Liquidity and Initial Public Offerings: An Unsolved Question

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ABSTRACT: This study examines the relationship between the characteristics that define initial public offerings (IPOs) and the liquidity and trading activity of stocks outstanding after the execution of these operations. We argue that higher relative size, retail composition and underpricing of the offerings higher post-listing liquidity and trading activity. Using a sample of Spanish IPOs, the results reveal that the liquidity and the trading activity can be explained by the characteristics that define IPOs. In addition these results remain robust after excluding the market effect.

KEYWORDS: Initial public offerings (IPOs), liquidity, trading activity, underpricing, microstructure, capital structure.

JEL Classification: G14; G32

1. Introduction

Most of the literature examining initial public offerings (IPOs) focuses on the analysis of two anomalies: the initial under-pricing of these offerings (see Ritter and Welch, 2002, for an overview of the evidence) and the low long-run returns that they deliver (Ritter, 1991; and Gompers and Lerner, 2003). There are nevertheless a few that have analysed the influence of IPO characteristics on the liquidity of shares outstanding, this being one of the objectives IPOs are meant to achieve. It should be noted therefore that the positive effects of high liquidity include that: a) it increases firm value (Amihud and Mendelson, 1986); b) it reduces transaction costs in future offerings (Ibbotson and Ritter, 1995); c) it provides a better framework for management incentive schemes (Holmström and Tirole, 1993) and, d) the resulting ownership dispersion is a defence mechanism against hostile public takeover bids (Shleifer and Vishny, 1986).

Nevertheless, high liquidity may also have adverse consequences, one of which is that investors with a small share in the ownership (which is generally associated with a higher liquidity) are less inclined to track the firm's activities with a view to reducing agency costs (Burkart, Gromb and Panunzi, 1997; and Bolton and Von Thadden, 1998). Another is the cost of obtaining liquidity which is usually associated with under-pricing the offering in order to obtain a larger shareholder base (Pham, Kalev and Steen, 2003).

Liquidity, among other factors, was briefly analysed by Miller and Reilly (1987), Hanley (1993) and Schultz and Zaman (1994) who observed that the most severely underpriced IPOs showed higher after-market trading turnover than overpriced IPOs, but offered no conclusive explanation for their finding. According to Booth and Chua (1996), issuers' demand for a liquid aftermarket creates a underpricing incentives. In particular, they suggest that underpricing is a positive function of ownership dispersion and secondary-market liquidity. Recently, Ellul and Pagano (2006) have developed a model incorporating investor concern for post-listing liquidity. They argue that "the less liquid the aftermarket is expected to be, and the less predictable its liquidity, the larger will be the IPO underpricing".

Exactly how the ownership structure affects liquidity is not clear. It does appear obvious, however, that a less concentrated ownership structure reduces the importance of information asymmetry, which in turn reduces adverse selection costs, encourages

trading activity and enhances secondary market liquidity (Bhide, 1993 and Holmström and Tirole, 1993). Thus, firms that use an IPO to obtain liquidity can be expected to underprice the share offering in order to attract small-scale uninformed investors. If, on the other hand, their objective is to concentrate ownership in order to gain more control and reduce agency costs between shareholders and managers (Shleifer and Vishny, 1986), the issue should be less underpriced, because, furthermore, large-scale investors are better informed about real firm value. Therefore, some IPO-companies may forfeit liquidity for the sake of increasing their control. Pham et al. (2003) and Li, Zheng and Melancon (2005) conclude that greater underpricing not only increases trading turnover, but also reduces bid-ask spread. Pham et al. (2003) claim that this relationship is due to the dispersion of the ownership structure brought about by the IPO.

The relationship between share retention (i.e. the proportion of shares retained by the pre-IPO owners) and liquidity is also unclear. Zheng, Ogden and Jen (2005) claim that, as the number of shares retained by the pre-IPO owners increases (i.e. the number of shares floating is reduced), liquidity decreases, *ceteris paribus*, therefore pre-IPO owners should underprice more in order to try to improve liquidity. However, the signalling theory suggests that share retention may lead to an increase in firm value by suggesting that the pre-IPO owners are expecting high cash flows in the future (Leland and Pyle, 1977). According to this way of thinking, therefore, one would expect to find a positive relationship between the number of shares retained and post-IPO liquidity. The ultimate relationship between share retention and liquidity will depend on whether the share floating effect dominates the signalling effect or vice versa. Consistent with signalling theory, Li et al. (2005) found pre-IPO owners' retention to be positively related to trading turnover and negatively related to bid-ask spread. They concluded that high retention rates attract more trades, provide quality assurance and improve IPO aftermarket liquidity.

All of this reveals, therefore, that few studies have investigated the determinants of after-market liquidity based on IPO characteristics. It is in this context that we present our study, which differs from previous research in several ways. The first is that we offer a more complete and complementary view of the variables analysed after the IPOs, that is, the proxies for measuring liquidity and trading activity. The second is that we go beyond previous studies by analysing, not only the influence of the underpricing on the liquidity and trading activity but also the relative size and retail composition of the

offering, as additional IPO[1] characteristics. Thirdly, given that the variables analysed may be influenced by market movements during the post-listing period together with the fact that these operations are usually undertaken during up-market states when trading volume is high[2], we isolate these variables from the market effect in our analysis. The fourth difference is our research scenario, since we analyse the effect of IPOs in a small order-driven market, which may differ from large price-driven markets both in size and as a result of its microstructure characteristics. Fifth and last, we provide satisfactory evidence of the influence of stock allocation (relative size of offering), ownership structure (retail composition of offering) and underpricing on post-listing liquidity and trading activity of newly listed firms in the Spanish stock market, with the characteristic features of the French or German bank-oriented system, which differs considerably from the market-oriented Anglo-Saxon systems (Rajan & Zingales, 1995 and Saá-Requejo, 1996). In fact, the countries of continental Europe have a more concentrated ownership structure that makes it easier for majority shareholders to monitor managerial performance, and thereby reduce agency costs, whereas firms listed in the Anglo-Saxon stock markets, tends to have a less concentrated ownership structures, which leads to greater liquidity.

The article is structured into five sections. Section two is devoted to a description of the data base. Section three analyses the effects of IPOs on the liquidity and trading activity of stocks outstanding. Section four explores the role played by the IPO defining variables on liquidity and trading activity and the final section presents the main conclusions that can be drawn from the analysis.

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[1] Note that (1) the relative size of the offering or simply size of the offering variable (i.e. the ratio of shares offered to shares outstanding) is the complement to unity of the share retention variable (i.e. the ratio of shares retained to shares outstanding) and (2) the retail composition of the offering variable is a measure of the ownership structure of the offering and is therefore a proxy for the post-IPO ownership structure, and thus related to ownership dispersion, which is cited by some authors (Pham et al., 2003; and Zheng et al., 2005) as a means of achieving liquidity.

[2] This is one of the patterns that led to the proposal of the "*opportunity window*" hypothesis (Ritter, 1991; and Spiess and Affleck-Graves, 1995)

2. Data base

The sample consists entirely of IPOs by firms listed on the Spanish continuous market from 1993 to 2004. The SIBE (Spanish Stock Market Interlinking System), or continuous market, is chosen in order to avoid problems with different trading systems. Another important reason for this choice is the greater liquidity of stock trading on this market, which provides more opportunity for arbitrage. The continuous market represents approximately 98.5% of all stock market trading in Spain.

Table A1 in the appendix lists the firms that make up the study sample and shows the main data (i.e. offered firm, year, offered shareholder, authorization date, first trading day date and number of offered shares). A total of 50 IPOs were made over the study period (1993-2004). These, however, were marked by a variety of events that, due to their effect on liquidity and share trading activity during the post-listing period (i.e. from day 0 to 135), might distort the results of the analysis. For example, variations in shares outstanding (i.e. new share offerings and share listings) or secondary offerings (SOs). Any IPO featuring one of these effects was eliminated from the sample. Of the 50 IPOs originally considered for the study, 43 were found to be entirely free of any such circumstances.

All data relative to IPO characteristics and conditions were obtained from the records of the *Comisión Nacional del Mercado de Valores* (National Stock Exchange Commission) and Madrid Stock Exchange price bulletins. The remaining daily stock market data that were required (price, bid-ask spread, depth, and trading volume) were provided by the *Sociedad de Bolsas* (Stock Exchanges Company).

[Insert Table 1]

Table 1 shows the year by year distribution of IPOs and the descriptive statistics of the main IPO characteristics. The year by year distribution (panel A) shows a high concentration of this type of operation during 1997, 1998 and 1999, coinciding with the best three years of the Spanish stock market for the study period (1993-2004), which confirms the need, as will be seen later, to exclude market performance from the analysis. Panel B gives a brief overview of the main IPO variables. The first of these is the number of shares offered, a variable with which it is nevertheless more convenient to work in relative terms, that is, the relative size of the offering, which is the ratio of shares offered to shares outstanding. This variable shows that the average size of IPOs is 41.157% of the shares outstanding with a variation ranging between 2.620% (European Aeronautic) and 100% (Dinamia and Parques Reunidos). Note that Zheng et al. (2005) and Li et al. (2005) name this variable share retention, given that relative size

of retention is the complement to unity of the relative size of offering and represents the ratio of shares retained to shares outstanding. The second key variable is the retail composition of offering, which measures the ratio of shares offered in the retail tranche to the number of shares offered. The importance of this variable stems from the fact that it defines the ownership structure of offerings by setting the proportion of shares offered to small shareholders. The average value of this variable is 33.405%, although the size of the retail tranche can be anywhere from 0% (Abengoa, Barón de Ley, Dogi, Befesa, Enaco and Mecalux) to 100% (Gines Navarro and Bodegas Riojanas). Finally, the third variable considered is the underpricing of the offering, which shows the ratio of the difference between the market share price on the first trading day and the offering average price to the offering average price. Judging by the large number of articles on this type of operations, there is more than sufficient justification for including this variable in the study of IPOs. This variable has an average value of 14.412% and a variation ranging between -6.553%, i.e. overpricing, (European Aeronatic) and 94.979% (TPI).

3. Liquidity and trading activity of shares outstanding after IPOs

The variables used to measure share liquidity are bid-ask spread, relative depth and market quality index. The bid-ask spread (S_{it}) is the average cost of simultaneously buying and selling one stock i on trading day t. It is defined as the average quotient obtained by dividing the price spread by its average price, as shown in expression [1]. The price spread in an order-driven market, like that of Spain, is calculated from the difference between the lowest price at which investors are willing to sell share i at time t' on trading day t (the price that investors would have to pay for one share, $P_{it\,t'}^{Ask}$), and the highest price at which they are willing to buy it (the price that investors would charge for one unit of this asset, $P_{it\,t'}^{Bid}$).

$$S_{it} = \sum_{t'=1}^{T} \frac{\left(\dfrac{P_{it\,t'}^{Ask} - P_{it\,t'}^{Bid}}{(P_{it\,t'}^{Ask} + P_{it\,t'}^{Bid})/2} \right)}{T} \qquad [1]$$

where T is the number of share i's price spreads during day t.

The relative depth (RD_{it}) represents the average number of shares i available at each side of the market at the best first level prices on trading day t relative to the number of

shares outstanding[3]; and the market quality index (MQI_{it}) is the ratio between the average relative depth and the bid-ask spread. This can be written as follows:

$$MQI_{it} = \frac{RD_{it}/2}{S_{it}}$$ [2]

Liquidity is certain to be enhanced when the bid-ask spread narrows and the relative depth increases or when the market quality index increases.

The variables used to measure share trading activity are relative trading volume or trading turnover, relative number of transactions and relative trading volume or trading turnover per transaction. The relative trading volume (RTV_{it}) or trading turnover reflects the number of shares i that are traded on trading day t relative to the number of shares outstanding. The relative number of transactions (RNT_{it}) represents how many times shares i are traded on trading day relative to the number of shares outstanding and the relative trading volume per transaction ($RTVT_{it}$), also referred to as relative size or trading turnover per transaction, quantifies the average number of shares i that are traded in each transaction on trading day relative to the number of shares outstanding.

Having defined the variables to measure liquidity and trading activity after IPOs, we then defined the post-listing period as extending from trading day 0 to 135. Nevertheless, according to Miller and Reilly (1987), Aggarwal and Rivoli (1990), Krigman, Shaw and Womack (1999), Pham et al. (2003), Corwin, Harris and Lipson (2004) and Zheng et al. (2005), where liquidity and trading activity are shown to be excessively high during the first few days of trading as a result of informed trading activities that continue until the share price reaches the fair value as perceived by the market, the first ten days after the listing date are excluded from the analysis to overcome this problem. Therefore, the post-listing period used in our study extends from trading day 11 to 135 and the measures of liquidity and trading activity for each firm in the sample are calculated as the average value after IPO (i.e. from day 11 to 135, which is approximately 6 months).

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[3] Note that in the study sample the number of shares outstanding may differ considerably across firms that are the object of an initial public offering. To keep the data comparable, therefore, we take relative values, dividing by the number of stocks outstanding. The trading volume, number of transactions and trading volume per transaction are treated in the same way.

[Insert Table 2]

Table 2 shows the values of these variables after the execution of IPOs. The liquidity data reveal that the bid-ask spread has an average value of 0.754% and a variation ranging from 0.139% to 2.212%; relative depth as an average value of 0.011% and a variation of 0.014% and, finally, the combine variable representing both, that is the market quality index, has an average value of 0.822% and a variation ranging between 0.010% and 4.223%. The trading activity data, meanwhile, reveal an average relative trading volume of 0.255% with a variation ranging from 0.011% to 0.571%; an average relative number of transactions, in thousands of shares outstanding, of 0.775% with a variation of 1.057% and, finally, an average relative trading volume per transaction of 0.003% with a variation of 0.003%.

Graphs 1 and 2 show the main variables driving these results, that is the market quality index and the relative trading volume, and, as indicated earlier, provide the rationale for excluding the first ten days after the listing date from the analysis.

[Insert Graphs 1 and 2]

4. IPO characteristics and influence on liquidity and trading activity

As already stated, while most of the research on IPOs has focused on explaining the underpricing phenomenon, few studies have investigated the determinants of after-market liquidity (see Pham et al. , 2003; Corwin et al. , 2004; Li et al. , 2005; Zheng et al., 2005; and Ellul and Pagano, 2006). For this reason we focus our attention on liquidity and trading activity for the post-listing period. In addition, because the listing firms have no prior trading history and limited public information, the liquidity and trading activity may be affected by the offer design, that is, by the IPO characteristics and the market conditions. Therefore, we will analyse the ability of these factors to explain the liquidity and trading activity in post-listing shares.

To examine the relationship between the IPO characteristics and the liquidity and trading activity of shares outstanding after the execution of these operations, the following cross-sectional regression was run for each liquidity or trading activity variable in the sample:

$$\overline{X}_i = \delta_0 + \delta_1 . RS_i + \delta_2 . RC_i + \delta_3 . U_i + \varepsilon_i \qquad [3]$$

where $\overline{X}_i$ is the post-IPO average value of the variable for firm i (i.e. from day 11 to 135, that is, approximately 6 moths), RS_i is the relative size of offering i, defined as the ratio of the number of shares i offered to the number of shares i outstanding, RC_i is the retail composition of offering i, defined as the ratio of the number of shares i offered in the retail tranche to the number shares i offered, and U_i is the underpricing of offering i, defined as the ratio of the difference between the market price of share i on the first trading day and the offering average price to the offering average price. Note that the independent variables of equation [3], as shown in Table A2 of the Appendix, do not present problems of multi co-linearity. Previous research on the Spanish case had already demonstrated the absence of correlations between these variables (Álvarez, 2001 a, and 2001 b; and Álvarez and González, 2006)

The results of these regressions are summarized in Table 3. The data reveal that, in overall terms, relative size of offering (RS) has explanatory capacity to explain post-IPO liquidity and trading activity. There is, for example, significantly positive relationship between the relative size of offering and relative depth, market quality index, relative trading volume and relative number of transaction. Recall that the relative size of offering and share retention are inversely correlated, and therefore our results suggest that a decrease in the number of shares retained by the pre-IPO owners increases liquidity and enhances trading activity, supporting the dominance of the share-floating effect over the signalling effect. Pham et al. (2003) also conclude an inverse relationship between shares retained and trading turnover. Li et al. (2005), however, find that the pre-IPO owners' retention rate is positively related to trading turnover ratio and negatively related to bid-ask spread. This may be due to the already high level of ownership concentration of the firms listed in the Spanish stock market compared to firms in the Anglo-Saxon markets, shifting their priorities towards increasing liquidity. Meanwhile, retail composition of offering (RC), which is a reflection of the ownership structure of offerings, since it determines the proportion of shares offered to small shareholders, shows significantly positive correlation with relative depth, market quality index and relative number of transactions, that is, a higher percentage of shares offered in the retail tranche leads to greater liquidity and trading activity. These findings are

consistent with past propositions by Demsetz (1968), Bhide (1993) and Holmström and Tirole (1993). Pham et al. (2003) find that a less concentrated ownership structure increases the level of post-listing trading activity. This again suggests that the Spanish firms resorting to IPOs are motivated less by the desire to increase their control over managerial performance and reduce agency costs due to high ownership concentration and more by the desire to obtain liquidity. Finally, underpricing of offering (U) shows significant negative correlation with bid-ask spread, and significant positive correlation with relative trading volume and relative number of transactions. A similar positive relationship between underpricing and trading turnover was also reported by Kligman, Shaw and Womack, (1999); Pham et al. (2003); Reese (2003); and Li et al. (2005) and Zheng et al. (2005), in the last case in both the short run (from day 5 to day 122) and the long run (from day 129 to day 500). Pham et al. (2003) and Li et al. (2005) also concluded the existence of a significant negative relationship between initial underpricing and the bid-ask spread.

[Insert Table 3]

We therefore provide satisfactory evidence of the influence of stock allocation (relative size of offering), ownership structure (retail composition of offering) and underpricing on post-listing liquidity and trading activity of newly listed firms. Nevertheless, given that the evolution of these variables for each firm during the post-listing period may be linked to market movements and, as stated in the database section, that these operations were concentrated into the best three years for the stock market (1997, 1998 and 1999) covered by our sample period, we isolate the market effect on these variables in our analysis by using the following (time-series) specification:

$$X_{it} = \beta_{i0} + \beta_{i1} \cdot X_{Mt} + \varepsilon_{it} \qquad\qquad [4]$$

where X_{it} is the value of the variable X for firm i on day t and X_{Mt} is the average value of the variable X on day t for the remaining firms in the market, with t from day 11 to 135. Regression coefficient β_{i0} is the constant or intercept and represents the average value of the variable X for firm i after IPO, excluding the market effect. We test the significance of these coefficients by means of the t-test. The results of this analysis are presented in Table 4. The data show the mean values of these variables for the post-

listing period (i.e. from day 11 to 135) after excluding the market effect to be significant.

[Insert Table 4]

To test the robustness of the relationship between the IPO characteristics and the liquidity and trading activity of shares outstanding after the execution of these operations, we propose the (cross-section) specification:

$$\beta_{i0} = \lambda_0 + \lambda_1 . RS_i + \lambda_2 . RC_i + \lambda_3 . U_i + \varepsilon_i \qquad [5]$$

where β_{i0} is the constant or intercept of equation [4], which represents the average value of the variable X for firm i after IPO without the market effect, RS_i is the relative size of offering i, RC_i is the retail composition of offering i and U_i is the underpricing of offering i.

[Insert Table 5]

These results are presented in Table 5. The data reveal that, though less satisfactory than those displayed in Table 3, they are able to explain the liquidity and trading activity after IPOs. Probably, the timing of the IPO (they are usually executed during up-markets when trading volume is high) may explain the observed changes. This highlights the importance of isolating overall market performance to avoid attributing these operations with effects that are not directly due to them, but to the performance of the market itself. In particular, after excluding market effect, the relative size of offering (RS) shows a significantly positive relationship with market quality index and relative trading volume, supporting the fact that the higher the percentage of shares offered, and thereby the lower the share retention, in IPOs, the greater the liquidity and trading activity obtained through such operations (Pham et al., 2003; and Zheng et al., 2005). Thus, the results appear to suggest that Spanish investors do not interpret the share retention mechanism as a signal launched to the market by pre-IPO owners (Leland and Pyle, 1977). Furthermore, it is possible to observe a significantly positive relationship between retail composition of offering (RC) and relative number of transaction, showing that a higher percentage of individual shareholders results in a greater number of transactions (Pham et al. 2003). Finally, there is a significantly negative relationship between underpricing of offering (U) and relative trading volume per transaction,

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suggesting that the more underpriced the IPO, the fewer the shares traded in each transaction, partially confirming the arguments put forward by Pham et al. (2003), who claim that underpricing is the cost of the liquidity, since it is the compensation offered by the firm to attract small-scale investors that will help to generate liquidity.

5. Conclusions

In this paper we have analysed the influence of IPO characteristics on the liquidity and the trading activity of shares outstanding, which, given the scarcity of previous studies on the topic, constitutes a novel aspect of this field of research. Our findings are based on an analysis of the variables that measure liquidity and trading activity after the execution of IPOs.

According to the results obtained, three IPO characteristics, that is, relative size, retail composition and underpricing of offering have explanatory power for the liquidity and trading activity of the shares outstanding. It should be noted that this explanatory power is much greater before isolating the market effect. Nevertheless, given the evidence to show that these operations are executed during upmarket periods when trading volume is high, the non exclusion of the market effect may attribute these variables with more explanatory power than they actually possess. Be that as it may, even after eliminating the market effect, their explanatory capacity is still considerable.

Again after excluding the market effect, a clearly significant positive relationship can be observed between relative size of offering and both market quality index and relative trading volume. In addition, the post-listing trading activity appears to be related to the type of ownership structure that remains after the execution of an IPO. In particular, a higher percentage of small shareholders is a determining factor in the increase in the number of transactions after IPOs. Finally, more underpricing is also observed to result in a smaller size per transaction.

Thus, we provide satisfactory evidence of the influence of stock allocation (relative size of offering), ownership structure (retail composition of offering) and underpricing on post-listing liquidity and trading activity of newly listed firms in the Spanish stock market. Nevertheless, these results are very likely due to the fact that ownership-concentrated Spanish firms, unlike the ownership-dispersed firms of the Anglo Saxon markets, do not use IPOs to sustain or increase control over managerial performance or

as a quality signalling mechanism, by increasing the number of shares retained (or reducing the size of the offering), but rather as a means to increase stock liquidity, which in turn serves the primary goal of shareholder wealth maximization.

Appendix

[Insert Table A1]

[Insert Table A2]

References

ÁLVAREZ, S. (2001 a): "El efecto de las señales informativas en la valoración de las salidas a bolsa", *Revista Española de Financiación y Contabilidad*, vol. 30, no. 108, pp. 409-454.

ÁLVAREZ, S. (2001 b): "Las salidas a bolsa en España: características y rentabilidades iniciales", *Cuadernos de Economía y Dirección de Empresas*, vol. 9, pp. 303-325.

ÁLVAREZ, S. and GONZÁLEZ, V.M. (2006): "Determinantes de la variación de la cuota de mercado de las entidades financieras en las OPIs españolas", *Revista Española de Financiación y Contabilidad*, vol. 35, no. 130, pp. 541-561.

AGGARWAL, R. and P. RIVOLI (1990): "Fads in the Initial Public Offering Market", *Journal of Management*, vol. 19, pp. 45-57.

AMIHUD, Y. and H. MENDELSON (1986): "Asset Pricing and the Bid-Ask Spread", *Journal of Financial Economics*, vol. 17, pp. 223-249.

BHIDE, A. (1993): "The Hidden Costs of Stock Market Liquidity", *Journal of Financial Economics*, vol. 34, pp. 31-51.

BOLTON, P. and E.L. VON THADDEN (1998): "Blocks, Liquidity and Corporate Control", *Journal of Finance*, vol. 53, pp. 1-25.

BOOTH, J. and L. CHUA (1996): "Ownership Dispersion, Costly Information, and IPO Underpricing", *Journal of Financial Economics*, vol. 41, no. 2, pp. 291-310.

BURKART, M.; GROMB, J. and F. PANUNZI (1997): "Large Shareholders, Monitoring and the Value of the Firm", *Quarterly Journal of Economics*, vol. 112, pp. 693-727.

CORWIN, S.A.; HARRIS, J.H. and M.L. LIPSON (2004): "The Development of Secondary Market Liquidity for NYSE-listed IPOs", *Journal of Finance*, vol. 59, no. 5, pp. 2339-2373.

DEMSETZ, H. (1968): "The Cost of Transactions", *Quarterly Journal of Economics*, vol. 82, pp. 33-53.

ELLUL, A. and M. PAGANO (2006): "IPO Underpricing and After-Market Liquidity", *Review of Financial Studies*, vol. 19, no. 2, pp. 381-421.

GOMPERS, P. and J. LERNER (2003): "The Really Long-Run Performance of Initial Public Offering: The Pre-NASDAQ Evidence", *Journal of Finance*, vol. 58, no. 4, pp. 1355-1392.

HANLEY, K.W. (1993): "Underpricing of Initial Public Offerings and the Partial Adjustment Phenomenon", *Journal of Financial Economics*, vol. 34, pp. 231-250.

HOLMSTRÖM, B. and J. TIROLE (1993): "Market Liquidity and Performance Monitoring", *Journal of Political Economy*, vol. 101, pp. 678-709.

IBBOTSON, R.G. and J.R. RITTER (1995): "Initial Public Offering", in Jarrow, R.A.; Maksimovic, V., Ziemba, W.T. (Eds.) Handbooks in Operations Research and Management Science: Finance, vol. 9. North-Holland, Amsterdam, pp. 993-1016.

KRIGMAN, L.; SHAW, W.H. and K.L. WOMACK (1999): "The Persistence of IPO Mispricing and the Predictive Power of Flipping", *Journal of Finance*, vol. 54, pp. 1015-1044.

LELAND, H. and D. PYLE (1977): "Information Asymmetries, Financial Structure and Financial Intermediation", *Journal of Finance*, vol. 32, no. 2, pp. 371-387.

LI, M.; ZHENG, S.X. and M.V. MELANCON (2005): "Underpricing, Share Retencion and the IPO Aftermarket Liquidity", *International Journal of Managerial Finance*, vol. 1, no. 2, pp. 76-94.

MILLER, R.E. and F.K. REILLY (1987): "An Examination of Mispricing, Returns and Uncertainty for Initial Public Offerings", *Financial Management*, vol. 16, pp. 33-38.

PHAM, P.K.; KALEV, P.S. and A.B. STEEN (2003): "Underpricing, Stock Allocation, Ownership Structure and Post-Listing Liquidity of Newly Listed Firms", *Journal of Banking and Finance*, vol. 27, no. 5, pp. 919-947.

RAJAN, R.G. and L. ZINGALES (1995): "What do We Know about Capital Structure? Some Evidence from International Data", *Journal of Finance*, vol. 50, no. 5, pp. 1421-1460.

REESE, W. A. (2003): "IPO Underprising, Trading Volume and Investor Interest", *Working paper*, Tulane University.

RITTER, J. (1991): "The Long Run Performance of Initial Public Offering", *Journal of Finance*, vol. 46, pp. 3-28.

RITTER, J.R. and I. WELCH (2002): "A Review of IPO Activity, Pricing and Allocations", *Journal of Finance*, vol. 57, no. 4, pp. 1795-1828.

SAÁ-REQUEJO, J. (1996): "Financing Decisions: Lessons from the Spanish Experience", *Financial Management,* vol. 25, pp. 44-56.

SCHULTZ, P.H. and M.A. ZAMAN (1994): "After-Market Support and Underpricing of Initial Public Offerings", *Journal of Financial Economics*, vol. 35, pp. 199-219.

SHLEIFER, A. and R. WISHNY (1986): "Large Shareholders and Corporate Control", *Journal of Political Economy*, vol. 94, pp. 461-488.

SPIESS, D.K. and J. AFFLECK-GRAVES (1995): "Underperformance in Long Run Stock Returns Following Seasoned Equity Offerings", *Journal of Financial Economics*, vol. 38, pp. 243-267.

ZHENG, S.; OGDEN, J.P. and F. JEN (2005): "Pursuing Value through Liquidity in IPOs: Underpricing, Share Retention, Lockup and Trading Volume Relationships", *Review of Quantitative Finance and Accounting*, vol. 25, pp. 293-312.

Table 1.- Summary statistics for sample of IPOs in Spain (1993-2004)

Panel A: Distribution of IPOs by year

Year	Number	Proportion (%)
1993	1	2.326
1994	3	6.977
1995	0	0.000
1996	3	6.977
1997	7	16.279
1998	9	20.930
1999	9	20.930
2000	4	9.302
2001	2	4.651
2002	1	2.326
2003	1	2.326
2004	3	6.977
Total	43	100.000

Panel B: Descriptive statistics of IPO characteristics

Variable	Mean	Median	Minimum	Maximum	Standard deviation
Number of shares offered	39,231,698	14,400,000	640,020	482,430,511	79,818,206
Relative size of offering (%)	41.157	35.000	2.620	100.000	22.093
Retail composition of offering (%)	33.405	30.326	0.000	100.000	25.119
Underpricing of offering (%)	14.412	5.000	-6.553	94.979	23.223

Notes:

This table shows the results for the final sample, which is formed by 43 IPOs after excluding offerings with variations in their shares outstanding or secondary offerings for the post IPO period (i.e. from day 0 to 135). Relative size of offering is the number of shares offered relative to the number shares outstanding. In addition, the difference between unity and the relative size of offering is the relative size of retention. Retail composition of offering is the number of shares offered in the retail tranche relative to total shares offered. The underpricing of offering is the difference between the market price of share i on the first trading day and the offering average price relative to the offering average price.

Table 2.- Post-IPO liquidity and trading activity

Variable	Descriptive statistics				
	Mean	Median	Minimum	Maximum	Standard deviation
Liquidity					
Bid-ask spread (%)	0.754455	0.723071	0.138589	2.211863	0.462235
Relative depth (%)	0.010537	0.005008	0.000127	0.074222	0.013923
Market quality index (%)	0.821859	0.507360	0.010028	4.223453	0.879612
Trading activity					
Relative trading volume (%)	0.255426	0.227884	0.010934	0.571217	0.123119
Relative number of transactions (%)	0.000775	0.000360	0.000028	0.005467	0.001057
Relative trading volume per transaction (%)	0.002812	0.001861	0.000045	0.013947	0.003133

Notes:

The measures of liquidity and trading activity for each firm in the sample are calculated as the average post-IPO value (i.e. from day 11 to 135, that is, approximately 6 months).

Table 3.- Post-IPO liquidity and trading activity in relation to relative size, retail composition and underpricing of the offerings

Dependent variable	Regressions results: Independent variables				
	Constant (t-statistic)	Relative size of offering (t-statistic)	Retail composition of offering (t-statistic)	Underpricing of offering (t-statistic)	R-squared (%)
Liquidity					
Bid-ask spread	0.009402 (3.062)**	0.001786 (0.561)	-0.005586 (-1.382)	-0.005044 (-2.092)*	15.379
Relative depth	-5.37E-05 (-1.143)	0.000233 (2.524)*	0.000185 (2.211)*	8.97E-06 (0.160)	20.499
Market quality index	-0.003483 (-1.196)	0.013402 (2.425)*	0.015945 (2.929)**	0.005965 (1.435)	27.582
Trading activity					
Relative trading volume	0.001107 (2.583)*	0.002915 (6.037)**	-5.41E-05 (-0.096)	0.001846 (4.870)**	39.904
Relative number of transactions	-9.27E-06 (-3.024)**	1.88E-05 (4.339)**	1.71E-05 (2.915)**	2.47E-05 (2.353)*	50.769
Relative trading volume per transaction	1.61E-05 (0.969)	4.61E-05 (1.505)	-1.28E-05 (-0.462)	-1.86E-05 (-1.560)	14.270

Notes:

The following cross-sectional regression was run for each liquidity or trading activity variable in the sample:

$$\overline{X}_i = \delta_0 + \delta_1 \cdot RS_i + \delta_2 \cdot RC_i + \delta_3 \cdot U_i + \varepsilon_i \qquad [3]$$

where $\overline{X}_i$ is the average post-IPO value of the variable for firm i (i.e. from day 11 to 135, that is, approximately 6 months), RS_i is the relative size of offering i, defined as the ratio of the number of shares i offered to the number of shares i outstanding, RC_i is the retail composition of offering i, defined as the ratio of the number of shares i offered in the retail tranche to the total number of shares i offered, and U_i is the underpricing of offering i, defined as the ratio of the difference between the market price of share i on the first trading day and the offering average price to the offering average price. Newey-West standard errors are employed.

** Significance at the 1% level
* Significance at the 5% level
# Significance at the 10% level

Table 4.- Post-IPO liquidity and trading activity excluding the market effect

Dependent variable	Descriptive statistic of regression coefficients β_{i0}		
	Mean	Standard deviation	t-test(1)
Liquidity			
Bid-ask spread (%)	0.328341	0.428414	4.967**
Relative depth (%)	0.007438	0.013728	3.512**
Market quality index (%)	0.637329	0.668010	6.183**
Trading activity			
Relative trading volume (%)	0.174745	0.103895	10.900**
Relative number of transactions (%)	0.000244	0.000664	2.380*
Relative trading volume per transaction (%)	0.002476	0.002738	5.859**

Notes:

For each liquidity or trading activity variable and each firm in the sample, a time-series regression is run with the following specification:

$$X_{it} = \beta_{i0} + \beta_{i1} \cdot X_{Mt} + \varepsilon_{it} \qquad [4]$$

where X_{it} is the value of the variable X for firm i on day t and X_{Mt} is the average value of the variable X on day t for the remaining firms in the market, with t from day 11 to 135. Regression coefficient β_{i0} is the constant or intercept and represents the average post-IPO value of the variable X for firm i without the market effect.

(1) Null hypothesis = "the mean value of the intercept is equal to zero"

  Alternative hypothesis = "the mean value of the intercept is different to zero"

** Significance at the 1% level

* Significance at the 5% level

\# Significance at the 10% level

Table 5.- Post-IPO liquidity and trading activity excluding the market effect in relation to relative size, retail composition and underpricing of the offerings

Dependent variable	Regressions results: Independent variables				
	Constant (t-statistic)	Relative size of offering (t-statistic)	Retail composition of offering (t-statistic)	Underpricing of offering (t-statistic)	R-squared (%)
Liquidity					
Bid-ask spread	0.002816 (1.506)	0.001886 (1.207)	-0.001858 (-0.679)	0.002164 (1.405)	4.189
Relative depth	7.73E-09 (0.000)	0.000134 (1.236)	3.32E-05 (0.285)	5.53E-05 (0.976)	5.350
Market quality index	-0.001306 (-0.590)	0.009728 (2.575)*	0.009027 (1.576)	0.004581 (1.627)	19.385
Trading activity					
Relative trading volume	0.000377 (1.411)	0.002838 (6.027)**	0.000437 (1.149)	0.000395 (0.863)	35.930
Relative number of transactions	-1.35E-06 (-0.794)	2.93E-07 (0.089)	1.17E-05 (2.977)**	-1.79E-06 (-0.506)	20.659
Relative trading volume per transaction	1.58E-05 (1.196)	3.50E-05 (1.469)	-8.08E-06 (-0.323)	-1.90E-05 (-1.856)#	11.504

Notes:

The following cross-sectional regression was run for each variable in the sample:

$$\beta_{i0} = \lambda_0 + \lambda_1 . RS_i + \lambda_2 . RC_i + \lambda_3 . U_i + \varepsilon_i \qquad [5]$$

where β_{i0} is the constant or intercept of equation [4] in Table 4, which represents the post-IPO average value of the variable X for firm i without the market effect, RS_i is the relative size of offering i, defined as the ratio of the number of shares i offered to the number of shares i outstanding, RC_i is the retail composition of offering i, defined as the ratio of the number of shares i offered in the retail tranche to the total number shares i offered, and U_i is the underpricing of offering i, defined as the ratio of the difference between the market price of share i on the first trading day and the offering average price to the offering average price. Newey-West standard errors are employed.

** Significance at the 1% level

* Significance at the 5% level

Significance at the 10% level

Table A1.- Sample of IPOs in Spain (1993-2004)

Offered share	Year	Offered shareholder	Authorization date	First trading day date	Number of sale shares
Argentaria	1993	Soc. Est. de Patrimonio I	12/4/1993	12/5/1993	31,362,450
Continente	1994	Several	24/2/1994	17/3/1994	14,400,000
Cortefiel	1994	Several	16/6/1994	8/7/1994	4,911,534
Gines Navarro	1994	Corporación Financiera Alba	20/10/1994	17/11/1994	1,316,736
Mapfre Vida (1)	1994	Corporación Mapfre	22/11/1994	23/12/1994	1,200,000
E. e I. Aragonesas (1)	1995	Uralita	7/2/1995	20/2/1995	20,000,000
Sol Meliá	1996	Sol Meliá	4/6/1996	2/7/1996	14,190,000
Tele Pizza	1996	Several	25/10/1996	13/11/1996	4,829,816
Abengoa	1996	Several	12/11/1996	29/11/1996	1,972,633
Miquel y Costas (1)	1996	Several	15/11/1996	27/11/1996	2,034,162
Adolfo Domínguez	1997	Several	28/2/1997	18/3/1997	5,976,240
Barón de Ley	1997	Several	1/7/1997	16/7/1997	5,407,860
Cvne	1997	Several	4/7/1997	17/7/1997	640,020
Bodegas Riojanas	1997	Several	12/9/1997	30/9/1997	2,158,055
Aldeasa	1997	Soc. Est. de Partic. Patrimoniales	12/9/1997	1/10/1997	15,000,000
Iberpapel	1997	Iberpapel Gestión	14/11/1997	28/11/1997	3,872,629
Aceralia (1)	1997	Soc. Est. de Partic. Indust. (Sepi)	21/11/1997	10/12/1997	71,256,154
Dinamia	1997	Dinamia	27/11/1997	15/12/1997	9,000,000
Dogi	1998	Several	15/1/1998	21/1/1998	3,639,200
Fastibex	1998	Fatibex	26/3/1998	6/4/1998	825,000
Meliá Inversiones	1998	Meliá Inversiones	27/3/1998	8/4/1998	4,151,319
Superdiplo	1998	Superdiplo	29/4/1998	14/5/1998	14,315,764
Befesa	1998	Befesa	16/6/1998	1/7/1998	6,907,280
Europa&C	1998	Ardagan and Settsu Europe	26/6/1998	10/7/1998	12,571,578
Federico Paternina	1998	Marcos Eguizabal and B. Barón	4/9/1998	16/9/1998	1,842,836
Enaco	1998	Several	24/11/1998	11/12/1998	6,590,400
Funespaña	1998	Several	01/12/1998	09/12/1998	3,449,084
Transportes Azkar	1999	Azkar and others	21/1/1999	3/2/1999	14,576,000
Indra Sistemas	1999	Soc. Est. de Partic. Indust. (Sepi)	5/3/1999	23/3/1999	48,877,483
Grupo Ferrovial	1999	Grupo Ferrovial and others	15/4/1999	5/5/1999	48,117,540
Mecalux	1999	Several	16/4/1999	6/5/1999	8,820,300
Parques Reunidos	1999	Parques Reunidos	14/5/1999	26/5/1999	21,274,344
Tpi	1999	Telefónica	4/6/1999	23/6/1999	42,912,275
Red Eléctrica de España	1999	Soc. Est. de Partic. Indust. (Sepi)	18/6/1999	7/7/1999	47,344,500
Sogecable	1999	Sogecable and others	30/6/1999	21/7/1999	24,255,940
Amadeus (1)	1999	Several	1/10/1999	19/10/1999	147,500,000
Inmobiliaria Colonial	1999	La Caixa	8/10/1999	27/10/1999	32,000,000
Terra Networks (1)	1999	Terra Networks	29/10/1999	17/11/1999	66,076,415
Prisa	2000	Several	7/6/2000	28/6/2000	43,762,500
European Aeronautic	2000	Several	22/6/2000	10/7/2000	20,836,737
Recoletos	2000	Recoletos and Pearsons Overseas H.	3/10/2000	25/10/2000	25,475,000
Gamesa	2000	Several	11/10/2000	31/10/2000	24,329,990
Telefónica Móviles (1)	2000	Telefónica Móviles	2/11/2000	22/11/2000	345,000,000
Iberia	2001	Soc. Est. de Partic. Indust. (Sepi)	16/3/2001	3/4/2001	482,430,511
Inditex	2001	Several	27/4/2001	23/5/2001	162,645,600
Enagas	2002	Gas Natural	10/6/2002	26/6/2002	141,091,948
Antena 3 TV	2003	Telefónica	17/10/2003	29/10/2003	16,666,800
Fadesa Inmoviliaria	2004	Fadesa Inmobiliaria	13/4/2004	30/4/2004	40,425,863
Telecinco	2004	Telecinco and others	8/6/2004	24/6/2004	85,313,421
Cintra	2004	Cintra and Milsa	8/10/2004	27/10/2004	186,475,841

Notes:

(1) Denotes that the offering was eliminated from the study. The original sample is composed of 50 IPOs over the period 1993-2004, nevertheless the final sample is formed by 43 IPOs exempt of problems with liquidity and trading activity of shares during the post-listing period (from day 0 to 135), which might distort the results of analysis. In particular, the offerings that were eliminated from the initial sample presented variations in their shares outstanding (i.e. new share offerings and listing shares) or secondary offerings.

Table A2.- Relationship between relative size, retail composition and underpricing of the offerings

Pearson coefficient	Relative size of offering	Retail composition of offering	Underpricing of offering
Relative size of offering	1	-0.172	0.003
Retail composition of offering	-0.172	1	-0.121
Underpricing of offering	0.003	-0.121	1

Notes:

This table shows the absence of a relationship between the independent variables of equations [3] and [5] in Tables 3 and 5.

Graph 1.- Post-IPO market quality index

Trading days after initial public offerings

▲ Average market qualiy index
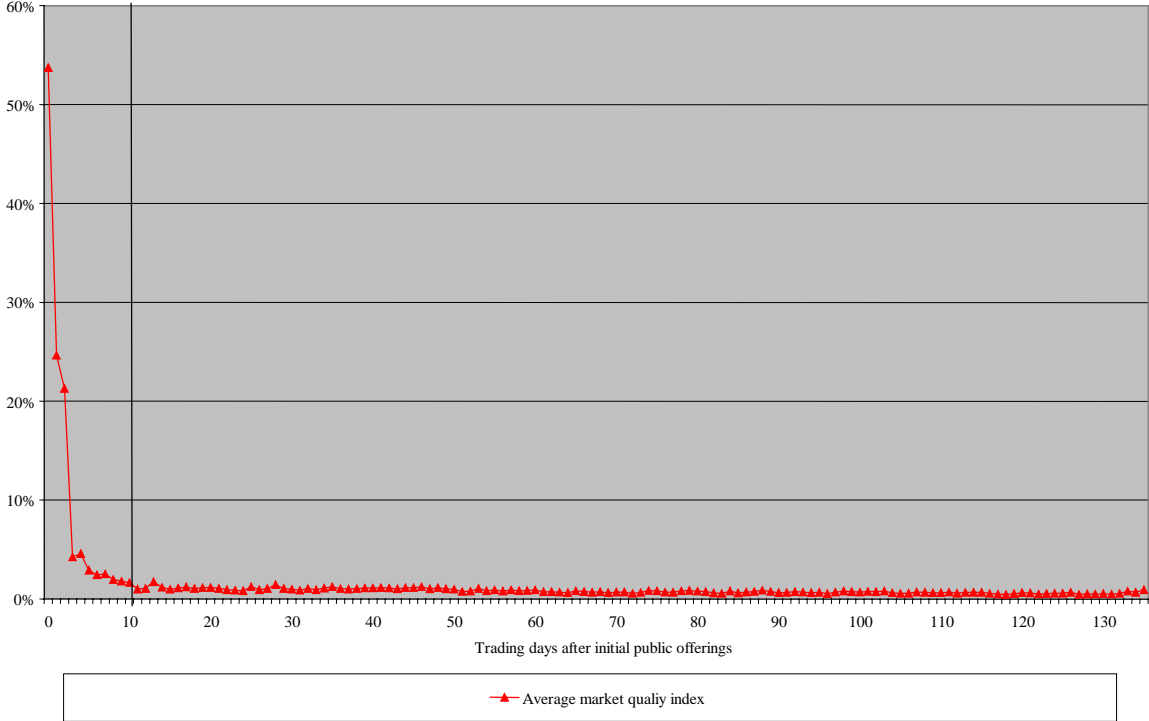
Graph 2.- Post-IPO relative trading volume