Pegem Journal of Education and Instruction, Vol. 15, No. 4, 2025 (pp. 2992-3006)

RESEARCH ARTICLE WWW.PEGEGOG.NET

Assessing the Impact of Liquidity and Financial Leverage on Firm Profitability: A case study based on a sample of enterprises operating within Algeria's Pasteurized Milk Industry

Latreche Walid [1], Henni Mohamed Fouad [2], Djorfi Zakaria [3]

[1] Research Laboratory in Applied Economics for Resources Governance and Territorial Development, University of Tipaza (Algeria), Email:Latreche.walid@cu-tipaza.dz
[2] Research Laboratory in Applied Economics for Resources Governance and Territorial Development, University of Tipaza (Algeria), Email: henni.mohamedfouad@cu-tipaza.dz
[3] Laboratory of Green Economy and Development in Algeria, University Center of Illizi (Algeria), Email: djorfi.zakaria@cuillizi.dz

Received: 22/02/2025 Accepted: 01/06/2025 Published: 02/09/2025

Abstract:
This study aims to analyze the impact of liquidity and financial leverage on the profitability of economic entities operating in the dairy sector, specifically the producers of pasteurized milk in Algeria, during the period from 2015 to 2022. It seeks to determine the extent to which liquidity management and the use of debt financing influence the profitability of these firms. To achieve this objective, a quantitative analytical approach was adopted, relying on the financial statements of a sample of Algerian dairy companies, **including Sidi Saada Dairy, Sidi Khaled Dairy, Algiers Colital Dairy Complex, and Boumerdes Dairy and Cheese Plant.**
To analyze the relationship, the study employs Quantile Regression (QREG) methodology. Consequently, time-series cross-sectional models with quarterly observations were used for a sample of 9 dairy-producing firms in Algeria. The results revealed a statistically significant positive relationship between liquidity and profitability, whereas financial leverage showed no significant statistical effect. This highlights the importance of liquidity management in achieving financial stability compared to the limited impact of debt in the studied sector.

Keywords: Liquidity, Financial Leverage, Profitability, QREG.

Introduction:

Economic institutions form a fundamental pillar in modern economies, significantly contributing to driving growth, creating job opportunities, and fostering innovation and development. With the growing challenges both locally and internationally, such as inflation, fluctuations in monetary policies, and increasing competition, there has emerged a need for the adoption of integrated financial strategies to ensure the continuity of these institutions and their ability to adapt. In this context, liquidity and financial leverage emerge as key tools for managing financial resources and achieving a balance between stability and expansion.

Liquidity, as an indicator of a firm's ability to meet its short-term obligations, is an essential element for maintaining financial and operational stability in the short term. In contrast, financial leverage provides opportunities to maximize returns and expand the investment base by mobilizing additional resources through borrowing. Over-reliance on one of these tools without the other leads to substantial risks, either by freezing underutilized financial resources or increasing debt burdens, thereby reducing financial flexibility. The significance of this dilemma became evident during the COVID-19 pandemic, where many firms faced severe liquidity pressures due to declining revenues, while those relying heavily on financial leverage experienced an exacerbation of the crisis. **(Antonio De Vito, 2020, p.347)**

1. Research Problem:

The ability to maximize profitability is no longer solely linked to increasing sales or reducing costs; it is also dependent on the effectiveness of balancing available liquidity and reliance on financial leverage. Liquidity represents a guarantee for stability and addressing unforeseen crises, while financial leverage provides opportunities for expansion and profit maximization. However, the absence of coordination between these factors can transform these tools from strengths to threats to financial performance. This raises the main research question:

How do variations in liquidity and financial leverage shape the profitability outcomes of firms engaged in the production of pasteurized milk in Algeria over the 2015–2022 period?

This main question branches into three sub-questions aimed at exploring the interactive relationships between these variables and clarifying their overall effect on the financial performance of the institutions under study:

- To what extent does liquidity level affect the profitability of economic institutions in the pasteurized milk production sector in Algeria during the period from 2015 to 2022?
- How does the interaction between liquidity and financial leverage affect the profitability of economic institutions in the pasteurized milk production sector in Algeria?

2. Research Hypotheses:

To answer the research questions, the following hypotheses are proposed:

- **H1 Hypothesis:** There is a statistically significant positive relationship between liquidity levels and the profitability of economic institutions operating in the pasteurized milk production sector in Algeria.

It is hypothesized that adequate liquidity enhances financial stability by enabling economic institutions to meet their short-term obligations, improving profitability indicators such as Return on Equity (ROE). However, previous studies have indicated that high liquidity levels may reduce the firm’s ability to maximize profits due to the associated higher opportunity cost, which diminishes resource utilization efficiency.

- **H2 Hypothesis:** There is a statistically significant positive relationship between financial leverage levels and the profitability of economic institutions in the pasteurized milk production sector in Algeria.

Financial leverage may enhance Return on Equity (ROE) if the return on debt-financed investments exceeds the cost of interest. However, high financial leverage can increase financial risks, particularly in the presence of low liquidity, negatively affecting profitability.

- **H3 Hypothesis:** Liquidity mitigates the negative impact of financial leverage on the profitability of economic institutions in the pasteurized milk production sector in Algeria, thus enhancing profitability even at high debt levels.

The interaction between liquidity and financial leverage is crucial in determining the financial performance of economic institutions. High liquidity can mitigate the risks associated with financial leverage, while financial leverage aims to maximize returns.

3. Research Objectives:

The study aims to provide a comprehensive analysis of the relationships between liquidity, financial leverage, and profitability in a sample of economic institutions operating in the pasteurized milk production sector in Algeria, through specific and integrated objectives summarized as follows:

Analyzing the impact of liquidity on profitability: This involves studying the extent to which liquidity can support the operational activities of firms and enhance their returns.

Assessing the effect of financial leverage on financial performance: This entails determining the nature of the relationship between debt financing and return on capital, as well as the associated risks.

Exploring the interaction between liquidity and financial leverage: Understanding how these two variables work together to either maximize or reduce profitability.

Providing practical recommendations for financial management: This will enable the institutions under study to improve their liquidity and financing strategies to enhance financial performance and reduce the risks associated with financial leverage.

4. Research Methodology:

The study adopts a descriptive approach in presenting and analyzing the literature and studies related to liquidity, financial leverage, profitability, and the relationship between these variables. The study also employs multiple regression analysis, which allows for measuring the impact of independent variables (liquidity and financial leverage) on the profitability of economic institutions (Return on Equity) accurately and objectively. Financial data from economic institutions in the pasteurized milk production sector were collected for the period from 2015 to 2022.

5. Structure of the Study:

The study is divided into four main sections. The first section provides the introduction, which includes the research problem, hypotheses, methodology, and tools used. The second section discusses the theoretical framework of the study, where all relevant variables are examined. The third section addresses the research methodology, study variables, the proposed model, and data analysis. The final section, the general conclusion, is dedicated to testing the hypotheses, presenting the results, and offering recommendations related to the study.

i. Theoretical Framework of the Study:

This section covers the theoretical framework for each of the study variables, in terms of their concepts, importance, and indicators, as well as an analysis of the nature of the relationship between profitability, liquidity, and financial leverage.

Liquidity: Concept, Indicators, and Importance

1.1 Definition of Liquidity

Liquidity is one of the core concepts in financial management, defined as the ability of an organization to meet its short-term financial obligations using its current assets, such as cash, accounts receivable, and inventories. (Albrecht, 2008, p.36) In another context, liquidity is considered a measure of the speed and ease with which assets can be converted into cash without a significant loss in value. (Al-Omari, 2007, p.57) On the other hand, liquidity refers to the ability of a firm to meet emergency

obligations without the need to sell long-term assets or resort to external financing. (Krajeh, 2006, p.25) Liquidity is also viewed as an indicator of financial health, reflecting the stability of the organization and its ability to withstand economic shocks. (Van Horne, 2008, p.113)

1.2 Liquidity Indicators

Liquidity is measured through a set of financial ratios that show the firm's ability to cover its short-term obligations:

1.2.1 Current Ratio: (Current Assets ÷ Current Liabilities) This ratio is the primary indicator of liquidity, showing the availability of current assets to cover short-term liabilities. The ideal ratio ranges from 1.5 to 2 times, where a ratio less than 1 indicates potential difficulties in settling financial obligations on time. (Al-Omari, 2007, p.57)

1.2.2 Quick Ratio: [(Current Assets - Inventories) ÷ Current Liabilities] The quick ratio reflects the actual ability of the firm to meet its short-term obligations using the most liquid assets, as inventories are excluded from current assets to provide a more accurate measure of immediate liquidity. (Gibson, 2011, p.230)

1.2.3 Cash Ratio: (Cash and Cash Equivalents ÷ Current Liabilities) This ratio reflects the firm's ability to cover its current obligations using only cash and cash equivalents, without relying on other assets. It is considered a precise indicator of liquidity in emergencies. (Al-Haddad, 2009, p.69)

1.2.4 Cash Conversion Cycle: This measures the time required to convert resources into cash through the operating cycle, which is calculated by summing the inventory cycle and accounts receivable cycle, then subtracting the accounts payable cycle. This cycle indicates the efficiency of liquidity management in the firm. (Brealey, 2020, p.111)

1.3 Importance of Liquidity

Liquidity is vital for the continuity of a firm's activities by supporting daily operations and reducing financial risks. For example, liquidity enables the payment of wages, settling bills, and covering operational expenses, ensuring uninterrupted operations. (Al-Zubaidi, 2008, p.97) Furthermore, liquidity provides a financial cushion against unforeseen cash flow fluctuations, such as declining sales or delayed payments. (Aql, 2006, p.22) Additionally, liquidity enhances investor and creditor confidence, improving the firm's reputation in the market. (Gitman, 2015, p.88) Finally, liquidity allows the firm to capitalize on emergency investment opportunities without the need for costly external financing. (Krajeh, 2006, p.23)

1.4 Challenges Associated with Liquidity

Despite its importance, managing liquidity involves complex challenges. On one hand, excessive liquidity leads to higher opportunity costs, as cash is held instead of being invested in profitable projects. (Al-Naimi, 2009, p.272) On the other hand, a lack of liquidity increases the risk of financial distress, which could lead to loss of confidence or bankruptcy in extreme cases. (Aql, 2006, p.26) Therefore, liquidity management requires achieving a delicate balance between covering obligations and effectively investing resources. (Keown, 2017, p.89)

1.5 Factors Affecting Firm Liquidity

Liquidity in economic institutions is influenced by a range of internal and external factors that affect their ability to manage cash flows. Analyzing these factors helps understand the challenges faced by firms in maintaining optimal liquidity levels. Below are the key factors affecting liquidity:

1.5.1 Nature of the Sector: Liquidity requirements vary depending on the sector in which the firm operates. For example, sectors with stable cash flows, such as services or public utilities, need less liquidity compared to sectors with high volatility, such as manufacturing or e-commerce (Ross, 2019,

p.48). In industrial sectors, the long production cycle may require holding large quantities of inventory, with a significant portion of capital invested in illiquid assets. (Brealey, 2020, p.116)

1.5.2 Credit Policies: The credit policies followed by the firm directly affect liquidity. Flexible policies, such as granting customers long payment periods, increase accounts receivable, reducing available cash. (Gitman, 2015, p.93) Conversely, strict credit policies may limit annual sales volume, negatively affecting cash inflows to the firm. Therefore, credit policies must balance attracting customers with maintaining an adequate liquidity level. (Van Horne, 2008, p.116)

1.5.3 Economic Conditions: General economic conditions, such as economic recessions or inflation, influence liquidity. For example, during an economic downturn, customers may delay debt repayments, reducing cash inflows. (Brigham, 2020, p.71) On the other hand, during inflationary periods, raw material costs may rise, increasing the need for liquidity to cover operational expenses. (Berk, 2017, p.100)

1.5.4 Inventory Management: Efficient inventory management is a critical factor in determining liquidity levels. Large inventories tie up capital in illiquid assets, reducing available cash. (Brealey, 2020, p.115) For example, firms using "Just-in-Time" inventory management systems are more efficient in freeing up cash compared to those holding large amounts of inventory. (Block, 2019, p.78)

1.5.5 Cost Structure: Whether fixed or variable, the cost structure affects liquidity. Firms with high fixed costs, such as industrial firms, require more liquidity to cover these costs regardless of sales volume. (Ross, 2019, p.50) In contrast, firms with variable costs are more flexible in managing liquidity. (Gitman, 2015, p.94)

1.5.6 Financing Policies: Financing policies play a key role in determining liquidity levels within a firm. A high reliance on short-term loans can exacerbate cash flow pressures due to recurring obligations and interest burdens. (Brigham, 2020, p.72) On the other hand, directing cash surpluses from retained earnings toward funding operations enhances the firm’s ability to maintain stable liquidity levels. (Van Horne, 2008, p.117)

1.5.7 Strategic Management: Strategic management is one of the essential factors affecting liquidity levels in a firm, where resource allocation decisions play a crucial role. For example, directing investments toward long-term projects may reduce available cash, while focusing on short-term projects helps enhance liquidity. (Brealey, 2020, p.116) Additionally, the effectiveness of management in forecasting cash flows and managing the operating cycle is key to improving and maintaining liquidity at acceptable levels. (Keown, 2017, p.90)

1.5.8 Seasonal Fluctuations: Seasonal fluctuations pose a significant challenge to liquidity management, particularly in seasonal sectors like retail. During peak periods, such as holidays, firms require high liquidity to meet the increased demand for inventory. (Ross, 2019, p.51) This highlights the importance of flexible financial planning to ensure adequate liquidity at the right times, reducing the risk of shortfalls and supporting business continuity. (Gitman, 2015, p.95)

2. Financial Leverage: Concept, Calculation, and Impact

2.1 Definition of Financial Leverage:

Financial leverage is defined as the use of debt to finance assets with the aim of maximizing the return on equity. (Brealey, 2020, p.145) In another definition, it is seen as a financial strategy based on borrowing to maximize potential profits, along with an increase in financial risk. (Ross, 2019, p.123) It can also be expressed by measuring the ratio of external financing (debt) to internal financing (equity). (NCERT, 2018, p.248) On the other hand, financial leverage is viewed as a tool to improve

the capital structure and enhance its efficiency; however, it requires close monitoring to avoid negative impacts on the financial stability of the firm. (Van Horne, 2008, p.116)

2.2 How to Calculate Financial Leverage

Financial leverage is measured through several financial indicators, the most important of which are:

2.2.1 Debt to Assets Ratio: (Total Debt ÷ Total Assets) This ratio shows the proportion of the firm's assets financed by debt. (Felix I. Lessambo, 2022, p.239) Its importance lies in assessing the firm's reliance on external financing. A high ratio indicates higher financial risk, while a low ratio reflects greater financial stability for the firm. (Kooli, 2013, p.209)

2.2.2 Debt to Equity Ratio: (Total Debt ÷ Equity) This ratio measures the balance between debt and equity in the capital structure. (Brigham, 2020, p.157) It provides insight into financing risks. A high ratio indicates that the firm relies heavily on debt to finance its investments, which may increase returns on equity but also elevate financial risks. (Brealey, 2020, p.146)

2.2.3 Interest Coverage Ratio: (Earnings Before Interest and Taxes ÷ Interest Expenses) This ratio shows the firm's ability to cover interest expenses with its operating income. It serves as an indicator of the firm's ability to meet its debt obligations. A low ratio signals difficulty in covering interest payments, which increases the risk of financial distress. (Lawrence J. Gitman, 2012, p.77)

3.2 Importance of Financial Leverage

Financial leverage is a highly strategic tool for achieving a range of financial objectives that support the stability of the firm and enhance its competitive capacity. Some of the most prominent of these objectives include:

3.2.1 Financial Risk Assessment: Leverage ratios contribute to measuring the level of risk associated with the firm's debt, where a higher debt-to-equity ratio is an indicator of potential financial distress. (Al-Lahlah, 2006, p.345)

3.2.2 Supporting Financing Decisions: Leverage ratios provide decision-makers with a clearer view of the balance between debt and equity, helping them choose the most suitable financing strategy for their future investments. (Brigham, 2020, p.159)

3.2.3 Signaling to the Market: Leverage ratios serve as indicators used by investors and creditors to assess the financial position of the firm. A higher interest coverage ratio strengthens creditors' confidence and their willingness to finance the firm in the future. (Matar, 2006, pp. 363-364)

3.2.4 Improving Capital Structure: Leverage ratios help determine the optimal distribution between debt and equity, reducing the cost of capital and increasing the firm's market value. (Al-Sahlawi, 2017, p.69)

3.2.5 Compliance with Regulatory Requirements: Certain sectors, such as banking, impose regulatory constraints on leverage ratios to ensure financial stability and mitigate systemic risks. (Brealey, 2020, p.147)

4.2 The Impact of Financial Leverage on Liquidity

Financial leverage directly impacts the liquidity of the firm through the periodic financial obligations it imposes, such as interest expenses and debt repayments, which reduce the available cash. (Brigham, 2020, p.158) However, efficient debt management can contribute to improving cash flows by directing them toward financing profitable and viable projects. (Ross, 2019, p.125) On the other hand, excessive financial leverage exerts additional pressure on liquidity, especially during periods of economic instability, which may increase the likelihood of financial distress. (Gitman, 2015, p.135)

2.4 Risks Associated with Financial Leverage

Despite its potential benefits in enhancing return on equity, financial leverage entails significant risks that may affect the stability and profitability of the firm. Analyzing these risks requires a deep understanding of the financial and operational effects resulting from reliance on debt. Below is an in-depth analysis of the risks associated with financial leverage:

2.4.1 Interest Rate Risks: An increase in financial leverage leads to higher interest expenses, which can negatively impact the net profits realized at the end of the financial year. For example, if interest rates in the market rise, the cost of variable-rate debt increases accordingly, putting additional pressure on cash flows. (Ross, 2019, p.126) This risk becomes more apparent in unstable economic environments, where the firm may struggle to achieve sufficient profits to cover interest expenses. (Brigham, 2020, p.159)

2.4.2 Risk of Financial Distress: High financial leverage increases the likelihood that the firm will be unable to meet its financial obligations, which could lead to financial distress or even bankruptcy. For example, if revenues decline due to an economic recession, the firm may find it difficult to repay the principal debt or interest expenses, which weakens creditors' confidence in the firm. (Brealey, 2020, p.148) Studies indicate that firms with high leverage were more prone to bankruptcy during the 2008-2009 global financial crisis. (Altman, 2006, p.45)

2.4.3 Market Fluctuation Risks: High financial leverage increases the firm's sensitivity to market fluctuations, whether related to changes in demand levels or fluctuations in raw material prices. For instance, in industrial sectors, a decline in demand may lead to reduced cash flows, lowering the firm’s ability to meet its financial obligations. (Ross et al., 2019, p.127) This risk is amplified in highly volatile environments, where cash flows become unstable and difficult to predict. (Van Horne, 2008, p.118)

2.4.4 Agency Costs: Financial leverage is associated with the emergence of agency costs due to conflicts of interest between shareholders and creditors. For example, shareholders may seek to adopt high-risk investments to maximize their returns, even at the expense of creditors' interests, which leads to increased financing costs. (Jensen, 1976, p.308) These costs are often reflected in the form of stricter credit conditions or higher interest rates imposed on loans. (Myers S.C., 1977, p.147)

2.4.5 Loss of Financial Flexibility: Excessive reliance on debt reduces the firm’s financial flexibility, as it is forced to allocate a large portion of its cash flows to servicing debt rather than directing them toward strategic investments that support growth. (Brealey, 2020, p.149) For instance, the firm may be deprived of financing for research and development projects due to its financial obligations, which weakens its long-term competitive ability. (Block, 2019, p.79)

2.4.6 Reputation Risks: High financial leverage poses a threat to the firm’s image in the market, as it may raise concerns about its financial stability and make it vulnerable to losing investors’ and customers’ trust. When signs of financial weakness or the likelihood of default emerge, demand for dealing with the firm may decrease, negatively impacting its market value. (Ross, 1977, p.25) This risk is heightened in sectors that rely primarily on trust, such as the financial services sector. (Gitman, 2015, p.136)

2.4.7 External Risk Factors: The impact of financial leverage is not only limited to the firm’s internal decisions but is also affected by external factors that may exacerbate the risks. Changes in monetary policies, such as raising interest rates by the central bank, lead to higher borrowing costs and add pressure on firms with high debt levels. (Brigham, 2020, p.160) Similarly, regulatory changes, such as imposing restrictions on debt ratios, may force firms to restructure their financial obligations, leading to additional costs. (Brealey, 2020, p.150)

2.4.8 Risks of Over-reliance on Short-term Debt: Financing long-term assets through short-term debt is one of the main financial risks, as it exposes the firm to refinancing risks and the inability to meet its obligations within the appropriate timeframe, especially under tight market conditions. (Van Horne, 2008, p.119) The danger of this approach is further exacerbated during financial crises, when opportunities for short-term financing shrink, potentially leading to severe liquidity crises that threaten the continuity of the firm's operations. (Acharya, 2012, p.3573)

2. Profitability: Concept, Indicators, and Relationship with Liquidity and Financial Leverage

2.1 Definition of Profitability

Profitability is defined as a measure of the firm's efficiency in generating profits from its various resources, whether financial, operational, or human. (Al-Sheikh, 2008, p.41) In another definition, it refers to the ability to create added value through the effective use of assets and capital. (Aql, 2006, p.32) According to this definition, profitability serves as a comprehensive performance indicator, showing how successful the firm is in achieving its financial and strategic goals.

2.2 Profitability Indicators

Profitability is measured through a set of financial ratios, the most important of which are:

2.2.1 Return on Assets (ROA): (Net Profit ÷ Total Assets). This ratio is one of the key indicators for measuring a firm's profitability, as it measures the contribution of each monetary unit invested, regardless of the period of use, in achieving operational results. It also helps evaluate whether the firm is generating a higher return on invested capital compared to the interest paid. (NCERT, 2018, p.266)

2.2.2 Return on Equity (ROE): (Net Profit ÷ Equity). This ratio measures the contribution of each unit of invested equity in generating the net result of the firm. (Lessambo, 2020, p.345)

2.2.3 Net Profit Margin: (Net Profit ÷ Sales). This ratio measures the amount of net profit the firm generates from each monetary unit of sales after covering all expenses and costs associated with the firm's ongoing operations, whether related to regular business activities or not, making it a comprehensive measure of profitability. (Lessambo, 2020, p.341)

3.2 Analyzing the Relationship Between Profitability, Liquidity, and Financial Leverage

3.2.1 Relationship Between Liquidity and Profitability

Liquidity is a fundamental factor in determining the level of a firm's profitability, as it can either positively or negatively impact profitability, necessitating a balanced management approach to ensure optimal results.

- **Positive Impact:** Adequate liquidity provides a guarantee for the continuity of the firm's operational processes, enhancing profit stability and improving profitability indicators such as Return on Assets (ROA) and Return on Equity (ROE). Liquidity reduces financial risks and allows the firm to focus on achieving its strategic objectives. (Brigham, 2020, p.203) For example, liquidity enables the firm to cover emergency obligations, reducing the likelihood of a default. (Ross, 2019, p.169)
- **Negative Impact:** Excessive liquidity increases the opportunity cost, as cash is retained rather than invested in profitable projects, reducing the return on assets. (Gitman, 2015, p.180)
- **Balance:** To achieve optimal profitability, the firm must maintain a balanced level of liquidity that ensures obligations are covered without hindering investment opportunities or wasting resources. This requires a well-planned financial strategy that balances operational needs and the firm's ability to expand investments. (Brealey, 2020, p.190)

3.2.2 Financial Leverage and Profitability

Financial leverage is a key strategic tool for improving profitability, with its positive or negative impact heavily depending on its management and the financial planning of its levels.

- **Positive Impact:** Financial leverage can enhance Return on Equity by financing profitable projects with low-cost debt, especially when the return on investments exceeds the cost of interest. (Brealey, 2020, p.191) For example, debt enables the firm to expand into new markets, increasing revenue and improving its financial performance. (Brigham, 2020, p.204)
- **Negative Impact:** High financial leverage can increase interest costs and financial risks due to the rising cost of interest on Return on Assets (ROA), which may limit profits and negatively impact Return on Equity in unfavorable economic conditions. (Van Horne, 2008, p.120)
- **Balance:** Achieving high profitability requires careful management of financial leverage, where the cost of debt remains lower than the return generated on investments. This necessitates a well-thought-out financial plan that balances risks and opportunities. (Block, 2019, p.80)

3.2.3 Interaction Between Liquidity and Financial Leverage

High liquidity mitigates the risks associated with financial leverage by allowing the firm to service interest payments and debt without pressure. (Berk, 2017, p.101) In contrast, high financial leverage combined with low liquidity can lead to financial crises, as the firm becomes unable to meet its financial obligations on time. (Van Horne, 2008, p.121) A balance between liquidity and financial leverage enhances profitability by ensuring financial stability and efficiently financing profitable projects. (Ross, 2019, p.171)

4. Analyzing the Interactive Relationships Between the Study Variables

The relationship between liquidity, financial leverage, and profitability is interactive and complex. Many studies indicate that high liquidity reduces the risks associated with financial leverage by providing the ability to meet obligations, thus enhancing profitability. (Myers S.C., 1984, p.576) However, excessive liquidity may reduce return on assets due to opportunity costs. On the other hand, financial leverage can enhance profitability if the return on debt-financed investments exceeds the cost of interest, but it may lead to performance deterioration in cases of excessive debt financing. (Jensen M.C., 1986, p.323)

Theoretically, the Trade-off Theory suggests that firms aim to achieve an optimal balance between the returns on debt, such as tax shields that reduce tax burdens and increase tax savings, and its costs, such as financial distress risks and higher borrowing costs. (Brealey, 2020, p.193) Conversely, the Pecking Order Theory emphasizes that firms prefer relying on internal financing, such as retaining liquidity, before resorting to external financing, such as debt or issuing shares, to reduce financing costs and associated complexities. (Myers S.C., 1984, p.187) Consequently, maximizing profitability is linked to an integrated management approach for liquidity and financial leverage, maintaining sufficient liquidity to cover emergency obligations without wasting resources, and using financial leverage smartly to maximize returns while minimizing financial risks, considering the economic and sectoral conditions that affect financing and investment decisions. (Ross, 2019, p.174)

i. Empirical Study:

1. Study Methodology:

Financial data were collected from 9 economic institutions operating in the pasteurized milk production and distribution sector in Algeria during the period from Q1 2015 to Q4 2022. The independent variables include the cash liquidity ratio (LIQ) and the debt-to-equity ratio (LEV). The dependent variable is Return on Equity (ROE). A multiple regression model was used as follows:

$$ROE=\beta 0+\beta 1LIQ+\beta 2LEV+\epsilon$$

To estimate the parameters of the studied model, we will use EViews 13 software and apply the Quantile Regression (QREG) method, which is considered one of the best estimation methods for time series data with cross-sectional data at a quarterly frequency. Therefore, we will use cross-sectional time series models with quarterly observations for nine firms operating in the milk production sector in Algeria (NT = 849), which equals 288 observations.

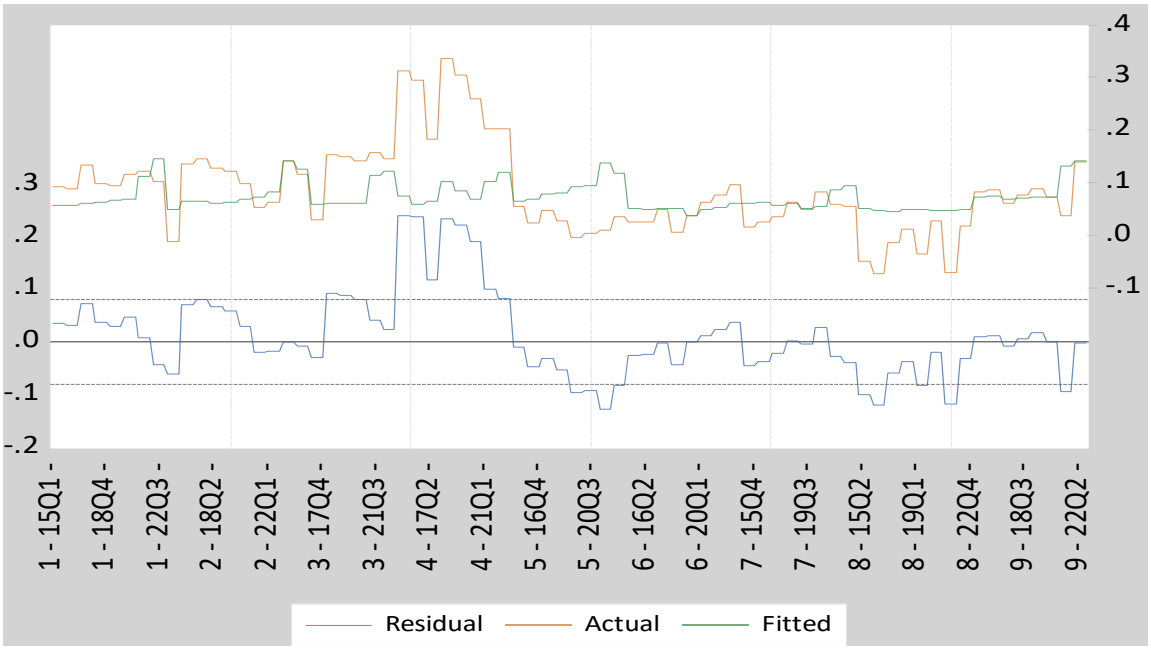
1. Model Quality Test

It is necessary to ensure the quality of the model's performance by using the following tests:

1.2 Model Quality:

To study the quality of the model, we must compare the actual values with the estimated ones, as shown in the following figure:

Figure 2: Actual and Estimated Values and Residuals.



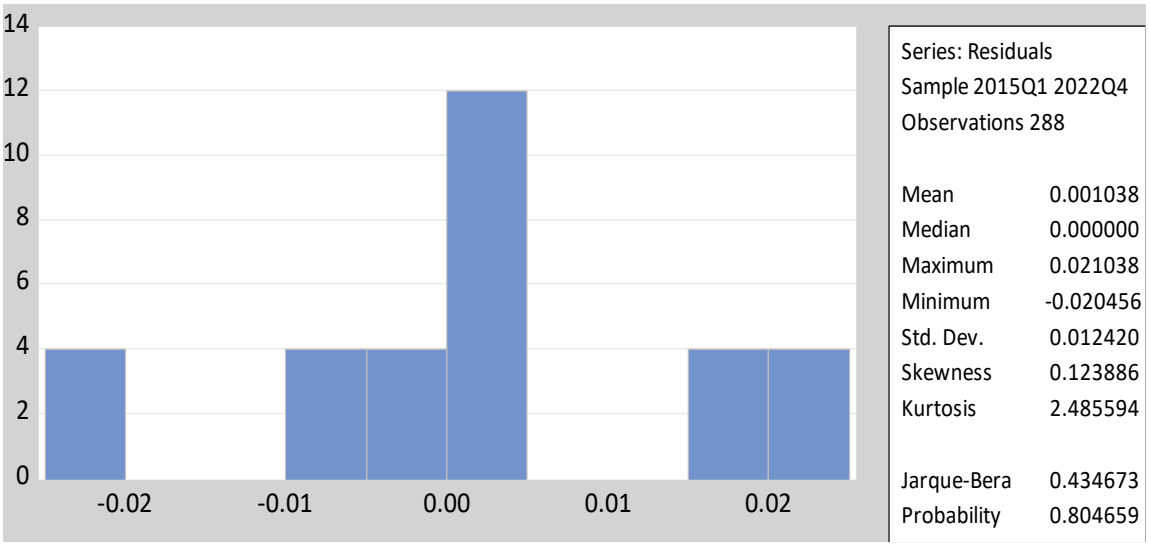
Source: EViews 13 Outputs

From the figure, we observe that the estimated values closely match the actual values, indicating the quality of the estimated model. Therefore, the model can be relied upon to interpret and analyze the results.

2.2 Normal Distribution of Residuals:

To verify the assumption of normal distribution, we use the Jarque-Bera test. The test result was found to be insignificant ($\alpha > 0.05$), which supports the assumption that the residuals follow a normal distribution. The J-B value of 0.43 is less than $\chi^2 = 5.99$, confirming that the residuals of the model follow a normal distribution, as shown in the following figure:

Figure 3: Normal Distribution of Residuals



Source: EViews 13 Outputs.

3.2 Autocorrelation Test of Errors:

To ensure that there is no autocorrelation, we resort to autocorrelation tests, as shown in the following table:

Table 6: Results of the Autocorrelation Test of Errors

Date: 11/21/25 Time: 00:09
Sample: 2015Q1 2022Q4
Included observations: 288

Autocorrelation	Partial Correlation		AC	PAC	Q-Stat	Prob*
		1	0.912	0.912	241.84	0.000
		2	0.823	-0.046	439.74	0.000
		3	0.735	-0.048	597.98	0.000
		4	0.646	-0.051	720.87	0.000
		5	0.602	0.208	827.80	0.000
		6	0.557	-0.033	919.81	0.000
		7	0.513	-0.035	998.00	0.000
		8	0.468	-0.036	1063.4	0.000
		9	0.466	0.297	1128.6	0.000
		10	0.465	-0.019	1193.4	0.000
		11	0.463	-0.020	1258.0	0.000
		12	0.461	-0.020	1322.2	0.000
		13	0.430	-0.023	1378.5	0.000
		14	0.400	-0.021	1427.2	0.000
		15	0.369	-0.022	1469.0	0.000
		16	0.339	-0.022	1504.3	0.000

*Probabilities may not be valid for this equation specification.

Source: EViews 13 Outputs.

From the table, we observe that the significance levels for Q-Stat were greater than 0.05, and thus, we accept the null hypothesis of no autocorrelation.

1. Analysis of the Quantile Model Estimation Results for Value at Risk

The parameters of the studied model were estimated using the quantile model for panel data, and the results are as follows:

Table 07: Results of the Quantile Model Estimation (Quarterly)

Dependent Variable: ROE
Method: Quantile Regression (Median)
Date: 11/20/25 Time: 23:59
Sample: 2015Q1 2022Q4
Included observations: 288
Huber Sandwich Standard Errors & Covariance
Sparsity method: Kernel (Epanechnikov) using residuals
Bandwidth method: Hall-Sheather, bw=0.14712
Estimation successfully identifies unique optimal solution

Variable	Coefficient	Std. Error	t-Statistic	Prob.
LIQ	0.027110	0.004428	6.122974	0.0000
LEV	-0.000237	0.000388	-0.611791	0.5412
C	0.029556	0.008728	3.386436	0.0008

Pseudo R-squared	0.078935	Mean dependent var	0.084619
Adjusted R-squared	0.072472	S.D. dependent var	0.083938
S.E. of regression	0.081340	Objective	8.280058
Quantile dependent var	0.072119	Restr. objective	8.989660
Sparsity	0.153692	Quasi-LR statistic	36.93635
Prob(Quasi-LR stat)	0.000000		

Source: EViews 13 Outputs.

From Table 07, we observe the following:

The R^2 value was 0.0789, which confirms that 7.89% of the changes in the return on equity (ROE) can be explained by the independent variables, meaning that only a limited portion of the changes in financial returns can be explained by the studied financial indicators. This highlights the importance of liquidity compared to the limited effect of financial leverage. The logical explanation for this result is the sensitivity of the dairy sector in Algeria to market fluctuations and the need for continuous liquidity, more than the need for debt financing. This is confirmed by the model estimation results, which are outlined as follows:

- The liquidity coefficient showed a positive value and strong statistical significance (0.0271, with a probability of 0.0000), confirming a statistically significant positive relationship between liquidity and the profitability of firms measured by return on equity (ROE). In practice, adequate liquidity enables firms to meet immediate obligations and avoid supply and production issues, which are crucial factors in the dairy sector, requiring flexibility and quick response to changes in supply and demand. Although some studies note that higher liquidity

might lead to inefficient resource use due to the opportunity cost, the Algerian institutional reality confirms that the need for immediate liquidity outweighs the consideration of alternative costs due to the nature of the sector and its sensitivity to crises. Therefore, the statistical results support the first hypothesis and confirm its validity.

- The financial leverage coefficient was -0.000237, indicating a slight negative signal, but more importantly, its statistical significance was extremely low (probability 0.5412), meaning that financial leverage has no significant effect on profitability in the studied sample. This is due to the policies of local industrial sectors, which prefer self-financing or government-supported financing over borrowing, in addition to the volatility of milk prices and market regulation, which makes debt financing have a limited effect on the profitability of firms. This confirms the invalidity of the second hypothesis.
- The statistical results did not show a significant effect of the interaction between liquidity and financial leverage on profitability. This means that high liquidity did not substantially mitigate any negative effect of financial leverage (since financial leverage itself was statistically insignificant). However, theoretically, it is known that high liquidity can reduce debt risks and enhance the ability to withstand its negative impacts, especially in sensitive sectors such as dairy. In light of the results, liquidity remains the primary driver of profitability. In contrast, the effect of financial leverage remains limited and statistically insignificant within the current environment of the studied firms. This does not support the third hypothesis.

Conclusion:

The study results showed a strong positive and statistically significant impact of liquidity on the profitability of economic firms active in the pasteurized milk production sector in Algeria. The liquidity coefficient was positive and highly significant, reflecting the importance of liquidity in ensuring the continuity of production and meeting short-term obligations.

In contrast, financial leverage had no significant or positive effect on profitability, as the financial leverage coefficient showed weak and negative significance, confirming the limited relationship between debt and improving performance in the studied sector.

The strength of liquidity's impact is due to the sector's sensitivity to market fluctuations and the need to ensure continuous and regular financing for production requirements. Meanwhile, firm managers in Algeria prefer self-financing or government-backed financing over borrowing to avoid risks. In this context, effective liquidity management becomes a fundamental pillar to ensure profitability and sustainability, as opposed to a cautious and ineffective debt policy in enhancing returns.

These results suggest that investing in liquidity enhancement is the optimal choice for firms to achieve satisfactory financial results and continuity in the dairy sector. Therefore, increasing profitability is linked to the availability of cash rather than financial leverage, emphasizing the priority of liquidity in the current Algerian market conditions.

Bibliography

1. Juan-Pedro & Gómez Antonio De Vito. (2020). Estimating the COVID-19 cash crunch: Global evidence and policy. Journal of Accounting and Public Policy, (2) 39, 346-356.
2. A. J., Martin, J. D., & Petty, J. W. Keown. (2017). Foundations of Finance. USA: Pearson Education.

3. Chad J. Zutter Lawrence J. Gitman. (2012). Managerial Finance, The Prentice Hall series in finance. USA: Prentice Hall.
4. Charles H. Gibson. (2011). Financial Reporting & Analysis. USA: South-Western Cengage Learning.
5. E. F., & Ehrhardt, M. C. Brigham. (2020). Financial Management: Theory & Practice. USA: Cengage Learning.
6. E. I., & Hotchkiss, E. Altman. (2006). Corporate Financial Distress and Bankruptcy. USA: Wiley.
7. Felix I. Lessambo. (2020). Financial Statements Analysis, Reporting and Valuation. Switzerland: Springer Nature.
8. J. C., & Wachowicz, J. M. Van Horne. (2008). Fundamentals of Financial Management. USA: Pearson Education.
9. J., & DeMarzo, P. Berk. (2017). Corporate Finance. USA: Pearson Education.
10. L. J, & Zutter, C. J Gitman. (2015). Principles of Managerial Finance. USA: Pearson Education.
11. M. C. Jensen. (May, 1986). Agency costs of free cash flow, corporate finance, and takeovers. The American Economic Review, 76 (2), 323-329.
12. M. C., & Meckling, W. H. Jensen. (October 1976). Theory of the firm: Managerial behavior, agency costs, and ownership structure. Journal of Financial Economics, 3 (4), 305-360.
13. Maher Kooli. (2013). Finance d'entreprise. Canada: Chenelière Éducation inc.
14. National Council of Educational Research and Training- NCERT. (2018). Accountancy: Company Accounts and Analysis of Financial Statements. India: NCERT.
15. R. A., Myers, S. C., & Allen, F. e. Brealey. (2020). Principles of Corporate Finance. USA: McGraw-Hill Education.
16. S. A., Westerfield, R. W., & Jordan, B. D. Ross. (2019). Fundamentals of Corporate Finance. USA: McGraw-Hill Education.
17. S. B., Hirt, G. A., & Danielsen, B. R Block. (2019). Foundations of Financial Management. USA: McGraw-Hill Education.
18. S. C. Myers. (1 November, 1977). Determinants of corporate borrowing. Journal of Financial Economics, 5 (2), 147-175.
19. S. C., & Majluf, N. S. Myers. (June, 1984). Corporate financing and investment decisions when firms have information that investors do not have. Journal of Financial Economics, 13 (12), 187-221.
20. S.A. Ross. (1977). The Determination of Financial Structure: The Incentive-Signalling Approach. Bell Journal of Economics, 8 (1), 23-40.
21. V. V., Davydenko, S. A., & Strebulaev, I. A. Acharya. (6 April, 2012). Cash holdings and credit risk. Review of Financial Studies, 25 (10), 3572-3609.
22. W. Steve Albrecht .(2008) .*Financial Accounting* .USA :Thomson South-Western.
23. Jamal El-Din Al-Marsi & Ahmed Abdullah Al-Lahlah. (2006). Financial Management: A Decision-Making Approach. Egypt: Dar Al-Jami'ah.
24. Hamza Mahmoud Al-Zubaidi. (2008). Advanced Financial Management. Jordan: Al-Waraq Publishing and Distribution Foundation.
25. Abdul Halim Krajeh. (2006). Financial Management and Analysis. Jordan: Dar Safa.

26. Abdul Sattar Mustafa Al-Siyah & Saud Jade Mashkour Al-Omari. (2007). Financial Management: Theoretical Frameworks and Practical Cases. Jordan: Dar Wa'il Publishing.
27. Abdul Qader Mohammed Ahmed Abdullah & Khaled bin Abdul Aziz Al-Sahlawi. (2017). Financial Management. Saudi Arabia: Al-Sarwat Printing Press.
28. Adnan Tayeh Al-Naimi. (2009). Financial Management: Theory and Application. Jordan: Dar Al-Masira.
29. Fayyad Salim Al-Haddad. (2009). Financial Management. Jordan: Dar Hamed.
30. Fahmy Mustafa Al-Sheikh. (2008). Financial Analysis. Palestine: Financial Inc.
31. Mohammed Matar. (2006). Credit Financial Analysis. Jordan: Dar Wa'il Publishing.

Mufleh Mohammed Aql. (2006). Introduction to Financial Management and Financial Analysis. Jordan: Arab Society for Publishing and Distribution