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The effect of additional foreign market presence on the trading volume of cross-listed/traded stocks

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ABSTRACT

This paper aims to address an unanswered question about the effect of additional foreign market presence on the trading volume of cross-listed/traded firms. Using a unique and comprehensive sample of 235 firms with 788 foreign listings/tradings over the period 1980–2013, we find that compared with the decrease in trading volume after the first cross-listing, additional foreign listing/trading results in more shares traded on the stock. Results also show that the effect of additional cross-trading is more important than additional cross-listing for high orders of foreign presences. We find that the increase in trading volume is negatively related to trading costs and positively to arbitrage opportunities. We also find that proximity preference and firm size play significant effects that depend on the order of cross-listing/trading.

1. Introduction

Since the 1980, a substantial number of companies choose to cross-list their shares in overseas regulated markets. Companies' shares may also be traded in unregulated markets. Hence, after cross-listing/trading, companies' shares become more accessible to investors and greater trading volume can occur[1]. The aim of this paper is to address this question and examine the effect of foreign presence (or cross-listing/trading) on trading volume of cross-listed/traded stocks.

Earlier literature examines the consequences of cross-listing on stock's liquidity in general and on trading volume in particular and finds mixed results. Some studies show an increased trading volume after cross-listing (Smith and Sofianos, 1997; Foerster and Karolyi, 1998; Hamet, 2002; Abdallah et al., 2011), and others conclude that international cross-listing have no impact or even a deterioration of stock liquidity (Silva and Chávez, 2008; Berkman and Nguyen, 2010).

Despite the fact that a considerable number of firms are cross-listed and/or traded in multiple foreign markets, earlier literature focus essentially on dual-listed stocks (or stock with home and only one foreign listing market). In addition, little

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[1] The main difference between cross-listing and cross-trading is as follows. Both, cross-listing and cross-trading are in addition to the home market listing and they make a firm's stock accessible to foreign investors. However, cross-listing is different from cross-trading in the way that it is initiated by the company's decision to cross-list its shares on a foreign regulated market and involves a company meeting listing and disclosure requirements of the host foreign stock exchange. A firm is cross-traded when it is admitted to trade, by market makers, on a foreign stock market without meeting the stock exchange's disclosure and listing requirements. Often, the company is not aware that its shares are traded abroad.

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attention was given in the literature for cross-traded stock. Potentially, cross-trading on a foreign market makes a company's shares available to a significant numbers of traders and could be a substitute for cross-listing with no additional costs related essentially to mandatory listing and disclosure requirements. However, comparison between the effects of cross-listing and cross-trading remains an open question that needs to be investigated.

Therefore, the purpose of this study is to contribute to the existing literature on the effect of cross- listing on trading volume as follow. Firstly, unlike prior studies which only investigate the effect of the first foreign listing on stock liquidity, we provide the first empirical analysis on the evolution of trading volume after each additional foreign listing and/or trading. The second objective of this paper is to understand the factors that can affect this evolution. We focus on some explanatory variables analyzed by earlier literature in the standard context of dual-listed stock and we further investigate, for the first time, the role of arbitrage opportunities in varying trading volume after listing/trading event.

We aim to contribute to the literature on cross-listing by providing new evidence using a unique and comprehensive sample of 235 firms from 32 countries with 788 foreign listings/tradings over the period 1980–2013. Our main results are as follow. Compared with the decrease in trading volume after the first cross-listing, our results show that additional foreign listing/trading results in more shares traded on the stock and that the increase in trading volume becomes more important as the listing/trading order increases. We also find that, compared to an additional cross-listing, the increase in trading volume is more important after an additional cross-trading for high orders of foreign presence. Regarding our regression analysis, results show a significant effect of culture and geographic proximity, company size, trading costs and arbitrage opportunities on the change of trading volume after additional foreign presence. Although, these effects may vary across different orders of listing/trading abroad.

This paper is organized as follows. Section 2 reviews the literature and develops testable hypotheses. Section 3 describes the sample and data collection. Section 4 explains the methodology. Section 5 presents the empirical findings and Section 6 concludes.

2. Literature review and hypothesis development

2.1. Effect of additional foreign listing/trading on trading volume

Several empirical evidences show an increase in trading volume after cross-listing in the standard setting of dual-listed stocks (Foerster and Karolyi, 1993; Mittoo, 1997; Smith and Sofianos, 1997; Abdallah et al., 2011).

The improvement in stock liquidity after listing or trading abroad can be explained as follow. First, a more liquid trading environment could be expected as an outcome of increased investor recognition and stock visibility (Merton, 1987). This latter suggests that firms can expand their shareholders' base by increasing the firm's visibility by making the stock more available to investors. Abdallah et al. (2011) report that cross-listing enables firms to extend their shareholders' base and consequently raise funds easily. Empirically, Baker et al. (2002) show that cross-listing increase firm's visibility and facilitate investors' recognition. Foerster and Karolyi (1999) show that cross-listing increase firm's shareholders' base by 28.8%.

Second, the intensified inter-market competition for order flow and the increased production of firm specific information as a consequence of the greater number of market participants trading the stock are likely to reduce information asymmetry (Glosten and Milgrom, 1985). Fernandes and Ferreira (2008) show that the level of private information incorporated in the stock price increase after cross-listing as a result of the change in the quality of the information environment. As suggested by Leuz and Verrecchia (2000), stock liquidity is expected to improve if the firm's information environment improves. Kyle (1985) shows that trading volume increase with information arrival. Noronha et al. (1996) show that the increase in trading volume after cross-listing is driven by the increase in informed trading.

Hence, we can expect that trading volume increase after additional foreign listing or trading as an outcome of expanded shareholder base and decreased information asymmetry. We have so the following hypothesis:

H1a. Additional cross-listing/trading increases trading volume.

H1b. The increase in trading volume after additional cross-listing/trading is more important for high orders of listing/trading abroad.

When firms are cross-listed or cross-traded in foreign(s) market(s), a higher level of trading volume is expected due to the decrease of information asymmetry since higher number of market participants is trading the stock. However, and compared to cross-listing, the stock does not commit to additional disclosure requirements after cross-trading. Therefore, cross-listing improves firm's information environment because of the need to meet the mandatory foreign listing and disclosure requirements (Leuz and Verrecchia, 2000; Brown and Hillegeist, 2007), which, in turn, is expected to increase trading volume (Kyle, 1985; Diamond and Verrecchia, 1991). Empirically, several studies show that improved information disclosure leads to higher trading volume (Welker, 1995; Healy et al., 1999; Heflin et al., 2000; Leuz and Verrecchia, 2000; Krishnamurti et al., 2005). Bailey et al. (2006) show that cross-listing in the US is associated with a significant increase in trading volume as a consequence of the change in firm level disclosure.

We can then expect that cross-listing leads to a higher trading volume than cross-trading due to additional disclosure requirement. We have so the following hypothesis:

H1c. Additional cross-listing results in the highest trading volume compared to additional cross-trading.

2.2. Determinants of the effect of additional foreign listing/trading on trading volume

The second step in our analysis is to understand which factors are associated with the change in trading volume after listing/trading abroad. To guide the analysis, we review the possible explanations why investors are more willing to trade. First, and since trading can arise from informational advantage, we develop theoretical hypothesis to account for the fact that proximity preference, firm's size and transaction cost determine the effect of additional foreign listing/trading on trading volume.[2] Second, trading can also occur from non-informational advantage and therefore, we find important to look at the role that arbitrage opportunities may play in determining such an effect.

2.2.1. Proximity preference: culture and geography

The intuition behind this hypothesis is that culture and geographic proximity between foreign and company's home market provide an informational advantage to foreign investors who become more willing to invest and therefore trading volume improves after cross-listing/trading.

One possible explanation why transaction may not occur is that investors may not be willing to invest in companies from culturally dissimilar markets. Dodd (2013) reports that familiarity with the firm's origin country provides information advantage to foreign investors who become more willing to trade. This follows Barkema et al. (1997) who report that cultural difference impede information flow, which is, in turn, increase information asymmetry and therefore reduce investors' willingness to trade (Huberman, 2001). This argument is supported empirically by several studies making a growing awareness in the literature of the importance of culture in investors' willingness to invest. Specifically, these studies conclude that cultural distance has a negative effect on capital flows between countries and on asset allocation (Grinblatt and Keloharju, 2001; Beugelsdijk and Frijns, 2010; Anderson et al., 2011; Aggarwal et al., 2012). For instance, Beugelsdijk and Frijns (2010) show that culture distance play an important role in explaining the foreign bias. Grinblatt and Keloharju (2001) show that, when the company is originating from country that communicates investor's native language, investors become more likely to invest.

Given these arguments, we expect that traders are more willing to invest in cross-listed/traded firms when there is a culture similarity between investors and firms' countries, we expect therefore the following relationship:

H2-1a. The effect of additional foreign listing/trading on trading volume is positively related to the culture linkage between firm's home and foreign listing/trading markets.

Cross-border equity flows may be determined by geographic proximity since it can affect information flow between foreign and local markets (Coval and Moskowitz, 1999; Pulatkonak and Sofianos, 1999; Sarkissian and Schill, 2004; Portes and Rey, 2005). In a same line, Wang and Zhou (2015) report that information flow is hindered when the host market and it counterpart home market are located in different time zone.

In line with the theoretical prediction of Admati and Pfleiderer (1988) that traders tend to cluster in time, Werner and Kleidon (1996) and Menkveld (2008) report that trading of a cross-listed stock improves in the overlapping trading hours. This was showed empirically by Bacidore et al. (2005) and Moulton and Wei (2009).

Given these arguments, we can conclude that geographic proximity, as measured by time zone difference, can be considered as a measure of stock's familiarity to foreign traders. Therefore, when the foreign and company's home market are located in the same time zone, foreign investors are at an informational advantage and an increasing trading volume is expected after cross-listing/trading.

We have so the following hypothesis:

H2-1b. The effect of additional cross-listing/trading on trading volume is positively related to the geographic proximity between firm's home and foreign listing/trading markets.

2.2.2. Company size

Larger companies have a better visibility since they disclose more information (Aggarwal et al., 2005). Thus, it's expected that larger companies have a lower level of information asymmetry and, accordingly larger trading volume. However the increase in trading volume after cross-listing or trading is expected to be more important for smaller companies since they overcome larger information barriers by means of cross-listing/trading. Empirically, Baruch et al. (2007) and Halling et al. (2008) show that US foreign markets attract lower trading volume for larger cross-listed companies. Hence, we expect the following relationship:

H2-2. The effect of additional cross-listing/trading on trading volume is negatively related to the company's size.

[2] The quality of information disclosure environment and the level of investor protection in the foreign market can also affect the change in trading volume since investors are more willing to trade in markets where they are better protected and can collect timely and accurately firm's information. These factors are not taken account in our analysis since cross-traded companies does not commit to additional disclosure and legal protection requirement when their shares are traded abroad.

2.2.3. Trading costs

It is well established that transaction costs in asset markets significantly determine the trading behavior of market participants. Theoretical models predictions by Kyle (1985), Admati and Pfleiderer (1988) is that equity trading will be concentrated in the market that offers the most favourable trading conditions. The rationale is that investors choose to trade on the market with lower trading costs. Furthermore, Glosten and Milgrom (1985) theoretically establish a positive relation between the bid-ask spread, a proxy for the trading costs, and the level of information asymmetry. More specifically, positive bid-ask spread is due to the presence of traders with superior information (Glosten and Milgrom, 1985). Thus, investors may interpret high level of bid-ask spread as an indication of high information asymmetry induced by the presence of informed insiders, and become so less likely to invest. In a similar line, Fleming et al. (1996) and Jones and Seguin (1997) suggest that more informed trading will occur in the market with lower trading costs.

The trading costs hypothesis predicts so that investors are more willing to trade in markets with lower transaction costs. This hypothesis was empirically supported by Fleming et al. (1996) and Frino and West (2003). In the setting of cross-listed stocks, Foerster and Karolyi (1998) and Wang and Zhou (2015) find that active trading is associated with lower trading costs measured by the bid-ask spread.

Given these arguments, we test the following expectation:

H2-3. The effect of additional cross-listing/trading on trading volume is negatively related to the level of trading costs.

2.2.4. Arbitrage opportunities

The intuition behind arbitrage opportunities hypothesis is as follows. When arbitrage opportunities are more frequent, an increased trading volume is expected after cross-listing/trading, since investors, and more particularly arbitrageurs, trade aggressively on price discrepancy to make arbitrage profit. This expectation is in line with the empirical evidence provided by Roll et al. (2007). The authors show that arbitrage opportunities attract arbitrage traders and therefore increase liquidity.

In another side, it is important to note that several empirical studies show that arbitrage opportunities exist in the standard setting of dual-listed stocks (Suarez, 2005; Gagnon and Karolyi, 2010; Alsayed and McGroarty, 2012; Ansotegui et al., 2013). Ghadhab and Hellara (2015) find the same result in a new setting of stocks with multiple foreign listings. Furthermore, Ansotegui et al. (2013) show that 80% of detected arbitrage opportunities involve real arbitrage trades. Thus, arbitrageurs are very active in markets for cross-listed stocks and may therefore explain the change in trading volume after cross-listing/trading.

We have so the following hypothesis:

H2-4. The effect of additional cross-listing/trading on trading volume is positively related to the frequency of arbitrage opportunities.

3. Data and sample description

In this study, we focus on firms with primary local listing and having multiple foreign listings/tradings on US markets (including AMEX, NASDAQ, NYSE and OTC), European markets (including London stock exchange, Deutsche Borse (including Frankfort stock exchange and XETRA), Euronext Paris, Euronext Amsterdam, Euronext Brussels, Swiss stock exchange, Madrid stock exchange, Milan stock exchange, Stockholm stock exchange, and the Irish stock exchange), Toronto stock exchange, Tokyo stock exchange, Australian stock exchange, New Zealand stock exchange and Luxembourg stock exchange, over the period from 1980 to 2013.

Company's stocks can be either cross-listed on regulated markets, or cross-traded on non-regulated markets. Non-regulated markets in the sample include US OTC market, the trading platform of the Swiss stock exchange VIRTX and the Open market of the Deutsche Borse, including the Frankfort stock exchange and XETRA.

We begin by collecting information on cross-listed/traded firms from stock exchanges websites and Datastream. Data on ADRs[3] are also from the bank of New York and J.P Morgan ADRs databases. We include both active and inactive stocks. Thus, this dataset is unlikely to suffer from survivorship bias and provides a complete chronology of cross-listing/trading. Our analysis includes both direct and ADRs listing.

We remove from the sample:

- Preference stocks listing as well as Rule 144.
- Firms for which we could not find an identifiable listing/trading date.
- Firms for which data on number of shares traded, market capitalization and daily closed bid ask prices are not available in Datastream.

The final sample consists of 235 firms from 32 countries with 788 foreign listings/tradings. Table 1 provides information about the number of foreign listings/tradings by home countries.

[3] Company's shares can be listed or traded in US markets either directory or via the issue of ADRs (American Depositary Receipts).

Table 1
Sample description.

		Number of foreign listings/tradings									
	Home country	2	3	4	5	6	7	8	9	Total number of firms	Total number of foreign listings/tradings
1	Argentina	2	0	0	0	0	0	0	0	2	4
2	Australia	4	5	0	0	0	0	0	0	9	23
3	Austria	3	0	2	0	0	0	0	0	5	14
4	Belgium	3	2	1	0	1	0	0	0	7	22
5	Brazil	1	3	0	0	0	0	0	0	4	11
6	Canada	14	2	1	0	0	0	0	0	17	38
7	Chile	2	0	0	0	0	0	0	0	2	4
8	China	2	3	1	0	0	0	0	0	6	17
9	Denmark	2	1	1	0	0	0	0	0	4	11
10	Finland	0	0	0	0	1	0	0	0	1	6
11	France	2	5	4	3	6	2	1	0	23	108
12	Germany	0	1	2	3	2	2	2	1	13	77
13	Greece	1	1	0	1	0	0	0	0	3	10
14	India	3	0	0	0	0	0	0	0	3	6
15	Indonesia	0	1	0	0	0	0	0	0	1	3
16	Ireland	3	5	3	0	0	0	0	0	11	33
17	Italia	2	2	3	1	0	0	0	0	8	27
18	Japan	2	4	4	1	0	0	0	0	11	37
19	Luxembourg	0	1	1	1	1	0	0	0	4	18
20	Netherlands	1	1	2	1	2	1	0	0	8	37
21	New Zealand	5	7	0	0	0	0	0	0	12	31
22	Norway	0	2	1	0	0	0	0	0	3	10
23	Singapore	1	0	0	0	0	0	0	0	1	2
24	South Africa	3	1	0	0	0	0	0	0	4	9
25	South Korea	1	2	0	0	0	0	0	0	3	8
26	Spain	3	2	1	1	0	1	1	0	9	36
27	Sweden	1	4	1	0	0	0	0	0	6	18
28	Switzerland	5	10	1	0	0	0	0	0	16	44
29	Taiwan	1	1	1	0	0	0	0	0	3	9
30	Turkey	1	0	0	0	0	0	0	0	1	2
31	UK	5	9	4	2	1	0	0	0	21	69
32	US	4	5	4	1	0	0	0	0	14	44
	Total	77	80	38	15	14	6	4	1	235	788

This table provides the number of stocks listed/traded in 2, 3, 4, 5, 6, 7, 8 and 9 foreign markets. For example, there are 2 Argentinean companies that are cross listed/traded in 2 foreign markets.

4. Methodology

4.1. Effect of additional cross-listing/trading on trading volume

Our methodology to analyze the effect of additional foreign presence on trading volume is to track it evolution before and after cross-listing/trading event. For that purpose, the year of the cross-listing/trading event is defined as the year 0, and the years around the year 0 are defined as the years $(-3, -2, -1, 0, +1, +2, +3)$ relative to the year 0.

We examine the change in trading volume after the cross-listing/trading event. To do this, we calculate, for each stock and for each listing/trading event, the following ratio:

$$liquidity\ \ ratio(LR)=\frac{\text{Average trading volume over the period } (+1,+3)}{\text{Average trading volume over the period } (-3,-1)}$$

liquidity ratio of more than one (less than one) indicate an increase (a decrease) in trading volume after each additional foreign listing/trading. Trading volume take into account trading volumes in all markets including home and foreign(s) markets where the stock is already cross-listed and/or cross-traded.

4.2. Regression analysis

The aim of the regression analysis is to understand the factors that can explain the evolution of trading volume after each additional foreign listing/trading. For that purpose, ***liquidity ratio*** for each listing/trading order are regressed on a set of explanatory variables resulting in the following equation:

$$\boldsymbol{liquidity\ \ ratio_{in} = \alpha + \beta_1 culture_{in} + \beta_2 geography_{in} + \beta_3 size_{in} + \beta_4 trading\ cost_{in} + \beta_5 AO_{in}}$$

where:

- ***culture*$_{in}$** is a dummy variable equals 1 if the home country of the i^{th} company and the n^{th} foreign country share a common language, and 0 otherwise.
- ***geography*$_{in}$** is a dummy variable equals 1 if the home market of the i^{th} company and the n^{th} foreign market are in the same time zone, and 0 otherwise. We consider 3 different time zones by regions: European and African region, American region, Australasia and Asian region.
- ***size*$_{in}$** is the size of the i^{th} company at the end of the year of the n^{th} foreign listing/trading.
- ***trading cost*$_{in}$** represents the trading costs for the i^{th} company for the period following the n^{th} foreign listing/trading.

For each year t, transaction cost is measured by:

$$spread_t = \frac{1}{N}\sum_{j=1}^{N}\sum_{m=1}^{M} spread_{jm}$$

Where: t, N, m and M refers respectively to the year following the n^{th} foreign listing/trading, number of trading days in the year t, listing/trading market and number of listing/trading markets where company' stock are already listed/traded at the n^{th} foreign listing/trading.Daily ***spread*$_j$** is defined as follow:

$$spread = \left(\frac{\text{ask} - \text{bid}}{(\text{ask} + \text{bid})/2}\right)$$

where ask and bid are daily closed bid and ask quotes.

The explanatory variable used in the regression analysis, ***transaction cost***, is the average ***spread*$_t$** for the 3 years period following the n^{th} foreign listing/trading:

$$\textbf{\textit{transaction cost}} = \frac{1}{3}\sum_{t=1}^{3} spread_t$$

- ***AO*$_{in}$** present arbitrage opportunities between the home market of the i^{th} company and the n^{th} foreign market.

To construct arbitrage opportunities variable, we use daily closing bid and ask quotes to measure price deviation. Thus, we can incorporate the bid-ask spread which is an important transaction cost that can impede arbitrage activities (Ghadhab and Hellara, 2015). All prices (at the home and the n^{th} foreign market) are converted to the same currency (USD), and stock prices are multiplied by the appropriate ADR ratio when the n^{th} foreign market is on the US.

For each trading day j in the year t following the n^{th} foreign listing, we compute price deviation between the local and the n^{th} foreign market as follows:

$$D_{tj} = \begin{cases} B_{Lj} \times A_{F_{Xj}} - A_{Fj} \times B_{F_{Xj}} & \text{if } A_{Fj} \times B_{F_{Xj}} < B_{Lj} \times A_{F_{Xj}} \\ B_{Fj} \times A_{F_{Xj}} - A_{Lj} \times B_{F_{Xj}} & \text{if } B_{Fj} \times A_{F_{Xj}} A_{\mathrm{L}j} \times B_{F_{Xj}} \\ 0 & \text{otherwise} \end{cases}$$

where: B_L and A_L are respectively the local bid and ask prices. B_F and A_F are respectively the foreign bid and ask prices. B_{FX} and A_{FX} are respectively the bid and ask prices of the exchange rate.

Average price deviation for the year t, is given by:

$$D_t = \frac{1}{N}\sum_{j=1}^{N} D_{tj}$$

where N is the number of trading days in the year t following the n^{th} foreign listing.

To take into account 3 years period following the n^{th} foreign listing/trading, the explanatory variable is given by:

$$\textbf{\textit{AO}} = \frac{1}{3}\sum_{t=1}^{3} D_t$$

Table 2
Trading volume evolution.

	Listing/trading		Listing only		Trading only	
Listing/Trading Order	LR	Test	LR	Test	LR	Test
1	0.64	1.13	0.39	2.44**	1.05	2.17**
2	1.49	1.85*	1.55	1.75	1.31	2.08**
3	1.35	2.05**	1.52	2.49**	1.4	1.21
4	1.45	2.33**	1.12	2.11**	1.59	2.08**
5	1.51	2.17**	1.45	1.77	1.64	1.92*
6	1.51	1.9*	1.1	1.79	2	1.41
7	1.7	1.67	1.7	1.67	-	-
8 and 9	0.98	1.01	1.05	1.03	0.77	1.18

This table provides the ***liquidity ratio*** (LR) which evaluates the change in trading volume after each additional cross listing/trading event. ***liquidity ratio*** is the ratio of the average trading volume over the period (+1,+3) per the average trading volume over the period (−3,−1). "Test" tests whether trading volume over the period (+1, +3) is different from trading volume over the period (−3,−1). "**" and "*" denote significance at respectively 5% and 10%.

5. Empirical results

5.1. Evolution of trading volume

In this section, we examine the effect of additional foreign listing/trading on trading volume. Table 2 reports the ***liquidity ratio*** which evaluate the change in trading volume between the period (−3,−1) and (+1, +3)[4].Regarding the results reported in the second column of Table 2, this later shows that the differences in trading volume between (−3,−1) and (+1, +3) periods are statistically significant except for the first and for the high orders of foreign listing/trading (7, 8 and 9 orders). Results on the ***liquidity ratio*** show that additional foreign listing/trading increase trading volume. There is also some evidence showing that the increase in trading volume becomes more important as the cross-listing/trading order increases. The results reported in the second column of Table 2 generally support Hypothesis H1a and H1b.

Most previous studies on cross-listing focus on stocks listed abroad. However, cross-traded stocks have received little attention. Thus, the cross-trading effect on trading volume remains unclear. The last two columns of Table 2 report results on ***liquidity ratio*** for respectively additional foreign listing and trading only. Results show that differences in trading volume between the two sub periods are statistically significant in several cases. The first cross-listing comes with deterioration in stock liquidity, which is in line with the finding of Foerster and Karolyi (1998), Silva and Chávez (2008) and Berkman and Nguyen (2010). However, ***liquidity ratio*** is above 1 for each additional cross-listing or cross-trading except for very high orders of foreign trading (8 and 9 orders). Additional cross-trading seems to have more important effect on trading volume for relatively high orders of foreign presence compared to additional cross-listing (4, 5 and 6 orders). We cannot thus accept strongly hypothesis H1c.

5.2. Regression results

Table 3 reports regression results on the effect of the explanatory variables on ***liquidity ratio*** for each of the cross-listing/trading order. Explanatory variables include ***culture*** and ***geography*** dummy variables, firm's ***size***, ***trading cost***, and arbitrage opportunities (*AO*). Table 2 shows that the effect of additional foreign presence on trading volume is different and depend on the listing or trading event status. Therefore, we consider further the following explanatory variable:

- $\boldsymbol{status_{in}}$ is a dummy variable equals 1 if the i^{th} company is cross-listed in the n^{th} foreign market, and equals 0 if the i^{th} company is cross-traded in the n^{th} foreign market[5]. For a listing order of 2 as an example, firms that are cross-listed in the second foreign market have a value of 1 for the variable "**status**", whereas firms that are cross-traded in the second foreign market have a value of 0 for this variable.

We group highly orders of cross-listing/trading with each other (6, 7, 8, 9 orders) to have a sufficient number of observations. It is also important to state that we treat each order of foreign presence separately. In others words, when we analyze cross-listing/trading of any order the remaining ones are excluded. For example, when we analyze the second order of cross-listing/trading, the 1st, 3rd, 4th, 5th, 6th, 7th, 8th and 9th orders are excluded. Results are as follow.

Regarding ***culture*** variable, results in Table 3 show a significant effect only for very high orders of listing/trading abroad. The effect's sign is negative which leads us to reject hypothesis H2-1a. While this result does not support culture proximity preference theory, it is consistent with investor recognition theory. Investor recognition theory implies the increase in shareholders base' occur when the foreign market is least familiar, due to the overcome of higher information barriers.

[4] For robustness, we repeat the analysis for different period, (−4,−1) and (+1, +4); (−2,−1) and (+1, +2), and the result do not change.
[5] Table 1 in Appendix reports definitions and data sources for the dependant and each explanatory variable.

Table 3
Regression results.

	Listing/trading order					
	1	2	3	4	5	6, 7, 8 and 9
culturec	12.5	−0.27	0.73	−1.27	0.27	−1.18
	(0.98)	(−0.19)	(0.29)	(−1.18)	(0.82)	(−3.08)**
geography	8.3	2.7	−3.6	1.6	0.66	0.22
	(1.6)	(1.81)*	(−1.42)	(1.15)	(2.4)**	(0.81)
status	−9.5	2.59	4.8	0.19	−0.27	−0.85
	(−0.85)	(1.87)*	(1.81)*	(0.24)	(−2.3)**	(−2.85)**
size	−5.2	−1.35	−3.5	1.22	0.99	0.3
	(−1.43)	(−2.05)**	(−2.68)**	(1.46)	(3.11)**	(0.26)
trading	−0.05	−0.04	−0.19	−0.012	−0.03	−0.01
cost	(−0.97)	(−2.17)**	(−0.91)	(−1.83)*	(−2.7)**	(−3.49)***
AO	0.02	0.03	0.2	0.15	0.17	0.09
	(1.5)	(2.01)**	(1.6)	(2.01)**	(2.1)**	(2.05)**
Constant	2.7	5.16	21.2	−3.8	−3.5	−0.26
	(1.72)*	(2.52)**	(3.88)***	(−0.98)	(−2.74)**	(−0.2)
R square	0.14	0.2	0.25	0.15	0.67	0.75
N	235	235	158	78	40	42

This table provides regression results. The dependant variable is ***liquidity ratio***. "***", "**" and "*" denote significance at respectively 1%, 5% and 10%. *t*-statistics are in parentheses below the corresponding robust parameter estimates. *N* is the number of observations.

Proximity preference theory may get support only for geographic concerns. The second and the fifth foreign listings/tradings are positively and significantly related to ***geography*** variable.

Consistent with the finding in Table 2, Table 3 shows that the change in trading volume after the second and the third orders of listing/trading abroad are significantly and positively related to ***status*** variable. This relationship becomes negative and more significant for high orders of foreign presences. Additional cross-trading results in the highest trading volume for high orders of trading abroad compared to additional cross-listing. This result can be explained as follows. In fact, additional disclosure requirements after cross-listing may have limit effect on informational environment for high orders of foreign presences since the company has already overcome higher informational barriers over the first orders of cross-listing. Therefore, the decrease in information asymmetry after cross-trading may be comparable and even more important than cross-listing for high orders of foreign presences. This evidence suggests that the increase in trading volume for high orders of listing/trading abroad comes essentially from the intensified competition among market participants rather than from additional mandatory disclosure requirements.

In line with our expectation set in hypothesis H2-2, firm's size is a significant and negative determinant of the effect of the second and third cross-listings/tradings on trading volume. However, sign's coefficient becomes positive for higher order of foreign presence (5th order). This result can be in line with that found for ***status*** variable. In fact, the decrease in information asymmetry for smaller companies is greater in the first orders of cross-listing/trading implying a larger trading volume compared to larger firms.

Table 3 shows that the effect of additional foreign listing/trading on trading volume is negatively related to trading costs. The negative effect is significant for several orders of listing/trading abroad. This result is in line with our predictions. We can thus accept hypothesis H2-3.

Finally, arbitrage opportunities have a positive and significant effect on ***liquidity ratio*** for the second, fourth, fifth and high orders of listing/trading abroad. We can thus conclude that additional foreign presence increase trading volume when arbitrage opportunities are more frequent. Hypothesis H2-4 can be therefore accepted.

6. Conclusion

In this paper, we contribute to the pre-existing literature on cross-listing by examining the effect of additional foreign presence (cross-listing or cross-trading) on trading volume and so we provide a more completely study and better conclusive results about stock liquidity of cross-listed/traded stocks.

Our results are as follow. Overall, we find new evidence that additional foreign listing/trading comes with an increased trading volume on the stock, in the local and foreign(s) market(s). When we compare cross-listing with cross-trading effect, we find that the later become more important for high orders of foreign presence. Our results also show that the increase in trading volume is negatively related to culture proximity between the home and foreign market for high orders of cross-listing/trading, which is consistent with investor recognition hypothesis. However, geographic proximity has a positive and significant effect for the second and the fifth orders. Firm's size seems to have a negative effect on the change in trading volume after listing/trading abroad for the first two additional foreign presences and a positive effect for higher orders of cross-listing/trading. Regression results also show that the effect of additional foreign presence on trading volume for cross-listed/traded stocks is negatively and positively related to respectively transaction costs and the frequency of arbitrage opportunities.

Appendix.

Table 1. Dependant and Explanatory variables.

Variable	Definition	Data source
liquidity ratio	Ratio of the average trading volume over the period preceding cross-listing/trading event to the average trading volume over the period following cross-listing/trading event. Trading volume is measured by the number of share traded in all markets where company stock is already listed/traded	Datastream
culture	Dummy variable equals 1 if the home and foreign countries share a common language and 0 otherwise	
geography	Dummy variable equals 1 if the home and foreign market are in the same time zone and 0 otherwise. 3 different time zones by regions are considered: European and African region; American region; Australasia and Asian region	
status	Dummy variable equals 1 if the company is cross-listed and 0 if it is cross-traded.	Sample dataset
size	The logarithm of the market capitalization of the company around listing/trading event	Datastream
trading cost	Takes into account trading costs in all markets (including home and foreign(s) markets) where company stock is already listed/traded. Trading costs is measured by the average ***spread*** for the 3 years period following cross-listing/trading where: ***spread*** = (ask − bid)/((ask + bid)/2). **Spread** is computed for each year based on daily closed bid and ask quotes	Datastream
AO	Presents arbitrage opportunities between the home and the foreign listing/trading market. Arbitrage opportunities are detected by computing the difference between daily closed bid and ask quotes	Daily closed bid and ask quotes for both company stocks and exchange rates are from Datastream

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