8 DYNAMICS AND DETERMINANTS OF STOCK LIQUIDITY IN EUROPEAN EQUITY MARKETS

Adrian-Gabriel ENESCU[1]
Monica RĂILEANU SZELES[2]

Abstract

This paper examines the dynamics and firm-level determinants of stock market liquidity in European equity markets, focusing on the role of institutional ownership and the information environment. Using a balanced panel of STOXX Europe 600 firms over the period 2005–2025, we measure liquidity by stock turnover and estimate dynamic panel models with firm fixed effects, employing system GMM estimators to address endogeneity arising from lagged liquidity and potentially endogenous firm characteristics. We document strong persistence in stock liquidity: past turnover explains a substantial share of current turnover even after controlling for size, growth opportunities, capital structure, dividend policy, and time effects. Once these controls are included, institutional ownership does not show a robust, statistically significant association with liquidity, suggesting that the mere presence of institutional investors is not a primary driver of trading activity. In contrast, the information environment matters: firms with more favorable analyst recommendations tend to exhibit higher turnover, consistent with the idea that analyst activity enhances liquidity by improving information flows and stimulating trading interest. An analysis of standardized coefficients shows that liquidity dynamics are dominated by their own history and firm size, with analyst recommendations playing a non-trivial role, while other firm characteristics and institutional ownership appear less influential.

Key words: stock liquidity, equity markets

JEL Classification:. G30, C33

1. Introduction

Stock market liquidity is a central ingredient of well-functioning capital markets. Highly liquid stocks facilitate rapid trade execution at low cost, support efficient price discovery, and reduce the cost of capital for firms, while illiquid markets can amplify volatility and destabilize the financial system (Amihud & Mendelson, 1986; Acharya & Pedersen, 2005; Butler et al., 2005). In the European context, where integration across national exchanges has deepened over the last decades, understanding what drives liquidity at the firm level is particularly important for both investors and policymakers. Yet, compared with the vast empirical literature on return and

[1] *Transilvania University of Brasov, Romania, adrian.enescu@unitbv.ro*

[2] *Transilvania University of Brasov, Romania; Institute for Economic Forecasting, Romanian Academy, monica.szeles@unitbv.ro*

volatility dynamics, the persistence and determinants of stock liquidity itself have received considerably less attention, especially in a broad European setting.

Much of the existing work on market dynamics focuses on the time series behaviour of returns and volatility, often interpreted through the lens of the Efficient Market Hypothesis (Fama, 1970). Empirical studies using ARCH and GARCH type models document rich short run volatility dynamics (Engle, 1982; Bollerslev, 1986), while research on fractionally integrated processes and long memory suggests that financial series may display substantial persistence over long horizons (Ding et al., 1993; Gil-Alana et al., 2023; Caporale et al., 2024). More recent contributions show that European stock indices also exhibit highly persistent behaviour in returns and volatility. However, the question of whether liquidity, proxied by trading activity and turnover, displays similar temporal dependence remains underexplored, even though market microstructure theories predict that order flow, inventory management, and information asymmetries can generate persistent patterns in trading volume and liquidity (Kyle, 1985; Admati & Pfleiderer, 1988; O'Hara, 1995).

At the same time, there is an active debate on how ownership structure and the information environment shape liquidity. Institutional investors are often seen as sophisticated market participants who can enhance liquidity by providing informed order flow and by monitoring firms more effectively than dispersed retail shareholders. Their role is, however, ambiguous. In periods of stress, leveraged or performance sensitive institutions may withdraw liquidity, trade in the same direction, or transmit shocks across assets and markets. Likewise, analyst coverage and recommendations are key components of the information environment. By producing and disseminating firm specific information, analysts may reduce information asymmetry and uncertainty, thereby supporting deeper and more resilient markets (Brennan & Subrahmanyam, 1995; Welker, 1995; Balakrishnan et al., 2014). Analyst activity might also spur trading and herding in ways that affect liquidity in more complex ways.

This paper contributes to these debates by examining the dynamics and firm level determinants of stock liquidity for a large panel of European equities. Using quarterly data for the STOXX Europe 600 constituents over the period 2005 to 2025, we focus on stock turnover as a widely used, market wide measure of liquidity. We estimate dynamic panel models with firm fixed effects and employ system GMM estimators to address endogeneity concerns associated with lagged liquidity and potentially endogenous firm characteristics. This empirical framework allows us to disentangle the relative contributions of past liquidity, institutional ownership, firm characteristics, and analyst related variables to both the level and the dynamics of stock turnover.

The paper makes three main contributions. First, it provides direct evidence on the persistence of stock liquidity in European equity markets, rather than on returns or volatility alone. By modelling turnover in a dynamic panel setting, we quantify how strongly current liquidity depends on its own past values. Second, we jointly examine institutional ownership and the information environment, proxied by analyst recommendations, within the same empirical framework and controlling for a rich set of firm characteristics. This design allows us to assess whether institutional holdings and analyst activity matter for liquidity over and above standard determinants such as firm size, growth opportunities, capital structure, and dividend policy. Third, by working with standardized regressors and comparing standardized coefficients across specifications, we identify which variables are the main drivers of liquidity in both the time series and cross sectional dimensions, and we provide a clear ranking of their relative economic importance.

The analysis is structured around four research questions. First, we ask to what extent stock liquidity is persistent over time for European listed firms (RQ_1). Second, we investigate whether higher institutional ownership is associated with higher liquidity once we control for firm size, growth opportunities, capital structure, dividend policy, and time effects (RQ_2). Third, we examine whether the information environment, proxied by analyst recommendations, matters for liquidity, and whether firms with different recommendation status, for example firms with no

recommendations, are systematically more or less liquid (RQ_3). Finally, we assess, among firm characteristics, institutional ownership, and analyst related variables, which are the main drivers of the level and dynamics of stock turnover (RQ_4).

Our results show that stock liquidity is highly persistent. Lagged turnover explains a large share of current turnover, even after we control for a rich set of firm level covariates and time effects. Once these controls are included, institutional ownership does not display a robust, statistically significant association with liquidity, which suggests that the presence of institutional investors by itself is not a primary driver of trading activity in our sample. In contrast, the information environment does matter. Firms with more analyst buy recommendations exhibit systematically higher turnover, which is consistent with the idea that analyst activity supports liquidity by improving information flow and attracting trading interest. When we compare standardized coefficients, we find that liquidity dynamics are dominated by their own past values and by firm size, with analyst recommendations also playing a non trivial role, while other firm characteristics and institutional ownership appear less influential.

The remainder of the paper is organised as follows. Section 2 reviews the related literature and develops the hypotheses. Section 3 describes the data, variables, and sample construction. Section 4 outlines the empirical methodology. Section 5 presents empirical results and discusses implications for investors and policy. Section 6 concludes the paper.

2. Literature review

2.1 Stock liquidity, institutional ownership and dividend policy

Stock liquidity is a central attribute of equity markets because it reflects the ease with which investors can trade shares without causing large price changes. The literature typically distinguishes between trading-cost measures such as bid-ask spreads, quantity-based measures such as trading volume, depth or turnover, and price-impact measures, most prominently the Amihud (2002) illiquidity ratio, which relates absolute returns to trading volume and is interpreted as a reduced-form proxy for price impact. A robust empirical finding is that investors demand a premium for holding illiquid stocks, so expected returns increase with illiquidity or with exposure to liquidity risk (Amihud and Mendelson, 1986; Amihud, 2002). Building on this insight, Pástor and Stambaugh (2003) and Acharya and Pedersen (2005) develop asset-pricing frameworks in which systematic liquidity risk is priced and a security's required return depends on both its own liquidity and the comovement of its liquidity with marketwide conditions. At the market level, aggregate liquidity is highly volatile and negatively serially dependent, namely that liquidity is significantly decreased in bear markets and recent market volatility is associated with a decrease in trading (Chordia et al., 2001). These contributions underscore that explaining the determinants of stock liquidity is important not only for trading costs, but also for the cost of capital and risk premium.

A large strand of research examines the firm-level determinants of stock liquidity (Chordia, Roll, & Subrahmanyam, 2001; Holden, Jacobsen, & Subrahmanyam, 2014; Naik & Reddy, 2021). Firm size, trading activity and free float are generally associated with better liquidity, while higher volatility, more severe information asymmetry and concentrated ownership tend to deteriorate it (Ding, Nilsson, & Suardi, 201; Rubin, 2007; Norvaišienė & Stankevičienė, 2014). For instance, recent evident for the European insurance and pensions markets is provided by Noja *et al*. (2023), indicating that ownership concentration negatively affects financial performance, suggesting that concentrated structures may weaken the firm fundamentals required to support robust market liquidity. Studies that estimate spreads and depth for broad cross-sections of firms show that trading characteristics such as volume and turnover are strong predictors of liquidity: more actively traded stocks tend to have tighter spreads and higher depth (Chordia et al., 2001). At the same time, macroeconomic and balance-sheet conditions such as earnings, leverage and interest

rates have been shown to explain time-variation in liquidity, with more benign macro and stronger firm fundamentals typically associated with higher liquidity and lower trading costs (Chordia et al., 2005; Naik & Reddy, 2021). These findings suggest that liquidity is jointly shaped by trading patterns, the information environment and firm characteristics that are themselves linked to ownership structure.

Within this framework, institutional investors play a dual role as both major providers and intensive consumers of liquidity. Institutional investors account for a large proportion of trading volume and are usually better informed and more sophisticated than retail investors. Their presence is strongly associated with richer disclosure, more analyst coverage and stronger governance, channels that reduce information asymmetry and adverse selection and should therefore enhance stock liquidity. Empirical studies that focus directly on institutional ownership and liquidity generally document a positive association. Liu (2013), for example, shows that stocks with higher institutional ownership exhibit better liquidity, especially when information asymmetry is high, and interprets this as evidence that information competition among institutions improves liquidity.

Agarwal (2007) similarly emphasizes that institutional investors' information advantage can affect liquidity through the following channels: information efficiency and adverse selection and document a U-shaped link between stock liquidity and institutional ownership. The information efficiency effect is explained by the increased competition among institutional investors, while the adverse selection effect arises from the informational asymmetry. The impact of institutional investors also depends on other factors such as disclosure environment and risk, together with the investment horizon of institutional investors. For instance, long-term oriented institutional investors, as well as risk-averse institutions tend to decrease liquidity. International evidence by Dang et al. (2019) indicates that institutional investors can also amplify the propagation of liquidity shocks, as was previously observed during the global financial crisis of 2008-2009, namely that equities with higher institutional ownership during the pre-crisis period were more profoundly affected by price drops.

At the same time, the impact of institutional ownership on liquidity is far from uniform and depends crucially on investor heterogeneity. The literature commonly distinguishes between long-horizon or dedicated institutions and short-horizon or transient institutions (Bushee, 2001; Yin, Ward, & Tsolacos, 2018). Long-horizon investors are more engaged in monitoring and governance, encourage better disclosure and reduce information asymmetry, which should support tighter spreads and more resilient liquidity. Short-horizon institutions instead rebalance portfolios frequently, respond aggressively to flows and are more prone to herding. Evidence on commonality in liquidity shows that institutional ownership can increase the synchronicity of liquidity across stocks when institutions trade in the same direction, thereby reinforcing episodes of liquidity deterioration (Koch, Ruenzi, & Starks, 2016). These patterns are consistent with the mixed findings on volatility: the same mechanisms that can reduce mispricing and stabilize prices in normal times can also produce strong order imbalances and price impact in stressed conditions.

Dividend policy is another important dimension through which institutional investors may affect stock liquidity. A robust result in the payout literature is that institutions tend to avoid non-dividend-paying firms and display a clear preference for dividend payers, with an additional inclination toward firms that supplement or partially substitute dividends with share repurchases (Grinstein and Michaely, 2005). This clientele effect means that dividend-paying firms are more likely to be held by institutions, to be larger and more mature, and to have better disclosure and governance, features that are usually associated with higher liquidity and lower trading costs. At the same time, the concentration of institutional ownership in dividend-paying stocks tends to generate intense trading around dividend announcements and ex-dividend dates. Karpoff (1987) theoretically and empirically links higher turnover to greater variability in returns. Azzam (2010) further documents that institutional investors are more prone to institutional herding than companies that do not pay

dividends. Such a finding is reiterated in the literature by Sias (2004), which suggest that institutional follow each other in and out for the same equities.

This interaction between institutional ownership and liquidity has attracted growing attention in both developed and emerging markets. While several studies for developed markets report a generally positive relation between institutional ownership and stock liquidity, recent work on emerging markets yields more nuanced results. Dinh (2024) finds that institutional ownership can, for the stocks listed on Ho Chi Minh Stock Exchange, during the 2008 to 2017 period, be negatively related to liquidity, reflecting that institutional investors that possess superior information could deepen the informational asymmetry. These conflicting findings reinforce the idea that institutional investors' net effect on liquidity depends on market structure, the distribution of investor types, and corporate policies such as payout.

European equity markets provide a particularly rich environment to study these issues. First, there is pronounced cross-country heterogeneity in investor protection, market development and the depth of the domestic institutional investor base. Second, regulatory changes such as MiFID and MiFID II have reshaped trading architecture by encouraging competition across venues and altering transparency and research coverage, which in turn affect both information asymmetry and trading costs. Evidence on MiFID II's research unbundling suggests that reduced analyst coverage for smaller firms is associated with wider spreads and worse liquidity, while large and visible firms are less affected. Third, European blue-chip indices such as STOXX Europe 600 concentrate institutional investment and index-tracking strategies, creating an environment in which benchmark-driven trading and herding can have sizable effects on liquidity, particularly for index constituents relative to non constituents.

Against this backdrop, our focus on the dynamics and determinants of stock liquidity in European equity markets is motivated by three main considerations. First, liquidity is an important channel through which institutional ownership and corporate policies such as dividend payouts can affect the cost of capital and risk for European firms. Second, the mixed evidence on whether institutional investors are liquidity providers or liquidity consumers suggests that ownership composition, payout policy and firm characteristics need to be analyzed jointly rather than in isolation. Third, the European institutional and regulatory environment offers substantial variation across countries and over time, making it possible to examine how changes in institutional participation and payout behavior are reflected in the evolution of stock liquidity for STOXX Europe 600 constituents. These considerations guide the empirical design of this study and motivate the hypotheses developed in Section 2.2.

2.2. Hypothesis development

RQ$_1$: To what extent is stock liquidity (measured by turnover) persistent over time for European listed firms?

Following the Efficient Market Hypothesis (Fama, 1970), the persistence of stock returns and volatility has been widely analyzed across different datasets, time spans, and econometric frameworks to assess the degree of market efficiency. Early empirical research relied heavily on the autoregressive conditional heteroskedasticity (ARCH) model (Engle, 1982) and its generalized form, GARCH (Bollerslev, 1986), which remain standard tools for examining short-run volatility dynamics. The GARCH framework was extended by recent applications to identify complex volatility patterns in the region, for instance, Lupu *et al.* (2024) utilize clustering techniques on GARCH estimates to identify distinct volatility transitions across European markets. Subsequent work explored the possibility of long-range dependence in financial markets through fractionally integrated processes such as ARFIMA, revealing varying degrees of predictability in returns (Aye *et al.,* 2014). The persistence of market behaviour has also been investigated across different market regimes. For instance, Gil-Alana *et al.* (2014) study bull and bear periods separately, although they find no systematic differences in persistence between the two.

Moreover, Granger and Hyung (2004) show that occasional structural breaks in financial time series may generate apparent long-memory behaviour, leading them to propose the Occasional Long Memory (OLM) model.

While persistence in returns and volatility has been extensively studied for U.S. and Asian markets, evidence for European markets remains relatively limited. Applying fractional integration methods, Gil-Alana et al. (2023) show that European stock indices exhibit high persistence, with orders of integration close to one, particularly after correcting for autocorrelation, suggesting little evidence of mean reversion. Caporale et al. (2024) analyse persistence in both returns and volatility at multiple frequencies (daily, weekly, and monthly) for major European indices (CAC, IBEX 35, DAX, FTSE 100, and Euro Stoxx 50). Their findings indicate that long-memory characteristics appear in daily returns and in volatility measures at daily and weekly frequencies, but not at the monthly frequency.

While much research has focused on the persistence of returns and volatility, less is known about whether liquidity exhibits similar temporal dependence. Market efficiency is fundamentally influenced by liquidity, which affects price discovery, reflects market depth, and contributes to financial system stability. Understanding liquidity persistence is therefore crucial, as it may affect trading costs, price formation, and the stability of financial markets.

A substantial body of market microstructure theory suggests that stock liquidity, particularly turnover, may indeed be persistent. Changes in a stock's liquidity can have lasting effects, as investors sometimes underreact to liquidity shocks. Order-flow dynamics play a central role: trades exhibit autocorrelation over time due to institutional investor strategies, correlated trading motives, and the gradual release of private information by informed traders (Hasbrouck, 1991). As emphasized in O'Hara (2018), microstructure models with heterogeneous investor types (e.g. informed vs uninformed, liquidity-motivated, different horizons) naturally give rise to persistent, clientele-specific trading patterns that shape liquidity over time. Serial dependence in trading activity also arises from microstructure frictions, such as inventory management constraints faced by market makers and other liquidity providers. These frictions create temporary imbalances between the supply and demand for fast trade execution, and because these imbalances do not resolve instantly, they generate persistent trading patterns. Finally, informational asymmetries and the clustering of news releases can cause trading intensity to remain elevated or subdued for extended periods. Together, these mechanisms indicate that liquidity, like returns and volatility, may exhibit meaningful temporal dependence, motivating an empirical assessment of turnover persistence for European equities.

RQ_2: Is higher institutional ownership associated with higher stock liquidity once we control for firm size, growth opportunities, capital structure, dividend policy and time effects?

The analysis of liquidity persistence in RQ_1 highlights that trading activity and turnover are not only subject to short-term fluctuations but also exhibit systematic patterns over time. Understanding these dynamics naturally raises the question of what factors influence liquidity at the firm level. Among potential determinants, the presence of institutional investors in the ownership structure has been widely theorized to shape trading behavior and market liquidity. Motivated by these considerations, RQ_2 investigates whether higher institutional ownership is associated with differences in stock liquidity, controlling for key firm-level characteristics and temporal effects.

Institutional ownership has long been viewed as a stabilizing force in financial markets, as institutional investors are generally believed to provide liquidity and improve price efficiency. However, concerns have been raised about the impact of institutional investors on market stability, particularly during periods of liquidity stress. Hedge funds, in particular, have attracted heightened scrutiny following recent financial crises due to their use of leverage, short-term funding, and potentially aggressive trading strategies, which may amplify liquidity shocks.

These considerations raise important questions about the relationship between institutional ownership and stock liquidity. While institutional investors may enhance liquidity under normal market conditions, their trading behavior could also increase exposure to fluctuations in market liquidity (liquidity risk), especially during turbulent periods. Prior research highlights that institutional and individual investors differ in trading patterns, investment horizons, and information access, suggesting that their impact on liquidity may not be uniform. Institutional investors can enhance liquidity via informed trading and commitment to long-term positions, while conversely, they may exacerbate liquidity risk during crises due to herd behavior, leverage, or short-term withdrawal of capital (Kyle, 1985; Garleanu and Pedersen, 2011; Nofsinger & Sias, 1999).

Building on these theoretical considerations, we hypothesize that institutional ownership exerts a systematic influence on stock liquidity. Specifically, we investigate whether variations in institutional ownership are associated with differences in liquidity, after controlling for firm-level determinants including size, growth opportunities, capital structure, dividend policy, and temporal effects. This empirical strategy enables a precise assessment of the relationship between ownership structure and liquidity, isolating the effect of institutional holdings from other factors that affect trading activity.

RQ$_3$: Does the information environment, proxied by analyst recommendations, matter for stock liquidity? Are firms with different recommendation status (e.g. no recommendation) systematically more or less liquid?

A substantial literature examines how a firm's information environment shapes market liquidity. Classic microstructure models show that liquidity is fundamentally influenced by information asymmetry between informed and uninformed traders (Kyle, 1985; Admati & Pfleiderer, 1988), with illiquidity emerging when market makers face heightened adverse selection risk. Early work on market transparency similarly emphasizes that greater disclosure reduces information asymmetry and thereby enhances liquidity (Welker, 1995; Balakrishnan et al., 2014). In this context, analyst activity, and particularly analyst recommendations, plays an important role in disseminating information to the market, reducing uncertainty, and improving price discovery.

However, recent research highlights that the information environment may affect liquidity through additional channels beyond pure information asymmetry. Johnson and So (2018), for example, argue that the structure of volatility is an important intermediary: markets characterized by infrequent large price jumps (jump volatility) impose greater inventory risk on liquidity providers than those dominated by smooth, diffusive price changes. This implies that analyst coverage may influence liquidity indirectly by shaping investors' expectations about future volatility dynamics, not only by reducing asymmetric information.

Building on these insights, we investigate whether firms with different analyst recommendation statuses, such as having no analyst coverage, exhibit systematically different levels of liquidity. If analyst activity improves the information environment and reduces both information asymmetry and inventory risk, firms lacking recommendations should, on average, display lower liquidity. Conversely, if analyst coverage amplifies trading activity or induces herd behavior, the relationship may be more complex. Our analysis explores these mechanisms empirically by examining whether variation in analyst recommendations is associated with differences in stock liquidity across firms.

RQ$_4$: Among firm characteristics, institutional ownership and analyst-related variables, which are the main drivers of the level and dynamics of stock turnover?

Different factors and variables from the areas of information economics, market microstructure and corporate finance contribute to different extent to the level (cross-sectional variation) and persistence/dynamics (time-series variation) of stock turnover.

Trading activity is jointly influenced by firm characteristics, ownership structure, and the flow of market-relevant information. Larger firms with transparent operations typically exhibit higher liquidity, while factors such as leverage, market uncertainty, and dividend policy may affect the willingness of traders to provide liquidity. This is because larger and more transparent firms tend to attract higher trading volumes, and in the same time highly leveraged or opaque firms may deter liquidity providers.

Institutional investors can either enhance or reduce liquidity depending on their investment horizon, trading strategies, and risk management constraints. Similarly, analyst coverage and recommendation activity shape the information environment by affecting information asymmetry, perceived uncertainty, and volatility structure. To disentangle the contribution of these factors, we estimate a series of panel regressions that distinguish between the level and dynamics of turnover, incorporating firm fixed effects and time effects. By comparing the explanatory power of firm characteristics, institutional ownership measures, and analyst-related variables, both individually and jointly, we identify the main drivers of liquidity across firms and over time.

3. Data and variables

3.1 Sample construction

The empirical analysis is based on quarterly panel data for firms included in the STOXX Europe 600 index over the period 2005–2025. The STOXX Europe 600 is a broad, free-float market-capitalization index that comprises large, mid, and small capitalization companies from major European markets, and therefore provides a comprehensive representation of European listed firms.

For each constituent, we collect quarterly information on trading activity, ownership structure, analyst recommendations, and standard accounting and market-based firm characteristics. Financial and market data are merged at the firm–quarter level, and firm identifiers are harmonized across databases. The resulting panel is unbalanced, since firms enter and leave the index over time and data are occasionally missing. After removing observations with missing values for the key variables, the final sample contains 14,489 firm–quarter observations.

3.2 Dependent variable

The main proxy for stock liquidity is stock turnover. For firm i in quarter t, turnover is defined as the ratio of trading volume to the number of shares outstanding, expressed at a quarterly frequency:

$$\text{Turnover}_{it} = \frac{\text{Shares traded}_{it}}{\text{Shares outstanding}_{it}}$$

This measure captures the intensity of trading relative to the firm's free float and is widely used as an indicator of market liquidity, since higher turnover reflects more active trading and a greater ability to convert positions into cash without large price concessions.

In addition to regressions in levels, we use a standardized version of turnover, denoted $\widetilde{\text{Turnover}}_{it}$, which is obtained by subtracting the sample mean and dividing by the sample standard deviation. This transformation does not affect statistical significance but allows a direct comparison of the relative economic importance of different regressors.

3.3 Key explanatory variables

We focus on three sets of firm-level determinants: ownership structure, firm characteristics, and the information environment.

Institutional ownership

Institutional ownership is measured as the share of total shares held by institutional investors. We work with the natural logarithm of institutional holdings, denoted InstOwn_{it}, which smooths the distribution and mitigates the influence of extreme values:

$$\text{InstOwn}_{it} = \ln(\text{Institutional holdings share}_{it}).$$

In the standardized regressions, we use the z-score of this variable, $\widetilde{\text{InstOwn}}_{it}$.

Information environment

To capture the information environment, we use the number of buy recommendations issued by financial analysts for each firm and quarter, denoted NoRec_{it}. This variable reflects the intensity of positive analyst coverage and is interpreted as a proxy for the amount of favourable information being disseminated to the market. In some specifications we use the standardized form $\widetilde{\text{NoRec}}_{it}$, which allows us to compare its effect with that of other variables on the same scale.

3.4 Control variables

The baseline specification includes a standard set of firm-level controls that are known to affect liquidity:

- **Firm size** (Size_{it}): market value of equity, denoted MV_{it}. Larger firms are typically more liquid, due to broader investor bases and greater visibility.
- **Growth opportunities** (MTBV_{it}): market-to-book ratio, defined as the ratio of market value of equity to book value of equity.
- **Profitability** (ROE_{it}): return on equity, computed as net income over book equity.
- **Capital structure** (DebtCap_{it}): debt-to-capital ratio, defined as total debt over the sum of debt and equity.
- **Dividend policy** (DY_{it}): dividend yield, measured as cash dividends over market value of equity.

All continuous regressors are standardized in the main reported regressions so that coefficients can be interpreted as the effect of a one standard deviation change in the regressor on liquidity (in standard deviation units). Time fixed effects are included at the quarterly level to capture common shocks that affect all firms in a given quarter, such as macroeconomic conditions or market-wide regulatory changes.

Table 1 reports descriptive statistics for the variables used in the empirical analysis. The Turnover Ratio has a mean of about 65,000 and a very high standard deviation and maximum value, indicating a strongly right-skewed distribution of liquidity with a few very actively traded stocks. Institutional ownership (log) and firm size (Market Value) display moderate dispersion, while variables such as Market-to-Book and Return on Equity exhibit very large ranges, reflecting substantial heterogeneity in firms' valuation and profitability. Capital structure and payout variables (Debt-to-Capital and Dividend Yield), as well as the number of buy recommendations, are generally within plausible ranges for listed European firms.

Table 1. Descriptive statistics

	Mean	Standard deviation	Min	Max
Turnover Ratio	65617.968	135375.683	4.479	4490982.965
Institutional ownership	2.045	0.662	0.511	4.304

(log) Market Value	3.882	0.640	1.533	6.171
Market-to-Book	3.064	73.959	-5401.695	1090.020
Return on Equity	20.493	73.788	-262.320	2409.860
Debt-to-Capital	38.708	22.210	0.000	111.220
Dividend Yield	2.865	2.495	0.000	91.082
No. Buy Recommendations	0.419	0.462	0.000	4.414
Observations	14489			

4. Empirical methodology

4.1 Dynamic fixed-effects specification

To analyze the dynamics and determinants of stock liquidity, we estimate a dynamic panel model in which current turnover depends on its own lag, institutional ownership, the information environment, and firm characteristics. For firm i in quarter t, the baseline specification can be written as:

$$\text{Turnover}_{it} = \alpha_i + \lambda_t + \rho\,\text{Turnover}_{i,t-1} + \gamma' Z_{it} + u_{it}, \quad (1)$$

where α_i captures firm fixed effects, λ_t captures time (quarter) fixed effects, ρ measures the persistence of liquidity, Z_{it} is the vector of observed firm-level determinants, and u_{it} is the idiosyncratic error term. The vector Z_{it}includes institutional ownership, firm size, market-to-book ratio, return on equity, debt-to-capital ratio, dividend yield, and the number of buy recommendations:

$$Z_{it} = (\text{InstOwn}_{it}, \text{Size}_{it}, \text{MTBV}_{it}, \text{ROE}_{it}, \text{DebtCap}_{it}, \text{DY}_{it}, \text{NoRec}_{it})'.$$

Equation (1) is first estimated using a fixed-effects estimator with firm and time dummies. Standard errors are clustered at the firm level in order to allow for arbitrary serial correlation and heteroskedasticity within firms over time. This specification exploits within-firm variation and controls for all time-invariant firm characteristics, such as industry affiliation, business model, or listing venue.

In the results section we also report estimates based on standardized variables, which correspond to the same model as in equation (1), but where both the dependent variable and all continuous regressors are transformed to have mean zero and unit variance.

4.2 Dynamic system GMM estimation

The presence of the lagged dependent variable $\text{Turnover}_{i,t-1}$ in equation (1) implies that the fixed-effects estimator is biased in panels with a relatively short time dimension. In addition, some regressors, such as institutional ownership and analyst recommendations, may be endogenous or predetermined with respect to liquidity. To address these concerns, we re-estimate the model using two-step system GMM, following Arellano and Bover (1995) and Blundell and Bond (1998).

Let the error term be decomposed as:

$$u_{it} = \eta_i + \varepsilon_{it},$$

where η_i is an unobserved firm-specific effect and $\varepsilon_{it}$is an idiosyncratic error with zero mean. The differenced form of equation (1) is:

$$\Delta\text{Turnover}_{it} = \rho\,\Delta\text{Turnover}_{i,t-1} + \gamma'\Delta Z_{it} + \Delta\varepsilon_{it}. \quad (2)$$

System GMM combines this differenced equation with the level equation (1) and exploits two sets of moment conditions. For the differenced equation, we use lagged levels of the dependent variable as instruments:

$$\mathbb{E}[\text{Turnover}_{i,t-s}\,\Delta\varepsilon_{it}] = 0, s \geq 2,$$

which implies that $\text{Turnover}_{i,t-2}$and $\text{Turnover}_{i,t-3}$are valid instruments for $\Delta\text{Turnover}_{i,t-1}$. For the level equation, additional moment conditions based on lagged differences are used under suitable stationarity assumptions:

$$\mathbb{E}[\Delta\text{Turnover}_{i,t-s}\,u_{it}] = 0, s \geq 1.$$

In the empirical implementation, we treat the lagged dependent variable as endogenous and instrument it using its own lagged levels and differences from periods $t-2$ and $t-3$. To avoid instrument proliferation, we use the collapse option so that the number of instruments remains small relative to the number of firms. Institutional ownership, firm characteristics, and analyst recommendations enter the specification as predetermined or exogenous variables and are included as standard instruments in levels. All specifications include firm and time dummies.

We estimate the system GMM models using two-step generalized method of moments with robust standard errors and a finite-sample correction for the covariance matrix. The validity of the specification is assessed using the Arellano–Bond tests for first- and second-order serial correlation in the differenced residuals and the Hansen test of overidentifying restrictions. A well-specified model should display significant first-order autocorrelation, no evidence of second-order autocorrelation, and a Hansen p-value that does not indicate rejection of the instrument set.

Taken together, the fixed-effects and system GMM estimates provide complementary evidence on the dynamics and determinants of stock turnover. The fixed-effects models capture within-firm relationships under the assumption of strict exogeneity, while the system GMM framework relaxes this assumption and allows for dynamic feedback between liquidity and its determinants.

5. Empirical results and discussions

Table 2 reports the determinants of stock liquidity, measured by standardized stock turnover, using a static fixed-effects model (column 1) and a dynamic System GMM specification (column 2). Across both models, stock liquidity is highly persistent: the coefficient on lagged standardized turnover is about 0.70–0.73 and strongly significant at the 1% level. This implies that a 1 standard deviation increase in last period's liquidity is associated with roughly a 0.7 standard deviation increase in current liquidity, confirming strong dynamics in trading activity. This provides a clear answer to RQ_1, showing that liquidity, like returns and volatility in earlier work (Engle, 1982; Bollerslev, 1986; Ding et al., 1993; Gil-Alana et al., 2014; Caporale et al., 2024), exhibits substantial persistence over time in European equity markets.

Table 2. Determinants of stock liquidity (standardized variables)

	(1) Fixed effects	(2) System GMM
Lagged standardized stock turnover	0.698***	0.729***
	(0.044)	(0.035)
Institutional ownership (std.)	-0.002	-0.001
	(0.002)	(0.002)
Market value (std.)	0.059***	0.076***
	(0.012)	(0.012)
Market-to-book ratio (std.)	0.001***	0.001***
	(0.000)	(0.000)
Return on equity (std.)	0.000	-0.001

	(0.001)	(0.001)
Debt-to-capital ratio (std.)	-0.015	-0.048***
	(0.017)	(0.018)
Dividend yield (std.)	-0.001	0.001
	(0.003)	(0.002)
Number of buy recommendations (std.)	0.009***	0.008***
	(0.003)	(0.003)
_cons	0.005	-0.019***
	(0.008)	(0.006)
Observations	14489.000	14489.000
AR(1) p-value		0.002
AR(2) p-value		0.139
Hansen p-value		0.334

Standard errors in parentheses

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Regarding the main variables of interest, institutional ownership (standardized) has a very small and statistically insignificant coefficient in both specifications. Conditional on firm fixed effects, past liquidity and the other controls, there is no robust evidence that higher institutional ownership is directly associated with higher or lower stock liquidity in this sample. This result directly addresses RQ_2 and suggests that, for large European firms, institutional presence per se does not systematically translate into more liquid trading once size, growth opportunities, capital structure and payout policy are controlled for. This finding contrasts with some studies that document a positive link between institutional ownership and liquidity, especially in emerging markets (Liu, 2013; Bao Dinh & Tran, 2024), but is consistent with the more mixed evidence in the broader literature, where the effect of institutions is found to be context-dependent and sometimes non-linear (Agarwal, 2007; Rubin, 2007; Dang et al., 2019).

By contrast, firm size is consistently and positively related to liquidity. The coefficient on Market value (standardized) is positive and significant at the 1% level in both models (0.059 in the fixed-effects regression and 0.076 in the System GMM), indicating that larger firms tend to exhibit more liquid trading, in line with standard microstructure evidence that big, visible firms attract more trading and lower trading costs (Amihud, 2002; Chordia et al., 2000, 2001; Holden et al., 2014). The market-to-book ratio also has a positive and statistically significant coefficient, although the magnitude is very small, suggesting that firms with higher valuations enjoy slightly better liquidity. Profitability, measured by return on equity, is not significantly related to liquidity in either specification. Capital structure appears to matter only in the dynamic specification: the coefficient on Debt-to-capital is negative and significant in the System GMM model (−0.048), indicating that more highly leveraged firms tend to have somewhat lower liquidity once endogeneity is addressed. This is broadly consistent with the view that higher leverage can increase risk and reduce the willingness of investors to trade (Naik & Reddy, 2021). Both dividend yield and institutional ownership remain statistically insignificant, suggesting that payout policy and institutional presence do not have a clear unconditional effect on liquidity once size, valuation, leverage and past liquidity are considered. Taken together, these results relate to RQ_4: among firm characteristics, past liquidity and firm size emerge as the dominant drivers of stock turnover, with leverage and valuation playing more modest roles.

The information environment, proxied by the number of buy recommendations, is positively and significantly associated with liquidity in both models (around 0.008–0.009). This is consistent with the idea that stronger analyst support and more optimistic recommendations are linked to higher trading activity and better liquidity, as analysts produce and disseminate firm-specific information

that reduces information asymmetry and stimulates order flow (Brennan & Subrahmanyam, 1995; Balakrishnan et al., 2014; Welker, 1995). This result aligns with recent evidence by Rehman *et al.* (2024), who highlight that information flows derived from news or sentiment play a critical role in driving market behavior. These findings directly answer RQ_3, indicating that firms with more favorable analyst recommendations are systematically more liquid than similar firms. In the context of RQ_4, the standardized coefficients show that analyst recommendations have a non-trivial but secondary effect: liquidity dynamics are dominated by their own past values and by firm size, while analyst-related variables provide an additional channel through which the information environment supports market depth and trading intensity.

For the System GMM estimation, the AR(1) test yields a low p-value (0.002), indicating first-order serial correlation in the differenced residuals, which is expected in dynamic panels, while the AR(2) test does not reject the null (p-value 0.139), suggesting no evidence of second-order serial correlation. The Hansen test of overidentifying restrictions has a p-value of 0.334, so the validity of the instrument set cannot be rejected. These diagnostics are consistent with a well-specified dynamic panel model in the spirit of Arellano and Bover (1995) and Blundell and Bond (1998), and they reinforce the conclusion that the main results from the fixed-effects model are robust to endogeneity concerns.

Conclusions

This paper has shown that stock market liquidity in European equities, proxied by turnover, is strongly persistent over time, with past liquidity and firm size emerging as the dominant drivers of current liquidity. Using dynamic panel system GMM models for STOXX Europe 600 firms over 2005–2025, we find that, once firm characteristics and time effects are controlled for, institutional ownership does not exhibit a robust, independent effect on liquidity. By contrast, the information environment matters since firms with stronger analyst buy recommendations tend to display higher turnover, suggesting that analyst activity supports liquidity by improving information flows and attracting trading interest. Overall, our results indicate that liquidity dynamics in European stock markets are primarily shaped by their own history, firm scale, and analyst coverage, while the mere presence of institutional investors plays a more limited role than commonly assumed.

References

Acharya, V. V., & Pedersen, L. H., 2005. Asset pricing with liquidity risk. Journal of financial Economics, 77(2), pp.375-410.

Admati, A. R., & Pfleiderer, P., 1988. Selling and Trading on Information in Financial Markets. The American Economic Review, 78(2), pp.96–103.

Agarwal, P., 2007. Institutional ownership and stock liquidity. Available at SSRN 1029395.

Akerlof, G. A., 1970. The Market for "Lemons": Quality Uncertainty and the Market Mechanism. The Quarterly Journal of Economics, 84(3), pp.488–500.

Amihud, Y., & Mendelson, H., 1986. Liquidity and stock returns. Financial Analysts Journal, 42(3), pp.43-48.

Amihud, Y., 2002. Illiquidity and stock returns: cross-section and time-series effects. Journal of Financial Markets, 5(1), pp.31-56.

Arellano, M., & Bover, O., 1995. Another look at the instrumental variable estimation of error-components models. Journal of Econometrics, 68(1), pp.29-51.

Aye, G. C., Balcilar, M., Gupta, R., Kilimani, N., Nakumuryango, A., & Redford, S., 2014. Predicting BRICS stock returns using ARFIMA models. Applied Financial Economics, 24(17), pp.1159-1166.

Azzam, I., 2010. The impact of institutional ownership and dividend policy on stock returns and volatility: Evidence from Egypt. International Journal of Business, 15(4), 443.

Balakrishnan, K., Billings, M. B., Kelly, B., Ljungqvist, A., 2014. Shaping Liquidity: On the Causal E§ects of Voluntary Disclosure. The Journal of Finance, 69(5), pp.2237-2278.

Bao Dinh, N., & Tran, V. N. H., 2024. Institutional ownership and stock liquidity: evidence from an emerging market. SAGE Open, 14(1), 21582440241239116.

Blundell, R., & Bond, S., 1998. Initial conditions and moment restrictions in dynamic panel data models. Journal of Econometrics, 87(1), pp.115-143.

Bollerslev, T., 1986. Generalized autoregressive conditional heteroskedasticity. Journal of Econometrics, 31(3), pp.307-327.

Brennan, M. J., & Subrahmanyam, A., 1995. Investment analysis and price formation in securities markets. Journal of Financial Economics, 38(3), pp.361-381.

Bushee, B. J., 2001. Do institutional investors prefer near - term earnings over long - run value?. Contemporary Accounting Research, 18(2), pp.207-246.

Butler, A. W., Grullon, G., & Weston, J. P., 2005. Stock market liquidity and the cost of issuing equity. Journal of Financial and Quantitative Analysis, 40(2), pp.331-348.

Caporale, G.M. et al., 2024. Persistence in European stock market returns and volatility. International Journal of Business and Economics, 9(1), pp.55-56.

Chordia, T., Roll, R., & Subrahmanyam, A., 2000. Commonality in liquidity. Journal of Financial Economics, 56(1), pp.3-28.

Chordia, T., Roll, R., & Subrahmanyam, A., 2001. Market liquidity and trading activity. The Journal of Finance, 56(2), pp.501-530.

Chordia, T., Sarkar, A., & Subrahmanyam, A., 2005. An empirical analysis of stock and bond market liquidity. The Review of Financial Studies, 18(1), pp.85-129.

Dang, T. L., Moshirian, F., & Zhang, B., 2019. Liquidity shocks and institutional investors. The North American Journal of Economics and Finance, 47, 184-209.

Ding, M., Nilsson, B., & Suardi, S., 2013. Foreign institutional investors and stock market liquidity in China: State ownership, trading activity and information asymmetry. Systemic Risk: Liquidity Risk, Governance and Financial Stability.

Engle, R. F., 1982. Autoregressive conditional heteroscedasticity with estimates of the variance of United Kingdom inflation. Econometrica: Journal of the Econometric Society, 987-1007.

Fama, E. F., 1970. Efficient capital markets: A review of theory and empirical work. The Journal of Finance, 25(2), pp.383-417.

Garleanu, N, Pedersen, L.H., 2011. Margin-based Asset Pricing and Deviations from the Law of One Price. The Review of Financial Studies, 24(6), pp.1980–2022.

Gil-Alana, L. A., Shittu, O. I., & Yaya, O. S., 2014. On the persistence and volatility in European, American and Asian stocks bull and bear markets. Journal of International Money and Finance, 40, 149-162.

Luis A. Gil-Alana, Juan Infante, Miguel Angel Martín-Valmayor, Persistence and long run co-movements across stock market prices, The Quarterly Review of Economics and Finance, 89, 2023.

Granger, C. W., & Hyung, N., 2004. Occasional structural breaks and long memory with an application to the S&P 500 absolute stock returns. Journal of Empirical Finance, 11(3), pp.399-421.

Grinstein, Y., & Michaely, R., 2005. Institutional holdings and payout policy. The Journal of Finance, 60(3), pp.1389-1426.

Hasbrouck, J., 1991. The summary informativeness of stock trades: An econometric analysis. Review of Financial Studies, 4(3), pp.571–595.

Holden, C. W., Jacobsen, S., & Subrahmanyam, A., 2014. The empirical analysis of liquidity. Foundations and Trends® in Finance, 8(4), pp.263-365.

Johnson, T. L., & So, E. C., 2018. A simple multimarket measure of information asymmetry. Management Science, 64(3), pp.1055-1080.

Karpoff, J. M., 1987. The relation between price changes and trading volume: A survey. Journal of Financial and Quantitative Analysis, 22(1), pp.109-126.

Koch, A., Ruenzi, S., & Starks, L., 2016. Commonality in liquidity: a demand-side explanation. The Review of Financial Studies, 29(8), pp.1943-1974.

Kyle, A. S., 1985. Continuous Auctions and Insider Trading. Econometrica, 53(6), pp.1315–1335.

Liu, S., 2013. Institutional ownership and stock liquidity. Investment Management and Financial Innovations, 10(4), pp.18-26.

Lupu, I., Criste, A., Dragu, A. D., & Albu, T. D., 2024. Volatility transitions in European stock markets: A clustering-based approach. *Romanian Journal of Economic Forecasting*, 27(3), pp.65-80.

Naik, P., & Reddy, Y. V., 2021. Stock market liquidity: A literature review. SAGE Open, 11(1), 2158244020985529.

Nofsinger, J. R., & Sias, R. W., 1999. Herding and feedback trading by institutional and individual investors. The Journal of Finance, 54(6), pp.2263-2295.

Noja, G. G., Hurduzeu, G., Cristea, M., Barna, F., Năchescu, M. L., & Gavrilescu, C., 2023. Board characteristics, ownership concentration and the financial performance of European listed insurance companies: New empirical evidence. *Romanian Journal of Economic Forecasting,* 26(4), pp.25-42.

Norvaišienė, R., & Stankevičienė, J., 2014. Companies' internal factors and stock liquidity: Evidence from the Baltic markets. Economics and Business, 26, 76-81.

O'hara, M., 2018. Market microstructure. In The New Palgrave Dictionary of Economics (pp. 8254-8258). Palgrave Macmillan, London.

Pástor, Ľ., & Stambaugh, R. F., 2003. Liquidity risk and expected stock returns. Journal of Political Economy, 111(3), pp.642-685.

Rehman, M. A. ur, Ahmad, M., Ali, F., & Ahmad, H., 2024. Expose the hidden: Investor sentiment and anomaly strategies in emerging market. Romanian Journal of Economic Forecasting, 27(4), pp.63-81.

Rubin, A., 2007. Ownership level, ownership concentration and liquidity. Journal of Financial Markets, 10(3), pp.219-248.

Sias, R. W., 2004. Institutional herding. The Review of Financial Studies, 17(1), pp.165-206.

Welker, M., 1995. Disclosure Policy, Information Asymmetry, and Liquidity in Equity Markets. Contemporary Accounting Research, 11(2), pp.801-827.

Yin, C., Ward, C., & Tsolacos, S., 2018. Motivated monitoring: The importance of the institutional investment horizon. International Review of Financial Analysis, 60, 197–212