The informational variables impact on firm's liquidity in the French market

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Abstract

This paper investigates the informational variables impact on stock liquidity in the French market. We use two types of informational variables: Google search volume from Google Trends database as a proxy of information demand and news headlines for each stock as a proxy for information supply. Concerning the liquidity proxies, we use these measures: the quoted spread, the turnover price impact and the Amihud illiquidity ratio. The results indicate that information variables have an influence on stock liquidity.

Keywords: *Liquidity; Bid-Ask spread; Information asymmetry; Information demand and supply; Amihud ratio; Turnover Price Impact.*

Suggested Citation:
Moussa, F. & Delhoumi, E. (2022). The informational variables impact on firm's liquidity in the French market. *International Journal of Accounting, Business and Finance*, 2 (1), 1-13.

1. Introduction

Transaction volume refers to the total number of trades or transactions that occur in a given market or exchange during a particular period of time, typically a day or a trading session. The transaction volume is often used as a measure of market liquidity because it reflects the ease with which buyers and sellers can trade with each other and convert their assets into cash without affecting market prices significantly. Higher transaction volumes generally indicate higher levels of liquidity, as there are more buyers and sellers actively participating in the market, which can lead to tighter bid-ask spreads and lower trading costs.

In recent years, several research have been interested in the study of the transaction volume behavior. Understanding its dynamics is essential according to Karpoff (1987) for three reasons. First, it allows the distinction between the homogeneity hypothesis and the heterogeneity hypothesis of investors. Second, it helps to better understand the effect of the financial markets' organization (order-driven market and price-driven market) on transaction volume dynamics. Finally, the study of the transaction volume behavior helps to understand the behavior of investors, their attention and their risk aversion.

In this context, several studies have focused on the transaction volume evolution and its determinants. At first, Bagehot (1971) introduced transaction grounds related to an information possession and to satisfy a liquidity need. Furthermore, some previous studies have demonstrated that information asymmetry alone cannot explain how much transaction volume is important in financial markets. They have shown the presence of other factors driving to a transaction activity to know beliefs' heterogeneity, public information, risk aversion. With Internet, it has become easy to attract investors' attention through weblogs and forums (Asur & Huberman, 2010; Bagehot, 1971; Kietzmann *et al.*, 2011). Since Web information is widely disseminated, it could be able to reduce asymmetry between informed and uninformed investors. As Hodge *et al.* (2004) pointed out that Internet technology helps investors access, analyze and understand information, leading to better interpretation.

Recently, using open-source data has been devoted to the study of stock transaction activity and uncertainty through information demand and supply. These studies try to show the impact of information variables on stock price behavior. But we do not notice much research which examine the impact of information demand and supply on stock liquidity. Instead, some papers have studied news disclosure on liquidity (Bischof & Daske, 2013; Frino *et al.*, 2013). For this reason, we devote this document to filling this gap in the literature and to check the impact of both information demand and supply on the stock liquidity in the French Market. The reason behind choosing this market also known as Euronext Paris, because it is one of the largest and most active stock markets in Europe. There are several unique features that make the French stock market distinct from other global stock markets: it is known for its size, liquidity, it has a strong regulatory framework that provides a high level of protection for investors, market structure, and cultural significance, which make it an attractive destination for domestic and international investors alike.

The first objective of this paper is to quantify the information demand, supply measures using, respectively, search volume index in Google Trends database, and news headlines of the firm and market. The second purpose of this study is to examine the impact of information variables on stock liquidity. The main result of the study shows the impact of informational variables on liquidity measures exists but hidden behind the instrumental variables such as stock returns.

The paper is organized as follows. Section 2 presents the literature review. Section 3 presents data and measures. Section 4 applies the research methodology and results. Finally, Section 5 concludes.

2. Literature review

Since the information spread on the Internet has been a voluntary choice for listed companies, several studies have introduced this disclosure in the analysis of signal theory, agency theory and cost-benefit analyzes. The focus on this topic is related to the theories that can explain voluntary disclosure via traditional media such as annual reports, and new channels such as Internet (Marston & Polei, 2004).

This research component began in the late 1990s. Studies at this early stage were descriptive because the Internet was starting to have a powerful impact on firm culture and business (Deller *et al.*, 1999; Gowthorpe & Amat, 1999; Gray & Debreceny, 1997; Petravick & Gillett, 1996; Trites, 1999). A common feature in previous studies is the positive relationship between firm size and Internet reports. This result emphasizes that the size of the company is an important determinant of the Internet use to disseminate information. This finding corresponds to Buzby (1975) who states that the information disclosure cost is low for large firms. Other studies found that individual stock liquidity co-moves to a high degree with market liquidity and industry liquidity (Kumar et al., 2020; Kumar & Misra, 2018).

Later, the empirical work began to study the effects of information diffusion through the internet on the financial markets. Antweiler and Frank (2004) have highlighted the significant effect of web information on stock returns. Recent studies have confirmed that there is a positive relationship between search intensity obtained by Google Trends and trading volume (Bank *et al.*, 2011; Barber & Odean, 2008; Da *et al.*, 2011; Joseph *et al.*, 2011).

Vlastakis and Markellos (2012) showed that online information demand helps to explain variations in the Market Volatility Index (the VIX) and impacts transaction volume. In addition, Rubin and Rubin (2010) found the importance of internet to get company related information. Based on research frequencies on Wikipedia, they showed that the higher the firm

information demand is, the lower are the forecast errors made by analysists. Blankespoor *et al.* (2012) found that spreading via Twitter is negatively associated with information asymmetry.

As we have seen, previous studies did not pay enough attention to examine the impact of information variables on market liquidity. They studied the impact of this type of disclosure on a firm's characteristics (earnings, return, and size). We dedicate this paper to analyze the effect of information demand and supply on liquidity. This study complements the previous ones by examining the relationship between public information in term of demand and supply and stock trading behavior in the French market.

3. Data and measures

3.1 Data selection

The initial sample of stocks consists of all firms listed on the CAC 40 index during an eight-year period from April 2007 to March 2017. The CAC 40 index is based on the forty most actively traded stocks listed in Paris. It includes the most liquid first and second markets under Euronext Paris. To ensure unbiased results we have not considered stocks with the search volume in ten consecutive weeks or equal to zero, then we made a final sample consisting of 25 of the 40 initial stocks.

We choose to collect search volume based on the stocks names as it was cited in Vlastakis and Markellos (2012) and Vozlyublennaia (2014). This choice is because investors type the shares names because stock tickers are not very famous to everyone (Da *et al.*, 2011). Then, in order to get out of using stock names in other items in Internet, we use Google AdWords, which gives related keywords for each search. This tool optimizes company name search. As a proxy for market information request, our analysis employs search volume index for the keyword "CAC40". Google Trends is available on a weekly frequency, so we use weekly data in this analysis.

In addition, to consider the market and stock information supply impact, we collect weekly news headlines data from the software FACTIVA. Table 1 presents the list of stocks and specific search keyword adopted in this paper. The reason behind choosing this market also known as Euronext Paris, because it is one of the largest and most active stock markets in Europe. There are several unique features that make the French stock market distinct from other global stock markets: it is known for its size, liquidity, it has a strong regulatory framework that provides a high level of protection for investors, market structure, and cultural significance, which make it an attractive destination for domestic and international investors alike.

3.2. Firm's liquidity proxies

Market liquidity could be measured by the time it takes to negotiate a given quantity of an asset or to be measured by the price concession for an immediate transaction (Lippman & McCall, 1986). We use several proxies to measure liquidity: The first measure is the bid-ask spread, the second is the Amihud illiquidity ratio and the third measure is the Turnover Price Impact TPI.

3.2.1. The quoted spread (QSpread)

The bid-ask spread, defined as the difference between the selling price (B) and the buying price (A) divided by the bid-ask midpoint (M), which represents the cost of immediacy. To explain the firm news disclosure and information asymmetry relationship we first need to measure information asymmetry in the stock market. Previous research have used different ways to assess it, the bid–ask spread appears to be the most frequently-used proxy to measure information asymmetry in previous studies on accounting information (Leuz & Verrecchia, 2000; Petersen & Plenborg, 2006; Welker, 1995). Being consistent with prior works (Petersen

& Plenborg, 2006; Yoon *et al.*, 2011), this study uses the spread as a proxy of information asymmetry and calculates the quoted spread (QSpread) as per Equation (1).

$$QSpread = \frac{A-B}{M} \quad (1)$$

where, $M = \frac{A+B}{2}$; B is the selling price, A is the buying price and M is the bid-ask midpoint.

We would like to see if the results hold with a slightly different version of measure by using the ((Bid – Ask)/Share Price) which represents the variable TS_{it}, for the stock *i* at week *t*.

3.2.2. The illiquidity Amihud ratio

Following Goyenko *et al.* (2009) and Xiong *et al.* (2013), we use the Amihud illiquidity ratio as a proxy of stock liquidity. It is a measure based on transaction volume. This ratio is calculated by dividing the absolute value of the return $| R_{it} |$ on the trading volume VT_{it} of security *i* for period *t* and defined as in Equation (2).

$$Illiquidity_{it} = \frac{|R_{it}|}{VT_{it}} \quad (2)$$

A low illiquidity ratio indicates a significant liquidity of the security.

3.2.3. Turnover Price Impact (TPI)

We follow Florackis *et al.* (2011) in using TPI as a proxy for stock liquidity. This ratio is estimated from the illiquidity ratio of Amihud (2002) but replacing the transaction volume by the volume of exchange in value and defined by Equation (3).

$$TPI_{it} = \frac{|R_{it}|}{TO_{it}} \quad (3)$$

where, R_{it} is the return of the stock *i* at period *t*, TO_{it} is the transaction volume of the stock *i* at *t*. This measure of liquidity is characterized by the fact that it is less influenced by inflation and the firm size. A security with a high TPI ratio can be interpreted as a less liquid stock.

3.3. Control variables

Previous research suggests several variables to control the liquidity model such as closing price, price volatility, trading activity, trade frequency, size of trade, and firm value (Chen *et al.*, 2007; Stoll, 2000; Welker, 1995). We use the following control variables: stock return, price volatility, trading activity, market value as control variables.

4. Research methodology and results

We first categorized our sample into three groups based on the stock market value. There are three groups G1 is the group of small-Market value stocks, G2 is the group of a medium market value and G3 includes securities with large market value. Securities with large market value refer to financial assets that have a high total value in the market. Market value is the current price of a security multiplied by the total number of outstanding shares. Securities with a large market value are typically issued by large, established companies with a significant market capitalization. They are highly liquid, as they can be easily traded due to their popularity and high demand in the market.

Then we start by estimating liquidity with informational variables and the traditional (explanatory) control variables that determine it.

$$QS_{it} = \theta_1 + \theta_2 IDF_{it} + \theta_3 ISF_{it} + \theta_4 IDM_{it} + \theta_4 ISM_{it} + \theta_5 \sigma_{it}^2 + \theta_6 R_{it} + \theta_7 VT_{it} + \theta_8 MV_{it} + \varepsilon_t \quad (4)$$

$$TPI_{it} = \theta_1 + \theta_2 IDF_{it} + \theta_3 ISF_{it} + \theta_4 IDM_{it} + \theta_4 ISM_{it} + \theta_5 \sigma_{it}^2 + \theta_6 R_{it} + \theta_7 VT_{it} + \theta_8 MV_{it} + \varepsilon_t \quad (5)$$

$$ILLIQ_{it} = \theta_1 + \theta_2 IDF_{it} + \theta_3 ISF_{it} + \theta_4 IDM_{it} + \theta_4 ISM_{it} + \theta_5 \sigma_{it}^2 + \theta_6 R_{it} + \theta_7 VT_{it} + \theta_8 MV_{it} + \varepsilon_t \quad (6)$$

$$TS_{it} = \theta_1 + \theta_2 IDF_{it} + \theta_3 ISF_{it} + \theta_4 IDM_{it} + \theta_4 ISM_{it} + \theta_5 \sigma_{it}^2 + \theta_6 R_{it} + \theta_7 VT_{it} + \theta_8 MV_{it} + \varepsilon_t \quad (7)$$

where, QS_{it} is the QuotedSpread for the stock i at week t; TPI_{it} is the Turnover Price Impact for the stock *i* at week *t*; $ILLIQ_{it}$, is the illiquidity Amihud ratio for the stock *i* at week *t*; TS_{it} is the ((Bid – Ask)/Share Price) for the stock *i* at week *t*; IDF_{it} , is the firm information demand at week t, ISF_{it} is information supply for the stock *i* at week *t*; IDM_t and ISM_t are respectively the information demand and supply of market at week *t*; σ_{it}^2 is the volatility for the stock *i* at week *t*; R_{it}, is the return for the stock *i* at week *t*; VT_{it} is the weekly transaction volume de transaction for each stock *i*; MV_{it} is the weekly market value for each stock *i*.

4.1. Checking the endogenous variables

Previous work has shown that supply and demand for firm and market information have an impact on the return, volatility, and transaction volume of securities (Moussa *et al.*, 2017; Vlastakis & Markellos, 2012). Hence, we conduct a procedure to show the endogeneity of the variables from the Equations (8) to (12).

$$IDF_{it} = \alpha_1 + \alpha_2 \sigma_{it}^2 + \alpha_3 R_{it} + \alpha_4 VT_{it} + \varepsilon_t \quad (8)$$

$$ISF_{it} = \alpha_1 + \alpha_2 \sigma_{it}^2 + \alpha_3 R_{it} + \alpha_4 VT_{it} + \varepsilon_t \quad (9)$$

$$IDM_{it} = \alpha_1 + \alpha_2 \sigma_{it}^2 + \alpha_3 R_{it} + \alpha_4 VT_{it} + \varepsilon_t \quad (10)$$

$$ISM_{it} = \alpha_1 + \alpha_2 \sigma_{it}^2 + \alpha_3 R_{it} + \alpha_4 VT_{it} + \varepsilon_t \quad (11)$$

$$MV_{it} = \alpha_1 + \alpha_2 \sigma_{it}^2 + \alpha_3 R_{it} + \alpha_4 VT_{it} + \varepsilon_t \quad (12)$$

The results found in Table 1, stock return, volatility and transaction volume have a significant impact on the informational variables and on the stock market value. This result confirms the bidirectional causality relation between the flow of information and the characteristics of the stock market. Hence, we put them as instrumental variables for the informational variables. Then we will estimate the three liquidity measures by the informational variables.

The bidirectional causal relationship between information flow and stock market characteristics suggests that the flow of information affects the characteristics of the stock market, while the characteristics of the stock market also affect the flow of information. For instance, the release of important information, such as a company's earnings report, can lead to changes in the stock market's trading volume, volatility, and liquidity. Conversely, the characteristics of the stock market, such as its level of liquidity and trading volume, can affect the ability of market participants to access and process information, which can impact the flow and dissemination of information. Therefore, it is essential to consider both the flow of information and the characteristics of the stock market in analyzing their impact on each other.

4.2. Estimation of the liquidity measures by the informational

The liquidity estimate will be based on the instrumental variables due to the endogeneity between the informational variables and the traditional explanatory variables of liquidity, namely volatility, return, transaction volume and stock market value. The work is done equation by equation to avoid the problem of identification.

The estimation is carried out using the following models:

$$QS_{it} = \beta_1 + \beta_2 IDF_{it} + \beta_3 ISF_{it} + \varepsilon_t \quad (13)$$

$$QS_{it} = \beta_1 + \beta_2 IDM_{it} + \beta_3 ISM_{it} + \varepsilon_t \quad (14)$$

$$QS_{it} = \beta_1 + \beta_2 MV_{it} + \varepsilon_t \quad (15)$$

$$TPI_{it} = \beta_1 + \beta_2 IDF_{it} + \beta_3 ISF_{it} + \varepsilon_t \quad (16)$$

$$TPI_{it} = \beta_1 + \beta_2 IDM_{it} + \beta_3 ISM_{it} + \varepsilon_t \quad (17)$$

$$TPI_{it} = \beta_1 + \beta_2 MV_{it} + \varepsilon_t \quad (18)$$

$$ILLIQ_{it} = \beta_1 + \beta_2 IDF_{it} + \beta_3 ISF_{it} + \varepsilon_t \quad (19)$$

$$ILLIQ_{it} = \beta_1 + \beta_2 IDM_{it} + \beta_3 ISM_{it} + \varepsilon_t \quad (20)$$

$$ILLIQ_{it} = \beta_1 + \beta_2 MV_{it} + \varepsilon_t \quad (21)$$

$$TS_{it} = \beta_1 + \beta_2 IDF_{it} + \beta_3 ISF_{it} + \varepsilon_t \quad (22)$$

$$TS_{it} = \beta_1 + \beta_2 IDM_{it} + \beta_3 ISM_{it} + \varepsilon_t \quad (23)$$

$$TS_{it} = \beta_1 + \beta_2 MV_{it} + \varepsilon_t \quad (24)$$

The results of estimation Equations (13) – (24), are in Table 2. These estimates were obtained using a random effect by two stages least square G2SLS.

Table 1. Informational variables estimation by return, volatility, and transaction volume

	G1									
	IDF		**ISF**		**IDM**		**ISM**		**MV**	
α2	0.350***	(0.005)	0.122***	(0.000)	1.160***	(0.000)	0.397	(0.157)	-286.370***	(0.000)
α3	0.166***	(0.000)	0.005	(0.268)	0.028	(0.175)	0.190**	(0.004)	16.763**	(0.014)
α4	0.002***	(0.000)	0.000***	(0.013)	0.001***	(0.000)	0.002***	(0.000)	-0.002	(0.917)
α1	36.926***	(0.000)	1.911***	(0.000)	11.004***	(0.000)	86.119***	(0.000)	8560.804***	(0.000)
	G2									
	IDF		**ISF**		**IDM**		**ISM**		**MV**	
α2	0.936***	(0.000)	0.243***	(0.000)	3.539***	(0.000)	1.792***	(0.000)	-1421.210***	(0.000)
α3	0.046	(0.181)	0.006	(0.434)	0.085***	(0.000)	0.141*	(0.072)	68.051***	(0.000)
α4	0.000***	(0.000)	0.000	(0.841)	0.000***	(0.000)	0.000***	(0.000)	-0.072***	(0.000)
α1	36.387***	(0.000)	2.026***	(0.000)	8.365***	(0.000)	87.215***	(0.000)	21773.300***	(0.000)
	G3									
	IDF		**ISF**		**IDM**		**ISM**		**MV**	
α2	0.967***	(0.000)	0.315***	(0.000)	3.359***	(0.000)	2.049***	(0.000)	-2633.983***	(0.000)
α3	0.180***	(0.000)	0.014***	(0.001)	0.024*	(0.078)	0.073	(0.117)	60.115*	(0.055)
α4	0.000	(0.303)	0.000	(0.300)	0.000***	(0.000)	0.000***	(0.002)	0.023	(0.252)
α1	50.182***	(0.000)	2.165***	(0.000)	9.645***	(0.000)	89.188***	(0.000)	55309.410***	(0.000)

Note: ***, **, and * denote significance at 1%, 5%, and 10% levels. The values in parentheses refer to p-value.

First, it has been proved that the informational variables have a significant impact on the Amihud illiquidity ratio and the TPI ratio for the 3 groups of securities. The sign of this impact differs:

(i) The impact of the IDF-specific information request on the Amihud ratio is negative except for large-market value stocks. This result confirms that IDF improves the liquidity of securities but those with a large market value, the opposite effect exists: more demand for information and curiosity reduce liquidity. For the TPI measure, the demand for information influences only small- market value stocks and it is a negative impact.

(ii) Firm-specific information supply has a positive impact on liquidity measures except the Amihud. The information supply has no impact on large- market value. This result indicates that more press articles on the concerned firm generate a reduction in its liquidity in the financial market.

(iii) Contrary to the IDF variable, the market-specific information demand has a positive impact on the TPI and the Amihud ratio for the three groups of securities, so the increase in research on the CAC40 index leads to a decrease of the stock liquidity,

whereas the market-specific supply has a negative impact. As a result, the market information supply improves stock liquidity. Thus, information demand increases the feeling of ambiguity which increases the values of the Amihud ratio and the TPI ratio, this effect generates a decrease of the stock liquidity. On the contrary, market information supply improves the liquidity.

Table 2: Liquidity measures Estimation by the informational variables

	Qspread					
	G1		**G2**		**G3**	
IDF	-0.0006	(0.63)	0.0002	(0.86)	-0.0009	(0.62)
ISF	0.0083	(0.432)	-0.0019	(0.827)	0.0058	(0.557)
const	0.0148	(0.738)	-0.0037	(0.9)	0.0366	(0.646)
IDM	0.0006	(0.399)	0.0001	(0.883)	0.0019	(0.321)
ISM	-0.0005	(0.376)	-0.0004	(0.772)	-0.0028	(0.388)
const	0.0377	(0.377)	0.0400	(0.763)	0.2370	(0.394)
MV	-1.3E-06	(0.504)	-8.2E-08	(0.887)	-2.8E-07	(0.566)
const	1.2E-02	(0.441)	1.0E-03	(0.924)	1.8E-02	(0.479)
	TPI					
	G1		**G2**		**G3**	
IDF	-1.9E-06***	(0.000)	-1.4E-07	(0.532)	-1.4E-07	(0.532)
ISF	3.7E-05***	(0.000)	3.74E-06***	(0.001)	3.74E-06***	(0.001)
const	4.3E-05*	(0.088)	6.58E-06	(0.602)	6.58E-06	(0.602)
IDM	5.23E-06***	(0.000)	1.46E-06**	(0.037)	1.46E-06**	(0.037)
ISM	-4.2E-06***	(0.000)	-1.9E-06**	(0.045)	-1.9E-06**	(0.045)
const	0.00034***	(0.000)	1.65E-04**	(0.036)	0.00017**	(0.036)
MV	-1.2E-08***	(0.000)	-3.5E-10***	(0.000)	-3.5E-10***	(0.000)
const	0.00013***	(0.000)	2.7E-05***	(0.000)	2.7E-05***	(0.000)
	ILLIQUIDITY					
	G1		**G2**		**G3**	
IDF	-8E-05***	(0.000)	-0.0002*	(0.053)	1.4E-05**	(0.018)
ISF	0.00106***	(0.000)	0.00146*	(0.053)	-2.5E-07	(0.993)
const	0.00275***	(0.000)	0.00658**	(0.045)	-0.0004	(0.261)
IDM	0.00018***	(0.001)	6.5E-05***	(0.000)	3.4E-05**	(0.042)
ISM	-0.0002***	(0.000)	-9E-05***	(0.000)	-5E-05**	(0.031)
const	0.01428***	(0.000)	0.00775***	(0.000)	0.00431**	(0.021)
MV	-3.3E-07***	(0.000)	-2.1E-08***	(0.005)	-3.1E-09	(0.145)
const	0.00392***	(0.000)	0.00089***	(0.000)	0.00045***	(0.000)
	txspread					
	G1		**G2**		**G3**	
IDF	-.0000716	(0.575)	.0003369	(0.734)	-.0005936	(0.525)
ISF	.0011899	(0.662)	-.0008242	(0.886)	.0036371	(0.444)
const	.0020008	(0.800)	-.0114761	(0.692)	.024368	(0.530)
IDM	.0001946	(0.592)	-.0000667	(0.879)	.0001752	(0.833)
ISM	-.0001757	(0.462)	.0001789	(0.740)	-3.91e-06	(0.997)
const	.0144976	(0.411)	-.0159655	(0.724)	.0007333	(0.994)
MV	-4.06e-07	(0.728)	-9.89e-08	(0.841)	-2.36e-07	(0.498)
const	.0042963	(0.645)	.0018457	(0.838)	.0154869	(0.384)

Note: ***, **, and * denote significance at 1%, 5%, and 10% levels. The values in parentheses refer to p-value.

(iv) The liquidity measures, QSpread and TS did not have any influence on the information variables or the market value. This does not mean that the informational variables have no impact on them, but as the informational variables are expressed in terms of instrument variables (volatility, return, transaction volume and market value). There will be a compensation effect for these variables. If the effect is positive, then the variable's positive impact is the most powerful.

Therefore, to verify this impact, liquidity measures will be estimated using the traditional control variables characterizing the stocks of the sample.

4.3. Liquidity estimation by instrumental variables

After estimating the instrumental variables, the liquidity measures were estimated using the instrument variables for the three groups of securities G1, G2 and G3 in the following equations:

$$QS_{it} = \omega_1 + \omega_2\sigma_{it}^2 + \omega_3 R_{it} + \omega_4 VT_{it} + \varepsilon_t \quad (25)$$

$$TPI_{it} = \omega_1 + \omega_2\sigma_{it}^2 + \omega_3 R_{it} + \omega_4 VT_{it} + \varepsilon_t \quad (26)$$

$$ILLIQ_{it} = \omega_1 + \omega_2\sigma_{it}^2 + \omega_3 R_{it} + \omega_4 VT_{it} + \varepsilon_t \quad (27)$$

$$TS_{it} = \omega_1 + \omega_2\sigma_{it}^2 + \omega_3 R_{it} + \omega_4 VT_{it} + \varepsilon_t \quad (28)$$

As proven in the literature, volatility, stock return and transaction volume influence the securities' liquidity. It is true that information variables do not have a direct impact on liquidity measures, but they indirectly influence it through instrument variables. Estimation results are in Table 3. These estimates were obtained using a random effect by two stages least square G2SLS.

The results obtained in Table 3 confirm the results in the literature, that volatility, return and transaction volume influence stock liquidity measures. The estimates in Table 3 are carried out using a specific Panel considering the heteroskedasticity and the autocorrelation specific to each stock.

Table 3: Liquidity measures estimation by traditional control variables

	G1							
	Tx Spread		**Qspread**		**ILLIQUIDITY**		**TPI**	
ω1	.000787***	(0.000)	0.00082***	(0.000)	0.0012***	(0.000)	3E-05***	(0.000)
ω2	6.52e-06	(0.616)	4.53E-06	(0.892)	8.7E-05***	(0.000)	2.70E-06***	(0.000)
ω3	2.11e-06	(0.485)	2.00E-06	(0.711)	-7.6E-06**	(0.039)	-2.9E-07***	(0.002)
ω4	4.84e-09	(0.550)	2.92E-09	(0.866)	-9.9E-08***	(0.000)	-2.3E-09***	(0.000)
	G2							
	Tx Spread		**Qspread**		**ILLIQUIDITY**		**TPI**	
ω1	.000682***	(0.000)	0.0007***	(0.000)	0.0005***	(0.000)	1.1E-05***	(0.000)
ω2	.000050**	(0.028)	4.2E-05	(0.154)	3.3E-05***	(0.000)	2.07E-06***	(0.000)
ω3	8.67e-06*	(0.076)	1E-05*	(0.085)	-1.5E-06	(0.252)	-1.5E-07***	(0.000)
ω4	1.51e-09	(0.832)	1.56E-09	(0.876)	-1.6E-08***	(0.000)	-3.0E-10***	(0.000)
	G3							
	Tx Spread		**Qspread**		**ILLIQUIDITY**		**TPI**	
ω1	.00225***	(0.000)	0.0024***	(0.000)	0.0003***	(0.000)	1.1E-05***	(0.000)
ω2	.00034***	(0.000)	0.0003***	(0.005)	-2.8E-06	(0.384)	1.95E-07	(0.151)
ω3	.00001	(0.376)	9.99E-07***	(0.965)	1.17E-06**	(0.013)	7.62E-09	(0.663)
ω4	2.29e-08*	(0.076)	2.63E-08*	(0.095)	-3.1E-09***	(0.000)	-1.1E-10***	(0.000)

Note: ***, **, and * denote significance at 1%, 5%, and 10% levels. The values in parentheses refer to p-value.

In Table 3, the estimation of the QSpread ratio and TS with instrumental variables (return, volatility, and transaction volume) showed that:

(i) For the first group, G1, return, volatility, and transaction volume, have no impact on these liquidity measures. Thus, the liquidity of stocks with low market value measured by QuotedSpread and by the TS, are not sensitive to the information demand and supply.

(ii) For the second group of securities G2 the coefficient ω3 relative to the return is significant and positive. The return positively influences the QSpread and the TS as it is an instrument variable, therefore there was a compensating effect. Thus, we have found that IDM, ISM and MV have an indirect impact on QSpread and on TS through stock return. Returning to Table 2 for estimating informational variables using the return, the volatility and the transaction volume, the coefficient α3 specific to the return for G2 is significant for the three variables: IDM, ISM and MV. The positive

sign is dominant, so market information demand and supply as well as the stock market value have an indirect positive impact on the QSpread liquidity measure. This influence is indirect because it has manifested through stock return.

(iii) In addition, for the second group of securities G2 the coefficient ω2 relative to the volatility is significant and positive. The stock volatility positively influences the TS as it is an instrument variable, therefore there was a compensating effect. We have found that IDS, ISM, IDM, ISM and MV have an indirect impact on TS through stock volatility. Returning to Table 2 for estimating informational variables using the return, the volatility and the transaction volume, the coefficient α2 specific to the volatility for G2 is significant for the all the variables: IDS, ISM, IDM, ISM and MV. The positive sign is dominant, so market information demand and supply as well as the stock market value have an indirect effect on TS (Bid – Ask)/Share Price.

(iv) For the third group G3, the coefficients ω2 and ω4 respectively relating to the volatility and the transaction volume are significant. Back to Table 2, we find that coefficient α2 specific to volatility is significant for the following variables: IDF, ISF, IDM, ISM, and MV. The coefficient α4 relative to transaction volume is significant for the following variables: IDM and ISM. The impact of all informational variables and market value on the QSpread and the TS liquidity measure is expressed through volatility, it is a positive indirect impact. The impact of market information supply and demand is expressed through the significant and positive influence of the trading volume on them. Stocks of the G3 group with a large market value are the most sensitive to information variables.

In conclusion, the impact of informational variables on liquidity measures exists but is hidden behind the instrumental variables. It is true that informational variables do not have a direct impact on liquidity measures but indirectly influence the liquidity of securities through instrument variables.

5. Conclusions

The disclosure of public information can potentially result in a change in transaction activity, depending on the nature of the information being disclosed and the market participants' interpretation and reaction to it. If the public information is significant and unexpected, it may lead to increased transaction activity as market participants try to incorporate the new information into their valuations and trading decisions. For example, if a company announces better-than-expected earnings, investors may rush to buy its stock, resulting in increased transaction activity.

On the other hand, if the public information is already anticipated or widely known, it may not have a significant impact on transaction activity. In some cases, it may even lead to reduced transaction activity as market participants have already factored the information into their trading decisions. For example, if the Federal Reserve announces that it will keep interest rates unchanged, it may not result in significant transaction activity as market participants have already priced in this expectation. Overall, the impact of public information on transaction activity is complex and depends on a variety of factors, including the nature and significance of the information, the market participants' interpretation and reaction to it, and the prevailing market conditions. In this document, we are contributing to the financial literature by bringing along evidence that information demand and supply are determinant factors of stock market liquidity. In another context, studies have shown that the disclosure of public information results in a change in transaction activity. This research provides a new perspective on exploiting a new type of Internet data to analyze the relationship between information and transaction activity, by introducing the two data on the demand and supply of information to analyze and predict the stock trading activity. Hopefully this research can not only promote the

development of measurement of information variables and the attention of investors with other data in the Big Data era, but also encourage other researchers to include these data into the analysis and forecasting of other financial products. Our study indicates a significant relationship between public information and transaction liquidity. This result can give evidence to support the hypothesis that information variables can drive investor positions in the financial market.

List of abbreviations

QS_{it}, is the QuotedSpread for the stock *i* at week *t*,
TPI_{it}, is the Turnover Price Impact for the stock *i* at week *t*,
$ILLIQ_{it}$, is the illiquidity Amihud ratio for the stock *i* at week *t*,
TS_{it}, is the ((Bid – Ask)/Share Price) for the stock *i* at week *t*,
IDF_{it} , is the firm information demand at week *t*, ISF_{it} is information supply for the stock *i* at week *t*, IDM_t and ISM_t are respectively the information demand and supply of market at week *t*.
σ_{it}^2 , is the volatility for the stock *i* at week *t*,
R_{it}, is the return for the stock *i* at week *t*,
VT_{it} is the weekly transaction volume de transaction for each stock *i*,
MV_{it} is the weekly market value for each stock *i*.

Declaration of Conflicting Interests

The author declared no potential conflicts of interest with respect to the research, authorship, and/or publication of this article.

Funding information

The author declared no financial support for the research, authorship, and/or publication of this article.

Acknowledgments: None

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Appendix 1: List of selected stocks

Company name	Keyword	Ticker	Observations
ACCOR	"accor"	AC	365
AIRBUS Group	"airbus"	AIR	365
AXA	"axa"	CS	365
BNPPARIBAS	"bnp paribas"	BNP	365
BOUYGUES	"bouygues"	EN	365
CAPGEMINI	"cap gemini"	CAP	365
CARREFOUR	"carrefour"	CA	365
CREDIT AGRICOLE	"credit agricole"	ACA	365
DANONE	"danone"	BN	365
EDF	"edf"	EDF	365
ESSILOR	"essilor"	EI	365
L'OREAL	"l'oréal"	OR	365
MICHELIN	"michelin"	ML	365
ORANGE	"orange"	ORA	365
PERNOD RICARD	"pernod ricard"	RI	365
PUBLICIS	"publicis"	PUB	365
RENAULT	"renault"	RNO	365
SAINT GOBIN	"saint gobin"	SGO	365
STE GENERALE	"ste general"	GLE	365
TECHNIP	"technip"	TEC	365
TOTAL	"total"	FP	365
UNIBAIL	"unibail"	UL	365
VALLOUREC	"vallourec"	VK	365
VEOLIA	"veolia"	VIE	365
VIVENDI	"vivendi"	VIVI	365
CAC 40	"cac 40"	^FCHI	365