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The Role of SMEs in the Economy: Analyzing the Financial Performance of Algerian SMEs

Abstract. *Small and medium-sized enterprises (SMEs) represent a major pillar of the Algerian economy, accounting for 99.9% of businesses and employing over 3.3 million people. Despite their importance, these enterprises face complex challenges that affect their financial performance, measured by indicators such as return on assets (ROA). The study explores this performance's internal and external determinants, focusing on factors such as liquidity, debt levels, company size, and macroeconomic variables like GDP growth and inflation. Using the panel data method, we analyzed a sample of 40 SMEs over a five-year period (2018 to 2022). The results show that excessive liquidity, while seemingly prudent, has a negative effect on SME performance, as it limits investment opportunities. Similarly, short-term and long-term debt are associated with reduced profitability, contradicting some economic theories that view debt as a sign of good management. The limited access to credit often forces Algerian SMEs to rely on short-term financing, increasing their financial risks. In contrast, economic growth positively affects SME performance by boosting demand for their products and services. However, inflation has a negative effect, eroding profit margins due to rising operating costs. Thus, improving a company's performance is possible if the entity can create the conditions necessary for its survival and deploy the resources and logistics needed to achieve the desired objectives while aligning strategies across various activities to effectively implement its management policies. These research findings provide valuable insights for business leaders and policymakers, emphasizing the need for tailored strategies to maximize the financial performance of SMEs by considering these various factors.*

Keywords: *financial performance, microeconomic and macroeconomic determinants, SMEs, ROA, panel data.*

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Роль малих та середніх підприємств в економіці: аналіз фінансових показників алжирських малих та середніх підприємств

Анотація. Малі та середні підприємства (МСП) є основною опорою алжирської економіки, адже на них припадає 99,9% підприємств, на них працює понад 3,3 мільйона людей. Незважаючи на свою важливість, ці підприємства стикаються зі складними проблемами, які впливають на їх фінансову ефективність, зокрема рентабельність активів. Це дослідження вивчає внутрішні та зовнішні детермінанти фінансової ефективності МСП, зосереджуючись на таких показниках, як ліквідність, рівень заборгованості, розмір підприємства та макроекономічні змінні (зростання ВВП та інфляція). Використовуючи метод панельних даних, було проаналізовано вибірку із 40 МСП за п'ятирічний період (2018–2022 рр.). Результати дослідження свідчать, що надмірна ліквідність, хоча і здається розумною, негативно впливає на ефективність МСП, оскільки обмежує інвестиційні можливості. Подібним чином короткострокова та довгострокова заборгованість пов'язана із зниженою прибутковістю, що суперечить деяким економічним теоріям, які розглядають заборгованість як ознаку хорошого управління. Обмежений доступ до кредитів часто змушує МСП в Алжирі покладатися на короткострокове фінансування, збільшуючи їх фінансові ризики. Навпаки, економічне зростання позитивно впливає на ефективність МСП, підвищуючи попит на їхні продукти та послуги. Однак, інфляція має негативний вплив, зменшуючи прибуток через зростання операційних витрат. Таким чином, покращення діяльності підприємства можливе, якщо суб'єкт господарювання може створити умови, необхідні для свого виживання, розгорнути ресурси та матеріально-технічне забезпечення, необхідні для досягнення бажаних цілей, одночасно узгоджуючи стратегії в різних видах діяльності для ефективної реалізації своєї політики управління. Результати цього дослідження дають цінну інформацію для бізнес-лідерів і політиків, наголошуючи на необхідності індивідуальних стратегій для максимізації фінансової ефективності малих і середніх підприємств шляхом врахування різних факторів.

Ключові слова: фінансові показники, мікроекономічні та макроекономічні детермінанти, малі та середні підприємства, рентабельність активів, панельні дані.

INTRODUCTION

Although small and medium-sized enterprises (SMEs) have a modest scope compared to large companies, they remain a fundamental pillar of the global economy. Their importance lies in their ability to create jobs, foster innovation, and stimulate economic growth. In this competitive economic environment, SMEs' financial performance is crucial for their success and sustainability. These businesses, often characterized by their limited resources and operational flexibility, must navigate various challenges effectively to ensure long-term growth and success.

Generally, financial performance refers to the assessment of an organization's ability to generate profits and achieve its financial objectives. It encompasses a series of indicators, ratios, and financial measures that evaluate a company's health and profitability. Financial performance provides a comprehensive picture of the company's financial situation, operational efficiency, and capacity to create value for shareholders and stakeholders.

Evaluating the financial performance of Algerian small and medium-sized enterprises is crucial in the current economic context of Algeria. As a North African country rich in natural resources and labour, Algeria has a diverse economic fabric composed of SMEs operating in various sectors. By the end of 2022, the total population of this category of enterprises amounted to 1,359,803 entities, with a total workforce of 3,307,821 employees across all statuses. Nearly 99.9% of these entities are private companies, 56% of legal entities operate mainly in services and construction, while only 8.53% are industrial (Statistical Information Bulletin on SMEs, 2023).

Understanding the determinants of a company's financial performance is essential for analyzing the country's economic health, promoting sustainable growth, and strengthening competitiveness on the international stage. This research aims to explore the key determinants of the financial performance of SMEs in Algeria, analyze their impact, and address essential questions through a study on a sample of Algerian enterprises.

LITERATURE REVIEW

In general, the determinants influencing a company's financial performance can be classified into two categories: internal determinants, which are associated with the company's internal operations and management, and external determinants, which are related to the external environment in which the company operates.

Microeconomic (internal) determinants

Whether qualitative or quantitative, internal factors are key elements within a company that determine its financial performance. They are essential for assessing how the company generates revenue, manages expenses, and optimizes operations. These factors are controllable by the company.

Liquidity refers to a company's ability to meet its short-term debt obligations within the next twelve months through direct financial means or by converting assets into cash (Liargovas & Skandalis, 2010). Most studies demonstrate a positive relationship between liquidity and financial performance. For instance, studies conducted by Matar and Eneizan (2018) in Jordan between 2005 and 2015 and by Vuković et al. (2022) in Europe from 2013 to 2019 confirm this trend.

The size of a company influences its economies of scale, impacting its efficiency and financial performance. Large companies benefit from reduced production costs and improved operational efficiency, leading to better returns on assets. However, their organizational complexity can limit this efficiency. In contrast, despite higher production costs, small companies benefit from a simpler and more flexible structure, allowing them to adapt quickly and potentially achieve high profits (Pathirawasam & Knápková, 2013). While studies by Kuntluru et al. (2008) on Indian companies and by Leng (2004) on Malaysian companies highlight a positive relationship between company size and financial performance, this relationship is not consistently uniform. Other research, such as that by Matar and Eneizan (2018), suggests a negative link between these two variables.

Financing decisions represent a fundamental choice for company executives, crucial for implementing investment strategies and funding ongoing operations. To achieve this, companies turn to debt financing options, opting for long- and medium-term loans to finance investments and short-term debt to cover operational cycle needs. Scholes and Wolfson (1988) emphasized the critical role of short-term debt, including bank loans and other financing under one year, especially for companies uncertain about their tax position and facing high tax rates. These companies favour short-term debt as it proves to be a financially advantageous solution and an effective strategy for temporarily adjusting their debt levels to an optimal threshold. Previous research has highlighted a negative correlation between short-term and long-term debt, as noted in studies by Titman and Wessels (1988), Vuković et al. (2022), and Maksimovic and Titman (1991).

Regarding sociodemographic characteristics, the author emphasizes that the manager's experience, training, and age are determining factors for their

managerial qualities and ability to drive change within the company. Furthermore, the upper echelons theory, initially formulated by Hambrick and Mason in 1984 and revisited by Hambrick in 2007, links company performance to the sociodemographic characteristics of its top managers. According to proponents of this theory, these sociodemographic characteristics can significantly influence company outcomes. They specifically highlight that the management team's age, functional experience, and socioeconomic backgrounds are directly correlated with company growth. For example, extensive experience among executives is often seen as a positive growth factor, enabling them to make decisions well-suited to market fluctuations.

According to the Oslo Manual, innovation corresponds to the adoption of a product (good or service) or a process that is either new or significantly improved, as well as the implementation of innovative business or organizational methods in the company's activities, work structure, or external relations (Kenza & Fadwa 2023). Al-Ansari et al. (2013) examined the impact of organizational, product, process, and marketing innovations on various performance aspects of 184 manufacturing companies in Turkey. They evaluated the effect on innovation, production, market, and financial performance. The results revealed a positive correlation between innovations and overall company performance.

Macroeconomic (external) determinants

External factors, unlike internal elements, represent outside influences that affect a company's financial performance. These factors are beyond the company's direct control and require strategic adaptation to minimize risks and seize potential opportunities. According to the World Bank report (2019) and Ngowi (2015), the macroeconomic variables with the greatest influence on corporate performance include the exchange rate, GDP, interest rate, and inflation rate.

In 1979, Revel was the first to study the effect of inflation on economic performance. He found that the impact essentially depends on the evolution of operational expenses relative to inflation. He notes a negative repercussion on economic performance when these expenses grow faster than inflation. Conversely, slower growth proves beneficial (Cousin, 2011).

A country exhibiting sustained economic growth generally reflects its residents' high overall income level. Market players perceive this dynamic positively since a higher societal income increases the population's purchasing power (Isnurhadi et al., 2019). The analysis conducted by Isnurhadi et al. on 54 manufacturing sector companies, covering the period from 2011 to 2015, revealed that economic growth significantly and positively impacts companies' financial performance.

According to many authors, the interest rate determines the cost a company must bear to use the capital its funders provide. A high interest rate significantly impacts the financial operations of an investment company, notably by negatively influencing the present value of its cash flows. This situation arises because borrowing costs increase, making financing more

expensive for the company. Consequently, this translates into a higher cost of capital that the company must bear, thus affecting its profitability and ability to undertake future investments. Conversely, the study by Cliff and Willy (2012) highlighted a negative relationship between the two factors. The volatility of exchange rates affects the financial performance of international companies in several ways:

1. Exchange rate fluctuations influence revenues via the margin effect and the Pass-Through concept, where rate changes are not fully passed on to prices, reducing the commercial margin.

2. Exchange rate fluctuations can impact sales volume. For example, a 1% increase in the Chilean Peso relative to the US Dollar reduces US demand for Chilean salmon by 0.13%.

3. Exchange rate fluctuations can increase company costs, particularly when they import goods or services.

However, Bartram et al. (2005) indicate that a depreciation of the local currency can ultimately increase the parent company's profits despite rising production costs.

Overview of SMEs in Algeria

At the end of 2022, the total number of SMEs in this category amounted to 1.359.803 entities, with a total workforce of 3.307.821 employees across all legal statuses. Nearly 99.9% of these entities are private companies, 56% are legal entities primarily active in services and construction, whereas only 8.53% of SMEs are industrial. Overall, the growth of the SME population between 2021 and 2022 was 5.71% across all legal sectors, representing a net increase of 73.438 SMEs.

Micro-enterprises, which account for 98% of the total number of SMEs, offer greater adaptability to changes in demand and technological advancements. Within one year, 80.531 new entities were created, exceeding the previous year's population, with the new business creation rate accelerating to an annual growth rate of 5.71%. This significant number of SME creations results from state policy, including implementing important reforms and measures to support SME development in Algeria.

Table 1. Dynamics of SMEs during the 2019-2022 period

Year	2019	2020	2021	2022
Creation	57 642	43 558	57 129	80 531
Dissolution	20 550	17 297	14 508	19 179
Reactivation	14 402	11 487	12 675	12 088

Source: Prepared by the authors based on SME statistical bulletins No. 38 (2021), SME statistical bulletins No. 40 (2022), SME statistical bulletins No. 42 (2023).

Table 1 provides an overview of the dynamics of the SME market within the context of the economic impact of the COVID-19 pandemic and the subsequent recovery. The critical periods can be interpreted as follows:

2020: This was the most critical year, with a significant decrease in business startups to 43.558, a reduction in business closures to 17.297, and a drop in business reactivations to 11.487 due to the negative economic effects of the pandemic and lockdown restrictions.

2021: The year saw a gradual recovery, with new business startups almost returning to 2019 levels at 57.129, a continued decrease in business closures to 14.508, and a slight increase in reactivations to 12.675, indicating an adaptation to pandemic conditions.

2022: The year showed a strong rebound and economic catch-up, with a significant peak in new startups at 80.531, an increase in business closures to 19.179, likely due to the end of support measures, and a stabilization in reactivations at 12.088.

At the end of 2022, the total number of employees in SMEs was 3.307.821, with only 19.608 employed in public SMEs. Notably, the total number of SME employees increased by 5.46% between 2021 and 2022.

The value added by SMEs in Algeria from 2015 to 2021 shows overall growth, peaking in 2018, followed by a significant decline in 2020 primarily due to the COVID-19 pandemic, which caused substantial economic slowdowns, and a strong recovery in 2021 thanks to economic stimulus initiatives and SME adaptation to new

market requirements. This trend highlights the resilience of SMEs against economic fluctuations.

From 2000 to 2018, Algerian non-hydrocarbon exports experienced significant growth, increasing by 362%, but they remain marginal, representing only about 3% of total exports, while hydrocarbons dominate at 97%. Contrary to their impact on exports, SMEs significantly increased Algerian imports, mainly due to a strong investment orientation towards the commercial sector. Between 2000 and 2018, imports in Algeria increased by 370%, with notable annual growth spikes in 2002, 2004, 2007, and 2008. However, since 2015, import growth rates have been negative. Most of these imports are directed towards the private sector, particularly private SMEs, underscoring their central role in this dynamic.

RESEARCH OBJECTIVE

The primary objective of our study is to identify the key factors influencing the financial performance of SMEs in Algeria. We have formulated several hypotheses to address this essential question that will be tested through empirical research.

H1: The factors that can impact a company's financial performance are:

- Microeconomic factors, such as the level of debt (STD, LTD) and liquidity.
- Macroeconomic factors: economic growth and the inflation rate.

H2: The impact of each factor on the financial performance of SMEs:

H2.1 The level of debt negatively affects financial performance.

H2.2 Liquidity has a positive impact on financial performance.

H2.3 Economic growth has a positive impact on financial performance.

H2.4 Inflation negatively affects financial performance.

RESEARCH METHODOLOGY

This section will analyze how the chosen explanatory variables influence financial performance, specifically via the ROA indicator, using multiple regression in a panel model. We will also detail the results obtained with the Stata software, including descriptive analysis, data correlation, and appropriate tests for these data. The study will conclude by interpreting the results from the linear regression.

Our sample consists of 40 private Algerian companies distributed across various sectors (commercial and industrial). The Directorate General of Taxes (DGT) provides the list of these companies, and the financial statements of these companies (balance sheets and

income statements) were obtained from the database of the National Center for Trade Registry (CNRC) for the period from 2018 to 2022. Additionally, the database offers extraneous information such as ownership form, legal form, sector of activity, and geographical region. Data on macroeconomic determinants, such as the inflation rate and GDP, come from specific sources. The GDP is extracted from the World Bank's website, a renowned international source providing global economic data. The inflation rate is obtained directly from the Ministry of Finance, an official governmental source known for its reliability in national economic data.

In our study, we considered both internal factors of the company (microeconomic factors) and external factors (macroeconomic factors) to provide a comprehensive study of the determinants of the performance of Algerian companies. This model examines the impact of microeconomic variables, including short-term debt ratios (STD), long-term and medium-term debt ratios (LTD), liquidity (LIQ), and macroeconomic variables, such as economic growth and the inflation rate, on the economic profitability of the company.

Our model takes the following form:

$$ROA_{it} = \beta_0 + \beta_1 * LIQ_{it} + \beta_2 * STD_{it} + \beta_3 * LTD_{it} + \beta_4 * Economic\ growth_{it} + \beta_5 * inflation_{it} + \varepsilon_{it} \quad (1)$$

Where:

ROA: liquidity;

STD: short-term debt;

LTD: long-term debt;

Economic growth: it represents the GDP expressed in billions of DZD;

Inflation: expressed as a percentage.

RESULTS AND DISCUSSION

- a- Correlation Analysis (Appendix 1):** The correlation matrix validates our choice of variables, as none of the explanatory variables show a correlation exceeding 72% with the other.
- b- Multicollinearity Test (VIF) (Appendix 2):** No multicollinearity problem is detected among the variables (mean VIF = 1.56 so $1/VIF > 0.1$).
- c- Fisher Test (Appendices 3 and 4):** An individual effects model, whether fixed or random, is more suitable for our analysis (**Prob > F = 0.0000**).
- d- Hausman Test (Appendix 5):** The test results indicate that the random effects model is more appropriate than the fixed effects model (**Prob > chi2 = 0.7462**).
- e- Breusch-Pagan Test (Appendix 6):** The test confirms the presence of a random individual effect (**Prob > chi2 = 0.0000**).
- f- Heteroscedasticity Test (Appendix 7):** The test confirms the presence of heteroscedasticity issues (**Prob > chi2 = 0.0000**).
- g- Autocorrelation Test (Appendix 8):** The test indicates the presence of autocorrelation of the residuals in our model (**Prob > F = 0.0147**).
- h- Model Correction (Appendix 9):** Given the presence of heteroscedasticity and autocorrelation issues, the estimated random effects model is no longer suitable. It is necessary to correct these issues to improve the model's fit (using the PCSE method, Panel-Corrected Standard Errors). The Wald test indicates that the model is statistically significant. The model thus takes the following form:

$$ROA_{it} = 0.1213825 - 0.0016122 LIQ_{it} - 0.1161502 STD_{it} - 0.1954567 LTD_{it} + 0.0388461$$

$$Economic\ growth_{it} - 0.0651187 inflation_{it} + \varepsilon_{it}$$

Following the analysis of the presented regression model, the Wald Chi2 test reveals a global significance of the model at a 1% level (Prob > chi2 = 0.0000), indicating a strong fit and good explanatory power of the model.

We will now explore the effect of each variable included in our model on the financial performance of SMEs in Algeria based on the estimation results and taking into account previous studies conducted by other researchers.

Liquidity (LIQ)

Our model assesses liquidity by the ratio of short-term assets to short-term liabilities. We observe a negative relationship of -0.0016122 between this liquidity ratio and the financial performance of SMEs, which is significant at the 1% level. This relationship indicates that a 1% increase in the liquidity ratio leads to a 0.16% decrease in financial performance.

The negative relationship can be explained by the challenging economic context in Algeria and the obstacles to accessing bank credit, which compel SMEs to maintain a significant level of liquidity. This accumulation of cash reserves, though strategic in response to economic instability and financing challenges, limits profitable investment opportunities for SMEs, thereby affecting their profitability.

This result contradicts the findings of other researchers, such as (Vuković et al., 2022) and (Matar & Eneizan, 2018), who identified a positive impact of liquidity on financial performance as measured by ROA. This divergence may be due to SMEs' unique economic and financial characteristics.

Short-term Debt (STD)

Calculated as the ratio of short-term debt to total assets, the presence of a negative coefficient (-0.1161502), which is statistically highly significant (p-value < 1%), suggests that an increase in the proportion of short-term debt relative to total assets by one unit leads to a reduction in financial performance by 0.1161502.

This result contradicts the signalling theory, which suggests that managers use debt as an indicator to demonstrate the quality and profitability of the company's future projects. Debt is also a strategy that signals managers' expectations regarding the company's growth, attracting investors by reducing information asymmetry between them and the management.

Furthermore, this result is consistent with the study conducted by Vuković et al. (2022) on European agricultural companies in 2021.

Long-term Debt (LTD)

Long- and medium-term debt (DLT) has a negative impact on the financial performance of SMEs, as revealed

by a coefficient of -0.1954567, which is significant at the 1% level. This clearly indicates a strong link between long-term debt and financial performance.

This result contradicts agency theory, which suggests that taking on debt can reduce conflicts of interest between managers and shareholders. According to this theory, in cases of conflict of interest, the company may incur agency costs, such as audits and monitoring systems, which can decrease its profitability.

However, these findings align with the Pecking Order Theory (POT) established by Myers in 1977 and 1984. This theory suggests that profitable companies prefer to use their equity to finance themselves, favouring self-financing over debt. This demonstrates the negative relationship between financial performance and debt, where high-performing companies tend to avoid taking on debt. Finally, the negative relationship between long-term debt and financial performance was also observed in the study by Lahmini and Ibenrissoul (2015).

Economic Growth

GDP growth, measured by the annual increase in gross domestic product, with a positive and significant coefficient of 0.0388461 at the 1% level, shows a strong link between economic growth and the improvement of the financial performance of SMEs in Algeria.

The positive relationship between economic growth and SMEs' financial performance can be associated with the increased demand for products and services, driven by improved economic conditions and consumer standards of living. This situation leads to growth in sales and profits for SMEs. This positive phenomenon creates favourable opportunities for SME expansion, allowing them to play a crucial role in supporting and enhancing the overall economy.

This result aligns with the findings of Isnurhadi et al. (2019), who determined that economic growth positively impacts the performance of manufacturing companies listed on the Indonesia Stock Exchange (IDX). It also supports many authors' view, emphasizing the fundamental importance of economic growth in improving living conditions and economic performance.

Inflation

The regression analysis reveals a negative regression coefficient of (-0.1661899), clearly indicating that inflation has a negative and significant effect, with a p-value of 0.011, on financial performance as measured by ROA. This result suggests that an increase in inflation leads to a notable reduction in the financial performance of Algerian SMEs.

This negative relationship may be due to rising raw materials and operational expenses while the value of the national currency decreases. When SMEs cannot pass these costs on to their selling prices, their profitability diminishes. Additionally, high inflation can decrease

consumers' purchasing power, reduce demand for certain goods and services, and negatively impact sales and profitability.

Our findings align with other studies in the same field, particularly those of Isnurhadi et al. (2019).

CONCLUSION

Algerian small and medium-sized enterprises (SMEs) are a vital component of the national economy, playing a crucial role in driving economic growth by increasing wealth, creating jobs, and promoting industrial diversification. However, despite government efforts to support these businesses, they face multiple challenges that limit their development. These obstacles include persistent difficulties in financing, market access, and management skills.

Our study's primary objective is to identify the key determinants of financial performance for SMEs in Algeria. To achieve this goal, we reviewed theoretical and empirical literature. The results show that liquidity, debt, economic growth, and inflation significantly influence the financial performance of SMEs in Algeria.

Improving a company's performance is possible if the entity can create the conditions necessary for its survival and deploy the resources and logistics needed to achieve the desired objectives while aligning strategies across various activities to effectively implement its management policies. Our research findings provide valuable insights for business leaders and policymakers, emphasizing the need for tailored strategies to maximize the financial performance of SMEs by considering these various factors.

To optimize the financial performance of small and medium-sized enterprises (SMEs) in Algeria, we propose several strategic recommendations:

- Implement training programs for SME managers to enhance their financial management skills, particularly in financial planning and risk analysis.

- Policymakers should consider measures to mitigate the impact of inflation on SMEs, such as subsidies or direct aid to help these businesses manage rising costs and maintain their competitiveness.

- Improve SMEs' access to financing through special funds, credit guarantees, or relaxing lending criteria for small businesses.

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APPENDIXES

Appendix 1. Correlation matrix of variables

VARIABLE	ROA	LIQ	STD	LTD	Growth	Inflation
ROA	1					
LIQ	-0.0481	1				
STD	-0.2706***	-0.4526***	1			
LTD	-0.2676***	-0.0270	-0.1320*	1		
Growth	0.0518	-0.0386	-0.0334	-0.0289	1	
Inflation	0.0019	0.0234	-0.0362	-0.0305	0.7198***	1

Appendix 2. Multicollinearity test

Variable	VIF	1/VIF
Growth	2.10	0.477231
Inflation	2.09	0.479019
STD	D1.30	0.771061
LTD	1.28	0.780136
LIQ	1.03	0.971489
Mean VIF	1.56	

Appendix 3. Fixed effects model

Fixed-effect (within) regression Group variable : individus R-squared: Within = 0.1322 Between = 0.2231 Overall = 0.1995 Corr(u-i, X) = 0.0986				Number of obs = 200 Number of groups = 40 min = 5 avg = 5.0 max = 5 F(5,155) = 4.72 Prob > F = 0.0000		
ROA	Coeff	St.err.	Z	P> z	{ 95% conf.interval }	
LIQ	-.0011229	.00068	-1.65	0.101	-.0024661	-.0002204
STD	-.1051796	.0266211	-3.95	0.000	-.1577665	-.0525927
LTD	-.1615915	.0554843	-2.91	0.004	-.2711944	-.0519886
Growth	.0501756	.0315099	1.59	0.113	-.0120687	.1124198
Inflation	-.2244464	.1556042	-1.44	0.151	-.5318249	.0829322
_cons	.1146707	.0153117	7.49	0.000	.0844241	.1449174
Sigma_u	.05756985					
Sigma_e	.03815442					
rho	.6948123 (fraction of variance due to u_i)					
F test that all u_i=0: F (39, 155) = 10.91				Prob > F = 0.0000		

Appendix 4. Random effects model

Random-effect GLS regression Group variable : individus R-squared: Within = 0.1313 Between = 0.2333 Overall = 0.2063 Corr(u-i, X)= 0 (assumed)				Number of obs = 200 Number of groups = 40 min = 5 avg = 5.0 max = 5 Wald chi2(5) = 34.55 Prob > chi2 = 0.0000		
ROA	Coeff	St.err.	Z	P> z	{ 95% conf.interval }	
LIQ	-.0013928	.0006527	-2.13	0.033	-.0026721	-.0001136
STD	-.1095104	.0229329	-4.78	0.000	-.1544581	-.0645627
LTD	-.180799	.0483069	-3.74	0.000	-.2754787	-.0861193
Growth	.0482495	.0314631	1.53	0.125	-.013417	.1099161
Inflation	-.2199737	.1553527	-1.42	0.157	-.5244593	.0845119
_cons	.1184648	.0162578	7.29	0.000	.0866001	.1503294
Sigma_u	.05493988					
Sigma_e	.03815442					
rho	.67462876 (fraction of variance due to u_i)					

Appendix 5. Hausman test

Coefficient	(b) Fe	(B) Re	(b-B) Difference	Sqrt(diag(v_b-v_B)) Std.err.
LIQ	-.0011229	-.0013928	.0002699	.0001908
STD	-.1051796	-.1095104	.0043308	.0135189
LTD	-.1615915	-.180799	.0192074	.0272938
Growth	.0501756	.0482495	.001926	.0017168
Inflation	-.2244464	-.2199737	-.0044727	0.0088445

b = consistent under H0 and Ha; obtained from xtreg.

B = Inconsistent under Ha, efficient under H0; obtained from xtreg.

Test of H0 : Difference in coefficient not systematic

$$\chi^2(5) = (\mathbf{b}-\mathbf{B})'[(\mathbf{V}_b-\mathbf{V}_B)^{-1}](\mathbf{b}-\mathbf{B}) = 2.70$$

Prob>chi2 = 0.7462

Appendix 6. Breusch-Pagan test

Breusch and Pagan Lagrangian multiplier test for random effects		
ROA[individus,t] = Xb + u[individus] + e[individus,t]		
Estimated results:		
	Var	SD = sqrt(Var)
ROA	0.0054339	0.0737149
e	0.0014558	0.0381544
u	0.0030184	0.0549399
Test: Var(u) = 0		
chi2(1) = 168.18		
Prob > chi2 = 0.0000		

Appendix 7. Homoscedasticity test

Wald test for heteroscedasticity
H0: $\sigma(i)^2 = \sigma^2$ for all i
chi2 (40) = 48319.62
Prob>chi2 = 0.0000

Appendix 8. Autocorrelation test

Wooldridge test autocorrelation in panel data
H0: no first-order autocorrelation
F(1, 39) = 6.523
Prob > F = 0.0147

Appendix 9. Regression results

Prais-Winsten regression, correlated panels corrected standard errors (PCSEs)				Number of obs = 200		
Group variable : individus				Number of groups = 40		
Time variable: year				min = 5		
Panels: Correlated (balanced)				avg = 5.0		
Autocorrelation : common AR(1)				max = 5		
Estimated covariances = 820				R-squared = 0.1883		
Estimated autocorrelation = 1				Wald chi2(5) = 129.15		
Estimated coefficient = 6				Prob > chi2 = 0.0000		
ROA	Coeff	St.err.	Z	P> z	{ 95% conf.interval }	
LIQ	-.0016122	.0004921	-3.28	0.001	-.0025766	-.0006477
STD	-.1161502	.0172098	-6.75	0.000	-.1498808	-.0824195
LTD	-.1954567	.03443	-5.68	0.000	-.2629382	-.1279752
Growth	.0388461	.012697	3.06	0.002	.0139604	.0637317
Inflation	-.1661899	.0651187	-2.55	0.011	-.2938201	-.0385596
_cons	.1213825	.0093817	12.94	0.000	.1029947	.1397703
rho	.5113703					