IPO VALUATION AND PROFITABILITY EXPECTATIONS: EVIDENCE FROM THE ITALIAN EXCHANGE

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Abstract: This paper analyses the valuation of IPO companies listed on the Italian Exchange in the period 2000-20008. One the most common valuation techniques declared in the IPO prospectus to determine the offer price is the Discounted Cash Flow (DCF) method. We develop a 'reverse engineering' model to discover the short term profitability implied in the offer prices. We show that there is a significant optimistic bias in the estimation of future profitability and the mean forecast error is substantially large. Yet we also show that such error characterizes also the estimations carried out by analysts evaluating non-IPO companies. The forecast error is larger the faster has been the recent growth of the company, the larger is the past market performance, the more companies issued equity on the market. IPO companies generally exhibit a more positive operating performance before the listing, compared to comparable listed companies, while after the flotation they do not perform significantly different in term of return on invested capital. Pre-IPO book building activity plays a significant role in partially reducing the forecast error and revising expectations.

Keywords: Initial Public Offerings, DCF, book building, post-IPO profitability drop.

1. Introduction

Initial Public Offerings are undoubtedly among the most complex extraordinary finance operations that firms can face in their life-cycle. In the listing decision, companies have to solve the complex trade-off between the benefits and the costs arising from going public. Pagano et al. (1998) list the determinants characterizing this trade-off. On the cost-side they find the information asymmetries, the administrative expenses and the public disclosure of private information. On the benefit-side they list the overcoming of the borrowing constraints, the greater bargaining power with the banks, the portfolio diversification, the disciplining power over the management's behavior, the stock's liquidity, the investor recognition and the possibility to harness a window of opportunity according to the market sentiment.

IPO companies and their underwriters, who are responsible for determining the price of the offered shares, seem to be aware of the benefits ahead, and positively discount them in their valuation models. Cogliati et al. (2011) analyze the growth rates implicit in the IPO valuation models and find evidence that they far exceed the actual realizations in the following years. However, the over-optimism in firms' valuation does not regard only IPO stocks: financial analysts' forecasts about listed companies are biased on average, and the realized growth rates are significantly lower than expected (Goedhart et al., 2010). Despite such over-optimism in IPO pricing, a large body of the literature shows that IPO shares are placed at a discount, compared to the first-day price of trading (a review of IPO underpricing is contained in Ritter and Welch, 2002). This raises the question if the market is even more optimistic than analysts and issuers in pricing IPO shares. A further question concerns whether expectations are more biased upwards for IPO companies compared to already listed counterparts. Newly listed companies are generally smaller and younger, and information asymmetries are more severe. Therefore analysts should experience more uncertainty in the evaluation process, and produce conservative analyses if they are risk-averse.

In this paper we aim at exploring the process of IPO share pricing, by comparing pre-IPO expectations and post-IPO actual performance, and computing the forecast error related to the short-run operating performance. We have two main research objectives. First, we observe the change in the expectations about future operating performance from the issue of the IPO prospectus to the revision of the final offer price after book building activity among professional investors, up to the first day of trading. We posit that the collection of information during such span of time should drive to a better pricing of the share, reducing the forecast error. Second, we investigate whether the forecast error characterizes IPO companies, or is generally common in evaluating listed companies.

In our study we are aware of a major constraint. Indeed, the underwriters are not forced to publicly disclose the forecasts used in their valuation models. Thus, we do not know exactly the actual projections about future profitability assumed by underwriters (and sometimes by the analysts). To overcome this problem, we build a reverse engineering model of the discounted cash flow to stakeholders (DCF) valuation framework based on generally accepted assumptions, and we compare the increase in the expected Return on Invested Capital (ROIC) with its actual realization. We apply this methodology to 72 Italian IPOs listed between 2000 and 2008. Then we compute the forecast error (FE) on the operating performance (defined as the difference between the actual ROIC and the expected ROIC implicit in the share price) both for the IPO sample and for another set of 72 comparable firms already listed for at least four years. Finally we run a cross sectional regression model to find out the determinants of the forecast error.

We find that IPO companies generally exhibit a more positive operating performance before the listing, compared to comparable listed companies, while after the flotation they do not perform significantly different in term of return on invested capital. The IPO price is significantly biased and discounts an overly-optimistic future increase in the operating performance, which is generally not met as the operating performance declines to a sectorial standard value. Yet we show that the forecast error is not a peculiar characteristic of IPO companies, but is common to evaluations produced by analysts for listed companies. The forecast error is larger, the larger has been the recent

growth of the company, the better has been the recent market index performance and the more companies raised equity capital on the exchange previously, in the same sector.

Pre-IPO book building activity plays a significant role in partially reducing the forecast error and revising expectations, while the market is not able to recognize overoptimism in future expectations, at least in the first day of trading.

The findings suggest that IPO companies take advantage from private information disclosed by potential investors in order to reduce the forecast error, to a 'physiological' level characterizing all the stocks traded on the market.

We argue that the evidence challenges the usual argument about IPO underpricing. Even if the IPO first-day return may be positive for IPO subscribers, we show that IPO shares (as well as analysts' recommendations for other stocks) are overpriced referring to the operating performance in the years following the listing. Besides, evaluations are particularly biased when 'hot issue' markets arise and when the company experienced a sustained growth in the past years.

The paper is structured as follows. Section 2 reviews the related literature and the previous research on the topic. Section 3 introduces the model and the methodology. Section 4 describes the sample. Section 5 provides the results of our regression model and finally Section 6 draws the conclusions.

2. Literature review

Our study deals with two major topics in the financial literature: the post-IPO operating performance and the analysts' bias in stock valuation. The following sub-sections will review each topic.

2.1 The post-IPO profitability drop

Many researchers and academics have identified a drop in the companies' operating performance following an Initial Public Offering.

Leland and Pyle (1977) assume that information asymmetries exist in the IPO market, this reducing the possibility to distinguish between bad and good quality projects to be financed. Therefore, if the percentage of bad projects is too high, the market fails and only bad quality projects raise finance. Yet, bad projects destroy enterprise value and return on investments is expected to drop. Nevertheless, pre-IPO shareholders can retain a fraction of equity large enough to signal the good quality of their investment. Furthermore, if this signal is not perceived in the same way by all the investors in the market, the financial intermediation plays an important role to dampen the information transfer costs.

Jensen and Meckling (1976) model the agency costs that arise when the ownership structure of the issuing firm changes, by considering the moral hazard problem. In particular, they predict that when the main shareholders sell equity and contemporary maintain the control of the firm, the latter have an incentive to extract private benefits from the company, this turning into additional costs for the company and lower operating performance.

Jain and Kini (1994) study the drop in the operating performance of newly listed firms and, according to the agency theory, they detect a positive correlation between the post-IPO profitability and the equity retention by the main shareholder, whereas no significant relation is found with the initial underpricing and the decline in the return of assets.

Loughran and Ritter (1997), analyzing a sample of seasoned equity offerings, find that the operating performance reaches its peak in the year of the offering and then converges to standard values characterizing comparable listed companies. The authors explain the causes of this drop through the 'window of opportunity' framework: firms issue new equity when their performance is unusually good and cannot be sustained over time.

Mikkelson et al. (1997) posit that the operating performance is not affected by changes in the ownership structure, but it is significantly related to the firm size and to sales of secondary shares owned by pre-IPO investors. They interpret this result as a consequence of the extraordinary performance rather than the 'agency' theory.

Pagano et al. (1998) analyze the motivations that lead firms to list on a Stock Exchange. They find a significant correlation between the change of ownership at the IPO and the subsequent profitability drop. Teoh et al. (1998) find that the abnormal accounting accruals posted in the IPO year are correlated to poor stock returns in the three years thereafter, pointing out a significant role played by accounting manipulation techniques and earnings management strategies. Chemmanur et al. (2010) show that also the Total Factor Productivity drops in the years following the offering, this suggesting that the profitability drop cannot be explained only by accounting manipulation.

2.2 Analysts' optimism

Many papers have dealt with the topic of the analysts' over-optimism in estimating the future profitability of listed companies. The most recent piece of evidence is supported by Goedhart et al. (2010), who analyze data between 1970 and 2010 and find that the practitioners' expected growth rates are between 10 and 12 percent on average, while the actual performance rate is generally around 5-6 percent.

Three theories try to give an explanation of such empirical evidence.

The 'management relation hypothesis' (Francis and Philbrick, 1993) assumes that analysts are deliberately too optimistic as they want to keep good relations with the managers of the companies they are evaluating.

The 'trading boost hypothesis' (Kim and Lustgarten, 1998) posits that analysts have an incentive to publish 'buy' recommendations (thus inflating expectations about future cash flows) because this can boost the banks' trading business, with positive effects on the employees' compensation.

Eames et al. (2002) support the 'objectivity illusion'. According to this theory, analysts decide on the company's rating even before starting their analysis. They thus selectively pick the information in such an opportunistic way that the recommendation looks objective but actually is biased towards their a-priori judgment.

Focusing on the case of IPO companies, the evaluation process regards both the underwriters and the analysts. IPO underwriters have to solve a trade-off. On the one hand they have to satisfy the IPO company and its shareholders, who desire a generous valuation in order to raise more money from the offering. On the other hand, they have not to discourage the market participants to join the public placement, this pushing for underpricing the shares. Furthermore, they have to maintain their reputation as prestigious as possible, in order to maximize the long term returns from the underwriting activity, and avoid any litigation risk.

Analysts publish their recommendations from the IPO day thereafter (in some cases even before, according to national rules). They periodically evaluate the stock upgrading/downgrading on the basis of the flow of new information. Also analysts are supposed to maintain a fair reputation to make their reports credible to the investors.

The evidence shows that an upwards bias exists also in the case of IPO valuation. Purnanandam and Swaminathan (2004) find that IPO stock is on average overvalued with respect to the fair value based on peers' comparison. They also find that the evaluation error is smaller when peers are chosen on the basis of the growth prospects.

Considering the Italian IPO market, Cogliati et al. (2011) propose a 'reverse engineering' DCF model to prove that the growth rates implied in the offer prices far exceed the ex-post operating performance. They find that the larger are the company market to book ratio, the leverage, the income and the initial underpricing, the larger is the forecast error. On the contrary, the error is negatively correlated with the IPO firm age and size.

There is a scarce literature analyzing optimistic biases in the evaluation of IPO stocks, considering both the underwriters' and the analysts' objectives. To our knowledge, only Ali (1996) and Hansen and Sarin (1998) put an effort to analyze this topic. Ali (1996) finds that the IPO price is less accurately determined compared to the targets of analyst recommendations. Hansen and Sarin (1998), analyzing the same sample, find that the bias in public offerings valuation is mainly related to a wrong estimation of future growth.

3. Research hypotheses and methodology

By comparing profitability expectations implicit in the offer price with actual accounting results reported by IPO companies after the listing, we measure the forecast error. We compare forecast errors referring to IPO companies with errors made by analysts in estimating future profitability for non-IPO companies. Since IPO companies are new to the market and are characterized by larger information asymmetries, we hypothesize that the forecast error in pricing their stock is larger if compared to non-IPO listed companies. We also hypothesize that book building activity in the pre-IPO phase may help issuers to reduce the forecast error. In fact, in this phase the IPO company and its intermediaries collect non-binding expressions of interest from professional investors (banks, funds, asset management companies). This flow of information should increase the accuracy of IPO pricing.

Then, based on the stream of literature we have analyzed, we test the correlation of the forecast error with a series of potential determinants:

- Size: the smaller the IPO company, the larger the information asymmetries, the larger should be the forecast error. A positive relation is also possible if we hypothesize that larger firms require more complex valuation models;
- Age: younger firms are characterized by higher information asymmetries and should be associated with lower errors;
- Sales growth: investors and analysts tend to rely on past trends for estimating future growth (Lakonishok et al., 1994); therefore fast-growing companies should be associated to over-optimism;
- Reputation: prestigious underwriters and analysts should have an incentive to engage in more accurate pricing, as to maintain their reputation.

In order to test the hypotheses ahead, we need: (i) a measure of the forecast error referred to the future profitability, and (ii) a model to derive the expectations about future profitability from the

pricing process. We measure the forecast error as the difference between the profitability actually reported in the IPO company's accounts three years[1] after the listing (see next Section), compared to the expected profitability implicit in the evaluation at the IPO, related to the same year. We derive this latter variable from a 'reverse engineering' model.

The reverse engineering technique has been widely used to infer about expectations implied in analysts' valuations[2]. Generally, two methods are adopted in the pricing of IPO shares: the peers' comparison and the discounted cash flows (DCF) method. We focus on the second one, as it explicitly considers expectations about future cash flows.

Past researchers mostly used the Return on Assets ratio as a good proxy for company profitability. In this paper we argue that, besides its common usage and its simplicity, this measure of performance is not the best choice to assess the firms' operating profitability. The Return on Assets (RoA) is defined as:

$$RoA_t = \frac{Operating\ result_t}{Assets\ value_{t-1}} \qquad [1]$$

where the *Operating result*$_t$ is defined as the earnings generated by the operating assets, namely the return generated by the core business of the company during time *t*. The *Assets value*$_{t\text{-}1}$, instead, refers both to operating and non-operating assets available at the time *t*-1, which are financed by both operating and non-operating sources. Therefore RoA is not consistent to measure profitability.

Furthermore, the Return on Assets ratio leads to another relevant problem when assessing the performance for IPO firms: the denominator includes the liquidity raised during the offering. Therefore, as the new investments rarely show their effects on the operating income the year immediately following the offering, it may appear that the performance of these firms declines, while such effect is just a matter of investment timing.

[1] Alternatively, we consider also four years for robustness checks.

[2] See among other Dechow et al. (2000), Gebhardt et al. (2001), Easton (2006), Easton and Somers (2007), Cogliati et al. (2011).

To this extent, in this paper we adopt an alternative definition of operating performance, which is the Return on Invested Capital (ROIC). According to Koller et al. (2011), the ROIC is defined as:

$$ROIC_t = \frac{NOPLAT_t}{IC_{t-1}} \quad [2]$$

where $NOPLAT_t$ refers to the net operating profit after taxes realized at time *t*, namely the difference between the EBITDA of the company and the operating taxes. The Invested Capital IC_{t-1}, instead, represents the accounting value of the Assets in the Balance Sheet at time *t*-1 that refer to the core business of the company:

$$IC_{t-1} = Book\ Value_{t-1} + Financials\ Debt_{t-1} - Cash\ and\ cash\ equivalents_{t-1} \quad [3]$$

Thus, in our definition of operating performance the numerator and the denominator are consistent. Then, according to the basics of any textbook approach to the discounted cash flow models, the enterprise value (*EV*) is the sum of the free cash flow to firm (*FCFF*) discounted by the weighted average cost of capital (*WACC*), so that:

$$EV = \sum_{t=1}^{\infty} \frac{FCFF}{(1+WACC)^t} \quad [4]$$

Following the methodology used by Cogliati et al. (2011), Equation 4 can be written in a two-stage growth model, in which during the first period the company Free Cash Flows grow at a rate g_{short}, and thereafter as a perpetuity at the lower rate g_{long}:

$$EV = \frac{FCFF_1}{WACC - g_{short}}\left(1 - (\frac{1 + g_{short}}{1 + WACC})^T\right) + \frac{FCFF_{T+1}}{(WACC - g_{long}) * (1 + WACC)^T} \quad [5]$$

The model ahead implies that the company experiences a short-term competitive advantage, while in the long-run the profitability converges to an average 'normal' level.

The Free Cash Flow to Firm (FCFF) may be expressed as a fraction of the NOPLAT, net of the percentage h_t ploughed back to finance new investments:

$$FCFF_t = NOPLAT_t * (1 - h_t) \quad [6]$$

Combining Equations 5 and 6 we can now compute the Free Cash Flow to Firm (FCFF) as the Return on Invested Capital (ROIC) times the Invested Capital (IC) times the portion of the operating income normally retained by the company:

$$FCFF_t = IC_{t-1} * ROIC_t * (1 - h_t) \quad [7]$$

Our evaluation model relies on some assumptions.

First, the first period of the two stage DCF model annuity takes three years (as in Cogliati et al., 2011), as past research found evidence of the profitability drop beyond this time frame. However, in the robustness tests, we extend it also to four years.

Second, a public offering can be carried out through the sale of primary shares, secondary shares or both. In the first case the company raises liquidity. Our model assumes that such liquidity is immediately invested in new projects or used to pay back debt.

Adopting the assumptions ahead, we obtain:

$$EV = \frac{ROIC_t * (IC_{t-1} + \Delta IC_{t-1}) * (1-h)}{WACC - g_{short}} * \left[1 - \frac{(1+g_{short})^T}{(1+WACC)^T}\right] + \frac{FCFF_{T+1}}{WACC - g_{long}} * \frac{1}{(1+WACC)^T} \quad [8]$$

Then, assuming that for three years the company will plough back a constant percentage of its operating income in new investments ($h_t = h$) and will exhibit an average stable profitability ($ROIC_t$=$ROIC$), the growth rate g_{short} is constant and is equal to the profitability ratio times the ploughed-back ratio[3]:

$$g_{short} = h * ROIC \quad [9]$$

Therefore Equation 8 becomes:

$$EV = \frac{ROIC * (IC_{t-1} + \Delta IC_{t-1}) * (1-h)}{WACC - h * ROIC} * \left[1 - \frac{(1+h*ROIC)^T}{(1+WACC)^T}\right] + \frac{FCFF_{T+1}}{WACC - g_{long}} * \frac{1}{(1+WACC)^T} \quad [10]$$

Furthermore, we make the assumption that in the long run the competitive pressure brings extra-returns to the average level of the market in the long run. Therefore, we can expect that in the long run the ROIC equals the cost of capital WACC.

Finally, the Free Cash Flow to Firm in the long run can be expressed as the Invested Capital available at the end of the short term transitory period times the long run ROIC. Therefore, after these considerations, Equation 10 becomes as follows:

[3] In fact, if *h* and *ROIC* are constant, each year the invested capital will increase for the ploughed back profits, that will be equal to *h* * *ROIC* * *IC*. The percentage increase is therefore equal to *h* * *ROIC*.

$$EV = \frac{ROIC * (IC_{t-1} + \Delta IC_{t-1}) * (1-h)}{WACC - h * ROIC} * \left[1 - \frac{(1 + h * ROIC)^T}{(1 + WACC)^T}\right] + \frac{(IC + \Delta IC) * (1 + h * ROIC)^T}{(1 + WACC)^T} \quad [11]$$

Using the latter Equation, the expected Return on Invested Capital (ROIC) may be obtained from the value *EV* attributed to the listed company. If the firm is newly listed, this latter value has been computed considering either (i) the midpoint of the price range published in the prospectus times the number of the shares outstanding, or (ii) the IPO price determined after book building activity, or (iii) the price of the stock on the first day of trading. This allows us to examine the evolution of expectations implicit in the share price, during the pricing process. If the firm is already listed, the enterprise value is the sum of the net debt and the number of shares times the average target price reported in the analysts' researches published in the year considered on the web site of the Italian Exchange. This allows us to compute the implicit ROIC estimated by the market consensus.

The Invested Capital IC is obtained from the companies' Balance Sheets. We take into account any capital increase from primary shares at the time of the IPO.

We measure h as the average re-investment rate of comparable firms that operate in the same business sector. The data are collected from Aswath Damodaran's website[4].

The weighted average cost of capital WACC has been estimated as follows. The debt to value and the equity to value ratios are the pre-IPO leverage values if the ratio is lower than the industry average level (published in Aswath Damodaran's web site) while are set to the industry average level when the ratio is larger (and we assume that a part of the equity raised is used to pay back debt in excess)[5]. The cost of equity has been computed through the Capital Asset Pricing Model (CAPM), using as risk-free rate the yield of 10-year Italian government bonds, the sectorial

[4] http://pages.stern.nyu.edu/~adamodar/

[5] We also assume that the leverage ratio is constant; this allows to keep constant the weighted average cost of capital.

unlevered beta and, as market risk premium, the historical risk premium on Italian stocks. Data are collected from Aswath Damodaran's website.

We are aware that the significance of our results may depend upon the assumptions lying beyond our model. Therefore we will run a robustness test adopting different alternative hypotheses.

4. Sample

Our sample is made up by IPO companies listed in the regulated board of the Italian Exchange from 2000 to 2008.

We exclude: (i) financial/insurance companies and banks, because accounting criteria and valuation models are different compared to industrial companies; (ii) all the firms that delisted within 3 years after the IPO date, as it is impossible to run the reverse engineering model[6]; (iii) privatization firms, as the flotation process and evaluation models may be influenced by political objectives (Jenkinson and Ljungqvist, 2001); (iv) IPO firms that issued a prospectus in which the DCF method has not been adopted at all to find out the offer price. The final sample is made of 72 IPOs.

We build a second matching sample of 72 non-IPO comparable companies listed for at least four years in the Italian Exchange within the same period, in order to implement a matching process. The matching criteria regard business sector, age, size, availability of research analyses and citation as 'comparable company' in the IPO prospectus issued by the counterpart.

All the data regarding consolidated balance sheets, income statements and cash flow statements have been collected from the companies' interim financial reports.

Table 1 gives a brief description of the sample IPOs, according to the offer price evaluation method disclosed in the official prospectus. Remarkably, in 64 cases (88.9% of the sample) the DCF methodology has been combined with the peer comparison approach.

[6] We found 12 IPO companies in this group; 11 have been taken over and delisted (among which 7 industrial firms and 4 financial companies), while 1 went default.

We also split the sample according to the segment of the Italian Exchange chosen by the company (the main board MTA, or the 'Expandi' market, a second market designed for small companies, or the 'Nuovo Mercato', a market opened from 1999 to 2003 within the Euro.NM network for high-growth fledging companies), and according to the flotation period. We observe that a large percentage of IPOs occurred in 2000 ('new economy bubble') and in 2007 (before the global financial crisis).

[Table 1 about here]

Table 2 reports the main objectives of the listing explicitly cited in the official IPO prospectus. Out of 68 firms that have raised equity capital during the offering, 16 (22.2%) cited deleverage as an objective, whereas 70 of them aimed to invest in new projects either for consolidating the business (69.4%), expanding into new markets or products (77.8%), improving the efficiency (29.2%) or treasury management (2.8%). On the contrary, 4 companies issued only secondary shares at the IPO with no capital collection. Finally, 10 firms cited marketing objectives as reasons for going public (among which the only 4 firms that only issued secondary shares).

[Table 2 about here]

5. Empirical analysis

We now provide a brief insight into the actual operating performance of the IPO and non-IPO sample companies, measured by the Return on Invested Capital ratio (ROIC). From the interim balance sheets, we measure the ratio between the net operating profit less adjusted taxes and the invested capital, both defined in Section 3. Table 3 reports the results referring to mean and median values. Time 0 coincide with the year of the listing and we measure the operating performance in the two preceding years and in the following four.

On average, in the three years preceding the listing, the IPO firms (Panel A) tend to over-perform the comparable firms (the average spread of the ROIC is 10.18% in the IPO year). We test the difference using the Wilcoxon matched pairs signed-rank test and we find that the difference in ROIC is statistically significant for all the years preceding the IPO (see Panel C). We also notice that the average ROIC in the year of the IPO is larger compared to both previous and following years. We interpret the statistics as a possible consequence of the 'window dressing' phenomenon, i.e. firms go public when the operating performance is at the maximum level.

We also highlight that the results persists when other alternative performance ratios are considered (namely the Return on Assets ROA and the Return on Equity ROE) while the difference is not significant if we consider the Return on Sales ratio (ROS). This may indicate that the superior performance of IPO companies is mostly due to a productivity advantage, and not to cost efficiency. We then notice that the newly listed companies' performance declines steadily over the four years following the offering, and tends to align to the mean values of the comparable sample. The median value of the ROIC three years after the IPO is lower than the median value for the non-IPO counterparts, and the difference in performance is not significant. Considering the ROA and ROE ratios, we even find a significant lower performance for IPO companies four years after the listing.

[Table 3 about here]

We adopt the methodology described in Section 3 to estimate the expected profitability for the sample IPO companies and for the matching sample, implicit in the stock evaluation. The results are reported in Table 4.

We compare the actual profitability of the sample IPO companies after the listing with the expected values implicit in the prospectus evaluation (referring to the midpoint of the offer price range, Panel A). We also report the results referring to the final offer price (Panel B). The latter price takes into account also price adjustments made by the underwriters as a result of the book building activity,

and taking into account new information available on the market after the issue of the prospectus. Panel C reports the results obtained considering the first-day price of the IPO stock. This price takes into account expectations by both professional and unsophisticated investors that were not allocated IPO shares and buy them in the open market.

We find that on average the prices set in the IPO prospectus imply an increase in the operating performance (i.e. the difference between the ROIC implied in the share price and the ROIC exhibited in the last interim account) by 19.74% in the three years following the offering. The corresponding annual growth rate is equal to 17.74%. The median values are 13.28% and 15.81%, respectively.

The resulting forecast error is therefore remarkably high on average: 35.80% (median value: 33.66%). The data show that the IPO price generally discounts an increase in the operating performance, while most of the times it tends to decline. We find only 11 cases in which the forecast error is negative (i.e. the prospectus expectations are overcome by the actual performance).

The findings reported in Panel B, where implicit expectations are derived from the final IPO price, show that price revisions after book building activity lead to less optimistic expectations on average, thus reducing the mean forecast error (33.32%). Nevertheless, there is still a consistent gap between expectations and reality.

Panel C reports the statistics computed with the first-day market price. We register a further reduction in the mean and median forecast errors. Interestingly, we find an increase in the standard deviation of profitability expectations and forecast errors.

When the ROIC is computed for the matching sample of comparable companies (Panel D), we observe that the expected increase in the operating performance is again remarkable: the analysts on average expect a 29.42% increase (median value 20.65%), versus an actual decrease equal to 3.21% (median value 3.00%). This implies an average forecast error equal to 32.64% (median value 26.88%).

In Panel E we test for any significant difference between the statistics for the IPO sample and the figures for the matching sample. We perform the Wilcoxon matched pair signed rank test and we find that there are no significant differences referring to the implied ROIC and the forecast error. On the contrary the test shows that the ROIC improvement estimated by analysts for non-IPO companies is significantly larger compared to the IPO sample (considering expectations after book building activity). We also find that the actual ROIC increase is significantly lower for IPO companies, this confirming the long-run relative operating underperformance of newly listed firms. Panel F compares the statistics for IPO companies, analyzing the pricing process, from the prospectus price range, to the offer price, to the first-day market price. Interestingly, there are significant changes in the implied ROIC, expected increase and forecast error only before the setting of the final offer price, while there are no significant updated related to expectations when the share trades on the exchange.

[Table 4 about here]

Combining the results displayed in Tables 3 and 4, we posit that: (i) IPO companies generally exhibit a more positive operating performance before the listing, compared to comparable listed companies, while after the flotation they do not perform significantly different in term of return on invested capital; (ii) the IPO price is significantly biased and discounts an overly-optimistic future increase in the operating performance, which is generally not met (on the contrary, as stated before, the operating performance declines to a sectorial standard value); (iii) the forecast error is not a peculiar characteristic of IPO companies, but is common to evaluations produced by analysts for listed companies; (iv) pre-IPO book building activity plays a significant role in partially reducing the forecast error and revising expectations, while the market is not able to recognize overoptimism in future expectations, at least in the first day of trading.

We now turn to investigate the determinants of the forecast error committed by analysts and issuers through a cross-sectional regression model. Table 5 summarizes the list of the selected independent variables and their definition. We consider the log of the company age and size (proxied by the consolidated revenues), the growth rate of the sales in the two years before the IPO and the reputation of the analyst/underwriter. We also control for the market index return in 150 days before the IPO, the firm leverage ratio and any 'bundling' effect related to other placings organized by companies in the same sector in the 12 months before the IPO[7]. We finally introduce: (i) a dummy variable (IPO) which takes the value 1 for the IPO sample, and zero for the non-IPO counterparts; (ii) a dummy variables (VCB) which identifies companies backed by professional investors, i.e. private equity or venture capital funds (iii) annual dummies to take into account year specific effects.

Table 6 shows the correlation matrix between the covariates.

[Tables 5 and 6 about here]

We run an OLS regression model in order to identify the main explanatory variables beyond the Forecast Error FE. The general form of the model is:

$$FE_i = \alpha_0 + \alpha_1 SIZE_i + \alpha_2 AGE_i + \alpha_3 GSALES_i + \alpha_4 MKT\_RET_i + \alpha_5 LEVERAGE_i + \alpha_6 BUNDLING_i + \alpha_7 REPUTATION_i + \alpha_8 IPO_i + \sum_{t=2000}^{2007} \alpha_t DUMMY_t + \varepsilon_i$$

[7] Benveniste et al. (2003) posit that analysts may 'learn' about the company value drivers by examining previous equity issued carried out by similar companies.

Table 7 provides the results of the model implemented with different combinations of the independent variables, considering the forecast error originated either by the midpoint price of the IPO prospectus range or by the final offer price.

[Table 7 about here]

No robust correlation is detected with the age and size of the companies. This is interesting, and indicates that no particular information asymmetries characterize smaller and younger companies.

We also find the coefficient of the variable GSALES (namely the revenue growth rate before the IPO) to be significant and positively correlated in all the models. This shows that analysts tend to project the past growth rates in the future and to extrapolate recent trends, leaving aside other drivers of profitability (Lakonishok et al., 1994).

The market returns have a positive and significant coefficient in all the models. This points out that the analysts and the underwriters are more optimistic when past market returns are high. They do not seem to be able to catch reversing trends.

The sign of the BUNDLING variable (namely the number of placings occurred in the previous 12 months with respect to the IPO date) is also positive and statistically significant, contrary to expectations. Analysts do not increase their capability to predict future profitability and avoid overestimation learning the correct value drivers from previous equity issues. On the contrary they seem to be influenced by IPO waves and 'hot issue' periods.

Finally, another interesting result is the sign of the coefficient of the IPO dummy variable. We notice that the coefficient of the IPO dummy is never significant. This confirms our previous findings in the uni-variate tests, consistently with Hansen and Sarin (1998): even if the IPOs are overvalued and the forecast errors is positive, the bias is not statistically different from the valuation of already listed companies.

In brief, we find that the overoptimism in evaluating stock is not explained by particular firm characteristics (apart from the recent growth), but is systemic and particularly related to the market momentum.

In order to deepen the analysis of the expectation revision during the IPO process, in Tables 8 and 9 we give details about the changes in the forecast error after the closing of the book building phase, when the offer price is determined (Table 8) and on the first day of listing (Table 9).

The data confirm that in most IPOs the forecast error measured with implicit expectations about future profitability is positive. In 18 cases the IPO price revision leads to lower forecast errors, in 6 cases it is unchanged while in 48 cases the information collected by underwriters contribute to reduce the error. This is consistent with the results presented in Table 4. On the contrary, the first-day market price implicitly increases the forecast error in 39 cases, and reduces the bias in 33 cases. Again we find no contribution of the market trading in providing useful information to reduce overpricing.

[Tables 8 and 9 about here]

In order to test the robustness of our model we run a series of tests with alternative specifications of the model. In detail we vary the following parameters:

a) We extend the short-term forecast period to four years (in the annuity stage). Therefore we compare the expected increase of ROIC in the four years following the offering with the actual performance after four years.
b) We assume that the liquidity collected at the IPO is not employed immediately after the IPO, but the investments are equally partitioned over the short-term forecast period. This modifies the reinvestment rate (variable *h* in the reverse engineering model).

c) We adopt a value of 2.5% for the long term growth rate of the free cash flows (according to Cogliati et al., 2011); it is the historical growth rate in the real gross domestic productivity in Europe.

We report that no significant changes occur through the results presented ahead.

6. Conclusions

An extant research already showed that analysts are on average over-optimistic in their estimates about future profitability of scrutinized companies and that such over-optimism is detected also in the valuation of IPO shares.

In this paper we propose a reverse engineering model in order to find out implicit expectations about the short-term profitability in pricing equity stock. We apply this model to both IPO and already listed companies. We obtain that the initial pricing of IPO shares, disclosed in the IPO prospectus, suffers from a significant error in estimating future profitability. Such bias is significantly reduced (but not eliminated) in the pre-market period, when the IPO company is allowed to 'adjust' the final offer price, considering the feedback from professional investors on the market.

We think that our research could be of particular interest for analysts and for the investors in the market. The latter should be conceived in carefully considering the valuations proposed by companies issuing new capital, while the former should formulate more prudential expectations about the future performance of the scrutinized companies.

The results of the research also provides new insights into the well-known phenomenon of IPO underpricing, i.e. the first-day positive return that typically characterizes IPO stock, compared to the offer price (Ritter and Welch, 2002). Indeed we show that IPO shares are generally overpriced, with respect to the follow-up operating performance.

Analysts and IPO intermediates seem to be heavily influenced by the market momentum and by issue waves in evaluating future expectations, and assume that recent positive trends in the firm

growth may be sustainable also in the future. Whether the overoptimism in stock evaluation is mainly due to conflicts of interests and agency problems, or to cognitive biases, is a matter of future research.

Table 1.

IPO sample, split by valuation method (Panel A), exchange segment (Panel B), listing year (Panel C). Sample: 72 IPOs listed on the Italian Exchange from 2000 to 2008. In brackets the percentage values over the total are reported.

PANEL A: Valuation methods adopted in IPO pricing			
	IPOs	Only DCF	DCF + Peer comparison
All sample	72	72 (100%)	64 (88.9%)
PANEL B: Valuation methods adopted, by market segment			
MTA	43	43 (59.7%)	35 (55.6%)
EXPANDI	19	19 (26.4%)	19 (29.7%)
NUOVO MERCATO	10	10 (13.9%)	10 (15.6%)
PANEL C: Valuation methods adopted, by listing year			
2000-2001	23	23 (31.9%)	23 (35.9%)
2002-2004	6	6 (8.3%)	6 (9.4%)
2005-2008	43	43 (59.7%)	35 (54.7%)

Table 2.

Floating motivations disclosed in the IPO prospectus. The table shows the number of firms that explicitly reported each of the objectives in the filing prospectus. The table is divided into two main sections (first row): the firms that raise liquidity (left part) and the firms that get listed for general purposes (right part. The general purposes generally are the status enhancement and the marketing opportunities). The firms that raise liquidity can also report as an objective these purposes. Firms that raise liquidity have in general two aims: either to deleverage or to invest. If they state that they will use the cash for new investments, these can be for consolidating, expanding, improving the efficiency of the business or for investing in financial assets. The presence of one objective does not exclude the presence of the others (this means that one company could cite all the objectives at the same time). Sample: 72 IPOs listed on the Italian Exchange from 2000 to 2008.

	Financial purpose and raise liquidity, for:					Marketing purpose, with no financial needs
	Deleverage	New investment, through:				
		Consolidation	Expansion	Efficiency improvement	Treasury management	
MTA	9 (12.5%)	29 (40.3%)	35 (48.6%)	15 (20.8%)	1 (1.4%)	6 (8.3%)
EXPANDI	6 (8.3%)	14 (19.4%)	15 (20.8%)	3 (4.2%)	1 (1.4%)	4 (5.6%)
NUOVO MERCATO	1 (1.3%)	7 (9.7%)	6 (8.3%)	3 (4.2%)	- (0%)	- (0%)
Total	16 (22.2%)	50 (69.4%)	56 (77.8%)	21 (29.2%)	2 (2.8%)	10 (13.9%)

Table 3.
The effective operating performance before and after the listing. The definition of the indexes is as follows. ROIC is the Net operating profit less adjusted taxes (NOPLAT = EBIT(1-tax rate) – Amortization/Depreciation) over the Invested Capital (sum of the operating assets minus current assets or the sum of the book value of equity and the financial debts minus the cash and the marketable securities). ROA is the Return on Assets, intended as the EBITDA over the Total Assets. ROS is the Return on Sales, defined as the EBIT over the Total Revenue(in some cases it is defined as the EBIT margin). ROE is the Return on Equity, defined as the Net profit to the shareholders over the book value of equity). The timeline in the first row is relative to the IPO year. The year 0 refers to the data in the balance sheet the same year of the IPO has occurred. The years -1 and -2 are the 2 years preceding the IPO included in the prospectus. The years 1, 2, 3 and 4 are the three years following the IPO. All the data are taken from the year's end financial report). In brackets median values are reported. Z-statistics for the Wilcoxon matched pair test are reported. Sample: 72 IPOs listed on the Italian Exchange from 2000 to 2008

Year	-2	-1	0	1	2	3	4
Panel A: performance of IPO firms							
ROIC	12.63%	17.39%	19.41%	9.60%	6.26%	5.12%	4.51%
	(8.81%)	(9.82%)	(11.10%)	(9.03%)	(6.05%)	(5.17%)	(3.56%)
ROA	17.85%	18.34%	19.27%	11.72%	10.02%	9.23%	8.85%
	(13.60%)	(15.17%)	(15.52%)	(11.71%)	(9.89%)	(7.98%)	(8.15%)
ROE	18.42%	22.87%	31.67%	6.46%	3.19%	3.07%	-0.59%
	(14.86%)	(17.62%)	(18.09%)	(7.02%)	(4.28%)	(3.67%)	(0.45%)
ROS	13.57%	16.28%	15.02%	12.17%	10.53%	7.55%	8.71%
	(11.57%)	(13.52%)	(12.22%)	(10.84%)	(11.40%)	(10.88%)	(11.26%)
Panel B: performance of non-IPO firms							
ROIC	7.13%	11.35%	9.23%	8.54%	6.46%	6.41%	8.21%
	(8.90%)	(9.99%)	(8.96%)	(8.20%)	(7.28%)	(7.42%)	(7.53%)
ROA	13.17%	13.05%	14.11%	12.63%	10.56%	11.09%	12.19%
	(12.22%)	(12.36%)	(13.18%)	(12.71%)	(10.11%)	(11.82%)	(11.21%)
ROE	7.74%	8.88%	9.13%	9.01%	6.72%	9.92%	6.35%
	(9.97%)	(10.10%)	(11.07%)	(9.04%)	(7.52%)	(8.47%)	(9.05%)
ROS	13.85%	13.91%	14.79%	13.89%	12.85%	12.95%	14.31%
	(14.49%)	(13.76%)	(15.32%)	(15.40%)	(12.35%)	(13.48%)	(12.09%)
Panel C: z-statistic testing the yearly equality distributions between the IPO firms and the matched counterparts using Wilcoxon matched pairs signed-rank test							
ROIC	2.342**	1.766*	2.418**	-0.628	-0.232	-1.106	-1.517
ROA	1.692*	2.896***	2.143***	-0.322	-0.246	-1.278	-1.770*
ROE	2.214**	2.707***	2.825***	-0.917	-1.185	-2.151**	-1.986**
ROS	-0.462	1.354	0.326	-0.413	-0.911	-1.349	-1.390

*, **, *** = The difference is statistically significant at the 90%, 95%, 99% respectively.

Table 4.
Comparison between implied expected and actual profitability**.** The Table reports the descriptive statistics for the expectations derived from the reverse engineering model and the comparison with the actual value of the operating performance. The Implied ROIC is the three-year short term ROIC implied in the midpoint of the price range (Panel A) or in the final IPO price (Panel B) or in the first-day market price (Panel C). The methodology is applied also to the control sample of listed companies (Panel D) considering the target prices of analysts' researches published on the web site of the Italian Exchange. The Expected Increase in ROIC is the difference between the Implied ROIC and the ROIC posted on the last balance sheet preceding the IPO. The Expected short term growth rate is the Implied ROIC times the reinvestment rate. The Actual Increase in ROIC is the difference between the ROIC posted on the balance sheet the third year following the IPO and the year preceding the IPO. The Forecast Error is the difference between the Expected Increase in ROIC and the Actual Increase of ROIC. Differences among the statistics are tested in Panels E and F. Sample: 72 IPOs listed on the Italian Exchange from 2000 to 2008 (Panels A,B,C) and 72 matching companies (Panel D).

	Average	25th percentile	Median	75th percentile	Standard deviation	Max	Min
PANEL A: expectations vs. actual performance for IPO firms (midpoint of the price range in the prospectus)							
Implied ROIC	48.31%	25.60%	43.54%	68.55%	34.78%	188.32%	-36.53%
Expected increase in ROIC	19.74%	-2.07%	13.28%	36.49%	33.58%	148.40%	-55.07%
Expected short-term growth rate	17.74%	9.42%	15.81%	24.16%	12.50%	54.52%	-16.65%
Actual increase in ROIC	-16.06%	-20.45%	-11.77%	-3.46%	24.10%	36.87%	-93.90%
Forecast error	35.80%	13.33%	33.66%	52.68%	33.24%	164.31%	-59.53%
PANEL B: expectations vs. actual performance for IPO firms (offer price)							
Implied ROIC	45.83%	20.85%	40.76%	62.35%	38.92%	260.62%	-27.26%
Expected increase in ROIC	17.25%	-5.83%	12.02%	31.19%	37.72%	220.70%	-60.20%
Expected short-term growth rate	16.78%	9.01%	13.34%	21.80%	13.06%	60.62%	-12.43%
Actual increase in ROIC	-16.06%	-20.45%	-11.77%	-3.46%	24.10%	36.87%	-93.90%
Forecast error	33.32%	12.11%	31.84%	49.14%	36.61%	236.61%	-50.26%

PANEL C: expectations vs. actual performance of IPO firms (first trading day price)							
Implied ROIC	45.57%	18.63%	35.08%	63.73%	39.70%	194.91%	-27.25%
Expected increase in ROIC	16.99%	-6.62%	10.72%	36.56%	39.67%	177.00%	-85.80%
Expected short-term growth rate	17.01%	7.30%	13.16%	24.12%	14.49%	65.10%	-12.42%
Actual increase in ROIC	-16.06%	-20.45%	-11.77%	-3.46%	24.10%	36.87%	-93.90%
Forecast error	33.06%	6.38%	28.31%	52.66%	38.33%	189.65%	-50.26%
PANEL D: expectations vs. actual performance of non-IPO firms							
Implied ROIC	46.65%	19.86%	37.75%	60.23%	50.28%	397.58%	-4.68%
Expected increase in ROIC	29.42%	2.26%	20.65%	41.98%	47.18%	349.14%	-21.32%
Expected short-term growth rate	16.22%	7.46%	14.00%	23.70%	15.12%	114.18%	-1.63%
Actual increase in ROIC	-3.21%	-9.82%	-3.00%	2.35%	14.70%	44.87%	-48.24%
Forecast error	32.64%	3.73%	26.88%	49.82%	44.38%	304.26%	-35.65%

PANEL E: z-statistic testing the distribution equality between the IPO firms and for matched counterparts using Wilcoxon matched pairs signed-rank test

	Implied ROIC	Expected increase in ROIC	Expected short-term growth rate	Actual increase in ROIC	Forecast error
Midpoint of the price range	1.139	-1.324	0.225	-3.126***	1.027
Offer price	0.449	-1.734*	-0.654	-3.126***	0.466
First day trading price	0.342	-1.807*	-0.814	-3.126***	0.297

PANEL F: z-statistic testing the distribution equality between the IPO firms when the expectations are obtained with the different IPO prices

	Implied ROIC	Expected increase in ROIC	Expected short-term growth rate	Forecast error
Offer price vs. midpoint price	-3.346***	-3.337***	-3.225***	-3.343***
First trading day price vs. offer price	1.509	1.442	1.509	1.453

*, **, *** = The difference is statistically significant at the 90%, 95%, 99% respectively.

Table 5.

Definition of the dependent variables.

Variable name	Definition	Formula
SIZE	Consolidated annual revenues of the company at the time of the IPO	Log(Revenues +1)
AGE	Age of the company at the time of the IPO	Log(Age +1)
GSALES	Sales growth in the two years preceding the IPO	$\left(\frac{Sales_{-2}}{Sales_0}\right)^{-\frac{1}{2}} - 1$
MKT_RET	Return of the MSCI Italy in the 150 years preceding the IPO day (or the report date)	$\left[\prod_{i=1}^{150}(1 + r_{mkt,i})\right] - 1$
LEVERAGE	Financial leverage of the company	$\frac{Book\ value\ of\ debt}{Book\ value\ of\ assets}$
BUNDLING	Number of equity placings occurred on the Italian exchange in the 12 months preceding the valuation date	Ln(n° preceding placings +1)
REPUTATION	Dummy variable that takes into consideration the reputation of the financial analyst	1 if the price setting is made by one of the 5 leading Italian Investment banks or by an American one, 0 otherwise
VCB	Dummy variable for companies backed by professional financial investors (private equity and venture capital)	1 if a professional equity investors holds more than 10% of the shares, 0 otherwise
IPO	Dummy variable that takes into consideration whether the valuation refers to an IPO or not	1 if an IPO is being values, 0 otherwise
α_tDUMMY$_t$	Dummy variables for each year t considered in the analysis	1 if the sample company is observed at time *t*, 0 otherwise

Table 6.
Correlation matrix. Variables are defined as in Table 5. Sample: 72 IPO companies listed on the Italian Exchange from 2000 to 2008 and 72 matching listed companies.

	SIZE	AGE	GSALES	MKT_RET	LEVERAGE	BUNDLING	REPUTATION	VCB	IPO
SIZE	1								
AGE	0.0792	1							
GSALES	-0.1791	-0.2686	1						
MKT_RET	0.0678	-0.2263	0.1371	1					
LEVERAGE	0.1471	-0.1063	-0.03	0.1375	1				
BUNDLING	0.1417	0.0497	0.1267	-0.3477	0.009	1			
REPUTATION	0.3515	0.238	-0.0201	0.0076	-0.0786	0.0629	1		
VCB	-0.1076	-0.0696	-0.0915	-0.0402	-0.0273	-0.1648	0.0534	1	
IPO	-0.4281	0	0.3091	0	-0.0901	0	-0.0556	0.089	1

Table 7.
Determinants of the Forecast Error: OLS regression. In columns 1, 2 and 3 the dependent variable is the Forecast Error (FE) computed with the Expected ROIC implicit in the midpoint of the price interval; in columns 4, 5 and 6 the Forecast Error is computed with the Expected ROIC implicit in the Offer Price. The independent variables are defined as in Table 5. In brackets standard errors robust to heteroskedasticity are reported. Finally, in the last two rows, the R^2 adjusted and the F-Value test on the null hypothesis that all the coefficients are jointly equal to zero are reported. Sample: 72 IPO companies listed on the Italian Exchange from 2000 to 2008 and 72 non-IPO comparable companies.

	FE: mid-price			FE: offer price		
	1	2	3	4	5	6
SIZE	0.0120	0.00698	0.00968	0.0103	0.00404	0.00746
	(0.021)	(0.022)	(0.026)	(0.024)	(0.022)	(0.027)
AGE	-0.0682*	-0.0518	-0.0356	-0.0723	-0.0517	-0.0374
	(0.033)	(0.043)	(0.040)	(0.049)	(0.044)	(0.041)
GSALES	0.648***	0.600*	0.541**	0.542**	0.481*	0.437*
	(0.226)	(0.0269)	(0.254)	(0.255)	(0.246)	(0.242)
MKT_RET		0.634*	0.889**		0.796***	0.999**
		(0.282)	(0.367)		(0.300)	(0.387)
LEVERAGE			0.000150			0.000133
			(0.0002)			(0.0002)
BUNDLING			0.00749**			0.00595*
			(0.004)			(0.003)
REPUTATION			-0.114			-0.103
			(0.073)			(0.077)
VCB			0.0359			0.0263
			(0.056)			(0.057)
IPO	-0.0120	-0.0147	-0.0123	-0.0292	-0.0326	-0.0294
	(0.072)	(0.054)	(0.055)	(0.064)	(0.061)	(0.063)
α_tDUMMY$_t$	Yes	Yes	Yes	Yes	Yes	Yes
constant	0.417**	0.398***	0.212	0.447***	0.447***	0.270*
	(0.164)	(0.139)	(0.133)	(0.447)	(0.141)	(0.137)
R^2	11.11%	14.73%	19.62%	8.67%	14.00%	17.18%
F-value	4.34***	3.12***	9.75***	2.20*	3.33***	10.49***

*, **, *** = Statistically different from zero at the 90%, 95%, 99% respectively.

Table 8.
The change of the Forecast Error FE from the midpoint of the price range to the final offer price.
The table reports the descriptive statistics referring to the forecast error changes when the final offer price is revised, compared to the midpoint of the price. The change in error is computed as the difference between the forecast error computed respectively with the midpoint of the price range and with the final offer price. Sample: 72 IPOs listed on the Italian Exchange from 2000 to 2008.

		After the bookbuilding the FE is:			
		Larger	Unchanged	Smaller	TOTAL
The FE computed with the mid- point of the price range is positive	Obs.	16	6	43	65
	Mean	10.01%	0.00%	-12.75%	
	Median	4.46%	-	-5.43%	
	Std. dev.	17.21%	-	11.30%	
	Min	0.35%	-	-57.68%	
	Max	72.30%	-	-0.23%	
The FE computed with the mid- point of the price range is negative	Obs.	2	-	5	7
	Mean	5.19%	-	-3.03%	
	Median	5.19%	-	-2.58%	
	Std. dev.	4.08%	-	1.74%	
	Min	1.11%	-	-6.13%	
	Max	9.27%	-	-0.79	
TOTAL	Obs.	18	6	48	72

Table 9.
The change of the Forecast Error from the final offer price to the first trading day price. The table reports the descriptive statistics related to the Forecast Error changes when the first trading day price is considered. The change in error is computed as the difference between the forecast error computed respectively with the first trading day price and with the offer price. Sample: 72 IPOs listed on the Italian Exchange from 2000 to 2008.

		After the first trading day the FE is:		
		Larger	Smaller	TOTAL
The FE computed with the offer price is positive	Obs.	35	29	64
	Mean	12.00%	-14.54%	
	Median	3.87%	-1.89%	
	Std. dev.	26.73%	44.32%	
	Min	0.05%	-237.87%	
	Max	153.65%	-9.15%	
The FE computed with the offer price is negative	Obs.	4	4	8
	Mean	1.81%	-6.03%	
	Median	0.86%	-0.73%	
	Std. dev.	2.18%	9.50%	
	Min	0.01%	-22.47%	
	Max	5.51%	-0.19%	
TOTAL		39	33	72

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