



An investigation of the partial adjustment effect of Brazilian IPOs

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Abstract

Initial public offer (IPO) is an alternative for companies to finance investments, for families to sell part or the total of their stake, and for private equity to exit. Although bookbuilding process reduces information asymmetry and underpricing in IPOs, global literature reports positive first day return. When the underwriter perceives high demand, he or she adjusts upward the offer price, but not the full fair price. This partial adjustment creates positive first day return, which is used to compensate informed investors for revealing truthful information during the pre deal period. We investigate Brazilian IPOs issued between 2004 and 2012 and find evidence of partial adjustment in Brazil. Pre-deal information predicts both, underpricing and the exercise of greenshoe option.

Key words: partial adjustment, IPO, underpricing, greenshoe option, overallotment

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1. Introduction

Initial Public Offer (IPO) is an alternative for companies to finance their investments. It is also an alternative for families that plan to sell the total or part of their stake to diversify their holdings and for private equity funds, that need to exit their investment. But going public is a costly operation that incurs in direct and indirect costs. Direct costs comprise fees for underwriters, auditors, lawyers as well as costs for publishing information and registration. Underpricing is the most common indirect cost. Usually IPOs have a positive first day return, meaning that the company could have issued their stocks at a higher price and raised more money.

The Brazilian Security Exchange Commission (CVM – *Comissão de Valores Mobiliários*) regulated the use of bookbuilding in December 2003 (Saito and Pereira 2006). Since then, most IPOs issued in Brazil have used this process. Bookbuilding allows underwriters to assess market demand before defining the final parameters of the initial public offering. The underwriter establishes a price range for the issue (minimum and maximum prices) in the preliminary prospectus. After that, the investment bank invites qualified investors to make non-binding buying offers. Each buying offer contains the desired number of shares for different price levels. At the end of this process, the *lead* underwriter estimates a demand curve, then he/she revises and establishes the final offer price in the definitive prospectus.

Qualified investors have superior information in relation to other investors in the market, because of their ability to obtain and analyze information or because they are recurrently

participating in IPOs and have strong relationships to investment banks. According to Benveniste and Spindt (1989), the underwriter has to compensate the well informed investor in order to receive truthful information during the bookbuilding process. When the underwriter observes high demand for an issue, he or she adjusts the price upward, but not to the full market value. This partial adjustment will create high initial return in the first trading day, which compensates qualified investors of revealing truthful information and for recurrently participating in IPOs promoted by the underwriter. Hanley (1993) and Bradley and Jordan (2002) find evidences of partial adjustment phenomenon in the USA stock market.

In this article we analyze IPOs issued between 2004 and 2012 and find evidences of partial adjustment in Brazil. Our results support that higher price revision predicts higher underpricing and the issue of new shares in the aftermarket using the greenshoe option. According to our results, when the underwriter perceives high demand, he adjusts the price upward, but only partially. In the aftermarket he or she sells short shares to accommodate the excess demand and till the end of the stabilization period exercises the greenshoe option, issuing additional shares and covering its short position.

Figure 1 illustrates the partial adjustment process for IPOs with high demand. The underwriter tries to maximize the amount of money raised in the IPO, controlling offer price and quantity of shares issued with the greenshoe option. There is underpricing, but it does not necessarily reduces the amount of money the issuing firm could raise. The company raises additional money with the new shares issued in the aftermarket, and this offsets at least partially the indirect cost of underpricing, although it creates a higher dilution for the existing shareholders before the IPO. Underwriter compensates informed investors with underpricing and overallocation.

FIGURE 1 HERE

The remaining of the article contains the following sections: Literature Review, Database and Descriptive Statistics, Regression models and results and Conclusion.

2. Literature Review

Reilly and Hatfield (1969), McDonald and Fisher (1972), and Logue (1973) find evidence that initial public offerings in the United States have, on average, positive returns on the first trading day, which is known as underpricing.. But if the process of an IPO were efficient, one would expect that the first day return be zero. If the issuing company has a clear expectation that its offer will have a positive return on the first trading day, it is rational to expect that the lead underwriter raise the offering price so it could capture that increase in value.

Ibbotson (1975) analyzes IPOs issued between 1960 and 1969 on the New York Stock Exchange and finds a positive mean initial return of 11.4%. He attributes his findings to downward bias in the offering.

Beatty and Ritter (1986) analyze the relationship between underpricing and underwriters' market share. According to their article, it is a dilemma for the underwriter to establish an offering price at a level that pleases qualified investors and the issuing company, putting their reputational capital at risk. The market for new issues has a complex net of conflicting interests among participants. When making their decisions, qualified investors, investment banks and issuing companies have to weigh-up short and long-term gains, risk (depending on the level of uncertainty of the new shares) and reward, their relationship networks and their reputational capital. In addition to this network of interests, there is also an issue of information asymmetry.

According to Beatty and Ritter (1986) and Titman and Trueman (1986) prestigious underwriters reduces information asymmetry, and therefore the underpricing. Barry et al. (1990) find evidence that venture capital backed IPOs are less underpriced than non-venture capital backed IPOs, because of the certification effect of venture capital funds.

Rock (1986) divides investors in two kinds: (i) qualified investors, with perfect information about the value of shares to be offered and (ii), ordinary investors (with imperfect information about them). According to his model the firm has to price its shares at a discount to attract uninformed investors and ensure the offer placement.

Levis (1990) tests Rock's model (1986) in the London Stock Exchange and finds evidences that underpricing is related to the existence of uninformed investors. According to the author, the greater the number of uninformed investors, the greater the dispersion of bids and, therefore, the greater the chance that the value of the shares at the end of the offer will be a long-way off the fair price.

Baron (1982) develops a theoretical model in which the issuing pricing is a function of market demand and the sales effort of the underwriter. The underwriter is better informed about the market demand than his client, the issuing company, but his distribution effort is not observable by the company. To address this moral hazard problem, the optimal contract sets the offering price below its real value, defined as the equilibrium price in the offer when the investment bank makes its best possible effort (GRINBLATT and HWANG, 1989). Therefore, the underpricing can also be seen as a bargaining chip between the issuing firm and the investment bank. The company would accept a discount on the fair value of its capital to promote the investment bank and ensure the placement of its bid.

Ritter (1984) relates underpricing with speculative waves and market euphoria. According to the author, in a period of 15 months from January 1980 to March 1981, the average return on the first trading day was +48.4% (well above the periods analyzed until then). Unlike existing explanations for the phenomenon of underpricing, the author argues that, apparently, the main reason for this phenomenon was the wave of offers of natural resource companies. These companies' risk was unknown to the market, and therefore the issuing price reflected depreciation greater than usual to ensure the share's placement on the market. The article has often been referenced since the Internet bubble of 2001, another characteristic period of a hot market with strong underpricing. Loughran and Ritter (2002) and Lowry and Schwert (2002) find evidence of positive autocorrelation among initial returns.

Leal (2004) finds a mean initial return of 34% for IPOs issued in the Brazilian market between 1974 and 1994. In 2003, the Brazilian Security Exchange Commission (CVM - Comissão de Valores Mobiliários) regulated the use of bookbuilding in IPOs. Since then, most IPOs in Brazil use this process. Bookbuilding is an efficient way of minimizing underpricing, since investors reveals their preferences in price and volume, and reduces the information asymmetry (SAITO and PEREIRA, 2006). We can observe the drop in the initial returns of IPOs after the bookbuilding adoption in Silva and Famá (2011). The authors find a mean underpricing of 4.8% in Brazilian IPOs issued between 2004 and 2007.

Benvenistes and Spindt (1989) model the IPO process as an auction in which participants are asymmetrically informed investors. In order to obtain truthfull pre-deal information from well informed investors, the underwriter needs to compensate them in a way that it is more interesting to reveal thruthfull information than false information. The allocation of shares is proportional to the non bidding indication of interest, revealed during the bookbuilding process. When demand

is high, the underwriter adjusts the offer price upward and the informed investor who revealed truthful information receives a higher allocation in a high demanded IPO than the investors that revealed false information. If there is overallocation, the underwriter can also issue more shares in the aftermarket to cover the short position by exercising the *greenshoe* option, creating the possibility of extra remuneration to the well informed investor that reveals truthful information. But if shares are rationed, even with the overallocation, the underwriter will adjust the issue price only partially, not incorporating all information he gathered pre-deal. This partial adjustment phenomenon will produce underpricing and overallocation. The first day return is a way of compensating well informed investors from revealing good information and not being able to buy all shares he wanted.

Hanley (1993) defines and tests the partial adjustment phenomenon. According to the author, at the end of the bookbuilding process the underwriter reviews the offering price, readjusting the offer with only part of the perceived demand. Thus, the underwriter facilitates the placement of shares (and the additional lots – the *greenshoe*) which as well as representing relatively less work for him, also increases his remuneration (investment banks are usually also paid for additional lots). Additionally, by passing on only part of the perceived demand, the investment bank ends up boosting the underpricing, because investors who could not participate in the offer will buy the shares directly on the stock exchange secondary market, thus raising the stock price. She finds evidence that IPOs with upward revision have higher underpricing, and concludes that pre-deal information predicts initial return. Bradley and Jordan (2002) also find evidence of partial adjustment phenomenon in the USA stock market.

Pinheiro and Carvalho (2011) investigate the price stabilization effect in the short run returns of Brazilian IPOs. For doing so, the underwriter distributes more shares than the originally

contracted. This overallotment is possible by selling shares short. According to the authors, there are three ways that allow the underwriter to cover its short position: (i) by acquiring shares in the secondary market at the market price during the stabilization period, (ii) by exercising the greenshoe option and buying shares at the launching price, or (iii) by doing both. The overallotment and ASC (aftermarket short covering) allows the underwriter to manipulate price in the secondary market without incurring in financial loss. There are two possible reasons for the overallotment: (i) to mitigate high volatility caused by *flippers* and (ii) to maintain the price artificially high during the stabilization period and compensate informed investors for revealing their information. The underpricing and price stabilization are mechanisms that serve to this purpose. Price stabilization reduces the underpricing, but allows the underwriter to buy back overpriced shares. The authors find evidence that the two reasons apply for the Brazilian market, and that ASC reduces underpricing.

Based on Pinheiro and Carvalho (2011) findings, we investigate the relationship between greenshoe option and price revision during the bookbuilding process. We expect the exercise of greenshoe option to be positively related to price revision, and that underwriter maximize the volume raised by working with short selling, offer price and the exercise of greenshoe option. The underwriter may use overallotment and ASC (i) to mitigate high volatility caused by flippers, (ii) to maintain the price artificially high during the stabilization period and also (iii) to supply excess demand he or she predicts during the bookbuilding process. This article investigates specifically the third use. Greenshoe option allows underwriter to allocate extra shares in high demanded deals without risk. Overallotment and the issue of new shares (i) increases the volume raised by the issuer in the aftermarket, (ii) increases the underwriter's fees; (iii) allows to compensate informed investors with underpricing, but controlling the level of it;

(iv) allows informed investors to buy more shares and (v) reduces the risk of the underwriter being wrong about the demand, since the creation of the extra shares is an option. The issuing of new shares with the greenshoe option reduces the cost of underpricing, but it also creates a higher dilution for pre-IPO shareholders.

3. Databases and Descriptive Statistics

3.1. Database

We collected information on all the IPOs that took place on the BM&F Bovespa between January 1, 2004 and December 31, 2012 in Bloomberg. We start our collection period in 2004 because there were hardly any offerings in previous years, and CVM regulated the bookbuilding process in 2003.

We included in our sample re-IPOs, that is, subsequent offerings of companies that had very little liquidity previously, as for instance TAM in 2005. We excluded of our sample Renar Maçãs in 2005, Le Lis Blanc and Nutriplant in 2008 because they were valued below R\$300,000,000.00, and were therefore much smaller than the other observations. Our final sample contains 138 IPOs.

We validated the preliminary and definitive data of offerings with information in the preliminary prospectuses, final prospectuses and notices of termination. In case of inconsistency, we used the information available in the latest official document, i.e., in the following order: notice of termination, followed by the final prospectus and, finally, the preliminary prospectus. We could find the documents in different sources: CVM, BMF&BOVESPA, underwriter and in the issuer investor relation sites.

3.2. Descriptive Statistics

3.2.1 Partial Adjustment

To analyze the partial adjustment phenomenon, Hanley (1993) allocates the IPOs into three groups: offerings with final prices below the offer range disclosed in the preliminary prospectus, offerings with final price within the offer range and offerings with final price above the offer range. The revision in the first group implies that there is bad information revealed in the pre-issue market, in the second group there is no information revealed and in the third group good information revealed.

We calculate the normalized price revision as $(P_O - P_L) / (P_H - P_L)$, where P_O is the offer launching price, P_L and P_H are respectively the minimum and the maximum price in the offer range.

Figure 2 presents normalized offer price revision in chronological order. The maximum price in the offer range equals 1 and that the minimum price in the offer range equals zero. With exception of BMF&BOVESPA and BOVESPA holding, all offers' values range from 1.5 (which represents a distance above the range equivalent to half the extension of it) and -1.25 (below the range to a distance equivalent to one and a quarter times the length of it). BMF&BOVESPA and BOVESPA holding normalized offer price are 2.75 and 2.5 respectively. There is an apparent concentration of observations in the maximum and minimum limits of the range. Although we do not identify any significant pattern, we can observe that the first half of the observations appears to be, on average, a little closer to the upper limit of the range, while the second half appears to be, also on average, a little closer to the minimum price of the range. However, there are no *a priori* signs that seasonality or more or less active periods influence the underwriter to review the price in any expected way.

FIGURE 2 HERE

To understand better the Brazilian IPOs' price revisions, we order the observations according to their relative positions (offering price in relation to the offer range in the preliminary prospectus). Figure 3 shows such ordering. We can observe that the offerings tend to be revised in an apparently symmetrical fashion. That is, if we compare the observations above 0.5 (the midpoint of the range, regarded as the expected offer price in the preliminary prospectus) with the observations below the same line, we will get similar curves, with a clear pattern of issues exactly on the maximum and minimum limits, as well as a series of observations at the midpoint of the range and below the range at a distance equal to the extent of it.

FIGURE 3 HERE

Hanley (1993) and other studies that examine the pre-market offer price revision separate the sample into three groups: final offer price below the offer range, final offer price within the offer range and final offer price above the offer range. However, as we can observe in Figure 2, there are few offerings with final price above the range and below the range. The vast majority of our sample has launched prices within the range. If we keep the same classification as the international literature, we will classify in the same category offers with final price in the upper range limit and in the lower range limit, and these offers clearly have different directions regarding the interpretation of the demand by the underwriter. In this study, unlike other studies in the literature, we group the offerings into (i) final offer price below the range or at the minimum value, (ii) final offer price within the range (excluding the limit values) and (iii) final offer price above the range or at the maximum value. For the sake of simplicity, the three subgroups are referred throughout the study as below, within and above the range. This distinction is important because it significantly alters the research results. We interpret that offerings with final offer price above or at the upward range limit signal a pre-market perception

of high demand; offerings with final offer price below or at the downward range limit signal a perception of low demand. Therefore it makes sense to classify differently offerings launched in the upward range than offers in the downward range.

Table 1 presents descriptive statistics along with the means difference test for each variable and between each subgroup. The group “below the range”, “within the range” and “above the range” have 59, 49 and 30 observations respectively. In three IPOs: Brasilagro, Even Construtora and Invest Tur we find only the expected price in the preliminary prospect, without a minimum and maximum price for creating a valuation range. We classify all three cases in the “below group” and we treated the range width as missing information. Despite being the smallest group, the offerings with an offering price at the maximum value or above the offer range represent 21.7% of the sample.

We calculate the width in Brazilian Reais of the valuation range as $P_H - P_L$, where P_H is the highest price in the offer range and P_L is the lowest price. We observe that although the width median is the same (R\$ 4.00), the mean differs significantly. The reason for that is because some offers were made at prices far above average, creating this distortion. The IPOs of BrasilAgro (2006), MMX (2006), InvestTur (2007), Brazil Brokers (2007), MPX (2007) and OGX (2008) were launched with share prices of around BRL 1,000.00. If we exclude these offerings, the mean of the offer range width is BRL 4.6 for the total sample, BRL 4.7 for the subgroup “below the range”, BRL 4.7 for the subgroup “within the range” and BRL 4.5 for the subgroup “above the range”. That is, there is apparently no significant difference between groups. The range width is a *proxy* for the level of offering uncertainty. When the underwriters are less confident about the company's value, or about the market demand for the issue, they tend to make assessments that are “broader”, with more distant “pessimistic” and “optimistic” scenarios. Therefore, as well

as analyzing the range width in terms of Reais (absolute terms), we also analyze the range width in percentage terms. We calculate the percent width as $(P_H - P_L)/P_L$ and use this variable in the regressions, in order to control the level of pre-bookbuilding uncertainty.

The offerings “above the range” have smaller range width mean and median than the other groups, but the difference in relation to the two other groups are not significant.

We calculate the expected offering price as $(P_H - P_L)/2$. Offers “below the range” have higher mean expected prices than those “within” or “above the range”. However, the difference is not significant and the medians are approximately the same for the three groups. This trend is reversed in the final offer price, published in the final prospectus for each offering. This time, there is indication that offerings “above the range” have offer prices that are higher than the other two subgroups, in terms of the median. Still, once again the means were not significantly different.

The *pre-greenshoe* volume offered differs significantly between the subgroups, both in terms of means and medians. Despite the fact that the difference between the offers “within the range” and the other two sub-groups is not significant, the difference between the offers “above” and “below the range” is. Offers “above the range” capture considerably more than offers “below the range” (nearly triple in terms of means and 1.2 times in terms of medians).

We also note that the offers above the range have a mean market capitalization significantly higher than the offers below the range, which indicates a greater appetite of the market for offerings from the largest companies.

TABLE 1 HERE

Table 2 presents the descriptive statistics about price revision during the bookbuilding process. We build the data comparing information in the preliminary prospectuses with the final prospectuses.

We calculate price revision as $(P_O - P_E)/P_E$, where P_O is the final offer price disclosed in the definitive prospect and P_E is the expected offer price in the preliminary prospect (the mid-price between the highest price (P_H) and the lowest price (P_L) in the valuation range). We observe that price revision is negative in the first subgroup and positive in the third, and in terms of the mean and median, the revisions distance ($P_O - P_E$) of the first group is a little bit higher in magnitude than in the third group. Price revision in “within the range” group is around zero.

The same occurs with the revisions regarding the limits of the offer range, calculated as $(P_O - P_L)/P_L$ for “below the range” and $(P_O - P_H)/P_H$ for “above the range”. This indicates that the negative revisions are slightly higher in absolute terms than positive revisions.

The underwriter has the possibility to increase up to 20% the number of shares declared in the preliminary prospect during the pre-deal period. If this happens, the deal is called a hot deal. This action is taken jointly by the issuing company and the underwriter before the IPO launching and it must be declared in the final prospect. We estimate the change in the number of shares offered as $(N_O - N_E)/N_E$, where N_O is the number of shares offered in the IPO and N_E is the number of shares disclosed in the preliminary prospectus. Although we identify changes in only 17.39% of IPOs in the sample, this adjustment represents significant difference in the total final volume offered. We observe that offerings in the “above the range” group have a greater propensity to have positive shifts (26.67%) in the number of shares issued than offers “below the range” (6.78% of this group). The underwriter, as well as adjusting the price according to the demand, also **adjusts** the number of shares. It is interesting to note that the underwriter adjusts

the number of shares in some offers even in the “below the range” group. We do not observe the demand curve estimated by the underwriter during the bookbuilding process, but it may be the case that the total offer volume increases if it lowers the price and increase the number of shares.

We calculate the difference in Brazilian Reais of expected volume to volume offered as $V_O - V_E$, where V_O is the number of shares offered multiplied by final offer price and V_E is the expected number of shares in the offering according to the preliminary prospect multiplied by the expected offer price in the preliminary prospect. We also calculate the ratios V_O/V_E , V_O/V_L and V_O/V_H , where V_L is the anticipated number of shares in the preliminary prospect multiplied by the lower price in the offer range, and V_H multiplied by the upper price in the offer range. In the below group V_O/V_L is close to 1.0 (concentration in the lower range bound), in the “within the range group” V_O/V_E is close to 1.0 (concentration in the medium of the range) and in the “above the range” group V_O/V_H is close to 1.0 (concentration in the upper range bound). Therefore, underwriter tends to make revision in price combined with revision in the number of shares in a fashion that the majority of the offers have prices within the predicted range in the prospectus.

TABLE 2 HERE

Table 3 contains an analysis of first day return, additional shares issued in the aftermarket and the return for investors that hold the shares till the end of the stabilization period. We assume the stabilization period ends in the disclosure date of the notice of termination, as declared in the final prospectus. In some IPOs this date is more than one month distant than the date of the liquidation of the exercise of greenshoe option. In these situations we consider the stabilization period finishes two days after the liquidation of the exercise of the greenshoe option. The mean and median stabilization period in our sample is 36 and 37 days respectively.

We calculate the initial return as $(P_1 - P_0) / P_0$, where P_1 is the closing price in the first trading day, P_0 is the launching price. We also calculate the abnormal return in the first day, subtracting from the initial return the Ibovespa return. We can see that the initial return is, on average, positive, both in absolute and abnormal terms. The percentage of offerings with positive first-day return increases with the price revision: around 40% in the group “below the range”, 70% in the group “within the range” and 87% in the group “above the range”. The mean initial return corresponds to 4.44% in the total sample. Underpricing seems to be related to excess demand. Note that it is negative (-0.5%) in the “below the range”, 5.0% in the “within the range” and 13.2% in the above the range. We also find that the magnitude of the underpricing in Brazil is around 4% less than the results in Hanley (2003) for the United States.

The percentage of offers with greenshoe option exercised also increases with the classification of the price revision. There is a higher possibility of creating new shares in the aftermarket if an IPO is classified in the “above” (80%) than in “within” (73%) and “below the range” (58%).

We observe that the above the range has a significantly higher ratio of new shares issued in the aftermarket than the other two groups. The median of the ratio of new shares created in relation to offered shares in this group is 14%, approaching the limit of 15% established by the Brazilian Security Exchange Commission (CVM).

We calculate the difference in Brazilian Reais of final offer volume to volume after the greenshoe option as $V_F - V_O$, where V_F equals the final number of shares after greenshoe multiplied by the final offer price and V_O is the number of shares offered in the launching day multiplied by the launching price. This difference represents the extra money the issuing firm raises with the additional shares. On average, a firm raises BRL 166 million if the IPO is classified in the “above the range” group. This is 2.4 times larger for the average extra volume

raised in IPOs in the “within the range”, and 4.6 times in the “below the range”. Therefore the issue of new shares significantly reduces the cost of underpricing.

The average abnormal buy and hold return from the launching day till the end of the stabilization period for the whole sample is approximately the same magnitude of the underpricing (4.5%). But when we examine the subsamples separately we have a different picture.

The abnormal buy and hold return for an investor of an “above the range” IPO is lower than the initial return. It means that in this group there is a price reversion from the first trading day to the launching price, but as it does not revert 100%, it still leaves a profit for institutional investors.

In the “within the range” group, the buy and hold abnormal return is very close to the abnormal initial return, meaning that there is persistence in the first day underpricing.

In the “below the range” group, the abnormal initial return is negative, but the buy and hold return from the launching day till the end of the stabilization period is positive (1.7%), meaning that on average institutional investors do not have a loss with deals with negative price revision.

About 62% of the IPOs in the “below the range” group has buy and hold return higher than the initial return. This percentage decreases to 54% to the “within the range” and to 25% to the “above the range” group. That is, on average, institutional investors are compensated in offers with positive price revision, but at a magnitude lower than the underpricing measured by the initial return.

The partial adjustment during the bookbuilding process creates underpricing and overallocation. The return in the end of the stabilization period is on average lower than the initial return for the “above the range group”, since new shares are issued. Although the

underwriter creates some underpricing, it also tries to maximize the volume raised in the IPO, controlling for offer price and issue of new shares with the exercise of the greenshoe option. The issuer accepts a lower launching price in exchange for raising additional money in the aftermarket with the issue of new shares. Overallotment also increases the underwriter fees and allows compensating institutional investors with extra allocation.

TABLE 3 HERE

4. Econometric Tests

We run (White heteroskedasticity robust) OLS regressions to validate our findings in the descriptive analysis.

In order to analyze the effect of bookbuilding information in initial return and the exercise of greenshoe option in the aftermarket we include the following variables in the regression in addition to the ones we described in the descriptive analysis:

- (i) Ibovespa % change in the three months previous the launching. We expect a positive correlation of this variable to initial return.
- (ii) Credit Suisse or UBS Pactual lead underwriter dummy: a dummy variable that equals one if the lead underwriter is Credit Suisse or UBS Pactual and zero otherwise. These two investment banks were the lead underwriter in the vast majority of IPOs in our sample, and we used this dummy as a proxy for underwriter reputation. We expect this variable to have a negative relation to underprice.
- (iii) Year Dummies – a dummy that equals 1 for issues in 2007, a dummy that equals 1 for issues in 2008 (affected for the crisis) and a dummy that equals 1 for issues after 2008.
- (iv) Range width X dummy for the group below the range and within the range.

(v) Greenshoe option – dummy with value 1 if the greenshoe option is exercised in the aftermarket.

Table 4 contains the results of the regressions. In models (1) and (2) we test how initial return is related to pre-deal information. In model (3) we test how the new shares issued in the aftermarket is related to pre-deal information. In model (4) we test if the exercise of the greenshoe option is related to price revision, and in this specific case we run a binomial logit model. Models (5) and (6) relates the information in the preliminary prospectus to the final prospectus.

In Model (1) we observe that abnormal initial return is significantly positive related to price revision, confirming our evidence of partial adjustment. We also find evidence that abnormal initial return is negatively related to valuation range width. We would expect that range width had a positive impact in underpricing, since more risky and uncertain deals should result in more underpricing. Our evidence is contrary to the expectation, where risk decreases the underpricing.

It is interesting to note in model (2) that when we include the interaction variable between valuation range width (a proxy for the IPO risk) and the dummy for the IPO being classified in the “within the range” group, we have significant negative coefficient only for the interaction variable. This implies that risk is related to underpricing only for IPOs that were priced in the valuation range. Therefore, the explanation for underpricing may differ for different classification in accordance to the relative position of launching price to the valuation range.

In Model (3) we find that the new shares created with the greenshoe option are positively related with price revision, offer size (measured by offered volume) and negatively related with 2008. We confirm this result with Model (4), where price revision and offer volume increase the propensity of exercising greenshoe option.

Models (1), (2), (3) and (4) confirm our findings in the descriptive analysis, that pre-deal information predicts underpricing and the exercise of greenshoe option. The higher the price revision, the higher the underpricing and the issue of new shares in the aftermarket.

Models (5) and (6) show a positive relation between price revision and the amount of shares offered. Price revision is also negatively related to valuation range width, positively related to the IBOVESPA percentage change in the 3 months before the IPO. Price revision is also negatively related to year 2007, 2008 and 2009-2012, meaning that it was higher in the period before 2007.

Our results support the idea in Benveniste and Spindt (1989), according to which underwriters compensate informed investors with underpricing and overallotment.

TABLE 4 HERE

8. Conclusion

Our results support the existence of partial adjustment in Brazilian IPOs. We measure an average underpricing of 4.4% for the whole IPO sample. But when we segregate IPOs in three groups according to price revision, we observe that IPOs in the “above the range” group have an average underpricing of 13%, much higher than the IPOs in the “within the range” (5%) and “below the range” (-0.5%).

It is interesting to observe that in Brazil underpricing is negatively related to risk (as measured by the preliminary prospectus valuation range). This is contrary to the international literature, and it is an evidence that IPOs are mainly caused by excess demand that were not covered in the pre deal.

Although it is possible to increase the number of shares by 20% during the bookbuilding process, only 17.4% of the offers in our sample makes this adjustment. The percentage of offers with new shares issued in the aftermarket is significantly higher: 68%. The group below the range has a mean increase of 3.7% of the number of shares, while the group within the range is 11.5% and above the range 13.8% (closer to the green shoe option limit of 15%).

When we examine the buy and hold return till the end of the stabilization period, we find that the initial return is not persistent for the above the range IPOs, although investors that buy shares in the launching date have still positive returns. It is interesting to note that although the “below the group” has a negative initial return, the buy and hold return reverses to positive in the end of the stabilization period.

Therefore underwriters launch shares at a discount, and adjust later the offer to the demand by selling shares short and increasing the number of shares with the exercise of greenshoe option. This maximizes the volume raised in an IPO, but it also produces underpricing and dilution for the pre IPO existing shareholders.

Issuer accepts a lower launching price in exchange for raising additional money with the issuing of new shares in the aftermarket with the exercise of the greenshoe option.

The mechanism of adjusting the number of shares in the aftermarket increases the probability of success in the IPO, increases the underwriter fees and also increase the volume of money raised in the IPO. Overallotment allows underwriters to control better underpricing. The cost comes in the form of a higher dilution for pre-IPO existing shareholders.

This interpretation is in accordance to Benveniste and Spindt (1989), where underwriter compensates informed investor with overallotment and underpricing and also with Grinblatt and Hwang, (1989), where underpricing is a bargaining chip between the issuing firm and the

investment bank. The company accepts a discount on the fair price to promote the investment bank and increase the success probability of the IPO.

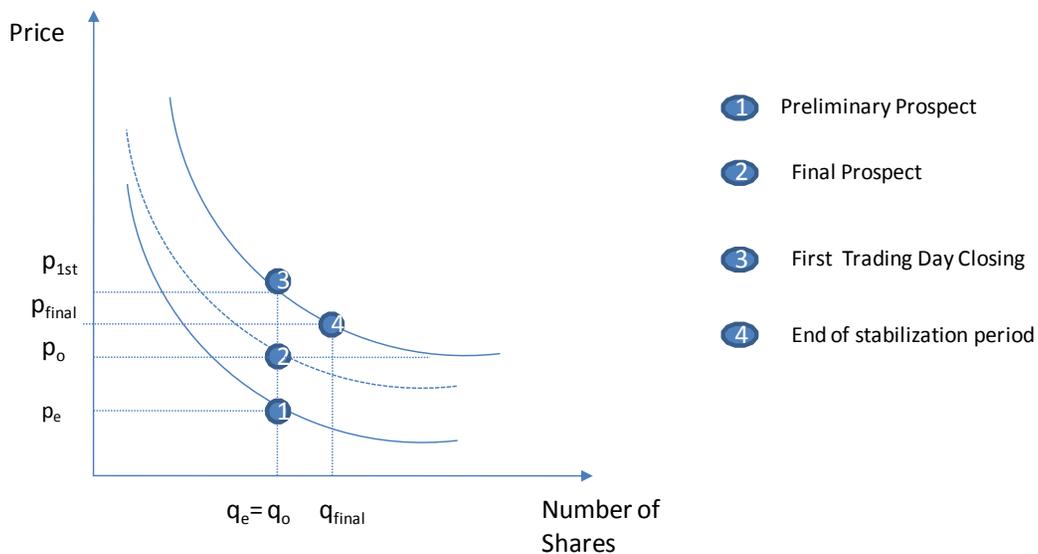
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Figure 1 – Illustration of the partial adjustment process



P_e = expected price, P_o = offer price, P_{1st} = closing price in the first trading day and P_{final} = price in the end of stabilization period.

q_e = expected number of shares issued q_o = number of shares issued in the offer, q_{1st} = total number of shares issued in the end of the stabilization period, including the exercise of greenshoe option.

Figure 2- Relative position of the offering price in chronological order

The 138 public initial offerings of the sample had their respective valuation ranges normalized, in a way that the maximum price was 1 and the minimum price was 0. Afterwards, the definitive offering price was also normalized and is represented in the graphic. The order is chronological.

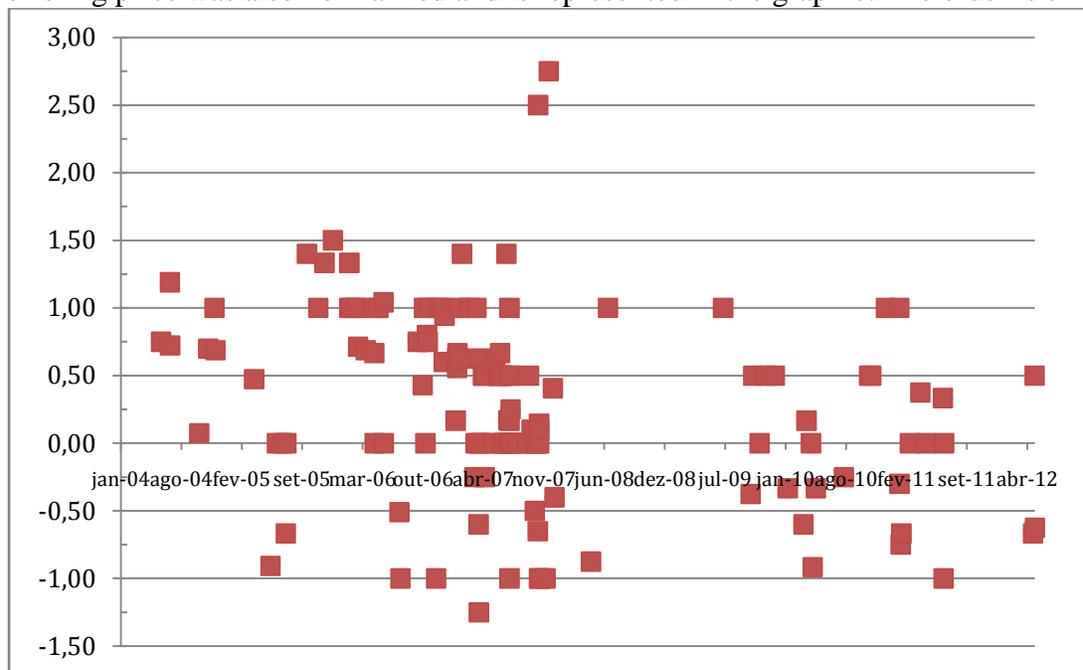


Figure 3 – Relative position of the offerings ordered according to the position

The 138 initial public offerings of the sample had their valuation ranges normalized in a way that, the maximum price was assumed to be 1 and the minimum price 0. The order is a function of the relative position of the definitive offering price after it was normalized.

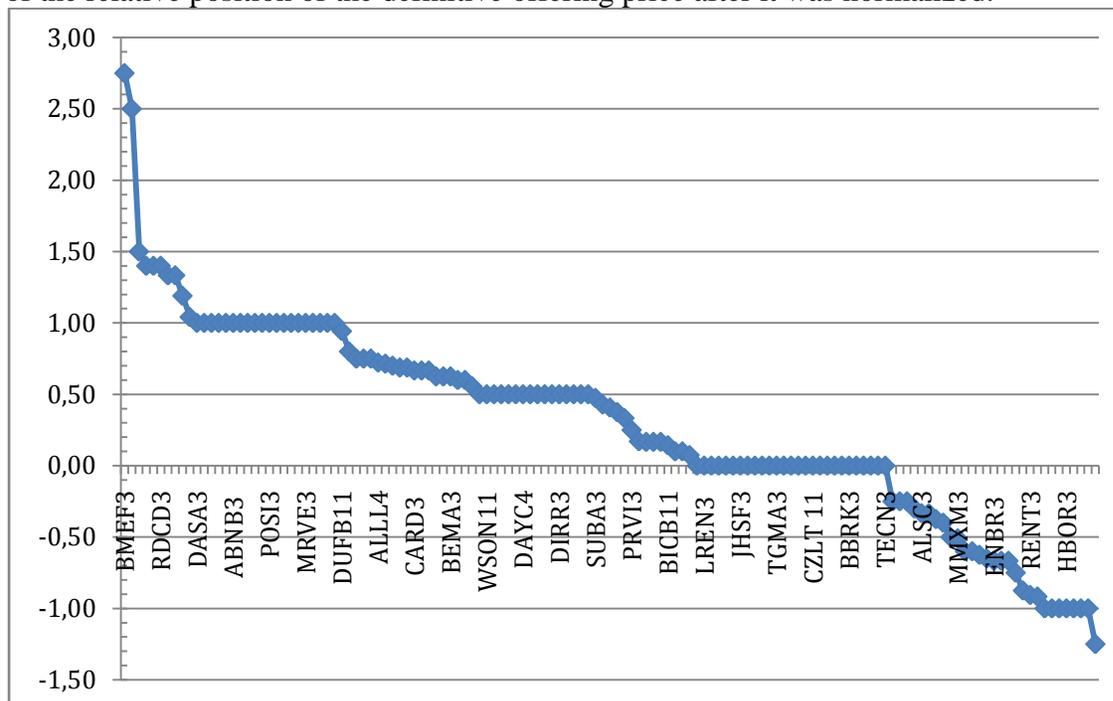


Table 1 - Statistics of the initial public offerings of the sample

Descriptive statistics of the final offer price and volume in relation to the pre-bookbuilding offer range and predicted volume in the preliminary prospectus. Below the means, the medians are presented in brackets. On the right, the means difference test, in which “*”, “**” and “***” represent statistically significant degree below 10%, 5% and 1 %, respectively.

	All IPOs	IPOs with final offering price below or at the minimum value of the offer range	IPO with final offering price within offer range (excluding limits)	IPOs with final offering price above or at the maximum value of the offer range	Means difference test		
		(1)	(2)	(3)	(1) - (2)	(1) - (3)	(2) - (3)
Number of issues	138	59	49	30			
Percent of sample		42,75%	35,51%	21,74%			
Offer range width in Brazilian Reais	R\$ 12,69 [R\$ 4,00]	R\$ 21,26 [R\$ 4,00]	R\$ 18,09 [R\$ 4,00]	R\$ 12,69 [R\$ 4,00]	3,17	8,57	5,40
Offer range width in percentage terms	27,20% [27,27%]	27,83% [28,24%]	27,33% [27,59%]	25,80% [25,40%]	0,50%	2,03%	1,53%
Net revenue in preceding year	R\$ 996,21 M [R\$ 366,91 M]	R\$ 921,39 M [R\$ 368,99 M]	R\$ 1.269,22 M [R\$ 313,60 M]	R\$ 675,43 M [R\$ 388,70 M]	-347,83	245,96	593,79
Expected offering price	R\$ 91,01 [R\$ 18,50]	R\$ 109,72 [R\$ 19,00]	R\$ 91,42 [R\$ 17,50]	R\$ 53,54 [R\$ 19,75]	18,30	56,18	37,88
Final offering price	R\$ 84,71 [R\$ 18,00]	R\$ 91,72 [R\$ 16,00]	R\$ 91,09 [R\$ 17,50]	R\$ 60,49 [R\$ 23,00]	0,63	31,22	30,60
Offered Volume R\$ Million (pre-greenshoe)	R\$ 896,18 M [R\$ 532,81 M]	R\$ 590,92 M [R\$ 507,61 M]	R\$ 923,65 M [R\$ 522,00 M]	R\$ 1.451,65 M [R\$ 651,15 M]	-332,72 *	-860,73 ***	-528,01
Market Capitalization at IPO	R\$ 3.160,49 M [R\$ 1460,46 M]	R\$ 1.539,13 M [R\$ 1248,27 M]	R\$ 3.381,61 M [R\$ 1478,58 M]	R\$ 5.987,98 M [R\$ 2141,75 M]	-1842,48 *	-4448,45 ***	-2606,37

Table 2- Offering adjustments between the preliminary and final prospectuses

Descriptive statistics of the percentage difference between the offering prices and offered volumes in relation to what is predicted in the preliminary prospectus. Below the means, the medians are in brackets.

	All IPOs	IPOs with final offering price below or at the minimum value of the valuation range	IPO with final offering price within valuation range (excluding limits)	IPOs with final offering price above or at the maximum value of the valuation range
		(1)	(2)	(3)
Mean percentage difference from expected offering price to final offering price	-5,01% [-0,96%]	-19,23% [-16,67%]	0,01% [0,00%]	14,77% [12,41%]
Mean percentage difference from minimum or maximum range values and the final offer price		-9,22% [-7,06%]		3,13% [0,00%]
Mean percentage change in the number of shares offered	15,28% [19,99%]	18,75% [20,00%]	14,55% [13,84%]	14,65% [19,99%]
Percentage of IPOs with positive change in number of shares	17,39%	6,78%	24,49%	26,67%
Average difference in Reais of expected volume to final volume offered	-R\$ 22,19 M -[R\$ 0,77 M]	-R\$ 199,20 M -[R\$ 100,50 M]	R\$ 26,12 M [R\$ 10,00 M]	R\$ 247,03 M [R\$ 91,35 M]
Average ratio of offered volume in relation to minimum volume expected	1,10 [1,07]	0,91 [0,98]	1,18 [1,17]	1,35 [1,32]
Average ratio of offered volume in relation to expected volume	0,97 [1,00]	0,81 [0,85]	1,04 [1,03]	1,19 [1,15]
Average ratio of offered volume in relation to maximum volume expected	0,87 [0,87]	0,71 [0,73]	0,93 [0,92]	1,07 [1,02]

Table 3- Underpricing and greenshoe option

Descriptive statistics regarding the price, shares and volume change after the issue date. Below the means, the medians are presented in brackets. On the right, the means difference test in which “*”, “**” and “***” represent statistically significant degree below 10%, 5% and 1 %, respectively.

	All IPOs	IPOs with final offering price below or at the minimum value of the valuation range (1)	IPO with final offering price within valuation range (excluding limits) (2)	IPOs with final offering price above or at the maximum value of the valuation range (3)	Means difference test		
					(1) - (2)	(1) - (3)	(2) - (3)
Initial return at first trading day	4,44% [1,06%]	-0,49% [0,00%]	5,03% [1,90%]	13,15% [11,92%]	-0,06 ***	-0,14 ***	-0,08 ***
IPOs with positive initial return	57,97%	37,29%	63,27%	90,00%			
Abnormal return at first trading day	4,29% [1,87%]	-0,53% [-0,82%]	4,80% [2,09%]	12,94% [12,90%]	-0,05 ***	-0,13 ***	-0,08 ***
IPOs with positive initial abnormal return	60,87%	41,00%	69,39%	86,67%			
percentage of offers with greenshoe option exercised	68,12%	57,63%	73,47%	80,00%			
new shares created with greenshoe option pos deal	8,16% [10,38%]	6,42% [3,69%]	8,50% [11,50%]	11,03% [13,83%]	-2,08% **	-4,60% ***	-2,52% **
average difference in reais of final offer volume to volume pos green shoe	76,30 [50,59]	36,25 [14,66]	69,52 [55,20]	166,03 [70,59]	-33,27 **	-129,78 ***	-96,51 **
Abnormal buy and hold return from launching till end of stabilization period	4,49% [3,89%]	1,69% [2,96%]	4,65% [2,98%]	9,72% [8,73%]	-2,95%	-8,03% **	-5,07% *
Percentage of offers with positive buy and hold return from launching	57,97%	52,73%	60,42%	78,6%			
Abnormal buy and hold return from 1st day till end of stabilization period	-0,03% [0,30%]	2,17% [3,18%]	-0,10% [0,74%]	-4,26% [-3,49%]	2,27%	6,44% ***	4,17% **
Percentage of offers with positive buy and hold return from 1st day	48,55%	61,82%	54,17%	25,00%			

Table 4 – Relation between pre deal information and initial return and greenshoe option.

White heteroskedasticity robust OLS regression. The t Test results are in brackets. The marks “*”, “**” and “***” represent statistically significant degree below 10%, 5% and 1 %, respectively.

	(1) Abnormal Initial Return	(2) Abnormal Initial Return	(3) New shares created with Greenshoe	(4) Exercise of Greenshoe	(5) Percentage change from offering price to expected price	(6) Percentage change in the number of shares offered
Constant	0,0798 (0.8639)	0,0775 (0.8670)	0,1493 (3.1204)***	0,6874 (0.3041)	-0,4030 (-2.8729)***	0,0084 (0.1396)
Percentage change in the number of shares offered	0,0704 (0.5622)	0,0859 (0.7009)	-0,0524 (-0.6757)	5,0867 (1.2435)	0,4235 (2.1453)**	
Percentage change from the offering price to the expected price	0,3337 (5.6506)***	0,2552 (2.2917)**	0,1452 (4.2449)***	2,6248 (1.9829)**		0,0759 (1.9038)*
Percentage width of valuation range	-0,2084 (-1.9413)**	-0,0953 (-0.6847)*	-0,1525 (-1.8035)*	-2,3127 (-0.8104)	-0,1620 (-0.8392)	0,0108 (0.1311)
Valuation width X dummy for below group		-0,1630 (-1.1863)				
Valuation width X dummy for within group		-0,1560 (-1.8901)				
ln (offered volume)	0,0052 (0.3369)	0,0047 (0.3149)	-0,0042 (-0.5677)	0,1567 (0.4639)	0,0671 (3.1514)***	0,0032 (0.3652)
lbovespa % change in the 3 months before the launching	0,0263 (0.2551)	0,0223 (0.2141)	0,0466 (0.5687)	1,4822 (0.6575)	0,3625 (2.1767)**	-0,0175 (-0.2706)
Dummy for Credit Suisse or UBS Pactual	-0,0153 (-1.0880)	-0,0113 (-0.7845)	-0,0116 (-0.9540)	-0,5856 (-1.3815)	0,0029 (0.1137)	0,0094 (0.9192)
2007	0,0202 (0.9694)	0,0254 (1.2391)	0,0162 (1.0869)		-0,0975 (-3.4356)***	-0,0227 (-1.5320)
2008	-0,0150 (-0.5998)	-0,0265 (-1.045)	-0,0703 (-4.3737)***		-0,1732 (-2.043)**	-0,0082 (-0.4382)
2009-2012	0,0036 (0.1706)	0,0057 (0.2815)	0,0223 (1.3559)		-0,1489 (-4.2807)***	0,0124 (0.6031)
R-squared	0,3725	0,3898	0,1723		0,2765	0,1046
Adjusted R-squared	0,3273	0,3352	0,1127		0,2306	0,0477
Loglikelihood	157,3225	159,2167	184,5395		80,1814	196,2147
F	8.2431***	7.1435***	2.8905**		6.01955***	1.8394**
LR				12.2484**		