash applicants. This act decreases financial flexibility and increases credit cost. By the increase of the granted credit cost, banks` financial risk level will be increased (Bakhtiari, 2009). Daily liquidity level of banks is variable (fluctuating). So, banks` liquidity should always be controlled to fullfil the commitments.

3. Literature review

The study done by Kheyraadi (2000) revealed that the model of determining the level of optimal liquidity for Refah Bank is a mixed planning model (multi-objective

and multi-index decision making). Heydari et al (2010) also reported that banks' cash reserves are consisted of two components. The planned component involves the reserves considered for the last liquidity anticipation and supporting component involves an additional margin of liquidity reserve on this anticipation. Based on the study, they concluded that introducing macroeconomic variables can influence the precise estimation of liquidity withholding level. In a study conducted by Naemi (2009), it was indicated that there is significant relation between anticipated liquidity values of Sepah Bank and its real values.

In the study conducted by Merrouche et al (2009), they concluded that using the model of games' theory can decrease the costs of supplying banks' liquidity during a day. They stated that banks withhold cash to ensure that they are able to pay instantly and can endure liquidity shocks during daily activities. Aikman et al (2009) also reported that liquidity crisis in a bank causes to spread liabilities to other banks and banks are involved in crisis costs without doing any specific act. Further, Simutis et al (2007) showed that cash demand is different for ATMs. They anticipate cash demand using artificial neural networks. In the model, the factors such as daily payable sums, holidays and seasonal changes influence cash demand. They estimated cash demand level of ATMs with an error less than 10%. Acharya et al (2009) also indicated that banks divide liquidity risk between other financial institutes and themselves by selling their assets to other institutes in case of encountering with liquidity crisis. Milon et al (2010) reported that government copes with cash demand crisis through increasing banks' liquidity. Further, banks attempts to purchase and increase their early liquid assets by decreasing the volume of their lending in inter-bank market. Ismal et al (2010) conducted a study on liquidity management in Islamic banking in Indonesia. They indicated that the structure of liquidity risk management of Islamic banks in assets and liabilities should be reestablished. By proposing the characteristics of depositors, categorizing them and anticipating liquidity behavior, he introduced some tools to decrease liquidity pressure. Again, Dusuki et al (2010) reported that the design of Murabaha contracts, with respect to its accordance with Islam religion, can be used an innovative solution to manage liquidity in Islamic banking. Notably, no study has ever been conducted in this regard in Iran.

4. There research hypotheses

1. There is a significant relation between current deposits and cash demand of Golestan's Refah bank.
2. There is a significant relation between saving deposits and cash demand of Golestan's Refah bank.
3. There is a significant relation between short-term deposits and cash demand of Golestan's Refah bank.
4. There is a significant relation between long-term deposits and cash demand of Golestan's Refah bank.
5. There is a significant relation between online (Hamrah) account and cash demand of Golestan's Refah bank.

6. There is a significant relation between other banks` accounts in Refah bank and cash demand of Golestan`s Refah bank.
7. There is a significant relation between checks accounts issued by other banks and cash demand of Golestan`s Refah bank.
8. There is a significant relation between sold checks accounts issued by other banks and cash demand of Golestan`s Refah bank.

5. Methodology

The statistical population of the study includes various types of deposits and accounts in the department of branches affairs of Golestan`s Refah bank and its related branches. The dependent variables involve current deposits, saving deposits, long-term deposits, short-term deposits, online account, other banks` accounts in Refah bank, checks accounts issued by other banks, and sold checks accounts issued by other banks. The independent variables of the study are considered as sum of fund`s account balance, Iran check account and Refah bank`s account in other banks. The information and statistics associated with these accounts and deposits have been gathered from the department of branches affairs of Golestan`s Refah bank. These statistics include accounting balance accumulated from each of branches` balances and bank`s units across the province. These variables have been identified based on the interview with the experts of the province and empirical observations and then entered into regression model. To estimate the model`s regression, OLS and Eviews software has been used. Daily data of the related branches obtained from 15 months, from March 21, 2010 to June 20, 2011, has been used. The information of July month has also been used to test prediction accuracy. So, 354 daily observations have been used. The dependent variables include:

- Fund`s account including account balance (in Rial) of the bank`s treasury at the end of working time
- Iran check account including account balance (in Rial) of Iran check at the end of working time
- Refah bank`s account in other banks including accounts balance (in Rial) of Golestan`s Refah bank in other related banks at the end of working time

The dependent variable of the study is obtained from the sum of three above mentioned variables (cash inventory of Golestan`s Refah bank). Table 1 presents mean, standard deviation, variance, and skewness of the three composing accounting of the dependent variable. Based on 324 working day, the cash mean of Golestan`s Refah bank is 32180/20 Rials and its standard deviation is 5085 Rials.

Table 1. Descriptive statistics of the components of Golestan`s Refah bank`s cash

Variable	Number	Mean	Standard deviation	Variance	Skewness	kurtosis
Fund (y1)	324	12852/55	2165/288	4688472/123	0/19	2/70
Iran check (y2)	324	12553/34	3271/988	107059054/47	1/38	5/64
The bank`s account in other banks (y3)	324	6774/306	2257/127	5094622/294	0/79	4/44
Cash inventory (y)	324	32180/20	5085/003	25857255/51	0/93	4/60

The independent variables of the research include:

- Account balance of current deposits, saving, short-term investment, and long-term investment of Golestan`s Refah bank which are defined as affective sources of the bank.
- Account balance of Golestan`s Refah bank`s online account which is defined as a part of affective sources of the bank as well. After creating electronic banking, banks have provided the opportunity of receiving and paying funds and delivering bank services across the country through connecting the branches to a central server. Such system has identified as online (Hamrah) account system in Refah bank`s system.
- Account balance of other banks in Refah bank, showing account balance at the end of working time in Golestan`s Refah bank.
- Account balance of the checks issued by other banks indicating encrypted checks which are issued by other banks in favor of Refah bank and through which, customers` funds are transferred from the bank to their account in Refah bank.
- Account balance of the sold encrypted checks that indicates the encrypted checks issued by Refah bank in favor of other banks during which, customers` funds are transferred from Refah bank to their account in pertained bank.

Table 2. Descriptive statistics of independent variables

Variable	Number	Mean	Standard deviation	Variance	Skewness	kurtosis
Current (x1)	324	116040/3	15546/77	241702057/4	1/02	5/45
Saving (x2)	324	115569/8	12236/46	149730953/3	1/02	3/81
Short term (x3)	324	153634/4	13743/74	188890389/2	1/27	7/39
Long term	324	223083/2	27930/10	780090486	-0/25	3/44

(x4)						
Online account (x5)	324	158903/6	49961/85	2496186455	0/61	3/01
Accounts of other banks in Refah bank	324	6325/037	2825/047	7980890/552	0/59	3/05
Account of checks issued by other banks	324	9274/444	4468/698	19969261/82	1/87	9/51
Account of the sold issued checks	324	39419/03	58697/14	3445354244	12/13	189/72

Stationary test

In a time series of data, if mean, variance and covariance are time independent, stationary will be confirmed. Generalized ADF test of Fuller has been used to investigate stationary. If absolute value of computational values of ADF statistic is greater than critical absolute value, non-stationary hypothesis is rejected and stationary of time series data is confirmed. As shown in Table 3, all the variables are static except than saving account, long-term account and online account. The variables of cash inventory, current account, short-term account, account of other banks in Refah bank, and account of the sold issued checks are then static since their ADF value is greater than the critical value (2/87).

Table 3. Stationary test results

Row	Variable	Computational value of ADF	Critical value		
			1%	5%	10%
1	Cash inventory	-4/369677	-3/450553	-2/870330	-2/571523
2	Current account	-5/394720	-3/450553	-2/870330	-2/571523
3	Saving account	-2/559293	-3/450411	-2/870274	-2/571493
4	Short-term account	-4/585607	-3/451146	-2/870591	-2/571663
5	Long-term account	-1/570336	-3/451146	-2/870591	-2/571663
6	Online account	-1/107777	-3/450747	-2/870416	-2/571569
7	Accounts of other banks in Refah bank	-9/169848	-3/450411	-2/870274	-2/571493

8	Account of checks issued by other banks	-6/077166	-3/450553	-2/870330	-2/571523
9	Account of the sold issued checks	-6/360567	-3/450553	-2/870330	-2/571523

Considering that saving account, long-term account and online account variables were considered as non-static, by making the difference one time, their ADF value show that they are static.

Table 4. Stationary test of variables with one time difference making

Row	Variable	Computational value of ADF	Critical value		
			1%	5%	10%
1	Saving account	-19/22983	-3/450474	-2/870302	-2/571508
2	Long-term account	-7/124010	-3/451146	-2/870591	-2/571663
3	Online account	-12/72105	-3/450474	-2/870416	-2/571569

Colinearity test

To investigate colinearity relation between independent variables, Pearson correlation coefficient has been used. Shown in Table 5, the lack of colinearity relation between independent variables is confirmed since correlation coefficient is less than 0/5.

Table 5. Result of correlation coefficient between independent variables

Variables	X1	X2	X3	X4	X5	X6	X7	X8
Current account X1	1	0/19	0/11	0/019	-0/096	-0/039	0/11	0/017
Saving account X2	0/19	1	0/014	-0/016	-0/094	-0/02	-0/06	-0/026
Short-term account X3	0/11	0/014	1	-0/27	0/02	-0/11	-0/051	-0/003
Long-term account X4	0/019	-0/016	-0/27	1	-0/013	-0/002	0/051	-0/004
Online account X5	-0/096	-0/094	0/020	-0/01	1	0/016	0/022	0/016
Accounts of other banks in Refah bank X6	-0/39	-0/02	-0/11	-0/002	0/016	1	0/14	0/09

Account of checks issued by other banks X7	0/11	-0/06	-0/051	0/051	-0/022	0/14	1	0/31
Account of the sold issued checks X8	0/17	-0/026	-0/003	-0/004	0/016	0/09	0/31	1

LM test for independent random error

In LM test, the null hypothesis is based on the lack of correlation. The test results are presented in table 6.

Table 6. Testing auto-correlation model

Durbin-Watson statistic	Status	F-statistic	Significance level of F-statistic	Obs*R-squared	Significance level of Obs*R-squared	Status
1/997541	Uncorrelated	0/314975	0/730044	0/659524	0/719095	Uncorrelated

Covariance test

One of the classic assumptions of regression model is homogeneity of the phrases of error terms during different periods. The problem of heterogeneity of variances is related with lack of homogeneity of dependent variable's variance in different periods. In this research, white and ARCH tests have been used to examine the homogeneity of variances. Considering F statistic, computed X^2 and the level of significance (< 5%), the hypothesis based on the homogeneity of variances is confirmed, so the model have covariance. Table 7 presents the results of covariance test.

Table 7. Covariance test results

Test	White test		Arch test	
	Statistic	Sig	Statistic	Sig
F-statistic	0/378450	0/999892	0/681266	0/409772
Obs*R-squared	18/27035	0/999786	0/684094	0/408181

Correlation test

To investigate the relation between each 8 independent variables with 3 liquidity indices of the bank, Pearson Product correlation coefficient has been used. Table 8 shows that there is a positive relation between the fund inventory with the current account, saving account, short-term account, long-term account, and online account. While, there is a negative relation between the fund inventory and the variables of other banks' accounts in Refah bank, accounts of the checks issued by other banks and accounts of the sold issued checks. There is also a positive relation

between Iran check account and account of other banks in Refah bank and other variables. The relation between the variable of account of the bank in other banks and current account, saving account, short-term account is negative while its relation with long-term account, online account, account of other banks in Refah bank, account of the checks issued by other banks, and account of the sold issued checks is positive.

Table 8. Correlation test results

Variables		X1	X2	X3	X4	X5	X6	X7	X8
Fund (y1)	Coefficient	0/224	0/133	0/406	0/026	0/006	-0/121	-0/07	-0/088
Iran check (y2)	Coefficient	0/139	0/164	0/137	0/025	0/017	-0/072	0/240	0/211
The bank's account in other banks (y3)	Coefficient	-0/047	-0/014	-0/092	0/043	0/007	0/395	0/199	0/004

Testing the research hypotheses

According to Table 9, out of the 8 independent variables of the model, the coefficients of the variables of current account, saving account, long-term account, online account, and account of other banks in Refah bank are significant at the confidence level of 95%. In other words, they have a significant positive effect in Refah bank's cash while the coefficients of short-term account, accounts of the checks issued by other banks, and accounts of the sold issued checks are not statistically significant. Durbin-Watson statistic equals with 1/997 indicating the lack of the model's autocorrelation. The value of F statistic is 59/32 which is significant statistically. Since total level of F statistic is less than 5%, total coefficient of the model is acceptable. Inverted AR Roots (-0/86<1) and Inverted MA roots (-0/13<1) indicate that the estimated pattern is static. The value of the model's determination coefficient (R^2) is 0/698 showing that about 70% of the dependent variable's changes (cash demand of the bank) is influenced by the 8 independent variables of the model and is explained through them.

Table 9. Testing the coefficients of regression model

Independent: cash inventory, the number of periods after modification: 351					
Variable		Coefficients	Standard error	t statistic	Sig
α	Constant coefficient	35/18931	4753/576	3/982549	0/0001
β_1	Current account	0/031884	0/012255	2/601735	0/0097
β_2	Saving account	0/081204	0/030468	2/665589	0/0081
β_3	Short-term account	0/054354	0/029297	1/855279	0/0645

β_4	Long-term account	0/0360030	0/016811	2/143291	0/0329
β_5	Online account	0/006891	0/003437	2/005212	0/0458
β_6	Account of other banks in Refah bank	0/157067	0/069819	2/249616	0/0252
β_7	Accounts of the checks issued by other banks	-0/002096	0/036759	-0/057013	0/9546
β_8	Accounts of the sold issued checks	-0/000230	0/002412	-0/095384	0/9241
β_9	First class autoregressive	0/743928	0/227304	3/272831	0/0012
β_{10}	Second class autoregressive	-0/137620	0/204327	-0/673530	0/5011
β_{11}	Third class autoregressive	0/206495	0/058628	3/522110	0/0005
β_{12}	Fourth autoregressive	0/132385	0/233279	0/567495	0/5708
Determination coefficient		0/698684	Dependent variable mean		43/32100
Modified determination coefficient		0/686906	Dependent variable deviation		5059/865
Regression standard deviation		2831/236	Durbin-Watson statistic		1/997541
F statistic		59/32203	Inverted AR Roots		0/86
Significance level of F		0/000000	Inverted MA Roots		-0/13

$$y = 35.18931 + 0.31884x_1 + 0.081204x_2 + 0.0360030x_4 + 0.006891x_5 + 0.157067x_6$$

As shown in Figure 1, autocorrelation function of residuals obtained from ARIMA pattern has White Noise characteristic. It indicates that the model's pattern has been clarified appropriately and slight autocorrelation of residuals is zero in all pauses.

Figure 1. Diagram of autocorrelation of regression analysis model

Date: 11/09/11 Time: 22:02

Sample: 5 324

Included observations: 320

Q-statistic probabilities adjusted for 4 ARMA term(s)

Autocorrelation	Partial Correlation	AC	PAC	Q-Stat	Prob
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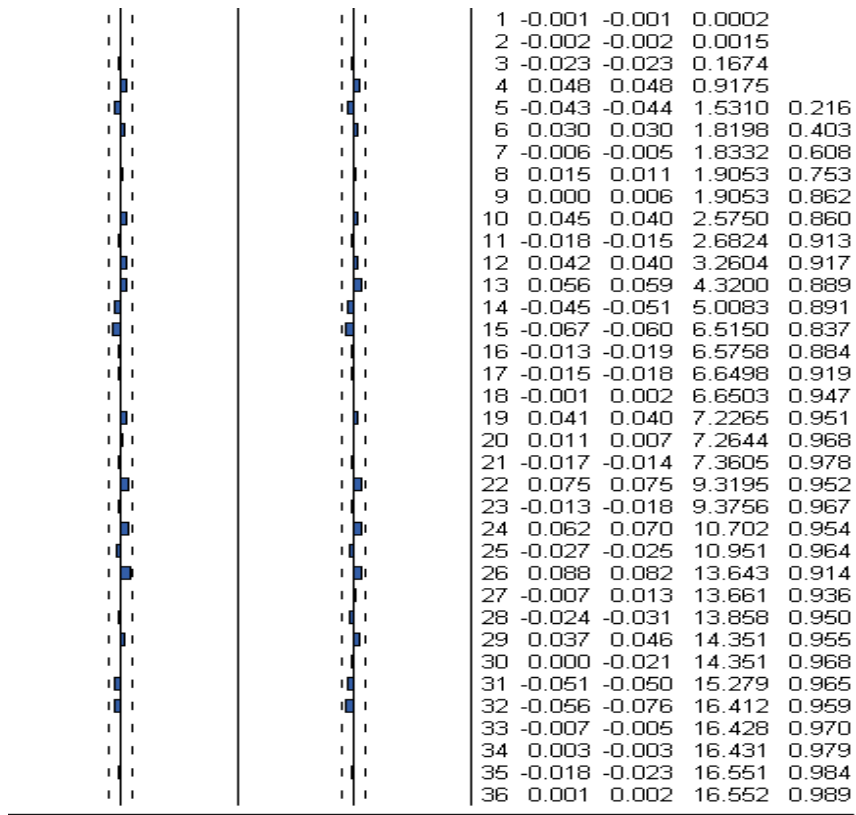


Figure 2 specifies the out of sample anticipation for a one-month period. Bias proportion (0/001507) indicates that the model anticipate the mean of series at the level of 0/5 very well.

Figure 2. indices of evaluating the model's anticipation

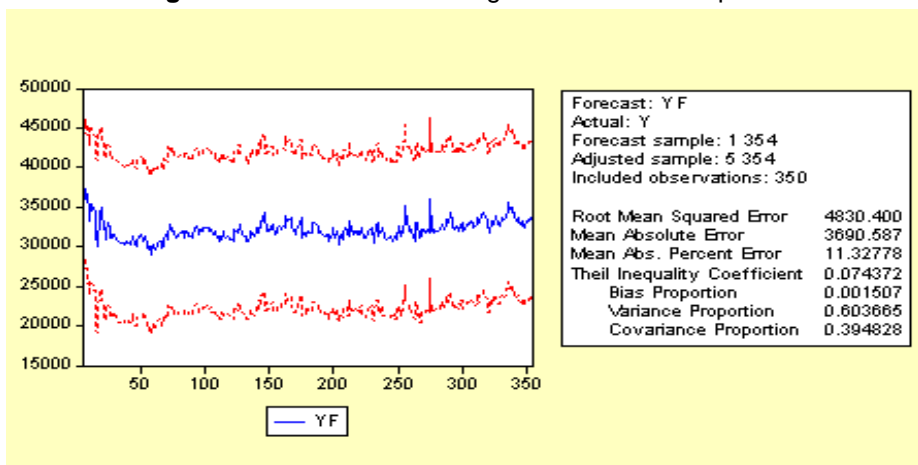


Table 10 presents real and anticipated values of cash and the difference between them. to examine the model's anticipation accuracy, anticipation errors have been tested for cash at the confidence level of 95%. Also, Table 11 shows real values of Refah bank's cash demand indicating a good fitness and high anticipation accuracy of the model.

Table 10. Comparative table of real values and anticipated values of dependent variable in July 2011

Real value	Anticipated value	Difference
28354	32108/99	-3754/99
29954	33017/24	-3063/24
29367	32029/21	-2662/21
26328	31891/18	-5563/18
31421	32038/61	-617/61
33570	33179/95	390/05
35999	33163/65	2835/35
35999	33002/44	2996/56
38147	33154/34	4992/66
31986	33436/84	-1450/84
40642	34498/30	6143/70
40642	35267/78	5374/22
39958	34420/64	5537/36
36492	34804/73	1687/27
31689	34139/35	-2450/35
33696	34240/39	-544/39
31852	34055/23	-2203/23
30048	33176/40	-3128/4
36986	33559/48	3426/52
34368	33143/40	1224/60
38095	32825/72	5269/28
40022	33184/79	6837/21
36318	32563/64	3754/36
36463	32315/42	4147/58
32052	32565/37	-513/37
34154	33254/22	899/78
37597	33193/11	4403/89
37508	33176/04	4331/96
41900	33634/72	8265/28
42005	33063/69	8941/31

Table 11. Real values and upper and lower bounds of anticipated values of cash inventory

YF-2*SEF	Y	YF+2*SEF
22893.7210314	28355	42715.2576409
23001.6593644	28354	42827.8107248
23926.8488165	29954	43768.6392971
23204.5507644	29367	43028.617895
22861.5211328	26328	42642.8737034
22813.9569995	31421	42588.0290857
23849.1519369	33570	43708.365379
23725.283655	35999	43666.2418101
23498.5023817	35999	43406.8175503
23551.1917461	38147	43528.2001123
23825.3597867	31986	43717.5108818
24825.7252504	40642	44748.5699842
25547.9416524	40642	45484.4353254
24664.8543139	39958	44604.6998368
25057.6942896	36492	44921.2935527
24387.7726384	31689	44209.4776959
24472.5908658	33696	44282.7574782
24281.3747521	31852	44065.8079757
23389.3553063	30048	43167.5442855
23763.1170276	36986	43531.8057096
23336.7489615	34368	43101.7390997
23013.1543588	38095	42769.0532753
23368.7780544	40022	43113.5468159
22740.578115	36318	42483.8977136
22483.3636241	36463	42231.2793022
22729.9034617	32052	42473.0849111
23398.3680303	34154	43172.3575215
23338.8116584	37597	43101.1059187

6. Conclusion

The results obtained from the study can be presented as follows:

1. There is a significant positive relation between current account balance and cash demand of Golestan`sRefah bank.
2. There is a significant positive relation between saving account balance and cash demand of Golestan`sRefah bank.
3. There is no significant relation between short-term investment account balance and cash demand of Golestan`sRefah bank.
4. There is a significant relation between long-term investment account balance and cash demand of Golestan`sRefah bank.
5. There is a significant relation between online account balance and cash demand of Golestan`sRefah bank.

6. There is a significant positive relation between account balance of other banks in Refah bank and cash demand of Golestan`sRefah bank.
7. There is no significant relation between account balance of checks issued by other banks and cash demand of Golestan`sRefah bank.
8. There is a significant relation between account balance of the sold issued checks and cash demand of Golestan`sRefah bank.

With respect to the low impact of e-banking in cash demand, the following suggestions are presented:

- Changing all conventional accounts into online accounts gradually;
- Increasing customers` trust by diversifying e-banking services which leads to the decrease of liquidity demand of Refah bank;
- Providing the opportunity of absorbing more sources in current accounts, saving account, long-term deposit, and account of other banks in Refah bank by managers to manage liquidity risk and cash management through increasing advertisement pressures;
- diversifying deposit types and minimize the focus on a single source of deposit Refah bank;
- decreasing reliance to receive funds in inter-bank market;
- Considering deposit insurance system;
- Managing the Adjustment of the structure of assets and liabilities maturity;
- Monitoring the proportion of loan to deposit;
- The possibility of access to ready credit lines in other big banks or the central bank in emergency and unexpected situations.

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