

# SECONDARY PRICE FORMATION OF IPOs ON THE FIRST TRADING DAY IN THE SPANISH MARKET\*

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This study analyses the secondary price formation process of IPOs on the first trading day for a sample of 67 IPOs placed on the Spanish stock market. Our findings, after stating that the undervaluation does not go beyond the first trading day and that the intraday or secondary (open-to-close) return is significantly positive, show that intraday price variation, observed through open-to-close return variable, is not related to the offer and firm characteristics. Nevertheless, the influence of the primary market over the secondary price formation process on the first trading day is quite evident. In particular, we observe that the combination of cold and primary (offer-to-open) return variables allows us to partly explain the intraday price variation and that our results are fully consistent with the price support arguments for cold IPOs and, to a lesser degree, the cascade effect for hot IPOs.

*Key words:* initial public offerings (IPOs), underpricing, cold IPOs, hot IPOs, intraday or secondary return

*JEL Classification:* G12, G14, G24.

**V**ery few studies, among which should be noted Barry and Jennings (1993), Chang *et al.* (2008) and Bradley *et al.* (2009), have analysed the IPO underpricing dividing the initial return (or offer-to-close return) into the initial return of the primary market (offer-to-open return) and the initial return of the secondary market (open-to-close return).

Barry and Jennings (1993), examining opening prices, find that, on average, about 90% of the initial day's mean return is earned on the opening transaction and that the subsequent average intraday or secondary return is smaller than conventional estimates of transactions costs. Thus, as they point out, only original purchasers of shares at the offer price are the beneficiaries of the underpricing of IPOs. Later, Chang *et al.* (2008) explore the two components of initial returns of

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IPO underpricing in China separately (i.e. in the primary market and in the secondary market) and show that the initial abnormal return in the secondary market is significantly positive. In particular, they find that the initial return in the secondary market is positively related to the market return and negatively related to IPO price levels. Recently, Bradley *et al.* (2009) also offering show a significant price increase on the first trading day of the secondary market and explore several possible non-mutually-exclusive hypotheses to explain their findings, including price support, laddering, retail sentiment and information asymmetry. Their findings are mostly consistent with the view that higher secondary market returns accrue to IPOs with more information asymmetries, possibly due to price and aggregate demand uncertainty.

In this context, we carry out our study, which investigates the secondary price formation process of IPOs on the first trading day for a sample of 67 IPOs placed on the Spanish stock market from January 1993 to December 2008, in order to contribute to broadening the international scope of empirical research on IPO underpricing in the secondary market on the first trading day<sup>1</sup>. In particular, after finding that the undervaluation does not go beyond the first trading day and that the intraday or secondary (open-to-close) return, also on the first trading day, is significantly positive, we are interested in analysing what factors are behind the secondary price formation process on the first trading day. More specifically, we want to know whether the open-to-close return on the first trading day is related to the offer-specific characteristics and/or the firm-specific characteristics (i.e. with information asymmetries associated with offers and/or firms). We also want to know the role played by the primary market on the secondary price formation on the first trading day through the price support of underwriters and the cascade effect motivated by investors.

Our empirical findings show that the underpricing of IPOs does not go beyond the first trading day and that the opening price of IPOs does not fully solve the underpricing of IPOs but that this phenomenon persists for the first trading day, which is consistent with the findings of Chang *et al.* (2008) and Bradley *et al.* (2009). Therefore, we explore the factors behind the secondary price formation process on the first trading day by analysing the open-to-close return variable. Our findings do not confirm that intraday price variation is related to the offer and/or firm characteristics. We explore price adjustment, share adjustment, price, retail proportion and offering proportion variables as offer characteristics and offering size, firm size, firm age and tech variables as firm characteristics. Neither do our results confirm any relationship with market return and volatility. Nevertheless, the influence of the primary market on the secondary price formation process on the first trading day is quite evident. In particular, we observe that the combination of cold and offer-to-open (primary) return variables allows us to partly explain the intraday price variation. That is, open-to-close return is signifi-

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(1) Most of the literature examining initial public offerings (IPOs) focuses on the analysis of two anomalies: the initial underpricing of these offerings and the low long-run returns that they deliver. In the Spanish case, we can see Álvarez (2000) and Álvarez and Fernández (2003) for underpricing and Farinós (2001) and Álvarez and González (2005) for long-run under performance.

cantly positive for hot IPOs, while cold IPOs present lower intraday return than hot IPOs and they are also insignificant<sup>2</sup>. Furthermore, there is no relationship between offer-to-open (primary) return and open-to-close return for hot IPOs while, in the case of cold IPOs, higher intraday or secondary return is observed when the offer-to-open (primary) return is more negative. Finally, the results obtained after the removal of IPOs whose offer-to-open (primary) returns were close to zero, with or without bootstrap procedures, provide robustness and confirm the different behaviour of cold IPOs versus hot IPOs. Therefore, all our findings seem to fully confirm the price support arguments for cold IPOs and, to a lesser degree, the cascade effect for hot IPOs.

Our study differs from previous research in several ways. The first is that, in our analysis, we include new offer-specific characteristics such as: the retail proportion (i.e. the number of shares allocated in the retail tranche relative to total shares allocated) and the offering proportion (i.e. the number of shares allocated in the offering relative to the number of outstanding shares), and a new firm-specific characteristic, namely, the firm size (i.e. the log of total assets adjusted by inflation) to try to explain the intraday price variation on the first trading day. We use the retail proportion variable to explore whether the intraday or secondary (open-to-close) return of IPOs is consistent with retail sentiment arguments. Secondly, we study the influence of the primary market over the secondary price formation process on the first trading day by the combination of cold and offer-to-open (primary) return variables, given that the relationship, as our findings show, is different for cold IPOs than for hot IPOs. The third and final difference is our research scenario since we analyse the secondary price formation process of IPOs in a small order-driven market, which may differ from large price-driven markets both in size and microstructure characteristics.

The Spanish stock market, with the characteristic features of the French or German bank-oriented systems, differs considerably from the United States or Great Britain market-oriented Anglo-Saxon systems [see Rajan and Zingales (1995) and Saá-Requejo (1996)]. In fact, the majority of Spanish firms use bank financing instead of capital markets to search for financing. This means that the degree of information asymmetry between the banks and firms is much lower, also taking into account that banking groups are usually among their shareholders. Moreover, the age at which Spanish firms transition to public status is much higher than the companies of the Anglo-Saxon countries<sup>3</sup>, which also implies lower degrees of information asymmetries. Furthermore, our firms have a more concentrated ownership structure, with less separation between property and control, making it easier for majority shareholders to monitor managerial performance and, thereby, reduce agency costs, whereas firms listed on the Anglo-Saxon stock markets tend to have less concentrated ownership structures. Finally, the legal system plays a

(2) We classify an IPO as cold if its offer-to-open return is negative or zero and as hot if its offer-to-open return is positive.

(3) The average age of the firms in our sample is approximately twenty four years old compared to the companies stipulated in Bradley *et al.* (2009) which are approximately twelve years of age.

key role in the protection of shareholders. Legal structures with little creditor protection exacerbate information asymmetries and contracting costs [La Porta *et al.* (1998) and Bancel and Mittoo (2004)]. Bancel and Mittoo (2004) conclude that the Common-Law system (Anglo-Saxon markets) provides better protection for investors than the Civil-Law system (Spanish market). All these particular characteristics of the Spanish stock market may influence the underpricing of IPOs and the revelation of information during the process and justifies a specific analysis.

The paper is structured in five sections. Section one presents the theoretical framework and hypotheses. Section two shows the data base. Section three contains the empirical evidence separated into three subsections (abnormal returns on the first five trading days, returns on the first trading day and open-to-close return on the first trading day). The final section summarises the main conclusions.

## 1. THEORETICAL FRAMEWORK AND HYPOTHESES

Several papers show that underpricing is an efficient response to problems of valuation of new firms entering the market in the presence of asymmetric information between firms, underwriters and investors [see Rock (1986), Beatty and Ritter (1986), Benveniste and Spindt (1989), and Welch (1992)].

Initially, all the valuation problems of new firms should be resolved at the beginning of the first trading day, thus affecting the primary (offer-to-open) return but not the intraday or secondary (open-to-close) return, which should be zero [see Barry and Jennings (1993)]. Rock (1986) indicates that it is crucial that the investors receive the benefits at the opening of the secondary market motivated by information asymmetry between firms, underwriters and investors. The consequence is the winner's curse that discourages uninformed investors from participating in the IPO market and, therefore, the underpricing is a compensation given by the issuer/underwriter to the uninformed investor in order to keep these investors in the market. Benveniste and Spindt (1989) propose that the benefit given to investors in order to disclose private information, about prices and shares demand during the presale or registration period, should be obtained at the beginning of the secondary market.

However, empirical studies have documented significantly positive intraday or secondary (open-to-close) returns on the first trading day. While Barry and Jennings (1993) report and argue that the intraday or secondary (open-to-close) return of 0.6% would not overcome transaction costs, Chang *et al.* (2008) and Bradley *et al.* (2009) find that these returns are much higher (1.55% and 2.35%, respectively). Therefore, issues such as information asymmetry, price support, the cascade effect, laddering<sup>4</sup> and market characteristics (market return and volatility) could explain the existence of a significant intraday or secondary (open-to-close) return.

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(4) Laddering is a *quid pro quo* arrangement between the investors and the underwriter according to which the latter allocates hot IPO shares to the former and, as a compensation for the allocation, the investors commit themselves to buying more shares of the IPO in the secondary market. The effect

Since Beatty and Ritter (1986) suggested that IPOs characterised by higher information asymmetry would be more underpriced, this prediction has received considerable empirical support. For example, Lowry *et al.* (2010) find that information asymmetry, using offer- and firm-specific characteristics as proxies, affects the underpricing. For this reason, information asymmetry associated with offer-specific characteristics (e.g. price adjustment, share adjustment, price, and retail proportion) can help to explain the open-to-close return in the secondary market [see Bradley *et al.* (2009)].

The adjustment in price and share number between the initial registration statement (prospectus) and their final value is a proxy for the amount of learning that occurs during the registration period [see Lowry *et al.* (2010)]. Substantial learning (i.e. a higher value of price and share adjustment) is more likely for firms whose value is more uncertain. Thus, following Benveniste and Spind's (1989) partial adjustment phenomenon and Hanley (1993), we propose our first hypothesis:

H<sub>1</sub>: "A positive relationship is expected between price/share adjustment and open-to-close return"

The offering price will have a negative impact on the open-to-close return in the secondary market since the higher the offering price, the less room for further price appreciation. In addition, higher offering prices would exclude some investors with less capital [see Chang *et al.* (2008)]. Therefore, we predict the following relationship:

H<sub>2</sub>: "A negative relationship is expected between offering price and open-to-close return"

Advertisement of IPO operations in order to attract sentiment investors can provide important advantages to the issuer and the investors, since these marketing campaigns could increase the stock prices, the firm valuation and the returns of investors [see Cook *et al.* (2006)]. In the particular case of retail investors, their sentiments are not justified by the fact at hand but by an overoptimistic view about the operation that pushes the prices and return upwards in the secondary market [see Bradley *et al.* (2009)]. Cornelli *et al.* (2006) find evidence that open-to-close return in the secondary market is related to retail demand. Dorn (2009) also finds evidence in the German market that retail investor sentiment increases prices in the secondary market due to investor overoptimism. He documents that retail buyers consistently overpay for initial public offerings. The observed willingness to overpay points to sentiment as a driver of retail trading decisions. Therefore, we use a new variable, retail proportion, as a proxy of the post-IPO ownership structure to explore whether the price variation of IPOs in the first trading day is consistent with retail sentiment arguments. The retail composition of the offering, which defines the ownership structure of the offering in terms of the per-

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of these agreements on the return in the secondary market was modelled by Hao (2007), who suggests that this artificial buying behaviour could help the underwriter to provide price support for cold IPOs and price increase for hot IPOs. In the Spanish IPO market there is no evidence of such agreements and, therefore, the price effect caused by laddering will be non-existent.

centage of uninformed investors, may have an important effect on its underpricing. So, we include the following hypothesis:

H<sub>3</sub>: “A positive relationship is expected between retail proportion and open-to-close return”

Lowry *et al.* (2010) posit that there is a positive relationship between the difficulty of valuing a firm (for example, small, young and tech firms) and the underpricing. Therefore, among the firm-specific characteristics that could influence the open-to-close return, we include the offering size, age and high-tech industry, which are the same variables used by Bradley *et al.* (2009).

Less information tends to be available about smaller IPOs, suggesting that investors will have more difficulty valuing such issues [see Lowry *et al.* (2010)]. Firm size may also influence the open-to-close return, since small firms are difficult to price due to a greater information asymmetry [see Bradley *et al.* (2009)]. Therefore, we propose the following relationship:

H<sub>4</sub>: “An inverse relationship is expected between the offering size (firm size) and open-to-close return”

Furthermore, older companies present lower information asymmetry. There is likely to be more uncertainty regarding the pricing of the stocks of young firms [see Bradley *et al.* (2009) and Lowry *et al.* (2010)]. Thus, we predict the following relationship:

H<sub>5</sub>: “An inverse relationship is expected between firm age and open-to-close return”

The value of technology firms tends to be much harder to estimate precisely because it depends on growth options [see Bradley *et al.* (2009) and Lowry *et al.* (2010)]. Thus, we include the following hypothesis:

H<sub>6</sub>: “A positive relationship is expected between tech firms and open-to-close return”

Considering the specific characteristics of our market, with features closer to the bank-oriented systems than to market-oriented Anglo-Saxon systems, one could envisage that the greater bank financing of Spanish business, less separation between property and control, and greater concentrated ownership (with a significant degree of involvement of family and banking groups in business ownership), will lead to a lower degree of information asymmetry. Thus, the proposed hypotheses, based on information asymmetries arising from the offer-specific characteristics and/or the firm-specific characteristics, will have a lower intensity (i.e. the relationships defined in the hypotheses would be less positive or negative). However, by contrast, the lower level of legal protection that the Spanish market provides to investors in comparison with the Anglo-Saxon markets leads to greater information asymmetry and, therefore, greater intensity in the proposed hypotheses (i.e. the relationships defined in the hypotheses would be more positive or negative). Thus, the final result to be expected about the strength of the hypotheses is a purely empirical question.

Furthermore, it is well known that underwriters support prices when the market price would have declined without their intervention<sup>5</sup>. Schultz and Zaman (1994) find evidence of open-to-close return caused by the price support of the underwriters. They suggest that underwriters quote higher prices than other market makers for issues that commence trading at or below the offer price. Aggarwal and Conroy (2000) also find evidence of price support as a reason to explain the open-to-close return. Price support in the aftermarket censors the left side of the return distribution [see Rudd, (1993) and Hanley *et al.* (1993)]. If price support is the main explanation for open-to-close underpricing, then hot IPOs (i.e. IPOs with high returns in the primary market) should not show significant open-to-close returns since they should not receive price support. However, with cold IPOs (i.e. IPOs with low returns in the primary market), price support will be greater the lower the offer-to-open return. Therefore, we propose the following relationship:

H<sub>7</sub>: “A negative relationship is expected between offer-to-open return and open-to-close return in the case of cold IPOs”

The cascade effect is based on behavioural theory, according to which investors ignore their private information and follow the behaviour of the preceding individual [see Welch (1992)]. In this context, underpricing of the primary market could be an inducement to early investors to participate in the secondary market. IPOs with a large offer-to-open return will have a high open-to-close return in the secondary market as investors try to “get on the bandwagon” [see Barry and Jennings (1993)]. This effect could be measured by the influence of the offer-to-open return on the open-to-close return. The investors of the first trading day will “jump on the bandwagon” of returns that have been obtained in the primary market. Thus, we predict the following hypothesis:

H<sub>8</sub>: “A positive relationship is expected between offer-to-open return and open-to-close return in the case of hot IPOs”

We also include a weaker version of the previous hypothesis in the following way:

H<sub>9</sub>: “A positive open-to-close return is expected in the case of hot IPOs independently of the magnitude of the offer-to-open return”

Finally, market return and market volatility are two variables to consider, since higher intraday return is expected when market return is higher [see Chang *et al.* (2008)] and also higher volatility is expected when the market is more volatile [see Bradley *et al.* (2009)]. Therefore, we propose the following relationships:

H<sub>10</sub>: “A positive relationship is expected between market return and open-to-close return”

H<sub>11</sub>: “A positive relationship is expected between market volatility and open-to-close return”

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(5) Among the empirical evidence that concludes that the underwriter uses price support, we highlight Chowdry and Nanda (1996), Benveniste *et al.* (1998), Ellis *et al.* (2000), Aggarwal (2000) and Lewellen (2006).



## 2. DATA AND DESCRIPTIVE STATISTIC

The sample consists entirely of IPOs by firms listed on the Spanish continuous market from 1993 to 2008. The reason for the selection of the SIBE (Spanish Stock Market Interlinking System), or continuous market, was to avoid problems with different trading systems. Another important reason is the greater liquidity of the stocks traded, since the continuous market represents approximately 99% of all stock market trading in Spain.

Table A1 in the appendix lists the sample companies and the main data. That is, offered firm, type of operation (N, new share offering and/or S, secondary share offering), year, main offering shareholder, initiation or registration date, first trading day date and number of shares allocated. A total of 71 IPOs were made over the study period (1993-2008). Some of them were affected by other events very close to the IPO that might distort the results of the analysis. For example, new share offerings or share listings. Any IPO featuring one of these effects was eliminated from the sample. Of the 71 IPOs originally considered for the study, 67 were found to be entirely free of any such effects.

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 was required was provided by the *Sociedad de Bolsas* (Stock Exchanges Company).

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 higher level of IPO activity during 1997-1999 and 2006-2007. Panel B gives a brief overview of the main IPO variables. The first two variables, the offered and allocated number of shares, signal that there has been a slight overallocation of shares in the IPOs, confirmed by the mean and median values. The same can be said for the price, since the price of the allotted shares exceeds the price of the offered shares. The size of allocated offering reveals a mean value of 549,134 thousand € with a variation ranging between 15,002 and 4,070,463. The relative size of the allocated offering, which is the number of shares allocated relative to the number of outstanding shares, shows close mean and median values with a variation ranging between 7.5% and 100%. Finally, the retail proportion, which is the number of shares allocated in the retail tranche relative to the total shares allocated, shows mean and median values very closely with a variation ranging between 0% and 100%. The importance of this variable stems from the fact that it defines the ownership structure of allocated offerings by fixing the proportion of shares allocated to small shareholders.

## 3. EMPIRICAL EVIDENCE

### 3.1. Abnormal returns on the first five trading days

We compute the abnormal returns on the first five trading days as the share return minus the market return. The abnormal return on the first day for each IPO is the return from the offering price to the closing price minus the market return



Table 1: SUMMARY STATISTICS FOR SAMPLE OF IPOs IN SPAIN (1993-2008)

Panel A: Distribution of IPOs by year					
Year	Number	Proportion (%)			
1993	1	1.493			
1994	4	5.970			
1995	0	0.000			
1996	3	4.478			
1997	7	10.448			
1998	9	13.433			
1999	10	14.925			
2000	5	7.463			
2001	2	2.985			
2002	1	1.493			
2003	1	1.493			
2004	3	4.478			
2005	1	1.493			
2006	10	14.925			
2007	10	14.925			
2008	0	0.000			
Total	67	100.000			
Panel B: Descriptive statistics of IPO characteristics					
Variable	Mean	Median	Min.	Max.	Standard deviation
Number of shares offered (thousands)	60,384	16,157	640	768,012	135,504
Number of shares allocated (thousands)	64,856	16,667	640	768,012	143,348
Price of shares offered (€)	15.07	13.46	1.93	55.59	8.89
Price of shares allocated (€)	15.22	13.64	1.19	61.62	9.49
Size of allocated offering (thousands of €)	549,134	243,697	15,002	4,070,463	870,098
Relative size of allocated offering (%)	37.645	34.573	7.500	100.000	19.089
Retail proportion of allocated offering (%)	28.693	28.497	0.000	100.000	24.951

This table contains the summary statistics for the final sample of IPOs, which is made up of 67 IPOs after excluding offerings which presented other operations very close to the IPO (i.e. new share offerings and listing shares). The relative size is the number of shares allocated relative to the number of outstanding shares. The retail proportion is the number of shares allocated in the retail tranche relative to total shares allocated.

Source: Own elaboration.

for the same period of time, while the remaining returns are computed for closing prices (i.e. the return from the closing price of the previous day to the closing price of the current day minus the market return for the same period of time). Table 2 shows mean, median and positive returns and two statistical tests for these days. The data shows that the underpricing of IPOs does not go beyond the first trading day. In particular, the average value of abnormal return for the first day is 10.463% and statistically significant. Furthermore, the median shows a similar behaviour. The remaining trading days do not present mean and median values which are significantly different from zero. This is consistent with the findings of Miller and Reilly (1987) and Barry and Jennings (1993), and allows us to state that underpricing is a phenomenon entirely corrected by the market on the first trading day.

Table 2: ABNORMAL RETURNS OF IPOs DURING THE FIRST FIVE TRADING DAYS					
Statistic	Trading days				
	First	Second	Third	Forth	Fifth
Mean (%)	10.463	0.229	-0.362	-0.203	-0.157
Median (%)	4.616	-0.073	-0.319	-0.421	-0.187
Positive returns (%)	73.134	49.254	40.299	41.791	43.284
t-statistic	4.978***	0.510	-1.388	-0.669	-0.482
Chi-squared	14.343***	0.015	2.522	1.806	1.209

This table shows the abnormal returns of IPOs during the first five trading days. The abnormal return on the first trading day for each IPO is the return from the offering price to the closing price minus the market return for the same period time (i.e. from the execution of the IPO until the closing of the first trading day). The abnormal return on the other trading days for each IPO is the return from the closing price of the previous day to the closing price of the current day minus the market return for the same period of time. The null hypothesis is that the mean (median) is equal to zero.

\*\*\* Significance at the 1% level.

Source: Own elaboration.

3.2. *Returns on the first trading day*

We are interested in analysing how the underpricing of IPOs is distributed during the first trading day. In particular, we want to know whether the opening price resolves the situation of underpricing or whether, on the contrary, this situation persists for the intraday session (i.e. first trading day of secondary market). For this reason, we divide the total returns of IPOs, computed from offer-to-close and registered in primary and secondary markets, in offer-to-open (primary) and open-to-close (intraday or secondary) returns. Table 3 presents the returns of IPOs on the first trading day with this division. The data shows that the mean and median values of all returns (i.e. offer-to-close, offer-to-open and open-to-close returns) are positive and statistically significant, as is confirmed by the statistical

tests of the mean and median. Furthermore, the t-statistic and Wilcoxon tests disclose that the mean value of the primary (offer-to-open) return is significantly greater than the mean value of the secondary (open-to-close) return. Therefore, we can state that the opening price of IPOs does not fully solve the underpricing but that it exists during the first intraday session. These results are fully consistent with the findings of Chang *et al.* (2008) and Bradley *et al.* (2009).

Table 3: RETURNS OF IPOs ON THE FIRST TRADING DAY

Statistic	Offer-to-close	Offer-to-open	Open-to-close
Mean (%)	10.250	8.025	2.295
Median (%)	4.762	3.212	1.045
Positive returns (%)	73.134	64.179	71.642
t-statistic <sup>(1)</sup>	4.859***	3.478***	3.713***
Chi-squared <sup>(1)</sup>	14.343***	5.388**	12.552***
t-statistic <sup>(2)</sup>		-2.641***	
Wilcoxon statistic <sup>(2)</sup>		-2.341**	

This table contains the returns of IPOs on the first trading day. The offer-to-close return on the first trading day for each IPO is the return from the offering price to the closing price. The offer-to-open (primary) return on the first trading day for each IPO is the return from the offering price to the opening price. The open-to-close (secondary or intraday) return on the first trading day for each IPO is the return from the opening price to the closing price. (1) The null hypothesis is that the mean (median) is equal to zero. (2) The null hypothesis is that the mean offer-to-open return is equal to the mean open-to-close return.

\*\* Significance at the 5% level.

\*\*\* Significance at the 1% level.

Source: Own elaboration.

### 3.3. Open-to-close return on the first trading day

As the mean value of open-to-close return is significantly positive, we are interested in analysing the factors behind the secondary price formation process on the first trading day. In particular, we want to know whether the open-to-close return on the first trading day is related to the offer-specific characteristics and/or the firm-specific characteristics, as proxies of asymmetric information. Thus, we carry out several univariate regression analyses on the open-to-close return dependent variable. Panel A of Table 4 shows the results of these regressions.

To see whether there is a statistical relationship between the open-to-close return and variables related to offer-specific characteristics, we carry out the following univariate regression analyses on the following independent variables: price adjustment, share adjustment, price, retail proportion and offering proportion (see from second to sixth columns of Panel A). Price adjustment is the offering price relative to the middle of the original range of the offering price in the

Table 4: UNIVARIATE ANALYSIS OF OPEN-TO-CLOSE RETURN OF IPOs ON THE FIRST TRADING DAY

Independent variables	Regression results of open-to-close (abnormal) return dependent variables								
Panel A: Open-to-close return									
Constant	0.016610 (0.380)	0.044658 (0.556)	0.040320 (1.997)**	0.027322 (2.547)**	0.039180 (2.826)***	-0.017291 (-0.270)	0.004643 (0.090)	0.018537 (1.969)*	0.020200 (2.758)***
Price adjustment	0.006349 (0.132)								
Share adjustment		-0.020256 (-0.273)							
Log price			-0.007660 (-0.901)						
Retail proportion				-0.015235 (-0.606)					
Offering proportion					-0.043112 (-1.337)				
Log offering size						0.002117 (0.650)			
Log firm size							0.000945 (0.371)		
Age								0.000183 (0.736)	
Tech									0.014175 (1.176)
Adjusted R-squared (%)	-1.524	-1.444	-0.499	-0.957	1.189	-1.248	-1.390	-0.779	-0.273

Table 4: UNIVARIATE ANALYSIS OF OPEN-TO-CLOSE RETURN OF IPOs ON THE FIRST TRADING DAY (continuation)

Independent variables	Regression results of open-to-close (abnormal) return dependent variables									
	Panel B: Open-to-close abnormal return									
Constant	0.049367 (1.091)	0.041830 (0.511)	0.053409 (2.499)**	0.027180 (2.524)**	0.044210 (3.282)***	-0.052913 (-0.822)	-0.023851 (-0.466)	0.019732 (2.119)**	0.020482 (2.801)***	
Price adjustment	-0.025061 (-0.511)									
Share adjustment		-0.016324 (-0.216)								
Log price			-0.012821 (-1.436)							
Retail proportion				-0.009907 (-0.400)						
Offering proportion					-0.052790 (-1.643)					
Log offering size						0.004064 (1.233)				
Log firm size							0.002488 (0.972)			
Age								0.000191 (0.8166)		
Tech									0.019872 (1.271)	
Adjusted R-squared (%)	-1.308	-1.477	1.334	-1.295	2.516	-0.478	-0.517	-0.720	0.924	

This table shows the univariate regression results of open-to-close dependent variable on the independent variables related to the offer-specific characteristics and the firm-specific characteristics. Open-to-close (intraday or secondary) return is the return from the opening price to the closing price on the first trading day. Open-to-close (intraday or secondary) abnormal return is the abnormal return from the opening price to the closing price on the first trading day, defined as the share return minus the market return. Price adjustment is the offering price relative to the middle of the original range of the offering price in the prospectus. Share adjustment is the number of shares allocated relative to the original number of shares offered in the prospectus, ignoring the overallocation option. Log price is the log of the offering price adjusted by inflation (i.e. expressed in monetary units of 1993). Retail proportion is the number of shares allocated in the retail tranche relative to the total shares allocated. Offering proportion is the number of shares allocated in the offering relative to the number of outstanding shares. Log offering size is the log of offering proceeds adjusted by inflation (i.e. expressed in monetary units of 1993). Log firm size is the log of total assets adjusted by inflation (i.e. expressed in monetary units of 1993). Age is the age of the firm in years from its creation date to the offering date. Tech is a binary variable equal to one if the offering firm's business is in a high-tech industry and zero otherwise. White (1980) heteroskedasticity-consistent standard errors are used and t-statistics are reported in parentheses. \* significance at the 10% level; \*\* significance at the 5% level; \*\*\* significance at the 1% level.

Source: Own elaboration.

prospectus, and share adjustment is the number of shares allocated relative to the original number of shares offered in the prospectus, ignoring the overallotment option. Price and share adjustments, which reveal private information in the pre-sale or registration period for each IPO with a review of the offering price or shares offered, are fully reflected in the opening price, since the intraday return is not correlated with these adjustments. Thus, this evidence is consistent with Barry and Jennings (1993). Furthermore, offer price and retail proportion variables -defined, respectively, as the log of offering price adjusted by inflation (i.e. expressed in monetary units of 1993) and the number of shares allocated in the retail tranche relative to total shares allocated- have no relationship to the intraday or secondary return, since we do not observe that the offering price has a negative impact motivated by the less room for further price appreciation [see Chang *et al.* (2008)] or that the retail proportion has a positive effect due to retail demand or investor over-optimism [see Cornelli *et al.* (2006) and Dorn (2009)]. Finally, we also include an *ad hoc* variable related to offer-specific characteristics, which has not been shown in the theoretical framework, namely, the offering proportion variable. This variable, which reflects the number of shares allocated in the offering relative to the number of outstanding shares, allows us to see whether the intraday price variation is related to the proportion of shares allocated. The results do not differ with respect to the above variables and show that the proportion of shares allocated does not affect the intraday price variation.

Other explanatory variables related to firm-specific characteristics were also examined for each IPO. The offering size, firm age and tech variables may serve as proxies to measure the difficulty of valuing a firm [see Lowry *et al.* (2010)]. We also include the firm size variable (defined as the log of total assets adjusted by inflation, i.e. expressed in monetary units of 1993) as an alternative to the offering size variable (defined as the log of offering proceeds adjusted by inflation, i.e. expressed in monetary units of 1993), since offering size may be considered as an offer-specific characteristic. The age variable is the age of the firm in years from its creation date to the offering date. The tech variable is a binary variable equal to one if the offering firm's business is in a high-tech industry and zero otherwise. As shown in columns seven to ten of Panel A, the intraday or secondary return of IPOs on the first trading day is not related to these variables. Therefore, our findings suggest that intraday price variation is not related to the offer and/or firm characteristics, as proxies of asymmetric information. That is, we cannot confirm any of the hypotheses formulated about the information asymmetry (see hypotheses one to six).

In order to provide robustness, we have repeated the analysis with open-to-close abnormal return, defined as the share return minus the market return. The results, summarized in Panel B of Table 4, again support our previous results mentioned above and confirms that the open-to-close return on the first trading day is not related to offer-specific characteristics and/or firm-specific characteristics.

As underwriters support the price of cold IPOs in the secondary market (price support) and investors try to "get on the bandwagon" of hot IPOs (cascade effect), we analyse the influence of the primary market on the secondary price formation process on the first trading day. To examine this issue, we divide the offerings into cold and hot IPOs taking into account their returns in the primary market (i.e. an IPO is classified as cold if its offer-to-open return is negative or

zero and as hot if its offer-to-open return is positive)<sup>6</sup>. Then, we analyse the relationship between open-to-close return and offer-to-open return considering the combination of cold and offer-to-open return variables.

The results, presented in Panel A of Table 5 (see second column), allow us to state that the constant for hot IPOs is significantly positive, while the coefficient of the cold variable is negative and significant. These results indicate that cold IPOs present lower intraday returns than hot IPOs. Furthermore, the offer-to-open (primary) return has no effect on the intraday return of hot IPOs. That is, the intraday return does not depend on the magnitude of the offer-to-open (primary) return of hot IPOs. Therefore, the cascade effect, which suggests that the investors follow the behaviour of the preceding investors, may partly explain the intraday or secondary return observed in hot IPOs and confirms the ninth hypothesis (see the regression coefficients of constant and offer-to-open return), since these IPOs present a positive intraday return independently of the magnitude of the offer-to-open return because investors may try to “get on the bandwagon” of hot IPOs [see Barry and Jennings (1993)]. On the other hand, in cold IPOs, the coefficient of the offer-to-open (primary) return variable is negative and significant. These results seem to confirm that price support is behind the observed relationship between the intraday price variation and primary market in cold IPOs. That is, the more negative the offer-to-open (primary) return of cold IPOs the higher the intraday or secondary return due to the price support of the underwriters [see Aggarwal and Conroy (2000)]. Moreover, this relationship is not observed in hot IPOs, which is fully consistent with the price support arguments and confirms the seventh hypothesis. Finally, we incorporate the market return and the market volatility as explanatory variables, since a higher intraday return is expected when market return is higher [see Chang *et al.* (2008)] and also when the market is more volatile [see Bradley *et al.* (2009)]. Our results are not affected by these variables (see third and fourth columns in Panel A). Furthermore, taking into account the condition indexes (much lower than 15), we note that there are no collinearity problems among the independent variables.

These same results can be observed more clearly when we separate the IPOs into hot and cold offers (see panels B and C of Table 5). On the one hand, the intraday return of hot IPOs is significantly positive and does not depend on the size of the offer-to-open (primary) return, which is partly consistent with the cascade effect (see the regression coefficients of constant and offer-to-open return). On the other hand, in the case of cold IPOs, the constant is insignificant and its intraday return shows a clear negative relationship with the offer-to-open (primary) return, which is consistent with the price support argument (see again the regression coefficients of constant and offer-to-open return and also that the adjusted R-squared is over 30%). Therefore, according to the results, we can confirm the seventh and ninth hypotheses.

In order to provide robustness, we have repeated the analysis after excluding the IPOs whose offer-to-open (primary) returns are close to zero, in particular, IPOs

(6) In our data, we have 24 cold IPOs and 43 hot IPOs. The cold variable is a binary variable equal to one if the offer-to-open return of IPO is negative or zero and zero otherwise.



Table 5: MULTIVARIATE ANALYSIS OF OPEN-TO-CLOSE RETURN  
OF IPOs ON THE FIRST TRADING DAY

Independent variables	Regression results of open-to-close return dependent variable		
Panel A: All IPOs (N = 67)			
Constant	0.033121 (3.567)***	0.032535 (3.433)***	0.034602 (2.903)***
Cold	-0.038531 (-2.481)**	-0.036799 (-2.311)**	-0.038506 (-2.467)**
Offer-to-open return	-0.076467 (-1.148)	-0.073466 (-1.078)	-0.076414 (-1.139)
Cold * Offer-to-open return	-0.657268 (-1.688)*	-0.662282 (-1.692)*	-0.660689 (-1.673)*
Market return	0.251719 (0.684)		
Market volatility	-0.109975 (-0.246)		
Condition index range	1.000 - 3.313	1.000 - 3.492	1.000 - 5.043
Adjusted R-squared (%)	13.292	12.152	11.924
Panel B: Hot IPOs (N = 43)			
Constant	0.033121 (3.592)***	0.032362 (3.398)***	0.035651 (2.458)***
Offer-to-open return	-0.076467 (-1.156)	-0.072583 (-1.061)	-0.076377 (-1.141)
Market return	0.325877 (0.656)		
Market volatility	-0.187897 (-0.268)		
Condition index range	1.000 - 1.970	1.000 - 2.072	1.100 - 4.652
Adjusted R-squared (%)	6.569	4.627	4.300

Table 5: MULTIVARIATE ANALYSIS OF OPEN-TO-CLOSE RETURN  
OF IPOs ON THE FIRST TRADING DAY (continuation)

Independent variables	Regression results of open-to-close return dependent variable		
Panel C: Cold IPOs (N = 24)			
Constant	-0.005410 (-0.429)	-0.004864 (-0.364)	-0.005095 (-0.386)
Offer-to-open return	-0.733734 (-1.889)*	-0.734694 (-1.850)*	-0.734438 (-1.813)*
Market return	0.119874 (0.229)		
Market volatility	-0.022958 (-0.041)		
Condition index range	1.000 - 2.574	1.000 - 2.836	1.100 - 4.307
Adjusted R-squared (%)	33.382	30.281	30.212

This table presents the regression results of the open-to-close return dependent variable. The open-to-close (intraday or secondary) return is the return from the opening price to the closing price on the first trading day. Cold is a binary variable equal to one if the offer-to-open return of the IPO is negative or zero and zero otherwise. The offer-to-open (primary) return is the return from the offering price to the opening price on the first trading day. Market return is the average open-to-close return for the remaining firms in the market on the first trading day. Market volatility is the average volatility for the remaining firms in the market on the first trading day (i.e. the volatility for each firm measures the maximum range of the price variation relative to the middle price of this range). White (1980) heteroskedasticity-consistent standard errors are used and t-statistics are reported in parentheses. The condition index range (much lower than 15) shows that there are no collinearity problems among the independent variables.

\* significance at the 10% level.

\*\* significance at the 5% level.

\*\*\* significance at the 1% level.

Source: Own elaboration.

that have a primary return between -2% and 2%<sup>7</sup>. The results, summarized in Table 6, again support our previous results mentioned above and confirm the different behaviour of cold IPOs versus hot IPOs (see also the increase in adjusted R-squared, particularly in the case of cold IPOs). That is, the secondary return is significantly positive and does not depend on the magnitude of the offer-to-open (primary) return for hot IPOs while, for cold IPOs, the secondary return is insignificant and the more

(7) In our data we have 15 cold IPOs and 36 hot IPOs after excluding the IPOs whose offer-to-open returns are between -2% and 2%.

**Table 6: MULTIVARIATE ANALYSIS OF OPEN-TO-CLOSE RETURN OF IPOs  
ON THE FIRST TRADING DAY AFTER EXCLUDING IPOs WHOSE  
OFFER-TO-OPEN RETURNS ARE BETWEEN -2% AND 2%**

Independent variables	Regression results of open-to-close return dependent variable		
Panel A: All IPOs (N = 51)			
Constant	0.038369 (3.372)***	0.038496 (3.356)***	0.034951 (2.465)**
Cold	-0.081004 (-2.553)**	-0.081803 (-2.537)**	-0.082251 (-2.618)**
Offer-to-open return	-0.088275 (-1.351)	-0.089012 (-1.347)	-0.088794 (-1.352)
Cold * Offer-to-open return	-1.109556 (-1.924)*	-1.112704 (-1.907)*	-1.112683 (-1.917)*
Market return	-0.067209 (-0.152)		
Market volatility	0.267254 (0.465)		
Condition index range	1.000 - 4.697	1.000 - 4.956	1.000 - 5.323
Adjusted R-squared (%)	17.559	15.782	15.928
Panel B: Hot IPOs (N = 36)			
Constant	0.038369 (3.413)***	0.037769 (3.289)***	0.037688 (2.291)**
Offer-to-open return	-0.088275 (-1.368)	-0.084791 (-1.275)	-0.088378 (-1.356)
Market return	0.317681 (0.541)		
Market volatility	0.053295 (0.065)		
Condition index range	1.000 - 2.131	1.000 - 2.227	1.000 - 4.611
Adjusted R-squared (%)	8.240	5.763	5.464

**Table 6: MULTIVARIATE ANALYSIS OF OPEN-TO-CLOSE RETURN OF IPOs  
ON THE FIRST TRADING DAY AFTER EXCLUDING IPOs WHOSE  
OFFER-TO-OPEN RETURNS ARE BETWEEN -2% AND 2% (continuation)**

Independent variables	Regression results of open-to-close return dependent variable		
Panel C: Cold IPOs (N = 15)			
Constant	-0.042635 (-1.396)	-0.051085 (-1.525)	-0.051454 (-1.584)
Offer-to-open return	-1.197831 (-2.027)*	-1.246734 (-1.996)*	-1.204723 (-1.973)*
Market return	-0.846118 (1.750)		
Market volatility	0.505172 (0.566)		
Condition index range	1.000 - 4.173	1.000 - 4.789	1.000 - 5.651
Adjusted R-squared (%)	48.033	46.840	44.788

This table presents the regression results of the open-to-close return dependent variable after excluding IPOs whose offer-to-open returns are between -2% and 2%. The open-to-close (intraday or secondary) return is the return from the opening price to the closing price on the first trading day. Cold is a binary variable equal to one if the offer-to-open return of the IPO is less than -2% and zero otherwise. The offer-to-open (primary) return is the return from the offering price to the opening price on the first trading day. Market return is the average open-to-close return for the remaining firms in the market on the first trading day. Market volatility is the average volatility for the remaining firms in the market on the first trading day (i.e. the volatility for each firm measures the maximum range of the price variation relative to the middle price of this range). White (1980) heteroskedasticity-consistent standard errors are used and t-statistics are reported in parentheses. The condition index range (much lower than 15) shows that there are no collinearity problems among the independent variables.

\* significance at the 10% level.

\*\* significance at the 5% level.

\*\*\* significance at the 1% level.

Source: Own elaboration.

negative the offer-to-open (primary) return the higher the secondary return. Therefore, all our findings seem to fully confirm the price support arguments for cold IPOs and, to a lesser degree, the cascade effect for hot IPOs.

Finally, given the limited number of observations and to increase the robustness of our findings, the same analyses were repeated using bootstrap procedures. In particular, we use the bootstrap technique to obtain the average values of the regression coefficients and the simulated p-values. The actual procedure was to perform 1,000 OLS regressions with 51, 36 and 15 observations, respectively, per

regression extracted with replacement. The p-values were obtained using the standard bootstrap percentile test procedure, which retains the essentially non-parametric nature of the bootstrap approach without imposing parametric assumptions on the distribution. The results, included in Table 7, clearly allow us to support our previous results mentioned above and confirm the different behaviour of cold IPOs versus hot IPOs.

Table 7: MULTIVARIATE ANALYSIS OF OPEN-TO-CLOSE RETURN OF IPOs ON THE FIRST TRADING DAY AFTER EXCLUDING IPOs WHOSE OFFER-TO-OPEN RETURNS ARE BETWEEN -2% AND 2% FOR 1,000 BOOTSTRAP OLS REGRESSIONS			
Independent variables	Regression results of open-to-close return dependent variable		
Panel A: All IPOs (N = 51)			
Constant	0.030271 (0.090)*	0.030328 (0.097)*	0.028242 (0.096)*
Cold	-0.068074 (0.038)**	-0.068541 (0.043)**	-0.070052 (0.034)**
Offer-to-open return	-0.028782 (0.268)	-0.030125 (0.262)	-0.033058 (0.262)
Cold * Offer-to-open return	-1.050940 (0.035)**	-1.057187 (0.037)**	-1.060781 (0.040)**
Market return	0.089274 (0.487)		
Market volatility	0.197416 (0.371)		
Panel B: Hot IPOs (N = 36)			
Constant	0.029281 (0.093)*	0.028840 (0.095)*	0.030024 (0.094)*
Offer-to-open return	-0.019973 (0.304)	-0.019510 (0.295)	-0.017498 (0.309)
Market return	0.503961 (0.230)		
Market volatility	-0.087484 (0.463)		

**Table 7: MULTIVARIATE ANALYSIS OF OPEN-TO-CLOSE RETURN OF IPOs ON THE FIRST TRADING DAY AFTER EXCLUDING THOSE IPOs WHOSE OFFER-TO-OPEN RETURNS ARE BETWEEN -2% AND 2% FOR 1,000 BOOTSTRAP OLS REGRESSIONS**

Independent variables	Regression results of open-to-close return dependent variable		
Panel C: Cold IPOs (N = 15)			
Constant	-0.036917 (0.125)	-0.047762 (0.055)*	-0.051405 (0.051)*
Offer-to-open return	-1.076877 (0.027)**	-1.171765 (0.014)**	-1.111312 (0.019)**
Market return	-0.630470 (0.125)		
Market volatility	0.788285 (0.195)		

This table presents the average regression results of the open-to-close return dependent variable after excluding IPOs whose offer-to-open returns are between -2% and 2% for 1,000 bootstrap OLS regressions with 51, 36 and 15 observations, respectively, per regression extracted with replacement. The open-to-close (intraday or secondary) return is the return from the opening price to the closing price on the first trading day. Cold is a binary variable equal to one if the offer-to-open return of the IPO is less than -2% and zero otherwise. The offer-to-open (primary) return is the return from the offering price to the opening price on the first trading day. Market return is the average open-to-close return for the remaining firms in the market on the first trading day. Market volatility is the average volatility for the remaining firms in the market on the first trading day (i.e. the volatility for each firm measures the maximum range of the price variation relative to the middle price of this range). The coefficients are the average values of the coefficients of 1,000 bootstrap OLS regressions and simulated p-values are reported in parentheses.

\* significance at the 10% level.

\*\* significance at the 5% level.

\*\*\* significance at the 1% level.

Source: Own elaboration.

In summary, the results from the univariate and multivariate analyses provide evidence that intraday price variation is not related to the offer and/or firm characteristics. Nevertheless, the influence of the primary market over the secondary price formation process on the first trading day is quite evident. In particular, we observe that the combination of cold and offer-to-open (primary) return variables allow us to partly explain the intraday price variation. That is, intraday return is significantly positive for hot IPOs, while cold IPOs present lower intraday returns than hot IPOs and they are also insignificant. Furthermore, there is no relationship between offer-to-open (primary) return and intraday return for hot IPOs while, in the case of cold IPOs, higher intraday or secondary returns are observed when

they are offer-to-open (primary) returns are more negative. Therefore, our results are fully consistent with the price support arguments for cold IPOs and, to a lesser degree, the cascade effect for hot IPOs.

#### 4. CONCLUSION

Since only a few studies, such as Barry and Jennings (1993), Chang *et al.* (2008) and Bradley *et al.* (2009), have analysed IPO underpricing distinguishing between primary and secondary underpricing, we carry out our study about the secondary price formation process of IPOs on the first trading day in order to contribute to broadening the international scope of empirical research on IPO underpricing in the secondary market on the first trading day.

After finding that the undervaluation does not go beyond the first trading day and that the intraday or secondary (open-to-close) return, also on the first trading day, is significantly positive, we are interested in analysing what factors are behind the secondary price formation process on the first trading day. More specifically, we want to know whether the open-to-close return on the first trading day is related to the offer-specific and/or the firm-specific characteristics. We also want to know the role of the primary market in the secondary price formation on the first trading day through the underwriter price support and cascade effect motivated by investors.

Our findings do not confirm that intraday price variation is related to the offer –and firm– specific characteristics. Price adjustment, share adjustment, price, retail proportion and offering proportion variables such as offer characteristics and offering size, firm size, firm age, and tech variables, such as firm characteristics, do not seem to be behind the secondary price formation process on the first trading day. Neither do our results confirm any relationship with market return and volatility. Nevertheless, the influence of the primary market on the secondary price formation process on the first trading day is quite evident. We observe that the combination of cold and offer-to-open (primary) return variables allow us to partly explain the intraday price variation. That is, open-to-close return is significantly positive for hot IPOs while cold IPOs present lower intraday returns than hot IPOs and they are also insignificant. Furthermore, there is no relationship between offer-to-open (primary) return and open-to-close return for hot IPOs while, in the case of cold IPOs, higher intraday returns are observed when they are offer-to-open (primary) returns they are more negative. Finally, the results obtained after the removal of IPOs whose offer-to-open (primary) returns were close to zero, with or without bootstrap procedures, provide robustness and confirms the different behaviour of cold IPOs versus hot IPOs. Therefore, all our results are fully consistent with the price support arguments for cold IPOs and, to a lesser degree, the cascade effect for hot IPOs.



Table A1: SAMPLE OF IPOs IN SPAIN (1993-2008)

Share offered	Type of operation	Year	Main offering shareholder	Initiation date	First trading day date	Shares allocated
Argentaria	S	1993	Soc. Est. de Patrimonio I	12/04/93	12/05/93	31,362,450
Continente	S	1994	Several	24/02/94	17/03/94	14,400,000
Cortefiel	S	1994	Several	16/06/94	08/07/94	4,911,534
Gines Navarro	S	1994	Corp. Financiera Alba	20/10/94	17/11/94	2,445,000
Mapfre Vida	S	1994	Corporación Mapfre	22/11/94	23/12/94	1,200,000
E. e I. Aragonesas <sup>(1)</sup>	S	1995	Uralita	07/02/95	20/02/95	20,000,000
Sol Meliá	N	1996	Sol Meliá	04/06/96	02/07/96	14,190,000
Tele Pizza	S	1996	Several	25/10/96	13/11/96	4,829,816
Abengoa	S	1996	Several	12/11/96	29/11/96	1,972,633
Miquel y Costas <sup>(1)</sup>	N and S	1996	Several	15/11/96	27/11/96	2,034,162
Adolfo Domínguez	S	1997	Several	28/02/97	18/03/97	5,976,240
Barón de Ley	S	1997	Several	01/07/97	16/07/97	5,407,860
Cvne	N and S	1997	Several	04/07/97	17/07/97	640,020
Bodegas Riojanas	S	1997	Several	12/09/97	30/09/97	2,158,055
Aldeasa	S	1997	Soc. Est. de Partic. Patrim. (Seppa)	12/09/97	01/10/97	15,000,000
Iberpapel	N and S	1997	Iberpapel Gestión	14/11/97	28/11/97	3,872,629
Aceralia <sup>(1)</sup>	S	1997	Soc. Est. de Partic. Indust. (Sepi)	21/11/97	10/12/97	71,256,154
Dinamia	N and S	1997	Dinamia	27/11/97	15/12/97	9,000,000
Dogi	S	1998	Several	15/01/98	21/01/98	3,639,200
Fastibex	N	1998	Fatibex	26/03/98	06/04/98	825,000
Meliá Inversiones	N and S	1998	Meliá Inversiones	27/03/98	08/04/98	4,151,319
Superdiplo	N and S	1998	Superdiplo	29/04/98	14/05/98	14,315,764
Befesa	S	1998	Befesa	16/06/98	01/07/98	6,907,280

Table A1: SAMPLE OF IPOs IN SPAIN (1993-2008) (continuation)

Share offered	Type of operation	Year	Main offering shareholder	Initiation date	First trading day date	Shares allocated
Europa&C	S	1998	Ardagan and Settsu Europe	26/06/98	10/07/98	12,571,578
Federico Paternina	S	1998	Marcos Eguizabal and B. Barón	04/09/98	16/09/98	1,842,836
Enaco	S	1998	Several	24/11/98	11/12/98	6,590,400
Funespaña	N and S	1998	Several	01/12/98	11/12/98	3,449,084
Transportes Azkar	S	1999	Azkar and others	21/01/99	03/02/99	14,576,000
Indra Sistemas	S	1999	Soc. Est. de Partic. Indust. (Sepi)	05/03/99	23/03/99	48,877,483
Grupo Ferrovial	N and S	1999	Grupo Ferrovial and others	15/04/99	05/05/99	48,117,540
Mecalux	N and S	1999	Several	16/04/99	06/05/99	8,820,300
Parques Reunidos	N and S	1999	Parques Reunidos	14/05/99	26/05/99	21,274,344
Tpi	S	1999	Telefónica	04/06/99	23/06/99	42,912,275
Red Eléctrica de Esp.	S	1999	Soc. Est. de Partic. Indust. (Sepi)	18/06/99	07/07/99	47,344,500
Sogecable	N and S	1999	Sogecable and others	30/06/99	21/07/99	24,255,940
Amadeus	N and S	1999	Several	01/10/99	19/10/99	147,500,000
Inmobiliaria Colonial	S	1999	La Caixa	08/10/99	27/10/99	32,000,000
Terra Networks <sup>(1)</sup>	S	1999	Terra Networks	29/10/99	17/11/99	66,076,415
Prisa	S	2000	Several	07/06/00	28/06/00	43,762,500
European Aeronautic	N and S	2000	Several	22/06/00	10/07/00	144,807,407
Recoletos	N and S	2000	Recoletos and Pearsons Overseas H.	03/10/00	25/10/00	25,475,000
Gamesa	S	2000	Several	11/10/00	31/10/00	24,329,990
Telefónica Móviles	N	2000	Telefónica Móviles	02/11/00	22/11/00	345,000,000
Iberia	S	2001	Soc. Est. de Partic. Indust. (Sepi)	16/03/01	03/04/01	482,430,511
Inditex	S	2001	Several	27/04/01	23/05/01	162,645,600
Enagas	S	2002	Gas Natural	10/06/02	26/06/02	141,091,948
Antena 3 TV	S	2003	Telefónica	17/10/03	29/10/03	16,666,800

Table A1: SAMPLE OF IPOs IN SPAIN (1993-2008) (continuation)

Share offered	Type of operation	Year	Main offering shareholder	Initiation date	First trading day date	Shares allocated
Fadesa Inmobiliaria	S	2004	Fadesa Inmobiliaria	13/04/04	30/04/04	40,425,863
Telecinco	S	2004	Telecinco and others	08/06/04	24/06/04	85,313,421
Cintra	N and S	2004	Cintra and Milsa	08/10/04	27/10/04	186,475,841
Corp. Dermoeestética	S	2005	Corp. Dermoeestética	28/06/05	13/07/05	17,265,992
Renta Corp.	N and S	2006	Renta Corp.	16/03/06	05/04/06	8,280,000
Parquesol Inmobiliaria	N and S	2006	Parquesol Inmobiliaria	19/04/06	05/05/06	12,381,543
Grifols	N	2006	Grifols	26/04/06	17/05/06	78,000,000
Astroc Mediterraneo	S	2006	CV Capital	12/05/06	24/05/06	30,297,500
Gam	N and S	2006	Gral. de Aquiler de Maquinaria	25/05/06	13/06/06	13,750,000
Técnicas Reunidas	S	2006	Técnicas Reunidas	02/06/06	21/06/06	21,284,962
Bme	S	2006	Bolsas and Mercados Españoles	29/06/06	14/07/06	25,139,996
Riofisa	S	2006	Riofisa	05/07/06	19/07/06	13,538,717
Vocento	S	2006	Vocento	20/10/06	08/11/06	22,231,563
Vueling Airlines	N and S	2006	Vueling Airlines	16/11/06	01/12/06	7,009,148
Clínica Baviera	S	2007	Clínica Baviera	15/03/07	03/04/07	6,739,187
Realia Business	S	2007	Realia Business	18/05/07	06/06/07	120,494,148
Solaria Energía	N	2007	Solaria Energía	31/05/07	19/06/07	26,894,667
Laboratorios Almirall	N and S	2007	Laboratorios Almirall	31/05/07	20/06/07	49,829,583
Criteria CaixaCorp	N	2007	Criteria CaixaCorp	20/09/07	10/10/07	733,019,037
Codere	N and S	2007	Codere	04/10/07	19/10/07	11,236,291
Fluidra	S	2007	Fluidra	11/10/07	31/10/07	45,949,779
Renta 4	N and S	2007	Renta 4	25/10/07	14/11/07	9,821,918
Laborat. Farm. Rovi	S	2007	Laboratorios Farm. Rovi	15/11/07	05/12/07	18,381,943
Iberdrola Renovables	N	2007	Iberdrola Renovables	22/11/07	13/12/07	768,011,800

Notes: (1) Denotes that the offering was dropped from the sample. Although the original sample included 71 IPOs over the period 1993-2008, the final sample numbered 67 IPOs free of any other operation very close to the IPO that might distort the results of analysis (e.g. new share offerings and listing shares). N indicates that the IPO only contains new shares (subscription). S indicates that the IPO only contain secondary shares (sale). N and S indicate that the IPO contains new and secondary shares.

Source: Own elaboration.

## REFERENCES

- Aggarwal, R. (2000): "Stabilization activities by underwriters after initial public offerings", *Journal of Finance*, vol. 55, pp. 1075-1103.
- Aggarwal, R. and P. Conroy (2000): "Price discovery in initial public offerings and the role of the lead underwriter", *Journal of Finance*, vol. 55, pp. 2903-2922.
- Álvarez, S. (2000): "La infravaloración de las salidas a bolsa (1985-1997)", *Bolsa de Madrid*, vol. 87, pp. 19-23.
- Álvarez, S. and A.I. Fernández (2003): "La explicación de la infravaloración de las salidas a bolsa españolas", *Revista de Economía Aplicada*, vol. 11, nº 33, pp. 49-64.
- Álvarez, S. and V.M. González (2005): "Signalling and the long-run performance of Spanish Initial Public Offerings (IPOs)", *Journal of Business Finance and Accounting*, vol. 32, nº 1-2, pp. 325-350.
- Bancel, F. and U. Mittoo (2004): "Cross-country determinants of capital structure choice: A survey of European firms", *Financial Management*, vol. 33, nº 4, pp. 103-133.
- Barry, C. and R. Jennings (1993): "The opening price performance of initial public offerings of common stock", *Financial Management*, vol. 22, nº 1, pp. 54-63.
- Beatty, R. and J. Ritter (1986): "Issuer expenses and legal liability in initial public offerings", *Journal of Law and Economics*, vol. 15, pp. 213-232.
- Benveniste, L., Erdal, S. and W. Wilhelm (1998): "Who benefits from secondary market price stabilization of IPOs?", *Journal of Banking and Finance*, vol. 22, pp. 741-767.
- Benveniste, L. and P. Spindt (1989): "How investment bankers determine the offer price and allocation of new issues", *Journal of Financial Economics*, vol. 24, pp. 343-361.
- Bradley, D.J., Gonas, J.S., Highfield, M.J. and K.D. Roskelley (2009): "An examination of IPO secondary market returns", *Journal of Corporate Finance*, vol. 15, pp. 316-330.
- Chang, E., Chen, C., Chi, J. and M. Young (2008): "IPO underpricing in China: New evidence from the primary and secondary markets", *Emerging Market Review*, vol. 9, pp. 1-16.
- Chowdry, B. and V. Nanda (1996): "Stabilization, syndication, and the pricing of IPOs", *Journal of Financial and Quantitative Analysis*, vol. 31, pp. 25-42.
- Cook, D., Kieschnick, R. and R. Van Ness (2006): "On the marketing of IPOs", *Journal of Financial Economics*, vol. 82, pp. 35-61.
- Cornelli, F., Goldreich, D. and A. Ljungqvist (2006): "Investor sentiment and pre-IPO markets", *Journal of Finance*, vol. 61, pp. 1187-1216.
- Dorn, D. (2009): "Does sentiment demand drive the retail demand for IPOs?", *Journal of Financial and Quantitative Analysis*, vol. 44, nº 1, pp. 85-108.
- Ellis, K., Micahely, R. and M. O'Hara (2000): "When the underwriter is the market maker: an examination of trading in the IPO aftermarket", *Journal of Finance*, vol. 55, pp. 1039-1074.
- Farinós, J.E. (2001): "Rendimientos anormales de las OPV en España", *Investigaciones Económicas*, vol. 25, nº 2, pp. 417-437.
- Hanley, K.W. (1993): "The underpricing of initial public offerings and the partial adjustment phenomenon", *Journal of Financial Economics*, vol. 34, pp. 231-250.
- Hanley, K.W., Kumar, A. and P. Seguin (1993): "Price stabilization in the market for new issues", *Journal of Financial Economics*, vol. 34, pp. 177-197.
- Hao, G. (2007): "Laddering in initial public offerings", *Journal of Financial Economics*, vol. 85, pp. 102-122.
- La Porta, R., Lopez-de-Silanes, F., Shleifer, A. and R. Vishny (1998): "Law and Finance", *Journal of Political Economy*, vol. 106, pp. 1113-1155.

- Lewellen, K. (2006): "Risk, reputation, and IPO price support", *Journal of Finance*, vol. 61, pp. 613-653.
- Lowry, M., Officer, M. and W. Schwert (2010): "The variability of IPO initial returns", *Journal of Finance*, vol. 65, n° 2, pp. 425-465.
- Miller, R. and F. Reilly (1987): "An examination of mispricing, returns, and uncertainty of initial public offerings", *Financial Management*, vol. 16, pp. 33-38.
- Rajan, R.G. and L. Zingales (1995): "What do we know about capital structure? Some evidence from international data", *Journal of Finance*, vol. 50, n° 5, pp. 1421-1460.
- Rock, K. (1986): "Why new issues are underpriced", *Journal of Financial Economics*, vol. 15, pp. 187-212.
- Rudd, J. (1993): "Underwriter price support and the underpricing puzzle", *Journal of Financial Economics*, vol. 34, pp. 135-151.
- Saá-Requejo, J. (1996): "Financing decisions: Lessons from the Spanish experience", *Financial Management*, vol. 25, pp. 44-56.
- Schultz, P. and M. Zaman (1994): "Aftermarket support and underpricing of initial public offerings", *Journal of Financial Economics*, vol. 14, pp. 199-219.
- Welch, I. (1992): "Sequential sales, learning, and cascades", *Journal of Finance*, vol. 47, pp. 695-732.
- White, H. (1980): "A heteroskedasticity-consistent covariance matrix estimator and a direct test for heteroskedasticity", *Econometrica*, vol. 48, pp. 817-838.

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## RESUMEN

El presente trabajo analiza el proceso de formación de precios del mercado secundario de las ofertas públicas iniciales (OPIs) en el primer día de cotización para una muestra de 67 OPIs llevadas a cabo en el mercado español de capitales. Nuestros resultados, después de comprobar que la infravaloración no va más allá del primer día de cotización y que la rentabilidad intradía o secundaria (de apertura a cierre) es significativamente positiva, muestran que la variación de precios intradía, analizada a través de la rentabilidad de apertura a cierre, no está relacionada con las características de la oferta y de la empresa. Sin embargo, la influencia del mercado primario sobre el proceso de formación de precios del mercado secundario en el primer día de negociación es bastante evidente. En particular, observamos que la combinación de las variables IPO fría y rentabilidad primaria (de oferta a apertura) permite explicar parcialmente la variación de precios intradía, siendo resultados plenamente consistentes con los argumentos de apoyo de precios para las OPIs frías y, en menor grado, el efecto cascada para las OPIs calientes.

*Palabras clave:* ofertas públicas iniciales (OPIs), infravaloración, OPI fría, OPI caliente, rentabilidad secundaria o intradía.

*Clasificación JEL:* G12, G14, G24.

