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A comparative study of the impact of bank liquidity risks on the degree of banking safety between Algerian public and private banks for the period 2014-2021

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***Abstract*---**This study aims to determine the extent to which bank liquidity risks affect the degree of banking safety in the Algerian banks under study during the period 2014-2021 and analyze the amount of impact between the two variables through a standard study, and through the estimation of the study models, the results of the estimate showed a set of results in public banks represented in the existence of an inverse statistically significant relationship between the cash balance ratio and the degree of banking safety, and the existence of a positive statistically significant relationship between both the legal liquidity ratio and the degree of Banking safety and the same positive relationship with the employment ratio, while in private banks there is a positive statistically significant relationship between the legal

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liquidity ratio and the degree of banking safety, while the latter is not morally related to both the cash balance ratio and the employment ratio, and this difference in results is due to several factors that distinguish between public and private banks active in Algeria.

***Keywords*---**Liquidity risk, Banking security, Banks, PANAL model.

1. Introduction

The banking sector is one of the pillars and basic sectors in contemporary economies, due to the role of financial mediation between various economic agents. In the same context the risk is a characteristic close to banking activity, and among the most important risks to this activity we find the risks of bank liquidity. Since banking security in the bank is a very important element in the banking industry, we find the majority of banks seeking to achieve the ideal combination between the risk of bank liquidity and the degree of banking safety, so reconciling these two factors is Important in the survival and continuity of the bank, especially in light of the contemporary economic and financial changes.

The problem of the study was formulated as follows: What is the impact of bank liquidity risks on the degree of banking safety in Algerian public and private commercial banks for the period 2014-2021?"
In order to answer the aforementioned problem, a set of sub-questions were asked that were formulated as follows:

1. The existence of a positive statistically significant relationship between the ratio of the cash balance and the degree of banking security in Algerian public banks
2. The existence of a positive statistically significant relationship between the legal liquidity ratio and the degree of banking security in Algerian public banks
3. The existence of a positive statistically significant relationship between the employment ratio and the degree of banking security in Algerian public banks
4. The existence of a positive statistically significant relationship between the ratio of the cash balance and the degree of banking security in Algerian private banks
5. The existence of a positive statistically significant relationship between the legal liquidity ratio and the degree of banking security in Algerian private banks
6. The existence of a positive statistically significant relationship between the employment ratio and the degree of banking security in Algerian private banks

The main objective is to know the direction of the relationship between bank liquidity risk transactions and the degree of banking security by adapting **PANAL DATA** models, and it should be noted that for the theoretical side, we decided to use the descriptive approach in order to conceptually root both bank liquidity risk and banking security, as for the applied aspect: The analytical approach was used by employing the standard study.

2. Generalities about bank liquidity risk and banking security

1.2 Bank liquidity risk:

Perhaps the most prominent challenges that the banking system seeks to realize are the management of banking risks of all kinds, including the risk of bank liquidity.

Liquidity risk: Risks associated with the bank's inability to meet its obligations on time **(Brana, Cazals, & Kauffmann, 2003, p. 114)** as defined as losses that occur when liquidating some of the bank's illiquid assets (Hanafi, Banking Management, 2007, p. 211).

It can also be said that the risks resulting from the possibility of the bank being exposed to difficulties in providing sufficient liquidity to meet the outstanding liabilities (Hashad, 2005, p. 42), which leaves the bank with the option of meeting these liabilities by selling some of its assets at low prices and in the shortest possible time.

Through the above, we see that bank liquidity risks can be defined as one of the types of financial risks resulting from the bank's inability to meet its obligations on time, which pushes the bank to liquidate assets in a timely manner and without high costs, in order to avoid a negative impact on the bank's profitability.

The risk of bank liquidity is measured through the following ratios:

First: Liquidity Coverage (LCR): This ratio is designed to strengthen the flexibility of bank liquidity risk in the short term in the period of 30 (Sharon and Kalash, Reading of Basel III Decisions and Modern Techniques for Measuring and Monitoring Liquidity Risk, 2019, page 7), and determines the liquidity coverage ratio **LCR** according to the following equation (Zebri, 2016, p. 72):

$$\mathbf{LCR} = \frac{\textit{Highly liquid assets}}{\textit{Total net cash flows over 30 days}} \geq \mathbf{100\%}$$

Second: Net Stable Financing Ratio (NSFR): This ratio was adopted in order to encourage banks to self-finance to meet the assets financed by the Bank for a period of one year (long term), (Sharon and Kalash, Reading of Basel III Decisions and Modern Technologies for Measuring and Monitoring Liquidity Risk, 2019, page 10), and the ratio of Stable funding **NSFR** according to the following equation (Cucinelli, p. 54):

$$\mathbf{NSFR} = \frac{\textit{Stable funding sources}}{\textit{Uses of financing sources}} \geq \mathbf{100\ \%}$$

Third: The financial gap: It is the difference between net assets and liabilities, and it takes two types: (Sharon and Shaoubi, 2018, page 16):

3.1 **Flow gap:** represents the difference in inflows and outflows of funds during the same period, calculated by the following relationship (Najjar, 2014, p. 177):

Flow gap = *Money Inflows – Money Outflows*

3-2- **Stored gap:** It is the difference between liabilities and assets under investigation on a given date, calculated through the following relationship (Najjar, 2014, p. 177):

Stored gap = *fund inflows – money outflows*

Fourth: Cash balance ratio: This ratio reflects the bank's ability to meet its obligations through the cash in the fund, the Central Bank and other banks on time, and this ratio varies from one country to another and may be subject to the instructions of the Central Bank (Jassim Mohammed, 2009, p. 262), and is extracted according to the following equation (Rose, 2002, p. 160):

Cash balance ratio = *(cash in the fund + cash at the Central Bank + other liquid balances) Deposits and the like*

Fifth: The legal reserve ratio: Through this ratio, the extent to which the bank responds to its financial obligations on the previously agreed maturity dates is expressed, and banks are obligated to maintain with central banks cash balances, which are determined by the Central Bank and the interest rate, and extracted according to the following equation (Bouabdali and Hamza, 2014, page 105):

Statutory Reserve Ratio = *Central Bank Balances / Total Deposits*

Sixth: **Legal liquidity ratio:** It is considered an indicator to measure the ability of reserves to pay the financial obligations of the bank, and this ratio ranges between (30%-35%) as a maximum in economic systems, and is calculated as follows (Benkheznadji, Khemissi, & Bentoumi, 2018, p. 173):

Legal liquidity ratio = *(Primary Reserves + Secondary Reserves) / Total Deposits*

Seventh: Employment ratio (lending ratio): This ratio is considered a criterion for the extent to which deposits are used in the lending process, and is considered the most expressive ratio of liquidity, and is determined according to the following equation (Pavla & Vodovà, 2011, p. 1063):

Employment Ratio = *Loans / Total Deposits*

Eighth: The ratio of liquid assets to total assets: This ratio helps to express the bank's ability to absorb the liquidity crisis, and is determined according to the following equation (Sheron and Shaoubi, 2018, page 16):

Ratio of liquid assets to total assets = *Liquid Assets / Total Assets*

2.2 Banking Security:

Safety indicators are an alarm guide that helps to understand, assess and monitor the robustness of the banking system in order to strengthen stability and determine the levels of risk that may result from it (Bouhera and Mustafa, 2017, p. 108), while the Basel Committee on Banking Supervision views banking safety (Bouabdali, Capital Policy in Algerian Banks Before and After Reforms 1990 - Case Study of the Algerian People's Loan Bank (1987-2006), 2011, p. 03) as the extent to which potential losses can be covered by owned capital.
Banking security is a bank's ability to protect depositors' funds by minimizing unexpected asset losses (Elevi and Sarir, page 36). Banking security can also be expressed mathematically (Omran, 2015, p. 471) as follows:

Banking Security = *Equity / Total Assets*

3. Standard study

1.3 Time limits: The study period was determined from 2014 to 2021, due to the availability of data and financial statements of the banks under study.
2.3 Spatial boundaries: A number of Algerian banks were relied on in 03 out of 06 Algerian public banks and 07 private banks out of 14 private banks active in Algeria, and the public banks in the Algerian Foreign Bank (**BEA**) and the Algerian People's Loan (**CPA)** were identified), National Savings and Reserve Fund (**CNEP),**) Private Banks Société Générale Algeria (**S,Gle)** Trust Bank – Algeria (**TRUST BANK)**)BNP PARIBAS ALGERIA (**PNP PARIBA BANK),**) ARAB BANKING CORPORATION ALGERIA (**ABC**) AL BARAK BANK OF ALGERIA (**BRK BANK),**) BANK AL SALAM ALGERIA (**SLM BANK)** GULF BANK-ALGERIA (**AGB BANK**)).
In order to address the subject, the variables of the study were linked in the following figure:

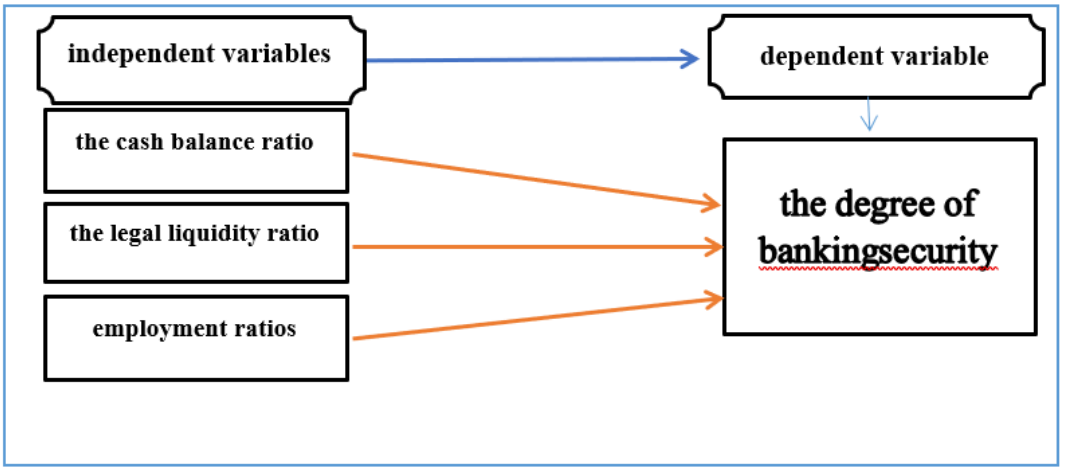

Figure 1: Study variables
Source: Authored by researchers

2004

In this study, we will use a model consisting of three independent variables represented in each of the cash balance ratio (L_1), the legal liquidity ratio (L_2) and employment ratios (L_3), and a dependent variable represented by the degree of banking security (Bs), and the general mathematical formula of the model is summarized as follows:

Bs=L1+L2+L3+ε_t

BS: Banking security, which is the dependent variable that represents the ratio of equity to total assets.
L_1: The ratio of the first independent variable cash balance related to liquidity risk, which is the ratio of cash in the Fund and at the Central Bank in addition to other liquid balances to deposits and the like.
L_2: The second independent liquidity ratio for liquidity risk which expresses the ratio of primary and secondary reserves to total deposits.
L_3: Liquidity risk independent variable employment ratio measures the ratio of total loans to total deposits.
ε_t: Error limit.

3.3 Estimating the study model:

According to the analysis of the results of the panel, and in order to achieve the objective of the study, the three longitudinal data models were estimated, namely the aggregate regression model (**PME**), the fixed effects model (**FEM)** and the random effects model (**REM)** for both public and private banks.
First: Estimation of models according to panel data for Algerian public banks for the period 2014-2021. The following table shows the results of the estimation using **the Eviews program 12, stata17**.

Table 1: Table showing the various models proposed in the study for public banks according to the analysis of the data of the panel

Interpreted variables	**Estimation Forms**		
	Aggregate Regression M odel (PME)	**Fixed Effects** Model (FEM)	**Stochastic Effects** Model (REM)
No	-0.303756	-0.3921871	-0.303756
No	0.5192135	0.6264958	0.5192135
No	0.1466518	0.1653799	0.1466518
Constant	-0.772099	-0.1055439	-0.0772099
R^2 (squared)	13.61	11.11	11.09
F (statistic)	1.05	0.71	-
Number of views	**24**		

Source: Prepared by researchers based on the outputs of Eviews 12, stata17.

Comparison tests between study models

In order to choose the optimal model of study, we will use tests such as the Hausman test and the Fisher restricted test.

1- F Fisher Restricted Test: The following are calculated:

$$F(N-1, NT-N-K) = \frac{(R^2_{FEM} - R^2_{PRM})/(N-1)}{(1-R^2_{FEM})/(NT-N-K)}$$

$$F(2, 20) = \frac{(0.1422-0.1361)/(3-1)}{(1-0.0.1111)/(24-3-1)} = \mathbf{0.0067}$$

The value of the restricted F was set at **0.0067**, which is the lowest tabular *statistical F* value at 05 %, which leads to the statement that the fixed effects model is the optimal model for this study compared to the aggregate regression method of estimation.

2- Hausman test: where the results appeared as follows:

Table 2: Hausman test schedule

Test Type	Chi-Stat	P-value
Hausman test	0.1422	0.9906

Source: Prepared by researchers based on stata17 outputs

The results of the above table for the Hausman test showed that its statistical value is set at 0.1422 at a significant level of 5%, so we say that the appropriate model is the random effects model to measure the impact of bank liquidity risks on the degree of banking safety in Algerian public banks for the period 2014-2021.

Second: Estimation of models according to panel data for Algerian private banks for the period 2014-2021

We will estimate the three longitudinal data models, namely the aggregate regression model (PME), the fixed effects model (FEM) and the random effects model (REM) for private banks, and the following table shows the results of the estimation usingthe Eviews 12, stata17 program.

Table 3: Table showing the various models proposed in the study for private banks according to the analysis of the data of the panel

Interpreted variables	Estimation Forms		
	Aggregate Regression Model (PME)	**Fixed Effects** Model (FEM)	**Stochastic Effets** Model (REM)
No	-0.1547293	-0.2712024	-0.2978826
No	0.2929993	0.4490592	0.4493806
No	0.2704041	0.744675	0.1149106
Constant	-0.919635	0.634813	0.358381
R² (squared)	61.66	44.81	43.03
F (statistic)	27.87	4.22	-
Number of views	**56**		

Source: Prepared by researchers based on the outputs of Eviews 12, stata17.

Comparison tests between study models

In order to choose the optimal model for the study, we will use three tests: Breuch and Pagan-LM-, which uses the Lagrange multiple, Hausman and Fisher's restricted test.

1- **Breuch and Pagan-LM** test**)**

This test is used to compare between the random effect model and the meta-model where:

Table 4: Test schedule (Breuch and Pagan-LM)

Type of selection	Chi-bar	P-value
(Breuch and Pagan-LM)	24.71	0.0000

Source: Prepared by researchers based on stata17 outputs

The - has a value of 24.71 and a probability (P-value = 0.0000) so it can be said that the aggregate model is the most appropriate.

2- Fisher F Restricted Test: The following are calculated:

$$F(N-1, NT-N-K) = \frac{(R^2_{FEM} - R^2_{PRM})/(N-1)}{(1-R^2_{FEM})/(NT-N-K)}$$

$$F(6.46) = \frac{(0.8809-0.6166)/(7-1)}{(1-0.4481)/(56-7-1)} = 0.0016$$

You set the value of F bound to ***0.0016*** is the lowest statistical *value of F* at 05%, so the constant effects model is the optimal model for this study compared to the aggregate regression method of estimation.

3- **Hausman test**: The results appeared as follows:

Table 5: Hausman test schedule

Test Type	Chi-Stat	P-value
Hausman test	0.8809	0.0083

Source: Prepared by researchers based on stata17 outputs

The Hausman test showed from the results of the above table that its statistical value is set at 0.8809 at a significant level of 5%, with a probability of 0.0083, or 0.83%, which is a value less than 05%. We say that the appropriate model is the fixed effects model to measure the impact of bank liquidity risk on the degree of banking security in Algerian private banks for the period 2014-2021.

Table 6: Estimation of the Impact of Bank Liquidity Risk and Degree of Banking Safety Algerian Public and Private Banks For the period 2014-2021

Algerian public banks
Random Effects Model Using **Robust** Method
-0.7720 *BS = -0.3037* L_1*+0.5192* L_2*+0.1466* L_3 (0.000) (0.028) (0.000) 0.331
Prob-F=0.000 F=153.32 R=0.1109 N.obs=24
Algerian private banks
Static effects model using **Robust** method
+0.6348 BS = -0.2712 L_1+0.4490 L_2+0.7446 L_3 (0.231) (0.017) (0.465) 0.635
Prob-F=0.0634 F=4.22 R=0.4481 N.obs=56

Source: Prepared by researchers based on the outputs of Eviews 12, stata17.

It should be noted that the statistical model used in the study cannot capture all the factors that would affect the degree of banking security in Algerian banks.

a. For Algerian public banks

It was concluded that the random effects model is optimal to study the relationship between bank liquidity risk indicators and the degree of banking safety of a sample of Algerian public banks.

The existence of an inverse statistically significant relationship between the cash balance ratio and the degree of banking safety at the level of 05% in Algerian **public banks,** as the increase in the cash balance ratio by one unit leads to a decrease in the degree of banking security by 30.37%, and this can be explained by the following reasons: The change in monetary policy managed by the Central Bank, the high demand for cash by economic operators, especially in times of crisis, and the instability in deposits makes it difficult to finance the cash financing process for these banks.

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The existence of a positive statistically significant relationship at a significant level of 05% between the legal liquidity ratio and the degree of banking safety in Algerian public banks, so that each increase by one unit in the legal liquidity ratio is accompanied by an increase in the degree of banking safety of the banks under study by 51.92%, and this is due to the following reasons: Algerian public banks maintain the highest levels of liquidity, and it can be said that the high ratio of legal liquidity means the provision of greater liquidity that would cover the bank's obligations, which explains the rise in the degree of banking security.

The existence of a positive statistically significant relationship between the employment ratio and the degree of banking safety in Algerian public banks at a significant level of 05%, so that each increase in the employment rate by one unit is offset by an increase in the degree of banking safety of the banks under study by 14.66%, and this indicates a low risk of bank liquidity and thus a high degree of banking safety, and this relationship can be explained by the nature of public banks and their orientation to employ deposits in order to meet the needs of customers from loans and advances, which Enhances customer confidence and increases banking security.

In. For Algerian private banks

The appropriate model for representing Algerian private bank data explaining the relationship between bank liquidity risk indicators and bank safety is the static effects model, which was estimated according to the Robust method.

The existence of a positive statistically significant relationship between the legal liquidity ratio and the degree of banking safety in Algerian private banks at a significant level of 05%, so that each increase in the legal liquidity ratio in an oasis unit results in an increase in the degree of banking security of the banks under study by 44.90%, and this is due to the commitment of private banks to the instructions and regulations in force and legislated by the Algerian Monetary Authority, especially in the field of available liquidity and thus maintaining a certain degree of banking security.

There is no statistically significant relationship between the ratio of the cash balance and the degree of safety in Algerian private banks at a significant level of 05%, due to the banking policy in Algeria, the different directives between public banks and private banks, in addition to the differences in the financial structure of these banks, their management and the nature of their financial management.

There is no statistically significant relationship between the employment ratio and the degree of banking safety of Algerian private banks at a level of 05%, due to the failure to adopt the bank's own policies in the lending process, but rather the employment policy is determined according to the orientation of Algeria's monetary policy.
Through our use of data models in our study, we found differences between public banks and Algerian private banks in terms of the impact of bank liquidity

risks on the degree of banking security, and this difference can be attributed to many reasons, including:

- **Establishment and ownership:** Public banks are older than their private counterparts, and their ownership is due to the state, unlike private banks.
- **The level of penetration** throughout the country of public banks, including remote areas.
- The **nature of financing** We find that Algerian public banks are working to implement the state's policy, especially in the field of real estate financing, savings, loans, according to the direction that the state sees, especially in order to promote economic development, while private banks focus more on attracting high-income people and providing banking services.
- **The crisis of private banks** in Algeria, the most prominent of which was the crisis of the Khalifa Bank and the BCA Bank.
- **Technological advances** We find private banks more sophisticated than their public counterparts in the use of banking technology through smart phone applications.

4. Conclusion

From the intersection of the theoretical and practical side of the study the following conclusions can be drawn:

- Bank liquidity risks are one of the most important financial risks that banks should seek to minimize and work to manage and control through mathematical tools and methods.
- In addition to achieving high levels of bank liquidity and minimizing its risk, banks also seek to achieve the highest levels of banking security as one of the most important goals of banks.
- There are returns and surplus liquidity in Algerian public banks, unlike private banks, but this increase is the result of the state's financial support directed to public banks.

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6. Appendices:

Appendix on the models proposed in the study for public banks according to the analysis of panel data

```
. xtreg Bs L1 L2 L3, re

Random-effects GLS regression                   Number of obs      =        24
Group variable: ID                              Number of groups   =         4

R-sq:                                           Obs per group:
     within  = 0.1109                                         min =         1
     between = 0.8840                                         avg =       6.0
     overall = 0.1361                                         max =         8

                                                Wald chi2(3)       =      3.15
corr(u_i, X)   = 0 (assumed)                    Prob > chi2        =    0.3691
```

Bs	Coef.	Std. Err.	z	P>|z|	[95% Conf.	Interval]
L1	-.303756	.364255	-0.83	0.404	-1.017683	.4101707
L2	.5192135	.2971919	1.75	0.081	-.0632719	1.101699
L3	.1466518	.1357587	1.08	0.280	-.1194303	.4127338
_cons	-.0772099	.1435119	-0.54	0.591	-.358488	.2040682
sigma_u	0					
sigma_e	.09221287					
rho	0	(fraction of variance due to u_i)				

```
. xtreg Bs L1 L2 L3, fe

Fixed-effects (within) regression               Number of obs      =        24
Group variable: ID                              Number of groups   =         4

R-sq:                                           Obs per group:
     within  = 0.1111                                         min =         1
     between = 0.8864                                         avg =       6.0
     overall = 0.1354                                         max =         8

                                                F(3,17)            =      0.71
corr(u_i, Xb)  = -0.6394                        Prob > F           =    0.5603
```

Bs	Coef.	Std. Err.	t	P>|t|	[95% Conf.	Interval]
L1	-.3921871	.7508124	-0.52	0.608	-1.976263	1.191889
L2	.6264958	.451467	1.39	0.183	-.3260163	1.579008
L3	.1653799	.2098865	0.79	0.442	-.2774419	.6082017
_cons	-.1064749	.2531442	-0.42	0.679	-.6405626	.4276128
sigma_u	.01413093					
sigma_e	.09221287					
rho	.02294444	(fraction of variance due to u_i)				

F test that all u_i=0: F(3, 17) = 0.05 Prob > F = 0.9852

Estimating a random effects model for Algerian public banks using the Robust method

```
. xtreg Bs L1 L2 L3, re robust

Random-effects GLS regression                   Number of obs      =        24
Group variable: ID                              Number of groups   =         4

R-sq:                                           Obs per group:
     within  = 0.1109                                         min =         1
     between = 0.8840                                         avg =       6.0
     overall = 0.1361                                         max =         8

                                                Wald chi2(3)       =    159.32
corr(u_i, X)   = 0 (assumed)                    Prob > chi2        =    0.0000

                                  (Std. Err. adjusted for 4 clusters in ID)
```

Bs	Coef.	Robust Std. Err.	z	P>|z|	[95% Conf.	Interval]
L1	-.303756	.0412948	-7.36	0.000	-.3846922	-.2228198
L2	.5192135	.23683	2.19	0.028	.0550352	.9833918
L3	.1466518	.0257996	5.68	0.000	.0960856	.197218
_cons	-.0772099	.0794144	-0.97	0.331	-.2328592	.0784394
sigma_u	0					
sigma_e	.09221287					
rho	0	(fraction of variance due to u_i)				

Hausman test supplement

```
. hausman fixed .
```

	(b) fixed	(B) random	(b-B) Difference	sqrt(diag(V_b-V_B)) S.E.
L1	-.3921871	-.303756	-.0884311	.6565345
L2	.6264958	.5192135	.1072823	.3398521
L3	.1653799	.1466518	.0187282	.1600685

b = consistent under Ho and Ha; obtained from xtreg
B = inconsistent under Ha, efficient under Ho; obtained from xtreg

Test: Ho: difference in coefficients not systematic

chi2(3) = (b-B)'[(V_b-V_B)^(-1)](b-B)
= 0.11
Prob>chi2 = 0.9906

xtreg Bs L1 L2 L3, re robust

Appendix to a table showing the various models proposed in the study for private banks according to the analysis of panel data

```
. xtreg Bs L1 L2 L3, fe

Fixed-effects (within) regression               Number of obs      =        56
Group variable: ID                              Number of groups   =         7

R-sq:                                           Obs per group:
     within  = 0.4481                                         min =         8
     between = 0.3959                                         avg =       8.0
     overall = 0.3986                                         max =         8

                                                F(3,46)            =     12.45
corr(u_i, Xb)  = 0.1708                         Prob > F           =    0.0000
```

Bs	Coef.	Std. Err.	t	P>|t|	[95% Conf.	Interval]
L1	-.2712024	.1274339	-2.13	0.039	-.5277135	-.0146913
L2	.4490592	.0951184	4.72	0.000	.2575958	.6405225
L3	.0744675	.0337824	2.20	0.033	.0064671	.1424679
_cons	.0634813	.0409223	1.55	0.128	-.018891	.1458536
sigma_u	.07089914					
sigma_e	.03544489					
rho	.80004226	(fraction of variance due to u_i)				

F test that all u_i=0: F(6, 46) = 17.04 Prob > F = 0.0000

```
. xtreg Bs L1 L2 L3, fe robust

Fixed-effects (within) regression               Number of obs      =        56
Group variable: ID                              Number of groups   =         7

R-sq:                                           Obs per group:
     within  = 0.4481                                         min =         8
     between = 0.3959                                         avg =       8.0
     overall = 0.3986                                         max =         8

                                                F(3,6)             =      4.22
corr(u_i, Xb)  = 0.1708                         Prob > F           =    0.0634

                                    (Std. Err. adjusted for 7 clusters in ID)
```

Bs	Coef.	Robust Std. Err.	t	P>|t|	[95% Conf.	Interval]
L1	-.2712024	.2035763	-1.33	0.231	-.7693356	.2269308
L2	.4490592	.1377517	3.26	0.017	.1119928	.7861255
L3	.0744675	.0955158	0.78	0.465	-.1592512	.3081862
_cons	.0634813	.1270609	0.50	0.635	-.2474256	.3743882
sigma_u	.07089914					
sigma_e	.03544489					
rho	.80004226	(fraction of variance due to u_i)				

الملحق الخاص بإختبار هوسمان

```
. hausman fixed ,sigmamore
```

	(b) fixed	(B) random	(b-B) Difference	sqrt(diag(V_b-V_B)) S.E.
L1	-.2712024	-.2978826	.0266802	.078887
L2	.4490592	.4493806	-.0003215	.0473688
L3	.0744675	.1149106	-.0404431	.0129209

b = consistent under Ho and Ha; obtained from xtreg
B = inconsistent under Ha, efficient under Ho; obtained from xtreg

Test: Ho: difference in coefficients not systematic

chi2(3) = (b-B)'[(V_b-V_B)^(-1)](b-B)
= 11.74
Prob>chi2 = 0.0083

Breuch and Pagan-LM Supplement

```
. xttest0

Breusch and Pagan Lagrangian multiplier test for random effects

        Bs[ID,t] = Xb + u[ID] + e[ID,t]

        Estimated results:
                         |       Var     sd = sqrt(Var)
                ---------+-----------------------------
                      Bs |    .0088297        .0939663
                       e |    .0012563        .0354449
                       u |    .0013921        .0373111

        Test:   Var(u) = 0
                                  chibar2(01) =    24.71
                              Prob > chibar2 =   0.0000
```

Appendix on the Estimation of the Fixed Effects Model of Algerian Private Banks Using the Robust Method

```
. xtreg Bs L1 L2 L3, fe robust

Fixed-effects (within) regression               Number of obs      =        56
Group variable: ID                              Number of groups   =         7

R-sq:                                           Obs per group:
     within  = 0.4481                                         min =         8
     between = 0.3959                                         avg =       8.0
     overall = 0.3986                                         max =         8

                                                F(3,6)             =      4.22
corr(u_i, Xb)  = 0.1708                         Prob > F           =    0.0634

                                    (Std. Err. adjusted for 7 clusters in ID)
------------------------------------------------------------------------------
             |               Robust
          Bs |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
          L1 |  -.2712024   .2035763    -1.33   0.231    -.7693356    .2269308
          L2 |   .4490592   .1377517     3.26   0.017     .1119928    .7861255
          L3 |   .0744675   .0955158     0.78   0.465    -.1592512    .3081862
       _cons |   .0634813   .1270609     0.50   0.635    -.2474256    .3743882
-------------+----------------------------------------------------------------
     sigma_u |  .07089914
     sigma_e |  .03544489
         rho |  .80004226   (fraction of variance due to u_i)
------------------------------------------------------------------------------
```