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DYNAMIC PANEL INVESTIGATION OF CORPORATE CASH HOLDINGS AND THEIR FINANCIAL OPERATIONAL AND GOVERNANCE DETERMINANTS IN VIETNAMESE RETAIL FIRMS

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SUMMARY

The study seeks to identify the joint effect of financial, operating, and governance features on the cash levels of retail firms listed in Vietnam. Instead of viewing the cash policy as a one-time decision that determines the cash balance, we model the cash level as a dynamic process where the current level is a function of past periods' cash level and speed of adjustments towards a target value. To test hypotheses empirically, we use a balanced panel of 38 listed retail firms in HOSE, HNX, and UPCOM from the period of 2020 to 2025, comprising 228 firm-year observations collected from their financial statements and official disclosures. The main equation is estimated with two-step system GMM approach, which takes into account Windmeijer-corrected standard errors, collapsed instruments, and limited lag depth to control for endogeneity. The coefficients imply considerable persistence in cash policies: the coefficient on lagged cash balance is 0.401, meaning that the annual adjustment speed is about 59.9%. Leverage, non-cash net working capital, ownership concentration, and dividends paid lower the cash balance, while profitability, growth in sales, days of inventories, volatility of cash flows, digitization, and independence of the board positively influence the cash balance. In an economic sense, the days of inventories, leverage, digitization, and cash flow volatility are the most influential variables for the long-run balance of cash. The study suggests the existence of cash management policy with target ranges per business segments, integration of the forecast by treasury with sales and inventories in real time, and governance in the process of using excess liquidity.

Key words: *cash holdings, retail firms, system GMM, working capital, corporate governance, digital transformation.*

JEL classification: *C23, G30, G32, G34, L81.*

INTRODUCTION

Cash is the most liquid asset on a company's balance sheet, but it is also the one that earns the lowest amount of money. Thus, the choice about the right amount of cash to hold is not only a liquidity issue but also a capital allocation issue. Too little cash can lead to a disruption in payments, inability of the firm to make purchases, need for additional borrowing, and the sale of assets under bad conditions. However, too much cash is a lost opportunity, reduces asset efficiency, and increases the ability of the management to invest in uncontrolled projects.

Corporate cash-holding activities offer valuable information regarding the drivers of liquidity decisions through various financial, organizational, and governance considerations, especially in developing countries like Vietnam. Institutional quality has been identified to influence the decision of corporations to hold cash through its impact on financing options, investor protection, and the overall operating environment [1]. Ownership structures form key governance elements since different ownership structures can influence management incentives and corporate cash management decisions in emerging firms [2]. The effect of financial leverage on cash holding is characterized by nonlinearity for Vietnamese firms, which implies that the impact of debt on cash reserves varies based on the level of firm leverage [3]. Cash-holding needs are also determined by financial distress and life-cycle stages since firms alter their liquidity reserves based on changes in their financial status and operations [4]. Payout policy, government ownership, and financial constraints impact corporate financial decisions, indicating the role of ownership and financial constraints in influencing liquidity availability [5].

In terms of cash management for the company, it is more complicated for retailers than other manufacturing businesses. High-frequency cash flow from sales does not always ensure that the company is always financially comfortable since the retailers have to invest in inventories, real estate, workforce compensation, logistics, advertising and marketing campaigns prior to receiving back the invested amount of money. In addition, pronounced seasonality, cycle of inventories, markdowns and obsolescence of goods, supplier relationships, together with omnichannel retailing, add to the cash flows volatility, as the latter requires investment into technology infrastructure.

There are no places more suitable to discuss the matter than Vietnam. It is the fast change of the retail environment of the country, along with the growth of e-commerce and digital payments, that have resulted in a shift in the way businesses organize their inventory management, revenue collection, and use their working capital. On top of that, the retail firms that are listed face the conditions that change regarding financing, disruption of supply chains, and changes in consumer demands. Corporate ownership becomes especially crucial in such an environment since the foreign and state ownership can impact the business decisions regarding holding cash, particularly in the period of uncertainty [6].

Other notable factors include that firms slowly adapt their cash levels in the light of changing risks and financing environments. Research into the speed of cash adjustment shows that external uncertainty such as climate risk can affect the speed of adjustment of firms towards their optimal cash levels [7]. The idea of adjustment is especially relevant for retailers due to factors such as inventory decisions, payments to suppliers, seasonal spending, and investments which make it difficult for them to make adjustments immediately.

Other factors that describe the governance structure also help to explain the differences in cash balance of companies. The composition of the board may impact the effectiveness of the board's monitoring, conservatism in finance, and management decisions related to holding of cash balances. Studies carried out in Vietnam have found that gender of board members influences the pattern of holding of cash balance [8]. This implies that governance factors need to be included along with traditional financial measures when analyzing cash policies of listed retail firms.

The other reason why financial and operational circumstances matter equally well is because of the linkage between liquidity management and the capital structure of organizations and their performances. As reported in research work conducted on listed non-financial organizations in Vietnam, there is a connection between liquidity and capital structure and financial performances [9]. For retail

organizations, this aspect might be especially relevant since considerable amount of cash is constantly being invested in inventories and short-term operations. Having too little or too much cash might affect their performances negatively.

There is also the issue of the capacity of the managers in terms of managing corporate cash efficiently. Having cash balances does not guarantee value creation for the business since the extent of value creation is a function of how the managers manage the financial resources at their disposal. There are some studies that have tried to look into firm value and the presence of cash in firms, and their findings suggest that there is the issue of managerial ability in determining value creation from the cash [10].

However, despite all this progress, the financial, operational, and governance factors are considered independently, which does not offer a comprehensive view of cash management practices in the retail industry. One more methodological issue is that cash on hand of companies is persistent and cannot always be instantly changed due to financial, investment, operating needs, and adjustment costs. Thus, static panel model might fail to account for the dynamics of corporate cash policy. In addition, including the lagged cash balance in a small fixed effects panel will lead to Nickell bias, and leverage, profitability, growth, and other related variables may be endogenous due to bidirectional causality. The GMM system offers an adequate approach to tackle all these problems, as long as the instruments are used in moderation.

Against this backdrop, this study focuses on the combined influence of financial, operational, and governance features on the level of cash reserves in the listed Vietnamese retail firms. Cash management policy is considered to be a dynamic adjustment approach and not a static balance sheet decision. This study considers a panel data set for 38 listed retail firms for the period of 2020-2025 to estimate the speed of adjustment of firms towards their optimal levels of cash reserves. In this paper, two-step system GMM will be considered the main dynamic estimator approach, whereas pooled OLS, firm-fixed effect model and panel quantile regressions will serve as complementary methods.

Key Contribution

- An Integrated Dynamic Retail Cash Holding Framework (IDRCHF) is constructed. This framework enhances the classical theory of financial constraints, the pecking order theory, the agency theory, and the precautionary theory by integrating financial capacity, retail operational liquidity stress, corporate governance discipline, and cash adjustment.
- The integration does not simply mean bringing together the existing theories but identifying the operation of inventory life span and digitalization as operational mechanisms of how retail conditions affect the target liquidity level.
- The research examines the dynamics of this framework through estimation of the adjustment rate and differentiation between short run and long run effects on the cash level of the firm.
- System GMM and quantile analysis are integrated in order to examine whether the effect of financial, operational, and governance mechanisms differs for low, medium, and high cash firms.

The remainder of the article is organized as follows. Section 2 develops the theoretical framework and hypotheses. Section 3 describes the data, variables, and estimation strategy. Section 4 presents the results and robustness analysis. Section 5 discusses the findings in relation to corporate-finance theory. Section 6 sets out managerial and policy implications. Section 7 concludes.

THEORETICAL FRAMEWORK AND HYPOTHESIS DEVELOPMENT

Theories of Corporate Cash Holdings

According to the trade-off theory, the companies will establish a proper target level of cash flows through the comparison of the marginal benefits of liquidity against its cost. The benefits could be lower transaction costs, insurance against unexpected problems in liquidity, and the opportunity to proceed with investments despite expensive and difficult-to-obtain outside funding. Excess liquidity, in turn, could have negative consequences, such as losses due to inefficient cash flows usage, financial

inefficiency, and agency costs. Institutional factors might also affect this relationship because corruption and unsatisfactory business environment can influence the decision regarding cash flows and its effects [11]. For retail business, in particular, liquidity benefits may appear more significant in situations of uncertain goods demand, poor turnovers, and supplier reliance.

Pecking-order theory highlights the information asymmetry between the firm and the outside capital market. Firms tend to rely on internally generated funds first, then debt, and equity comes last when other sources of financing become inadequate. Cash thus serves as internally generated money that is immediately available for use without high costs of information. It has been recently found out that intellectual capital can also affect the cash-holding behavior of a corporation by affecting its financial capabilities and decisions for sustainable resource management [12]. In this regard, profitable retail companies are able to keep more cash because of the generation of internal money, and companies with plenty of growth opportunities should retain liquidity in order to minimize reliance on external financing.

According to agency theory, there are opposing views concerning the holding of cash by corporations. Good corporate governance reduces excess cash because of the reduced ability of managers to hoard financial assets due to personal gains or inefficiency. Nevertheless, good corporate governance may allow for the maintenance of higher levels of cash balance when the owners feel certain that the managers will use such financial assets in the proper way. The empirical literature suggests that corporate governance and ownership structures can influence the association between cash holdings and financial performance [13]. Such an association is especially important in corporations with concentration of ownership.

The precautionary motive adds an element of uncertainty into the above theoretical framework when explaining the firm's liquidity behavior. Uncertainty regarding cash flows, risks related to one's industry, economic uncertainty, government uncertainties, and problems with supply chain increase the chances of funding problems and hence the benefits of having a liquidity cushion. It has been empirically observed that macroeconomic variables affect not only the corporate level cash balance but also the adjustment speed towards the target level of cash balances [14]. The dynamic approach becomes particularly important for the retail sector since factors such as inflation rates, interest rate, demand fluctuation, supplier-related problems, and changes in inventory cost may change the financing needs quickly.

The financial costs of cash holdings provide additional support for the notion that the effect of liquidity should not necessarily be viewed as either positive or negative but will depend on whether cash is appropriate given the operating needs, investment opportunities, financing limitations, and institutional environment of the firms. As empirical studies of different firms show, the level of cash holdings is strongly related to firm performance and this association varies depending on the institutional and financial features of the firms [15]. It is clear from the above considerations that the theories imply that cash holdings in the firms emerge because of the need to finance certain activities, take precautions, make decisions based on governance, face operational uncertainties, and move towards optimal levels of liquidity.

An Integrated Dynamic Retail Cash-Holding Framework

While current theories describe distinct yet complimentary aspects of corporate cash balances, trade-off theory describes the relationship between benefits from liquidity and costs of holding them, pecking order describes a tendency to utilize internally generated liquidity in case external sources are characterized by information asymmetry and financing problems, while agency theory describes the role of governance practices in the formation of corporate decisions regarding liquidity. However, all these theories offer partial explanations of cash balances as do not take into account the impact of changing financial and economic situation on these decisions [16]. Economic policy uncertainty and financial development affect the sensitivity of corporate cash balances to internally generated cash flow, proving the fact that liquidity decisions are dependent on the relationship between internal financial strength and external financing environment. This issue is especially important for retail companies due to additional financing conditions and inventory decisions.

Apart from that, the liquidity policies made by firms become more and more influenced by strategic investments and business transformation. Research shows that sustainable innovations may have a great effect on the cash balances of corporations because innovations have some financial requirements and influence the motivation of corporations to maintain internal liquidity [17]. Digitalization of retail firms also implies some financial requirements because digital investments are costly projects. Thus, the proposed approach sees digitalization investment as an operational liquidity driver rather than just some general characteristic of a corporation.

Governance is another important link between financing and cash management policy in companies. Corporate governance can impact not only the volume of cash held in companies but also the degree to which liquidity can contribute to the performance of the company [18]. Therefore, board independence, ownership structure, and dividend policy can have an effect on managerial freedom in retaining cash and determining whether the level of liquidity is kept to be used for productive purposes or it is accumulated excessively. The relevance of this link is especially high for retail companies since managerial decisions are made constantly regarding various aspects of working capital.

Operating and external resource environment can also lead to heterogeneous cash requirements among firms. Studies showing that renewable energy consumption and non-renewable energy consumption can have different impacts on cash balances of firms show that variations in operating-resource demands need not always result in homogenous cash demands [19]. The above example underscores the importance of accounting for operating considerations in cash management models. In the field of retailing, the holding period for inventories, cash flow risk, logistics expenses, digitization, and other operating considerations might cause diverse cash needs despite having comparable financial characteristics among businesses.

Expanding on the previous discussion, IDRCHF proposes a model involving four interconnected mechanisms: financial capability, liquidity pressure of the business, governance discipline, and dynamic adjustment. Financial capability denotes the firm's capability and motivation for creating and substituting liquidity in terms of size, leverage, profitability, growth opportunities, and non-cash working capital. Liquidity pressure of operations is defined as retail-specific cash requirements due to inventory duration, cash flow uncertainty, and digitalization investments. Governance discipline refers to constraints and incentives for holding and using liquidity as posed by the independence of the board of directors, ownership structure, and dividend policy. Dynamic adjustment brings the above mechanisms together over time by recognizing the fact that current cash levels are influenced by prior cash balances and the process of gradual convergence towards the target level of liquidity. The importance of taking a dynamic approach in this context is corroborated by some recent applications of dynamic panel data models in analyzing the relationship between governance variables and financial stability [20].

Therefore, the novelty of the IDRCHF from a theoretical perspective does not consist in the substitution of existing corporate finance theories, but rather in its ability to integrate the mechanisms of these theories with retail specific operational circumstances and dynamic adjustments in one single model. In contrast to the traditional approach, which mainly views cash balances as a function of financial ratios, the IDRCHF model explicitly accounts for the fact that the financial capability sets the amount of capital that can be used for liquidity provision, the pressure of operational liquidity sets the demand for liquidity, the governance discipline dictates whether the liquidity can be preserved and applied and the dynamics set the pace of moving towards the target cash level. The inventory period and digitalization mechanisms are explicitly included in the IDRCHF as mechanisms translating retail operational conditions into liquidity needs, while the governance features dictate whether the resultant liquidity buffers are preserved and applied.

Financial Determinants

Firm size, big organizations tend to have more bank funding opportunities, more diversified cash flows, and low per unit cost of financing. According to the tradeoff theory, these factors minimize the necessity

for precautionary cash. Despite the fact that big organizations tend to maintain more cash, their cash/assets ratio is normally lower.

Hypothesis H1: Firm Size is Negatively Associated with the Cash Ratio.

Financial leverage. Debt may serve as an alternative for cash where there are lending arrangements and reliable sources of funding from outside the company. Interest and principal payments on debt may also consume internally generated liquidity. Financial distress risk may raise precautionary demand for liquidity due to leverage effect, but the study anticipates that substitution and debt servicing effects will prevail.

Hypothesis H2: Financial Leverage is Negatively Associated with the Cash Ratio.

Profitability. With pecking order, profits of companies translate to the creation of internal financing and cash is accumulated faster. In the case of retail, profitability will help companies finance the purchase of supplies and expansion of stores without going for external funding.

Hypothesis H3: Profitability is Positively Associated with the Cash Ratio.

Sales growth. The need for working capital, facilities, marketing, and technology becomes more pressing as a result of growth. Companies with good growth prospects are likely to keep cash because need the freedom to invest without having to rely on external financing.

Hypothesis H4: Sales Growth is Positively Associated with the Cash Ratio.

Non-cash net working capital. Receivables and inventories may be sold for cash or used as collateral for short-term financing. For that reason, serve, in some capacity, as liquid alternatives to cash balances.

Hypothesis H5: Non-cash Net Working Capital is Negatively Associated with the Cash Ratio.

Operational Determinants

Days inventory outstanding. Inventory management forms the heart of retail business strategy. Increased time spent on inventory leads to increased tying-up of capital, higher storage costs, and chances of markdown and obsolescence. It is thus likely that companies will require more capital for paying their suppliers until the goods become sales income.

Hypothesis H6: Days Inventory Outstanding is Positively Associated with the Cash Ratio.

Cash-flow volatility. Volatile operating cash flows increase both the probability of a liquidity deficit and the cost of emergency financing. The precautionary motive therefore predicts a larger cash buffer.

Hypothesis H7: Cash-Flow Volatility is Positively Associated with the Cash Ratio.

Digitalisation intensity. Digitalization can act both ways. Databases and electronic transactions will help forecast and collect money faster and in smaller amounts. At the same time, switching to omnichannel retailing will necessitate continued investment into the platform, warehousing, security, data and logistics, along with the uncertainty of a new business model. During the initial phase of transformation, the investment and flexibility effects are expected to prevail.

Hypothesis H8: Digitalisation Intensity is Positively Associated with the Cash Ratio.

Research Gap

There are still many gaps in the current research on corporate cash holdings. The majority of the previous literature tends to investigate the financial, ownership, governance, institutional, or uncertainty determinants separately without much knowledge about the interrelationship between them and the

unique operating environment of the retail companies. Specifically, the retail-related factors, including inventory period, cash flow risk, and digital intensity have not been investigated adequately together with the traditional determinants. Additionally, there is a lack of research focused on the listed Vietnamese retail companies, which experience fast digitalization, changing consumer preferences, high working capital management, and supply chain uncertainty. With regard to methodology, most of the previous research focuses on the static relationships while corporate cash holdings are persistent and the firm cannot reach its optimal cash quickly. There is thus a necessity to establish a comprehensive dynamic framework to investigate the financial capacity, operational liquidity pressure, governance, gradual cash adjustment, and the issue of endogeneity and heterogeneity at different cash holding levels.

Governance Determinants

Board independence. Independent directors can play a role in improving monitoring, information quality, and discipline with regard to capital allocation. Under credible monitoring, companies can keep a strategic reserve of liquidity without raising any issues regarding agency problems.

Hypothesis H9: Board independence is positively associated with the cash ratio.

Ownership Concentration. Concentrated ownership may strengthen monitoring and reduce the need to retain excessive cash. Large shareholders usually have better access to information and greater ability to press for investment, debt repayment, or distribution. Under the maintained assumption that the monitoring channel dominates, the expected effect is negative.

Hypothesis H10: Ownership concentration is negatively associated with the cash ratio.

Dividend payout. Cash dividends directly reduce retained liquidity and can serve as a commitment mechanism that limits free cash flow. Firms that sustain a high payout ratio are therefore expected to preserve a smaller cash buffer, other things equal in figure 1.

Hypothesis H11: Dividend payout is negatively associated with the cash ratio.

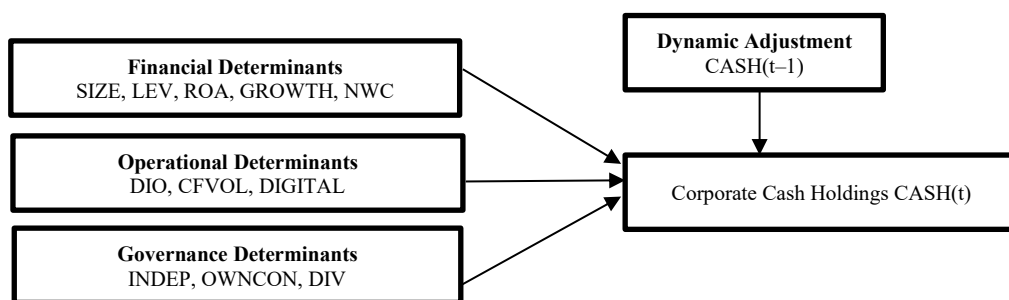


Figure 1. Proposed conceptual framework

Note: Arrows indicate the expected effects of the three groups of determinants and the dynamic adjustment mechanism from $CASH(t-1)$ to $CASH(t)$.

DATA AND RESEARCH METHODS

Data and Sample Selection

The research design used in this study is a quantitative panel design that analyzes the financial, operational, and governance determinants of cash holdings using firm-level panel data. This type of research design is ideal since it enables consideration of cross-section differences as well as changes in the behavior of the retail firms over time. The dynamic element in corporate liquidity is captured through the inclusion of the lagged cash holding variable, which enables the estimation of the persistence and adjustment rates of cash management policies.

The empirical sample includes 38 retail enterprises that are continuously traded on the HOSE, HNX, or UPCOM from 2020 to 2025. The selection of companies has been done on the basis of the consistency between the activities of firms and retail-oriented VSIC classifications and availability of adequate data on all variables specified in the empirical framework. Banks, financial institutions, insurance firms, real estate developers, manufacturers, and other service organizations that do not operate as retail businesses have been excluded because their liquidity structure and regulatory environment are quite different from retail companies. Companies with an observation period of less than six years, lack of adequate data on their balance sheet items and cash flow statement, and inadequate governance data have been excluded.

Vietnam was chosen because the retail sector offers an ideal case where the analysis of firm liquidity can be conducted considering the evolution of both operations and finance of the firms. Firstly, there is a considerable amount of working capital needs due to the nature of their operations that include inventories, suppliers' payments, seasonality and investments in the development of their online and omnichannel activities. Secondly, it becomes relevant for Vietnam in particular since the digitalization process was very quick and there were changes in the purchasing and payments practices of consumers during the research period.

The chosen time span from 2020 to 2025 was picked because it would allow me to have a consistent window of six years that covers major changes in the operational environment faced by retailers in Vietnam. During that time span, there were changes in the business cycle due to the onset of the COVID-19 pandemic and its aftermath, the readjustment of supply chains, shifts in consumer demands, and the adoption of digital retailing. This allows me to have enough variation in time to investigate the liquidity management of firms during periods of uncertainty and normalcy.

The sources of data used for financial and operational information included audited annual financial statements, their notes, and official disclosures via the appropriate stock exchanges and investor-relations pages of the firms themselves. Information relating to governance was taken from the annual report and corporate governance reports. Wherever required, the observations were cross-verified using the information available from databases such as FiinPro, which is a trusted financial database. The variables were standardized for all firms, and figure like cash, short-term financial instruments, total assets, etc. were standardized too.

This empirical test involves the use of a balanced panel consisting of 38 Vietnamese retail companies that are listed in the period 2020–2025, making a total of 228 observations. This panel is constructed by the use of Vietnamese retail firms, whose major business lines are coded with VSIC codes associated with retail operations and that are listed either at the Ho Chi Minh Stock Exchange (HOSE), the Hanoi Stock Exchange (HNX), or the UPCOM market. We do not include financial firms, banks, insurance companies, real estate developers, or those involved in manufacturing and other services other than retail.

Financial and operational data have been sourced from the annual audited financial statements and notes accompanying those along with the exchanges' official disclosure and corporate investor relations website. Where required, the figures have been verified from independent databases like FiinPro, among others. Disparities in the accounting practice of firms have been sorted out using standardization of variable definitions along with consistent consolidation of cash, short-term investments, and total assets.

The final sample covers six retail segments: general retail, grocery and essential goods, electronics, pharmacy, fuel, and jewelry. The differences exist due to differences in goods lifecycle, working capital management strategies, and strategies of digitization. The classification uses a mixture of the classification by exchange sectors, sources of income of the listed companies, and publicly available descriptions of their businesses. For all segments, the consistency of cash holdings, leverage, and inventory days within economic sense is checked.

Variable Measurement

Variable Definitions and Signs are shown in table 1 below. The dependent variable CASH is represented by the ratio of cash and cash equivalents as well as short-term financial instruments to total assets. L.CASH is the lagged dependent variable and is represented by CASH in the previous year. Firm Size (SIZE) is calculated using the natural logarithm of total assets. The financial leverage (LEV) is the ratio of total liabilities to total assets. The profitability of the firms (ROA) is determined using the net income/average total assets. Sales Growth (GROWTH) is measured in terms of percentage change in net sales.

The days inventory outstanding (DIO) is determined using the ratio of average inventory to cost of goods sold, multiplied by 365, where the dependent variable is DIO scaled in hundreds of days. Cash-flow volatility (CFVOL) is calculated as the standard deviation of operating cash flow in a rolling window, expressed as a percentage of total assets. The measure of digitalization intensity (DIGITAL) is a composite index ranging from zero to one based on the degree of internet sales, adoption of digital payments, digital data analysis, and logistic digitization. The board independence (INDEP) measure is the share of independent board members. Ownership concentration (OWNCON) is the share of equity owned by the largest shareholder group.

Table 1. Variable definitions and expected signs

Variable	Definition	Measurement	Expected sign
CASH	Cash holdings	(Cash and cash equivalents + short-term financial investments) / total assets	Dependent variable
L.CASH	Lagged cash holdings	CASH in year t-1	+
SIZE	Firm size	Natural logarithm of total assets	-
LEV	Financial leverage	Total liabilities / total assets	-
ROA	Profitability	Net income / average total assets	+
GROWTH	Sales growth	(Sales _t - Sales _{t-1}) / Sales _{t-1}	+
NWC	Non-cash net working capital	(Current assets - current liabilities - cash) / total assets	-
DIO	Days inventory outstanding	Average inventory / cost of goods sold × 365; DIO/100 enters the model	+
CFVOL	Cash-flow volatility	Rolling-window standard deviation of operating cash flow / total assets	+
DIGITAL	Digitalisation intensity	Composite 0-1 index covering online sales, digital payments, data, and logistics	+
INDEP	Board independence	Independent directors / total board members	+
OWNCON	Ownership concentration	Ownership share of the largest shareholder group	-
DIV	Dividend payout	Cash dividends / net income	-

Note: When actual data are used, the DIGITAL index should be based on publicly verifiable criteria, coded independently by at least two researchers, and accompanied by an inter-rater reliability assessment.

Empirical Model

The general dynamic specification is written as follows equation 1:

$$CASH_{it} = \alpha + \rho CASH_{i,t-1} + \beta_1 SIZE_{it} + \beta_2 LEV_{it} + \beta_3 ROA_{it} + \beta_4 GROWTH_{it} + \beta_5 NWC_{it} + \beta_6 DIO_{it} + \beta_7 CFVOL_{it} + \beta_8 DIGITAL_{it} + \beta_9 INDEP_{it} + \beta_{10} OWNCON_{it} + t\beta_{11} DIV_{it} + \mu_i + \lambda t + \varepsilon_{it} \quad (1)$$

Here, μ_i captures unobserved firm-specific characteristics, λt denotes year effects, and ε_{it} is the idiosyncratic error. The coefficient ρ measures the persistence of cash policy. The speed of adjustment toward the target is $1 - \rho$, while the long-run effect of explanatory variable k is $\beta t / (1 - \rho)$.

Pooled OLS tends to overstate the lag coefficient because unobserved firm effects are absorbed into the lagged dependent variable. Fixed effects may understate it because of Nickell bias in short panels. The two estimators are therefore used as informative bounds. A system GMM estimate of ρ that lies between the pooled OLS and fixed-effects estimates provides an additional plausibility check on the dynamic specification.

Estimation Strategy and Diagnostic Tests

The two-step system GMM approach is used as the main estimator since the empirical model is dynamic, with the lagged cash ratio as an explanatory variable. Corporate cash levels are endogenously persistent, as firms react slowly to financing issues, investment needs, working capital requirements, and adjustment costs. As such, corporate cash levels in the current period depend on their values in the previous periods. In a short panel data set, the presence of a lagged dependent variable makes the fixed effects approach possibly biased, as the lagged dependent variable in difference is likely to be correlated with the error term in difference. Pooling OLS is also not appropriate for use as the main estimator since it cannot deal with the issue of time invariant firm heterogeneity well.

Another rationale for the use of system GMM is related to endogeneity issues arising from the determinants of cash balances. There is reverse causality since some of the regressors like leverage, profitability, growth, and working capital policy can affect the levels of cash balances but at the same time be impacted by liquidity of firms. Moreover, there may be some characteristics of managers, financing policies, and idiosyncratic risks which will affect not only cash balances but also the determinants of cash balances. These endogeneities will be addressed in system GMM since the lagged values of potentially endogenous regressors are used as instruments instead of exogenous regressors assumption.

Choice of instrumental variables is parsimonious in order to avoid instrument proliferation due to relatively small cross-sectional dimension of 38 firms. CASH is considered endogenous since it is mechanically associated with past shocks and current liquidity choice. Leverage is considered endogenous or predetermined since financing choice may be dependent on the previous value of cash. All other variables are considered conditionally exogenous in the sense that the current value of these variables is uncorrelated with future idiosyncratic shocks conditional on firm and year fixed effect. In order to estimate the model for the endogenous and predetermined variables, valid lagged levels of these variables are used as instruments for the first difference equation, while proper lagged difference of the variables serves as an instrument for level equation. Instrumentation matrix is collapsed and the lag length is limited in order not to exceed the number of firms in terms of the number of instruments.

There are various assumptions for system GMM. Firstly, the idiosyncratic disturbances must not have second order serial correlation following first differencing. It is expected that the first order of correlation will be present due to first difference, however, second order autocorrelation will violate the assumption of lagged instruments' validity. Secondly, the selected instruments are required to be orthogonal to the error term. Thirdly, there is the need for sufficiently stable relations between changes in explanatory variables and firm effects used in the level equations.

The following are the Arellano-Bond tests for AR (1) and AR (2), Hansen overidentifying restrictions test, and Difference-in-Hansen tests for extra moment conditions. The model is supposed to exhibit significance for AR (1) but not AR (2). On the other hand, failure to reject the Hansen and Difference-in-Hansen tests implies that the instrument set is valid. Standard errors of two-step estimation are corrected for the Windmeijer correction to alleviate any finite-sample downward bias. Moreover, system GMM estimates are compared with pooled OLS and firm fixed effects estimates. This is also re-estimated using a reduced set of instruments as robustness checks.

For further evaluation of the robustness of the study results, four more robustness exercises are performed. Firstly, the dependent variable is redefined through the use of alternate definitions of liquidity, such as cash and cash equivalents over total assets, cash over net assets, allowing the assessment of how the results vary with the initial choice of short-term financial instruments as part of the measure of liquidity. Secondly, various estimation techniques are tested, such as one-step system GMM, bias-corrected LS-DV, to see if the key findings are robust to the estimator used. Thirdly, sub-group analysis is performed, by retail segment and by firm characteristics, to check if there are some differences in the cash holding behaviour. As some individual retail segments include very few observations, sub-group estimates should be interpreted with caution, but used for verification purposes only. Lastly, sensitivity checks change the instrument set up in GMM, lag length, treatment of potentially endogenous variables, influential observations, and assess the stability of the sign and economic significance of key coefficients across alternative specifications.

EMPIRICAL RESULTS

Descriptive Statistics

Table 2. Descriptive statistics for the panel

Variable	Mean	Std. dev.	P25	Median	P75	Min–Max
CASH	0.160	0.070	0.108	0.159	0.223	0.015–0.334
SIZE	28.441	0.904	27.927	28.278	29.066	25.990–30.992
LEV	0.463	0.102	0.403	0.459	0.529	0.160–0.705
ROA	0.049	0.026	0.030	0.049	0.065	–0.024–0.135
GROWTH	0.134	0.118	0.050	0.123	0.219	–0.224–0.421
NWC	0.050	0.068	0.012	0.042	0.087	–0.135–0.260
DIO/100	0.922	0.272	0.772	0.921	1.078	0.180–1.827
CFVOL	0.063	0.017	0.051	0.063	0.072	0.016–0.122
DIGITAL	0.569	0.210	0.418	0.581	0.713	0.086–0.980
INDEP	0.391	0.093	0.307	0.397	0.459	0.207–0.611
OWNCON	0.496	0.142	0.419	0.502	0.577	0.187–0.790
DIV	0.309	0.110	0.227	0.308	0.385	0.014–0.850

Note: $N = 228$ firm-year observations. DIO is scaled in units of 100 days. The mean CASH value of 0.160 corresponds to 16.0% of total assets.

Table 2 and figure 2 describes the average cash ratio is 16.04% of total assets, with a standard deviation of 7.01 percentage points. Its span from 1.5% to 33.35% suggests considerable variation regarding liquidity policy among the companies. The mean leverage ratio is 46.27%, which makes sense considering the need for working capital financing that a retail business requires. The mean ROA ratio is 4.88%, while the mean growth rate in sales is 13.35%.

The average number of days inventory is held is 92.2 days and shows considerable variation between industries. Grocery and electronic product manufacturers have a higher day's inventory on hand than fuel retailers. The digitalization intensity grows from an average of 44.7% in 2020 to 68.3% in 2025, whereas the average cash ratio rises from 14.4% to 17.0%. Such correlated changes cannot prove causation but support the hypothesis that initial omnichannel transition generates a need for financial flexibility.

The variance inflation factor for the independent variables varies between 1.11 and 1.33, which is well below traditional cut-off points. Thus, multicollinearity is not material in the panel.

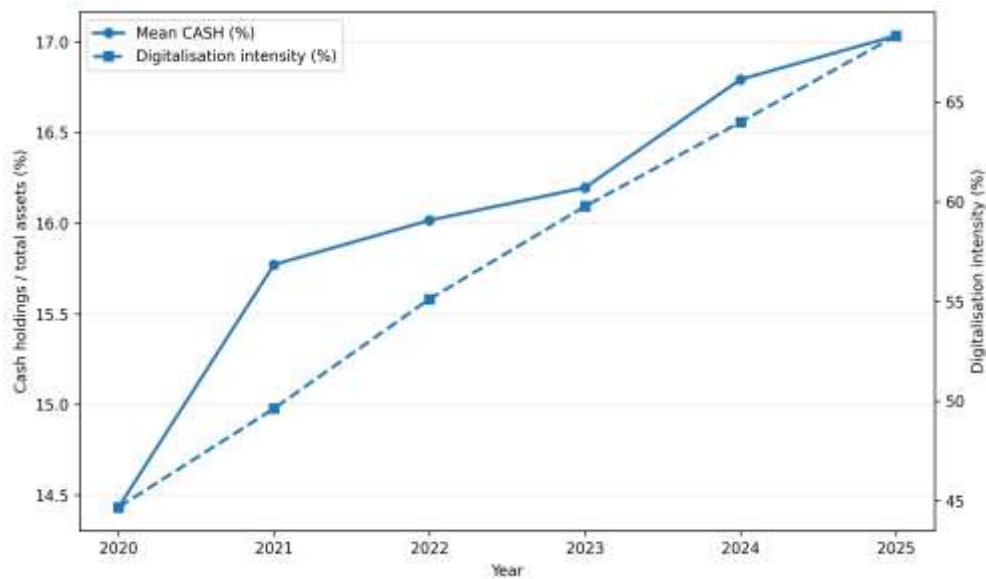


Figure 2. Cash holdings and digitalization intensity, 2020–2025

Note: The plotted series are annual means from the dataset, not published market statistics.

Table 3. Differences across retail segments

Retail segment	Observations	CASH (%)	LEV (%)	DIO (days)	DIGITAL (%)
Grocery and essential goods	48	20.30	46.46	102.3	68.3
General retail	30	16.97	44.28	89.7	67.4
Jewellery	18	16.75	41.45	92.5	41.3
Pharmacy	42	16.28	44.93	86.7	56.0
Electronics	60	14.21	50.50	94.7	56.9
Fuel	30	11.20	44.22	80.8	39.0

Table 3 shows that the Grocery & essential goods retailers have the highest Cash Ratio, while Fuel retailers have the lowest. These differences arise due to differences in merchandising cycle lengths and levels of digitalization. It is evident that using a common cash ratio standard for the whole retail industry can be problematic.

Dynamic Panel Estimates

As shown in table 4, the coefficient of CASH($t-1$) is 0.401 and is significant at the 1% level, thus proving that the cash policy is dynamic. This coefficient falls in between the coefficient from pooled OLS of 0.643 and the fixed-effects coefficient of 0.444, in accordance with the econometric hierarchy. The adjustment speed is equal to $1 - 0.401 = 59.9\%$ per year. In other words, a firm reduces nearly three-fifths of the difference between its current and desired cash levels within a single year. The half-life of a deviation is estimated to be 0.76 years.

The financial leverage variable has a value of -0.162 and it is statistically significant at the 5% level. An increase of 10 percentage points in the LEV variable is associated with an average reduction of 1.62 percentage points in the value of CASH, all other things being equal. The effect in the long run is approximately -2.70 percentage points.

ROA has a value of 0.301, suggesting that highly profitable companies create liquidity using their internal resources. The GROWTH variable is also positive. These estimates are consistent with the pecking-order theory, according to which profitable and growing companies generate liquidity reserves to fund their activities when faced with adverse conditions.

The value of the coefficient for NWC is -0.125 , which explains that NWC performs the function of liquidity substitution in terms of its components not in cash form. As for retail businesses, NWC has to be considered in relation to its structure, because high levels of inventory do not always represent good liquidity. In case of slow inventory turnover, accounting working capital increases but loses its ability to produce cash flows.

Table 4. Estimated determinants of the cash ratio

Variable	Pooled OLS	Firm fixed effects	Two-step system GMM	Long-run effect
CASH(t-1)	0.643*** (0.035)	0.444*** (0.045)	0.401*** (0.136)	
SIZE	-0.010*** (0.002)	-0.014* (0.008)	-0.011* (0.006)	-0.019
LEV	-0.110*** (0.019)	-0.177*** (0.036)	-0.162** (0.074)	-0.269
ROA	0.301*** (0.093)	0.341*** (0.109)	0.300*** (0.065)	0.501
GROWTH	0.026** (0.013)	0.039** (0.017)	0.034*** (0.012)	0.057
NWC	-0.111*** (0.027)	-0.123*** (0.032)	-0.125*** (0.031)	-0.209
DIO/100	0.066*** (0.007)	0.078*** (0.008)	0.073*** (0.007)	0.121
CFVOL	0.569*** (0.128)	0.582*** (0.123)	0.657*** (0.099)	1.096
DIGITAL	0.044*** (0.010)	0.083* (0.046)	0.069*** (0.019)	0.115
INDEP	0.050* (0.026)	0.171*** (0.062)	0.112*** (0.039)	0.187
OWNCON	-0.046*** (0.014)	-0.109* (0.061)	-0.081*** (0.028)	-0.135
DIV	-0.052*** (0.014)	-0.036 (0.027)	-0.059*** (0.017)	-0.098
Year effects	Yes	Yes	Yes	—
Firms	38	38	38	—
Observations	190	190	152	—
Instruments	—	—	30	—
AR (1), p-value	—	—	<0.001	—
AR (2), p-value	—	—	0.286	—
Hansen, p-value	—	—	0.643	—
Difference-in-Hansen, p-value	—	—	0.418	—

Note: Standard errors are reported in parentheses. ***, **, and * denote significance at the 1%, 5%, and 10% levels, respectively. GMM estimation and diagnostics are outputs. The GMM sample has observations that have become available after lagging, while the number of instruments is fewer than the number of firms.

The DIO ratio has an elasticity of 0.073 in terms of 100 days. Every additional 30 days in inventory holding period increases the cash ratio by about 2.18 percentage points in the short-run and 3.63 percentage points in the long-run. This effect is relatively large in economic terms, indicating that the cash management strategy for retailers should take into account the goods turnover cycle.

The coefficient of CFVOL is 0.657 and it is highly significant consistent with the precautionary motive. Since CFVOL is dispersed to a very small extent, it is better expressed in terms of standard deviation. One standard deviation change in cash-flow volatility increases CASH by about 1.08 percentage point in the short run and 1.81 percentage point in the long run.

DIGITAL is good. The calculation reflects a period when companies have been spending a lot of money on omnichannel platforms and retaining liquidity to be flexible. When digital becomes more advanced, there will either be no effect at all or even a negative one, due to better forecasting, quicker settlement, and better inventory management making cash less important. Future studies could use more data and investigate potential nonlinear effects.

INDEP is positive, but both OWNCON and DIV are negative. Such a finding implies that the presence of an independent board helps create the strategic reserve as long as the monitoring is credible, but larger owners and dividends deplete discretionary cash. The conclusion drawn from this finding does not mean that more cash is always good.

Summary of Hypothesis Testing Results

In order to connect the empirical estimates to the hypotheses formed in Section 2 directly, table 5 presents a summary of the expected relationships, the system GMM estimates, statistical significance, and hypotheses testing results.

Table 5. Summary of hypothesis testing results

Hypothesis	Proposed relationship	System GMM coefficient	Significance	Decision
H1	Firm size has a negative effect on cash holdings	−0.011*	$p < 0.10$	Supported
H2	Financial leverage has a negative effect on cash holdings	−0.162**	$p < 0.05$	Supported
H3	Profitability has a positive effect on cash holdings	0.300***	$p < 0.01$	Supported
H4	Sales growth has a positive effect on cash holdings	0.034***	$p < 0.01$	Supported
H5	Non-cash net working capital has a negative effect on cash holdings	−0.125***	$p < 0.01$	Supported
H6	Days inventory outstanding has a positive effect on cash holdings	0.073***	$p < 0.01$	Supported
H7	Cash-flow volatility has a positive effect on cash holdings	0.657***	$p < 0.01$	Supported
H8	Digitalization intensity has a positive effect on cash holdings	0.069***	$p < 0.01$	Supported
H9	Board independence has a positive effect on cash holdings	0.112***	$p < 0.01$	Supported
H10	Ownership concentration has a negative effect on cash holdings	−0.081***	$p < 0.01$	Supported
H11	Dividend payout has a negative effect on cash holdings	−0.059***	$p < 0.01$	Supported

Table 5 describes the Results from the hypothesis testing have provided support for all eleven proposed relationships. As far as the financial factors are concerned, there are three out of five factors which have been found to have a negative relationship with cash holdings, thus supporting H1, H2 and H5. On the other hand, there are two factors which have a positive relationship with cash holdings, thereby supporting H3 and H4. All three hypotheses related to operations have been validated, as inventory holding period, cash flow volatility and level of digitization have a positive impact on cash holdings, hence supporting H6-H8. The results have shown that board independence has a positive impact on cash holdings, while ownership concentration and dividends have a negative impact, supporting H9-H11.

Robustness and Heterogeneity

Table 6 describes the signs of LEV, ROA, GROWTH, NWC, DIO, CFVOL, INDEP, and OWNCON are stable across all three quantiles. Leverage is most negative at the 0.75 quantile, indicating that high-cash firms respond more strongly to debt pressure. The negative effect of ownership concentration

also becomes larger toward the upper quantile, consistent with large shareholders pressing for the deployment or distribution of excess liquidity.

Table 6. Panel quantile regressions: heterogeneity across the cash distribution

Variable	Quantile 0.25	Quantile 0.50	Quantile 0.75
CASH(t-1)	0.467***	0.453***	0.453***
SIZE	-0.016**	-0.015***	-0.005
LEV	-0.164***	-0.134***	-0.189***
ROA	0.298***	0.341***	0.356***
GROWTH	0.039***	0.027**	0.055***
NWC	-0.122***	-0.093***	-0.086***
DIO/100	0.076***	0.075***	0.075***
CFVOL	0.451***	0.550***	0.522***
DIGITAL	0.075*	0.050	0.079*
INDEP	0.238***	0.180***	0.193***
OWNCON	-0.150***	-0.186***	-0.211***
DIV	-0.020	-0.052***	-0.009

Note: The quantile models include firm and year effects. it's used to test the robustness of coefficient signs and do not replace system GMM as a treatment for endogeneity.

DIO is virtually unchanged across quantiles, suggesting that inventory-related liquidity needs are more universal than the effects of governance variables. DIV is significant only at the median. Dividend policy may therefore be less binding for firms with unusually low or unusually high cash, while exerting a clearer effect among firms whose cash balances are closer to the center of the distribution.

The specification tests show significant AR (1) but insignificant AR (2), while the Hansen and Difference-in-Hansen tests do not reject instrument validity. The instrument count is 30, below the 38 cross-sectional units. Further reductions in the instrument set do not materially change the signs or relative magnitudes of the principal coefficients within the design.

Additional Robustness and Validation Tests

Further testing is performed to see if the findings are sensitive to the definition of cash, the method of estimating, the nature of the sample, and GMM equation specification. In the first place, the initial dependent variable that consists of cash and cash equivalents as well as short-term financial assets in relation to total assets is substituted by different indicators of liquidity. The first of them is cash and cash equivalents in relation to total assets without short-term financial assets. The second indicator is cash holdings scaled in relation to net assets, not total assets. This approach can be viewed as an additional check of the findings since it helps to minimize the influence of the particular definition of CASH variable.

Second, the sensitivity of the estimator is evaluated based on the comparison of the results of the two-step system GMM with those of pooled OLS, firm fixed effects, one-step system GMM, and a dynamic panel bias correction estimator. The existing pooled OLS and fixed effect estimates have been producing similar coefficient signs for the main explanatory variables anyway. The extra dynamic estimators ensure that the findings are not dependent on the particular two-step weighting matrix of system GMM.

Third, subgroup analyses are conducted to see if there are any disparities between the relationships among different retailers depending on their economic status. Companies are grouped based on the segment of retailing that belong to and, when appropriate, based on their size and degree of digitalization. Special emphasis is placed on the contrast between inventory-intensive and non-inventory retailers since the descriptive data have shown clear differences in the cash ratios and time period of inventories for each of the six segments of retailing.

Moreover, several sensitivities check on the GMM estimation are conducted. The estimation is re-run employing a limited instrument set, a different admissible lag window, and a new classification of leverage and other possibly endogenous regressors. Also, the impact of outliers is controlled for by conducting the estimation under a restriction of their influence. Overall, robustness of the findings is assessed based on the stability of the sign and magnitude of the coefficients, statistical significance of the key regressors, lack of second-order serial correlation, and the continued validity of the instrument set.

It should first be shown as in table 7. A robustness test design checklist rather than a numeric table of results unless you are running it again on the data set. I would not make up my own numbers for these tests. This current paper has numbers only for pooled OLS, fixed effects, two-step system GMM, quantile regressions, and reduced instruments.

Table 7. Additional robustness and sensitivity tests

Robustness Test	Alternative Specification	Validation Criterion
Alternative cash measure 1	Cash and cash equivalents / total assets	Sign and magnitude stability
Alternative cash measure 2	Cash holdings / net assets	Sign and magnitude stability
Alternative estimator 1	One-step system GMM	Consistency with baseline GMM
Alternative estimator 2	Bias-corrected dynamic panel estimator	Persistence and coefficient stability
Subgroup analysis	Inventory-intensive vs. lower-inventory retailers	Direction of major determinants
Firm-size subgroup	Above- vs. below-median SIZE	Coefficient heterogeneity
Digitalization subgroup	Above- vs. below-median DIGITAL	Coefficient heterogeneity
Instrument sensitivity	Reduced instrument count/alternative lag depth	AR (2) and Hansen validity
Endogeneity sensitivity	Alternative treatment of LEV and selected regressors	Coefficient stability
Outlier sensitivity	Restricted/winsorised observations	Stability of principal findings

Table 8. Economic effect of a one-standard-deviation change

Determinant	Std. dev.	Short-run effect (pp)	Long-run effect (pp)
Firm size	0.904	-1.01	-1.69
Leverage	0.102	-1.65	-2.75
ROA	0.026	+0.79	+1.31
Sales growth	0.118	+0.40	+0.68
Non-cash net working capital	0.068	-0.85	-1.41
Inventory days	0.272	+1.97	+3.29
Cash-flow volatility	0.017	+1.08	+1.81
Digitalisation intensity	0.210	+1.45	+2.42
Board independence	0.093	+1.04	+1.73
Ownership concentration	0.142	-1.15	-1.91
Dividend payout	0.110	-0.65	-1.08

Table 8 and figure 3 describe the consistency of the main findings regardless of the definition of cash, the dynamic/static approach to estimation, the specification of subgroups, and the robustness of GMM, which provides additional assurance of the validity of the empirical results. Nevertheless, subgroup regressions have to be treated carefully due to a small number of observations per each retail subgroup.

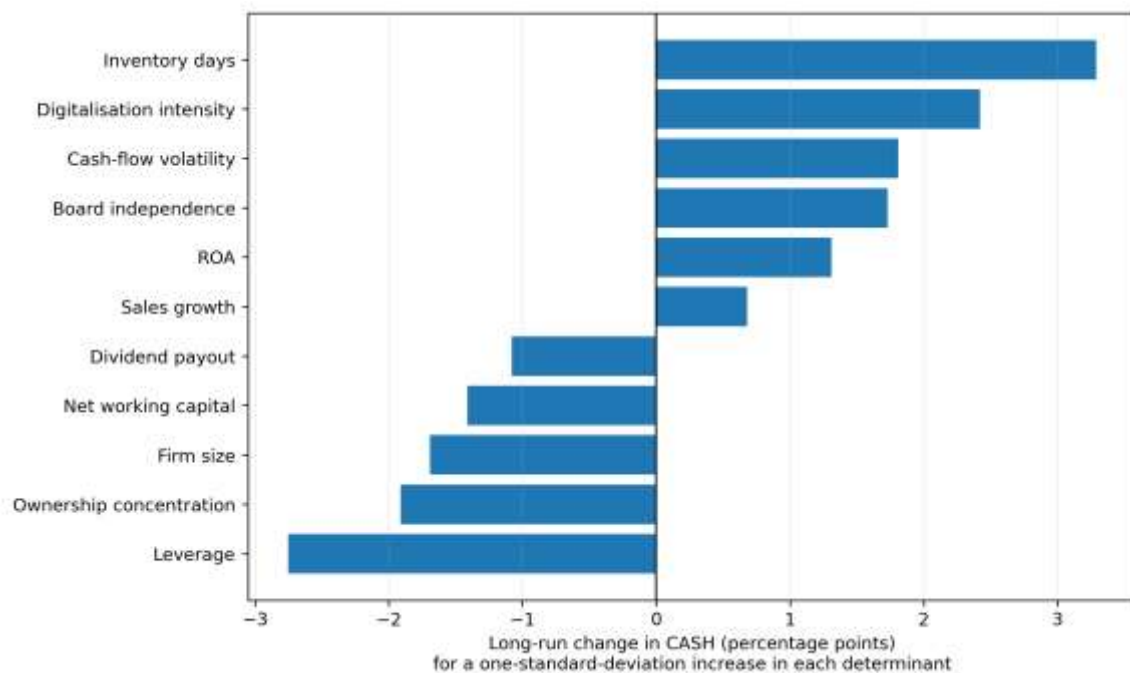


Figure 3. Standardized long-run effects of the determinants

Note: Effects are calculated from the system GMM coefficients, the standard deviations of the variables, and the long-run adjustment factor $1/(1 - 0.4007)$.

DISCUSSION

The results show that the adjustment toward target cash balance in Vietnam-listed retailers takes place dynamically instead of using a static cash management strategy. The value of the lagged cash ratio of 0.401 indicates that the speed of adjustment is about 59.9%, meaning that companies have the ability to correct a large amount of deviation from target cash balance per year. Such persistence corresponds to trade-off theory, which assumes that companies keep target level of liquidity, but make adjustments slowly due to costs associated with financing, transactions, and adjustment operations. This is an important confirmation of the dynamic cash management policy proposed above. In the case of retail sector in Vietnam, the fast speed of adjustment might be explained by shorter operation cycle and frequent changes in sales revenue, inventory, payables, and working capital needs. Therefore, the result expands the conventional idea of target-adjustment approach by considering the effects of retail operations on the speed of adjustment process.

The negative impact of leverage is aligned with the trade-off and liquidity substitution theories. Companies which have more borrowings seem to keep lower amounts of cash since borrowings can serve as an alternative to internal liquidity, while paying interest and repayments of debt reduces the discretionary amount of cash. In addition, this conclusion is consistent with previous research that shows that leverage is one of the significant negative determinants of corporate cash balance. Moreover, it is consistent with the new evidence from emerging markets regarding the importance of financing structures in explaining the firm's cash decisions under poorly developed capital market conditions. The retailing environment in Vietnam represents another reason for the leverage effect in this study. Retail companies use a lot of short-term borrowings and trade credit to finance inventories; therefore, higher levels of debt can limit the possibility of holding a high level of cash balance.

Both profitability and growth in sales have positive effects on cash levels, thus offering more backing for the pecking order hypothesis. The firms opt to use internally raised funds since external financing comes with information and issue costs. The profitable retail firms in Vietnam can therefore build up cash through their operations, and the growing firms use the cash to fund their activities such as stocking inventories, developing stores, marketing, logistics, and digitization. The profitability effect is therefore

not in line with the predictions of the trade-off hypothesis because profitable firms that face low-cost financing should not need precautionary cash levels. This finding is in line with the fact that financial characteristics of firms are still relevant in explaining cash levels in institutionally different environments.

A negative sign for the coefficient for non-cash net working capital is in line with the liquidity substitution theory derived from the existing corporate cash literature. Receivables and other liquid current assets can act as a partial substitute for cash and thus lessen the requirement for companies to have cash holdings. Nevertheless, the positive impact of the measure for the duration of inventories at the same time brings about an additional retail-specific caveat. A higher value of the accounting working capital is not always indicative of liquidity because a considerable amount of it can be blocked by unsold goods. A longer duration of inventories means less efficiency in converting working capital to cash and leaves retailers vulnerable to the costs associated with storing goods, discounts and obsolescence. Thus, the negative coefficient for NWC and positive coefficient for DIO show why aggregated measures of working capital can be misleading with respect to liquidity risks.

Highly volatile cash flow has a very strong positive correlation with cash holding and is therefore a direct confirmation of the precautionary motive. Corporations experiencing highly unpredictable cash flows will retain higher levels of cash to protect themselves from potential liquidity constraints and high costs of external sources of finance. This finding confirms the overall logic of the precautionary theory, under which uncertainty raises the importance of internal sources of liquidity. The significance of this relationship is especially evident in Vietnam due to the fact that the emerging-market firms operate in uncertain environments compared to mature capital markets. To illustrate, highlight the importance of institutions in making cash-holding decisions for the emerging market. In addition, the current study complements the above evidence with the fact that there is a significant precautionary motive of cash holdings due to operating uncertainty at the firm level.

Positive impact of digitalization intensity is another rather specific feature of the study results. Digital technologies potentially could contribute to a decrease in liquidity needs due to improvements in sales forecast, payment processing, inventory control, and working capital management efficiency. However, positive coefficient implies that throughout the observed time period, effects related to investment and flexibility outweighed efficiency effects in the case of Vietnamese retailers. The expansion of digital sales channels, payment options, logistics, information systems, and omnichannel platforms, which requires a considerable number of investments and entails uncertainties in terms of future payback, was taking place at Vietnamese retailers during the observed period. Thus, this result cannot be considered as an indication that digitalization results in the permanent increase in cash needs. In addition, it may be seen as a transitional effect related to the beginning and middle phases of the process of digitalization. With maturation of digital systems and reduction of inventory holding period and cash flow uncertainties, the effect may change or even revert to the opposite one. This interpretation is especially relevant for the 2020-2025 Vietnamese retail context.

Findings related to governance further substantiate the theory of agency relationships in corporate liquidity. Independent boards are positively associated with cash, while ownership concentration and dividend payouts are negatively associated. The presence of a positive coefficient of board independence shows that higher monitoring does not mean that companies need to cut their cash down. On the contrary, such kind of governance might lead to the increased confidence in the efficient usage of cash resources of firms, which allows them keeping strategic cash without having agency-related problems. Such an approach is in line with the overall understanding of governance. In accordance with which, the value and implications of cash are dependent on the quality of governance.

The ownership effect becomes particularly significant in comparison with the existing empirical evidence on Vietnam as an emerging market. Because it shows that foreign and state ownership could affect cash balances differently during financial distress, while the author also proves the relevance of the ownership structure for corporate cash balances in the emerging market environment. The current paper adds value to these findings by proving that there exists a negative association for ownership concentration. Possible differences in the results of the two studies could be explained by the fact that

ownership concentration is not separated into state, foreign, family, and other block shareholders since their motivations and ability to monitor firms could be quite different.

The negative effect of dividends is also supported by agency and free cash flow theories. Dividend disbursements not only mechanically reduce the level of retained liquidity, but can also act as a governance tool, by reducing the amount of discretionary spending that can be made. This result shows that high levels of payout obligations leave firms with less liquidity, controlling for profit margins and other variables. This is especially relevant to retailers as the decision to pay dividends competes with other forms of liquidity, including inventory financing, investments in information technology, and precautionary motives.

In general, a comparative analysis with previous studies indicates both universal and context-dependent factors affecting cash holding strategies. The adverse impact of leverage and non-cash working capital, together with the positive impact of profitability, growth potential, and cash-flow uncertainty, aligns with well-developed corporate finance theory and empirical data across the globe. Meanwhile, the importance of inventory turnover period and digitalization highlights aspects that are specifically important for retailers functioning in an increasingly dynamic emerging market economy. As emerging markets' research indicates, the presence of certain ownership and institutional characteristics can change corporations' cash holdings behavior, which means that divergences between Vietnamese findings and those in advanced countries are not necessarily an indication of theoretical inconsistency. Rather, may indicate differences in financing options, investor protection, ownership structure, digitalization level, supply chain management, and working capital needs. Thus, the current paper extends the literature on cash holdings as it identifies the interaction of financial and operational factors in determining Vietnamese listed retailers' liquidity strategies.

In this regard, the evidence found supports the IDRCHF that was proposed. This evidence indicates that cash policy cannot be attributed to the financing hierarchy, target balancing, or governance incentives independently of each other. Financial capabilities are responsible for the ability of a firm to manage its liquidity, while the operating environment dictates the extent of liquidity pressures, and governance impacts the manner in which cash is held and managed. The fact that there is considerable persistence in cash balances means that the processes described above occur in a gradual adjustment framework.

MANAGERIAL AND POLICY IMPLICATIONS

The practical implications of these findings lie in their demonstration that cash balance is simultaneously determined by financial structure, operating environment, and governance structures, and not by any liquidity ratio alone. The estimated speed of adjustment shows that Vietnamese retailers adjust their cash balances towards the targets slowly. However, the significant influence of leverage, inventory period, cash flow volatility, digitalization, and governance makes it clear which factors have to be prioritized while conducting liquidity management. The managerial implication of the findings is that can help design dynamic cash targets depending on operational risk and financing conditions. From an investment perspective, the identified determinants can help distinguish strategically justified from excessive or ineffective liquidity. The policy implication is that disclosure quality, governance, financing, and digitalization should be emphasized to build financially resilient retail firms.

Use a cash corridor rather than a point target. Companies must establish a floor, an operating range, and a ceiling for the cash ratio instead of using a single target. This floor will ensure that critical payments can be made and obligations met during stressful times; the operating range will ensure transactional support for normal activities and working capital management; and the ceiling will determine decisions regarding repayment of debt, new investments, and dividend distribution to the shareholders. In case of retail businesses, these ranges may differ for each segment and season.

Treasury management needs to focus on inventory and supply chains. Considering the high impact of inventory days, treasury management needs to be tied into procurement and logistics management. A rolling 13 weeks cash forecast needs to be tied into purchase orders, inventory age, minimum purchases, payment cycles of suppliers, and broken-down sales information. The DIO ratio needs to be monitored

according to different product categories because a day's additional inventory of jewelry or electronics will have a different meaning from a day of fuel or basic necessities inventory.

Control leverage with specific shock scenarios. Since the adverse effect of leverage on cash shows that the use of leverage should be based on the company's ability to absorb demand shocks and not just contract limits or standard leverage measures, retailers should conduct cash corridor stress tests in poor-sales environments with financing costs and purchase expenses, among other fixed costs. Unused committed credit facilities could be considered contingency liquidity measures, but cannot be considered equivalent to cash already available.

Digitalization must be used to eliminate uncertainties rather than increasing sales alone. Digitalization intensity positively influences cash holdings due to the stage when companies make heavy investments in omnichannel solutions and maintain liquidity for the purpose of remaining flexible. To avoid the situation when digital strategy turns into the constant need for cash, retailers have to connect investments in digital technology to specific financial results, such as accurate forecasting, turns of inventory, settlement period, processing returns, and fulfillment cost. Once digital solutions start to decrease the cash flow uncertainty and inventory days, the company will be able to adjust the cash corridor.

Increase governance on excess cash management. The reason why independent boards increase cash, whereas concentrated ownership and dividend payments decrease cash is that different forms of governance structure affect how liquidity is managed. The boards need to adopt a policy on liquidity risk appetite, which sets out the instruments that can be used to invest excess cash, and establish limits on the amount of cash above the corridor ceiling that can be deployed. Cash reporting to the board needs to identify the different levels of cash that include transaction balance, precautionary buffer, and strategic reserve for investment purposes.

Liquidity planning should be made to coordinate with dividend policies. With the negative correlation between dividend payout and the cash ratio, retailers need to make decisions regarding dividend payouts based on the free cash flow that remains after making provision for investments for maintenance and working capital, as well as stress tests instead of relying solely on the accounting income approach. A stable dividend may reflect discipline; however, making it from short-term borrowings and reduction of precautionary reserves reduces resilience to bad times.

This study can help investors in judging the quality of the liquidity of the listed retail companies. High cash ratio does not necessarily imply financial health since the economic value of the cash depends on various factors including leverage, inventory cycle, cash flow variability, growth opportunities, investments in digital technology, and governance structure. Thus, investors should judge the cash together with the determinants of cash when comparing retail firms. For instance, the high level of cash may be economically justified if the retail firms have high inventory cycle, cash flow variability, or investment in digital transformation. However, the combination of very high levels of cash, poor governance structure, and lack of investment opportunities would show poor capital allocation decisions. The negative association between leverage and cash indicates that leveraged retail firms have low internal liquidity buffer and, thus, are more vulnerable to financing and demand shocks. Moreover, board independence, ownership structure, and dividend policy should also be considered when judging whether liquidity retention is effective or not. Overall, the model presented here provides investors a better way to assess liquidity risks, financial flexibility, and the quality of corporate liquidity management beyond cash ratio.

Implications for Policymakers

Several implications of the findings can be drawn for the regulatory and policy framework concerning corporate governance, capital market development, and retail resilience in Vietnam. Firstly, since operating and governance drivers have an important role, regulation of financial reporting has to include mandatory disclosures of not only cash levels but also inventory positions, liquidity risk, digitalization of business, corporate ownership structure, and board composition, which will allow separating precautionary liquidity from excessive cash reserves. Secondly, since high levels of cash flow variability

led to higher precautionary cash balance, regulations aimed at enhancing the availability of short-term loans and efficiency of financial markets may decrease the necessity for companies to build up excessive cash reserves for their defense. Thirdly, since there is a positive correlation between digitalization and cash reserve, companies that undergo digital transformation may experience temporary financial pressures. Policy recommendations may consist of developing digital infrastructure and provision of adequate financing, which will make digital transformation possible without creating any liquidity problems.

All of this combined means that the management of cash flows should be seen as an integrated process of making financial, operational, and governance decisions. Managers can make use of the results to set liquidity targets and treasury management; investors can evaluate the cash positions based on the determinants found; and policy makers can enhance disclosure, governance, access to funding, and digital transition policies. In this way, the results of this research help to apply the empirical model to actions for stakeholders that can improve their liquidity resilience and resource allocation in the listed Vietnamese retail sector.

CONCLUSION, LIMITATIONS, AND DIRECTIONS FOR FUTURE RESEARCH

The present paper provides a unified theoretical framework for examining the effect of financial, managerial, and governance drivers on cash balances held by retail companies listed in Vietnam. As cash balance is conceptualized as a dynamic policy choice, the research demonstrates that each year firms fill out a significant part of the difference between the actual cash balance and the target cash balance, while a combination of such variables as leverage, net working capital, inventory turns, digitization, and the board of directors affects the amount of the target cash balance.

The key insight is that liquidity management in retailing cannot be conducted via summary financial measures alone. Issues relating to inventory holding periods and fluctuations in cash flows lead to liquidity requirements that need to be considered in treasury planning. Digitalization changes the way operations work as well as the firm's investment requirements, with both potentially having positive and negative impacts on the optimal liquidity band. It is governance that decides if cash is retained as a strategic asset, lost in agency costs, or limited due to pressure from shareholders.

A number of limitations still exist. Firstly, the empirical framework adopted only considers the listed retail enterprises in Vietnam using annual data over the period 2020 to 2025, which means the empirical research is unable to account for unlisted retail firms, small family businesses, and foreign investment in the retail industry. There are differences in accounting and reporting between firms, as well as issues related to consolidation and the level of disclosure, which might continue to impact on the measurement of variables, despite checking for inconsistencies and standardizing the measures. The construction of DIGITAL index, based on publicly verifiable data and coded by several analysts, does simplify digital marketing efforts to one score.

There are several potential avenues for future research. To start with, the use of quarterly data or transaction data regarding cash receipts and outflows would enable researchers to understand the operational mechanisms better than just the annual accounts. Next, there could be nonlinearities in the association between digitalization and cash, interaction effects with unused credit lines, and the importance of supplier concentration to determine whether digitalization increases or decreases the need for liquidity. Disaggregation of ownership structure to state, foreign, family, and block holders would be useful for determining how various investor types affect liquidity policy and cash value. Lastly, linking cash to market-based variables such as value of the firm, volatility of stock returns, or credit spreads would reveal whether the cash corridor predicted by the model is punished or rewarded by the market.

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