

**OWNERSHIP STRUCTURE AND INITIAL PUBLIC  
OFFERINGS IN SMALL ECONOMIES  
- THE CASE OF PORTUGAL -**

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**ABSTRACT**

This study aims to answer to three different questions. First, whether we could observe the short-term abnormal return anomaly or the long-term underperformance in the IPOs of a small economy. Second, if these anomalies exist, whether they are distinct when ownership categories (private versus state owned) are compared. And third, if these categories show different patterns, i. e., whether private placements show a significantly different under / overpricing phenomena than placements made by state owned companies. In order to do so, we selected the Portuguese market testing whether cumulative abnormal returns (CARs) or the wealth relative (WR) of a set of portfolios were statistically and significantly different from zero.

We found significant short-term abnormal returns either for IPOs placed by private firms either for IPOs placed by state owned firms. In addition, state owned IPOs have been more profitable for short term investments than private IPOs.

Secondly, we observed weak signs for one-year time period underperformance, but we found new evidences, as reported in the literature, for significant differences for a one-year performance according to the ownership structure. As opposed to our expectations derived from the literature on economic and financial performance of privatised firms, we found that IPOs placed by private companies tend to perform better in a one-year term than IPOs placed by state owned firms. However, our results seem to be quite sensitive to the methodology under use.

**Key words:** IPO, abnormal returns, market efficiency, event studies.

*JEL Classification:* G14 – Information and Market Efficiency; Event studies.

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## **I – Introduction**

The aim of this study is to analyse the Initial Public Offerings in small economies, using the case of the Portuguese securities market and taking particular attention to the ownership structure of the companies that place the offer. We wonder if the so-called underpricing phenomena commonly referred in the literature, and detected in several major markets, it is observable in a small securities market as the Portuguese. Moreover, we investigate if private companies placing public offers in the market, show a different pattern of behaviour from the state owned companies when executing the Governmental privatisation programme.

If the value of the stock is fairly priced by the issuer in the public offer, the investors should not expect any abnormal returns. Otherwise, statistically strong abnormal returns should be observed.

In Portugal, during the 90's Government and private companies competed for funds. Although the state owned IPO processes were more innovative, private companies followed them immediately.

We suspect that empirical findings of underpricing observed in developed markets, is still observable in a small and emerging market. However, according to Megginson, Nash and Van Randenborgh (1994), who found privatisation programs associated with an increase on economic and financial performance of privatised companies, we expect a significant difference between state owned companies and private IPOs. Therefore, we suspect that the underpricing phenomena it is still observable in a small economy, but it is expected to be more pronounced when state owned companies are involved, serving the national interests of the Government in stimulating the use of capital markets by the entire economy. Splitting the analysis into

two samples – public offers made by private companies and by state owned firms – we expect to find differences between them in terms of market price behaviour.

The study goes over a six-year period, between 1992 and 1998, assuming investors would buy the stocks in the IPO or in the first trading day after it occurred and holding it for a one-year time period.

We start this paper by describing briefly the IPO literature. Next we present the data and the methodology in use. Then we present the empirical results and conclusions

## II – Initial public offerings literature

The financial theory has been uncovering an IPO pattern where the initial abnormal returns are positive and the long-term abnormal returns are negative.

Ibbotson (1975), with a small and non normal distribution, concluded that, in average, the IPO abnormal return until the end of the first trading month (bid price) was +11.4%. At the end of one year, the average monthly abnormal return was 2.4%. In the long term, however, he did not find statistically strong support to reject the hypothesis of an efficient market. The author supported this market behaviour with the hypothesis of a value transfer between investors and issuers through financial intermediaries. This process would guaranty the subscription of all subsequent IPOs placed by the financial intermediary. He also showed that IPO issuers had a higher systematic risk than the market as an all.

Later, Ibbotson and Jaffe (1976) and Ibbotson, Sindelar and Ritter (1988) showed the links between market variables such as the initial abnormal returns and the “hot issue markets”.

In the long term, Ritter (1991) showed evidences that IPO issuers underperform other non-issuers in the same economic sector with equal market value. The author concluded that timing for placing an IPO is not at random, being chosen the most adequate moment for the market. Loughran e Ritter (1995) compared two portfolios of IPO issuers and non-issuers through the process which Ritter (1991) called *wealth relatives* defined as the ratio between the buy and hold IPO portfolio returns, and a buy and hold non-issuers portfolio returns for the same time period<sup>2</sup>. In a study with one

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<sup>2</sup> Please refer to Equation 3 below.

year of data after the IPO event, they estimated the *wealth relatives* as 0.95, which means a negative abnormal return. When replacing the non-issuers portfolio by the *Standard & Poor's 500* index the conclusions did not change. Even using a five-year period, abnormal returns remained negative with the IPO portfolio with higher systematic risk than non-issuers portfolio.

Fama (1998) doubts on the analysis that highlights the market inefficiency hypothesis and the IPO long term abnormal returns. The author points out the methodology and the selection of non-random samples as main reasons for those suspicions. In addition, Fama and French (1992) or Banz (1981) suggest that present financial theory does not answer all the questions raised.

Those three hypotheses of market inefficiency in IPOs – initial abnormal returns, “hot issue markets” and long term abnormal returns – were complemented by other authors’ explanations.

In *the winner's curse hypothesis*, Rock (1986) supports the idea that IPO returns are a compensation for trading against agents with superior information. He shows a possible existence of information asymmetry between market agents.

*The cost of information acquisition hypothesis* supports that initial abnormal returns are the reward for investors who reveal valuable information to the financial firm. This information is vital to price the IPO. In this sense, Benveniste and Spindt (1989) support the investors’ discrimination.

Welch (1992) supports that investors take into account previous buying decisions from other investors in the IPO process. If investors’ decisions are sequential, latter investors behave accordingly to previous investment decisions. To avoid initial lack of interest in the IPO, which can affect subsequent investment decisions, the issuer undervalues it. This should capture an important first “wave” of investors who will attract others, creating the effect of a *cascade (the cascades hypothesis)*.

*The information asymmetry hypothesis* is based on the presumption that financial firms have superior knowledge over the market than the issuer and benefits from it reducing the risk. However, Beatty and Ritter (1986) showed a negative relation between financial firms market share and the fixing of a wrong IPO price. Ibbotson, Sindelar and Ritter (1988) support that financial firms avoid misconduct behaviour to protect its commercial brand name.

Brennan and Franks (1997) supporting *the ownership dispersion hypothesis* pointed out that the initial underpricing creates a demand surplus. When it happens, managers can select the investors and sell less stock to each one. On the other hand, shareholders have less power and influence over management.

*The signalling hypothesis* implies the issuer management has a high value reference for the company. In order to signal this value over time, they underprice the IPO. Usually, in the long term, the issuer does a seasoned equity offering to recover the initial underprice. Although Jegadeesh, Weinstein and Welch (1993) found support to state that initial underpricing is due to lack of market information by the issuer. However, Garfinkel (1993) did not find statistical support for both these hypotheses.

*The stabilisation hypothesis* is based on the presumption that initial underpricing is the effect of an agreement between the issuer and the financial firm to sustain the price from falling below the IPO price. This process would create the ideal conditions for subsequent public offers. Ruud (1993) found empirical support for this proposition.

*The market incompleteness hypothesis* assumes that investors ask a premium (the initial return) for holding IPO stocks instead of listed stocks.

Tiniç (1988) suggested *the legal hypothesis* in explaining why issuers underprice the offer to reduce the probability of future legal actions against them, if something goes wrong with the IPO. However, Drake and Vetsuypens (1993), Ibbotson and Ritter (1995) and others did not find support for this hypothesis.

*The market regulation* could be another reason for underpricing, if there are any kind of rules (or limits) to price the IPO.

*The wealth distribution hypothesis* has its roots in the privatisation programs of the majority of European governments, where the offers underprice tends to attract small investors to the market and creates the conditions for wealth distribution.

Ibbotson and Ritter (1995) explain the “hot issue markets” with *the favourable information hypothesis* where investors buy stocks if previous IPO had notorious rallies.

Finally, we report the hypothesis based on *the changing perception of risk*, which considers the concentration of high risky stocks IPOs within short time periods.

The explanation for the long-term underperformance, observed by Loughran (1993), may be obtained from three different theories found in the literature. The *opportunity windows’ hypothesis* suggested by Ritter (1991) argues that managers are able to determine the best moment to sell the stocks. Usually, they sell overpriced

stocks, which correct its price in the long term. However, Jung, Kim e Stulz (1996) did not support this hypothesis.

Shiller (1990) presents another suggestion, known as *the impresario hypothesis*. He supports the idea of financial firms creating an initial and apparent demand surplus. In the long term the market would correct the price. Issuers have no second chance because financial firms, which do not underprice, would be out of business.

*The divergence of opinion hypothesis*, presented in Miller (1977) is based on the assumption of the existence of two clusters of investor's opinion: the optimistic and the pessimistic on the IPOs future performance. The formers are notorious prone buyers in the IPO but, as time goes by, opinions tend to converge implying a long-term price underperformance.

Apart these pricing phenomena Megginson, Nash and Van Randenborgh (1994) observed a significant increase on firms' operational and financial performance as a result of privatisation programs.

As a result of the literature, when observing the result of an IPOs wave process in a small economy of an emerging market, where a significant number of firms changed its ownership structure, passing from a state owned to a private status, we have no expectations for a different behaviour. Therefore, we expect to observe the short term initial abnormal return effect as well as the long run underperformance. Moreover, we are expecting to find privatised firms with a better market performance as a result of a significant change in the ownership structure with consequences on the setting and reaching better economic and financial results.

### **III – Data and Methodology**

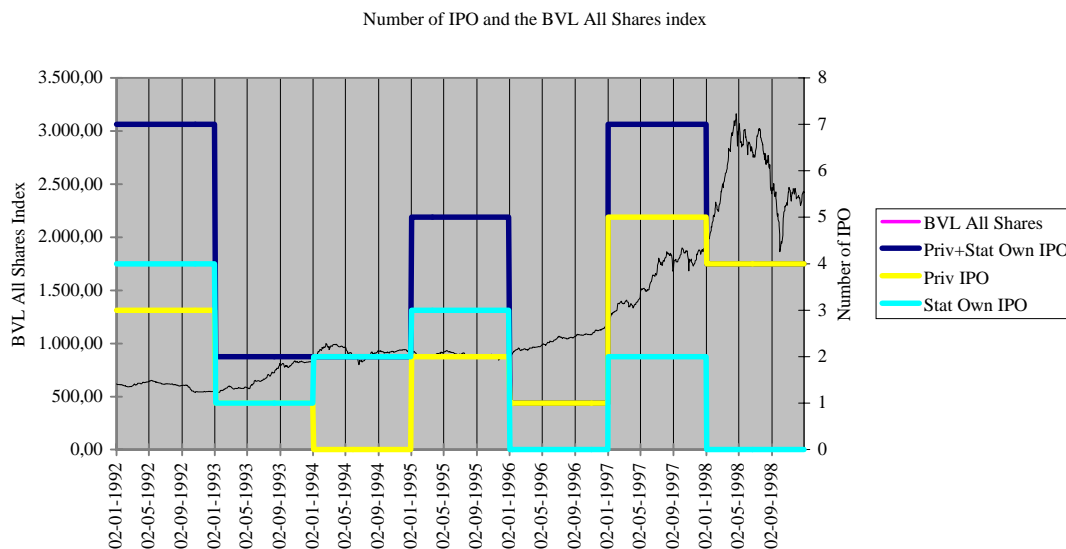
We analyse all the initial public offerings followed by listing, occurred in the main market (Mercado de Cotações Oficiais) of the Lisbon Stock Exchange (Bolsa de Valores de Lisboa – BVL), from 1992 to 1998. In order to be listed, the exchange requires a firm to have, at least, two years of business activity and three years of published accounts. Additionally, the issuer must have a sound economic and financial situation, an estimated minimum market capitalisation of EUR 2,5 million representing 500.000

shares and a 25% free float. This enables small companies, in European terms, to be offered and quoted in the Lisbon Stock Exchange.

The issuer establishes the offering price in the prospectus, which is approved by the securities regulator (CMVM – Portuguese Securities Market Commission). This offering price can be revised (lowered) once under the issuer will, but for an amount no less than 5%. Because the issuer can not increase the offering price, it sells a call option with a strike price equal to the offering price. Welch (1992) observes that this rule is also common to the US market to prevent issuers of a failed IPO to raise the price. In 1995, the Portuguese issuers started initial public offerings based on the book-building system and a price interval to establish the offering price. These changes increased the flexibility to fix the IPO price. Benveniste and Wilhelm (1997) define the book-building system as the process to gather information from institutional investors to fix the offering price, quantity and buyers for the IPO. Under the Portuguese law, the issuer can stop the IPO if there is a proper clause previously set in the prospectus.

Figure 1 shows the BVL All Shares (BVL - Geral) index evolution and the number of IPOs in the main market per year:

Figure 1 -



The IPO activity has not been constant along time, showing some signs of being correlated with price movements. Table 1 shows the correlation coefficient between the BVL All Shares index return and changes in the number of IPOs per year. It is

noticeable that the IPOs activity tended to be more aggressive in bull markets. Both private companies and state owned companies follow this general rule. However, recently, as the number of companies already privatised increased, the state owned IPOs tends to decrease.

Moreover figure 1 also shows signs of some waving IPO activity, as spotted by Ritter (1991).

Table 1 – Correlation coefficient between the BVL All Shares index return and the variation in the number of IPOs per year.

IPO	Priv+State Own	Priv	State Own
$\rho_{v/t}$	0.41	0.65	0.65
$\rho_{v/(t-1)}$	0.14	0.24	0.13

Notes: [1]  $\rho_{v/t}$  = correlation coefficient between the variation in the number of IPOs in year (t) and the BVL All Shares index return in year (t).  $\rho_{v/(t-1)}$  = correlation coefficient between the variation in the number of IPOs in year (t) and the BVL All Shares index return in year (t-1); [2] Priv+State Own = sample of private plus state owned IPOs, Priv = sample of private IPO and State Own = sample of State Owned IPOs;

There were 28 IPOs in the main market of the Lisbon Stock Exchange (16 placed by private companies and 12 placed by state owned companies) between 1992 and 1998, with a total value higher than EUR 5.103 million. Following the IPO, all these companies were listed. Sixteen of these IPOs were offered at a fixed price, seven as tender offer and five as a direct placement. Twelve IPOs used the book-building system. Additionally, there were 12 other IPOs that were subsequently listed on the other markets of the Lisbon Stock Exchange (Second Market and Market Without Quotations). But, as most of them were very illiquid in the after-market, we did not consider them.

In order to avoid other important effects on the companies selected for sampling, we dropped the IPOs that were followed by a seasoned equity offering within a one-year time period after the IPO event<sup>3</sup>. Whenever a tender offering or an exclusion from the market occurred, we kept the IPO in the sample but subsequent price observations after

<sup>3</sup> As the average number of trading days per year in the Lisbon Stock Exchange between 1992 and 1998 was 247 we assumed a time window of that range around the IPO as a measure of one-year time.

these events were dropped. Hence, we did not collect prices after the previous day of one of these event announcements (market exclusion or a subsequent tender offer) to be considered in the time window. Although other methods could be used to treat these phenomena we think this is a more realistic assumption for investors holding IPOs portfolios, as suggested by Loughran and Ritter (1995). Kothari and Warner (1997), for instance, filled the remaining return series after the tender offers with the return earned until the exclusion and Barber and Lyon (1997) filled them with the return of a reference portfolio.

All stocks considered in the sample have a known offering price and were listed (with a known first-day closing price) immediately after the IPO. Then, we were able to build three different samples: a total sample with 21 observations representing an approximated value of EUR 5.069 million, a sample with 11 IPOs placed by state owned companies representing 86% of that value, and a sample of 10 IPOs placed by private companies. Table 2 shows the characteristics of each IPO:

Table 2 – IPOs in Portugal between 1992 and 1998 (Euros)

DATE		ISSUER	OWNERSHIP CATEGORY	NUMBER OF SHARES IN IPO	IPO TOTAL VALUE	IPO AVERAGE		IPO		LISTED SHARES	1° CLOSING PRICE	ISSUER MARKET VALUE	IPO MARKET VALUE	OBSERV
IPO	LISTING					PRICE	=> REFERENCE	PRICE	PRICE					
(a) IPO included in the sample														
25-06-1991	13-10-1992	BON	STATE	3.600.000	93.951.961	26,10	25,09	INVESTORS	3.600.000		4,99	17.956.724	17.956.724	Tender offer.
12-08-1991	31-01-1992	ESP	PRIVATE	1.479.700	14.761.425	9,98	9,98	INVESTORS	12.000.000		9,48	113.725.921	14.023.354	Fixed price.
14-04-1992	30-06-1992	MCF	STATE	10.000.000	166.800.606	16,68	16,22	INVESTORS	10.000.000		15,96	159.615.327	159.615.327	Tender offer.
17-11-1992	30-12-1992	IMP	STATE	7.000.000	127.254.247	18,18	18,29	INVESTORS	7.000.000		19,95	139.663.411	139.663.411	Tender offer. Exclusion = 112D (SEO).
02-12-1992	30-12-1992	CPP	STATE	25.000.000	203.629.538	8,15	8,46	INVESTORS	25.000.000		8,48	211.989.106	211.989.106	Tender offer.
03-02-1993	20-04-1993	MEL	STATE	18.333.332	121.803.464	6,64	6,86	INVESTORS	18.333.332		5,04	92.360.737	92.360.737	Tender offer.
04-07-1994	08-07-1994	CPR	STATE	14.000.000	197.574.007	14,11	14,47	INVESTORS	14.000.000		13,47	188.545.605	188.545.605	Tender offer.
27-12-1994	02-01-1995	BFE	STATE	15.603.100	96.807.983	6,20	6,48	INVESTORS	15.603.100		6,84	106.779.926	106.779.926	Tender offer.
01-06-1995	02-06-1995	PTC	STATE	51.800.000	711.410.500	13,73	13,97	INVESTORS	51.800.000		14,47	749.294.201	749.294.201	Fixed price.
27-06-1995	28-06-1995	PTI	STATE	38.520.000	197.098.991	5,12	5,19	INVESTORS	34.800.000		5,28	183.822.987	203.473.030	Fixed price.
26-07-1995	27-07-1995	SEM	PRIVATE	7.000.000	43.644.816	6,23	6,23	INVESTORS	23.666.489		6,53	154.524.766	45.704.851	Fixed price.
09-12-1996	10-12-1996	TLE	PRIVATE	7.645.000	303.158.139	39,65	39,65	INVESTORS	21.500.000		47,39	1.018.794.705	362.264.443	Fixed price.
24-03-1997	25-03-1997	COP	PRIVATE	3.396.127	35.573.603	10,47	10,47	INVESTORS	11.597.731		11,32	131.317.771	38.453.369	Fixed price.
16-06-1997	17-06-1997	EDP	STATE	177.572.200	1.952.681.537	11,00	11,22	INVESTORS	177.572.200		15,46	2.744.866.112	2.744.866.112	Fixed price.
21-11-1997	27-11-1997	IBS	PRIVATE	998.000	19.912.012	19,95	19,95	INVESTORS	2.000.000		27,93	55.865.364	27.876.817	Fixed price.
24-11-1997	25-11-1997	BRI	STATE	20.569.225	489.815.564	23,81	24,19	INVESTORS	20.569.225		26,54	545.928.543	545.928.543	Fixed price. Exclusion = 243D (SEO).
02-12-1997	05-12-1997	SOA	PRIVATE	8.482.056	84.616.634	9,98	9,98	INVESTORS	37.500.000		11,72	439.565.647	99.424.545	Fixed price.
17-02-1998	20-02-1998	CFN	PRIVATE	1.000.000	12.469.947	12,47	12,47	INVESTORS	3.000.000		25,94	77.812.472	25.937.491	Fixed price. Exclusion = 10D (SEO).
22-06-1998	23-06-1998	FNB	PRIVATE	3.000.000	35.913.449	11,97	11,97	INVESTORS	14.200.000		12,97	184.156.184	38.906.236	Fixed price. Exclusion = 139D (1999).
13-07-1998	16-07-1998	SVA	PRIVATE	6.600.000	85.593.719	12,97	12,97	INVESTORS	30.000.000		14,56	436.797.318	96.095.410	Fixed price. Exclusion = 122D (1999).
09-10-1998	23-10-1998	TDU	PRIVATE	5.400.000	74.340.839	13,77	13,77	INVESTORS	35.000.000		14,02	490.567.732	75.687.593	Direct placement. Exclusion = 52D (1999).
(b) IPO excluded from the sample														
28-03-1995	22-06-1995	BSM	STATE	6.100.000	33.769.176	5,54	5,69	INVESTORS	6.100.000		5,99	36.512.006	36.512.006	Fixed price. No trade available.
13-03-1992	25-03-1992	BNF	PRIVATE	N/A	N/A	N/A	N/A	N/A	17.500.000		8,48	148.392.374	N/A	Direct placement.
N/A	01-04-1992	SAP	PRIVATE	N/A	N/A	N/A	N/A	N/A	7.089.365		8,48	60.114.726	N/A	Direct placement.
N/A	12-05-1993	IFT	PRIVATE	N/A	N/A	N/A	N/A	N/A	1.000.000		6,48	6.484.373	N/A	Direct placement.
N/A	31-03-1995	EGL	PRIVATE	N/A	N/A	N/A	N/A	N/A	4.274.000		11,27	48.180.086	N/A	Fixed price. Merger.
N/A	02-03-1997	INP	PRIVATE	N/A	N/A	N/A	N/A	N/A	19.500.000		6,53	127.417.923	N/A	Fixed price. Asset split.
24-09-1997	06-10-1997	CBI	PRIVATE	N/A	N/A	N/A	N/A	N/A	6.000.000		10,70	64.195.289	N/A	Direct placement.

Notes: [1] Exclusion = exclusion after  $x$  trading days (*reason to be excluded*); D = trading days; SEO = seasoned equity offering; 1999 = the price series end in the first day of 1999; N/A = data not available; [2] BON = Bonança; ESP = Espart; MCF = Mundial Confiança; IMP = Império; CPP = Crédito Predial Português; MEL = Banco Mello (UBP); CPR = Cimpor; BFE = Banco Fomento Exterior; PTC = Portugal Telecom; PTI = Portucel Industrial; SEM = Semapa; TLE = Telecel; COP = Colep; EDP = Electricidade de Portugal; IBS = Ibersol; BRI = Brisa; SOA = Sonae Imobiliária; CFN = Cofina; FNB = Finibanco; SVA = Siva; TDU = Teixeira Duarte; BSM = Banco Pinto & Sotto Mayor; BNF = Banif; SAP = Sapec; IFT = International Factors; EGL = Engil SGPS; INP = Inparsa; CBI = Central Banco de Investimento.

Stock prices were retrieved from the Lisbon Stock Exchange data system and represent daily closing prices. Each price series was corrected for the most relevant events (stock splits, equity issues and dividends). In the case of dividends the drop observed in stock prices were assumed to be in full by the gross dividend paid. Daily instantaneous stock returns were then computed according to  $r_{it} = \ln(P_{i,t}/P_{i,t-1})$ , where  $P_{i,t}$  represents the adjusted closing price of stock  $i$  on day  $t$ . For the first trading day, ordinary investors would get an instantaneous rate of return of  $r_{i1} = \ln(P_{i,1}/P_{i,0})$  where  $P_{i,0}$  represents the offering price of the IPO.

We computed the cumulative abnormal returns (CAR) in comparison to the market according to equation 1.

$$CAR_{p,u} = \sum_{t=p}^u \left[ \sum_{i=1}^n x_i * (r_{it} - r_{mt}) \right] \quad \text{Eq. 1}$$

where  $CAR_{p,u}$  represents the portfolio cumulative abnormal return between day  $p$  and day  $u$  and  $u > p$ ,  $r_{mt}$  represents the market ( $m$ ) return on day  $t$  measured by log relative BVL All Shares index and  $x_i$  represents the stock  $i$  weighting factor. In order to account for a possible size effect in IPO long run underperformance, detected by both Brav and Gompers (1997) and Fama (1998), we used two different methodologies to calculate the portfolio CARs: the equally-weighted methodology where  $x_1 = x_2 = \dots = x_i = 1/n$  and value-weighted methodology. The value-weight for a specific stock is

$$x_i = \frac{N_i P_{i,1}}{\sum_{j=1}^n N_j P_{j,1}} \quad \text{Eq. 2}$$

Where  $N_i$  represents the number of stocks listed and  $P_{i,1}$  the first closing price of stock  $i$  after the IPO.

Choosing the BVL All Shares index to compute the abnormal return, we face three problems. First, the index is a value-weighted index, which creates a mismatch when computing the equally-weighted CAR ( $CAR_{eqw}$ ). Second, following the IPO, the new listed stock is one of the index components. And third, we assume  $\beta_i = 1$  when Ibbotson (1975) and Ritter (1991) showed that IPO issuers have a systematic risk higher than 1. This means that the sample tend to overvalue abnormal returns.

Although Barber and Lyon (1997) conclude that abnormal returns measured against other non-offering issuers with similar market value and book-to-market ratio show good results, we could not adopt this method because of scarcity of issuers. In Lisbon Stock Exchange, on average, 28% of the issuers do some sort of public offer each year. Using that method, and a protective time window for keeping data apart from other effects, it would dry up the total sample. Sector indices could also not be used as Brav and Gompers (1997) proposed, since in some cases the sectors are the result of the new public offers under scope<sup>4</sup>.

We also used one other method to estimate abnormal returns called *wealth relative* ( $WR$ ) as suggested by Ritter (1991):

$$WR_{p,u} = \frac{1 + R_{i,u}}{1 + R_{m,u}} = \frac{1 + \sum_{i=1}^n x_i * \left[ \prod_{t=p}^u (1 + r_{i,t}) - 1 \right]}{1 + \sum_{i=1}^n x_i * \left[ \prod_{t=p}^u (1 + r_{m,t}) - 1 \right]} \quad \text{Eq. 3}$$

If  $WR > 1$  the return from investing in an IPO portfolio is higher than investing in the market portfolio, if  $WR < 1$  means the opposite and if  $WR = 1$  it would be indifferent in which portfolio to invest.

The aim of the study is to answer to three different questions. First, whether we could observe the short-term abnormal return anomaly and the long-term underperformance. Second, if these anomalies exist in the Portuguese market, whether they are distinct when ownership categories (private versus state owned) are compared. And third, if these categories show different patterns of price behaviour: whether private placements show a significantly different under / overpricing phenomena than

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<sup>4</sup> This is the case of telecommunications, energy and the cement sectors.

placements made by state owned companies. In order to do so, we tested the null hypothesis ( $H_0$ ) of the cumulative abnormal returns (CAR) of Portuguese IPOs as well as wealth relative (WR) being rejected for the total sample, the state owned companies sample, and the private companies sample. This is:

$$H_0: \mu = 0$$

$$H_a: \mu \neq 0$$

A t-test was used to accept / reject the null hypothesis, assuming independent and normally distributed abnormal returns.

## IV – Empirical Results

We started by computing the issue market value for each portfolio (sample). In order to do so we used the closing prices after the stock being listed. The average value of the state owned IPOs is bigger than the average value of the private IPOs and the total value is almost the double. But the difference between private and state owned IPO is not straight when we compare the median and minimum amounts for each one in Table 3. This is a result of including few, very large state owned firms (usually utilities) in the state owned IPO sample.

Table 3 – Market value of the issues in each sample computed with close price of the first trading day after the IPO.

Market value (EUR million)	Private plus state owned IPOs (21 issues)	Private IPOs (10 issues)	State owned IPOs (11 issues)
Median	184	169	184
Mean	393	310	467
Maximum	2.745	1.019	2.745
Minimum	18	54	18
Total	8.244	3.103	5.141

Note: Private plus state owned market values on the first trading day after the IPO are from Almeida (1999).

Usually, neither daily returns nor abnormal daily returns after the IPOs follow normal distributions. They show high values for skewness and kurtosis. Table 4 documents the characteristics of the daily returns and the daily abnormal returns determined for equally (eqw) and value-weighted (vw) portfolios for each sample. Brown and Warner (1985) in their study overcame this difficulty by using 250 samples, each one with 50 stocks, but our small sample did not allow such a procedure in this study.

Table 4 – Descriptive statistics of (a) daily returns of each sample and (b) daily abnormal returns of each sample.

IPO	Period: 247 trading days				
	Mean	Md.	Sd.	Skew.	Kurt.
(a) Daily returns of each sample					
Priv+State Own (eqw)	0.08%	0.09%	1.08%	2.48	48.16
Priv (eqw)	0.16%	0.09%	1.46%	6.19	70.72
Sate Own (eqw)	0.01%	0.06%	1.37%	-2.57	65.14
Priv+State Own (vw)	0.19%	0.07%	1.32%	7.99	98.57
Priv (vw)	0.19%	0.09%	1.59%	2.73	20.12
Sate Own (vw)	0.19%	0.01%	1.53%	7.30	85.96
(b) Daily abnormal returns of each sample					
Priv+State Own (eqw)	-0.01%	-0.05%	1.08%	3.18	56.91
Priv (eqw)	0.08%	0.00%	1.31%	7.18	85.80
Sate Own (eqw)	-0.08%	-0.06%	1.40%	-2.17	62.60
Priv+State Own (vw)	0.04%	-0.02%	1.16%	10.20	137.44
Priv (vw)	0.07%	-0.01%	1.33%	2.35	17.75
Sate Own (vw)	0.03%	-0.12%	1.39%	10.03	133.25

Notes: [1] Priv+State Own = sample of private plus state owned IPOs, Priv = sample of private IPOs and Sate Own = sample of public IPO; [2] Private plus state owned IPOs (Priv+State Own) figures are from Almeida (1999); [3] eqw = equally-weighted, vw = value-weighted; [4] Md. = median, Sd. = standard deviation, Skew. = Skewness and Kurt. = Kurtosis; [5] Normal distribution has a skewness = 0 and a kurtosis = 3.

While daily returns show a positive mean and median, we did not find similar results for daily abnormal returns. However, we found state owned IPOs to show a poorer daily performance than private IPOs, either in terms of average returns either on

average abnormal returns. Furthermore, although state owned IPOs show a lower daily performance they also present higher abnormal returns' standard deviation. In addition, both returns are far from being normally distributed. In spite of this, care must be taken when interpreting statistical results.

The initial returns (observed between the subscription price and the first closing price after the listing) are positive whichever the weighting method (Table 5). But the weighting method makes a difference. Large state owned IPOs show higher returns than small state owned IPOs. However, we have the opposite situation for the private IPO sample.

Table 5 – Initial returns.

IPO <sub>0,1</sub>	Initial returns	
	eqw	vw
Priv+Sate Own	10.55%	16.68%
Priv	16.95%	13.33%
State Own	4.74%	18.70%

Notes: [1] Priv+Sate Own = sample of private plus state owned IPOs, Priv = sample of private IPOs and State Own = sample of state owned IPOs; [2] Private plus state owned IPOs (Priv+Sate Own) figures are from Almeida (1999); [3] eqw = equally-weighted portfolio, vw = value-weighted portfolio.

Our sample with equally-weighted private plus state owned IPOs show smaller initial returns than those reported by Alpalhão (1988) for the Portuguese market. It is the 7<sup>th</sup> smaller initial return out of 25 countries reported by Loughran, Ritter and Rydqvist (1994), when ranked among their sample.

The cumulative returns on the 247<sup>th</sup> trading day, after having bought the stock in the IPO, are shown in Table 6. We found the same pattern as in the initial returns, but the value-weighted method in the private IPOs reaches a higher return than the equally-weighted method. Once again, the value-weighted methodology presents a positive difference after 247 trading days.

Table 6 – Cumulative returns on the 247<sup>th</sup> trading day.

IPO <sub>0,247</sub>	Cumulative returns	
	eqw	vw
Priv+Sate Own	20.48%	47.11%
Priv	40.30%	45.78%
State Own	3.28%	46.29%

Notes: [1] Priv+Sate Own = sample of private plus state owned IPOs, Priv = sample of private IPOs and State Own = sample of state owned IPOs; [2] Private plus state owned IPOs (Priv+Sate Own) figures are from Almeida (1999); [3] eqw = equally-weighted, vw = value-weighted.

Figure 2 and 3 document the path of the cumulative returns per sample and weighting methodology until the 247<sup>th</sup> trading day after the IPO.

Figure 2 -

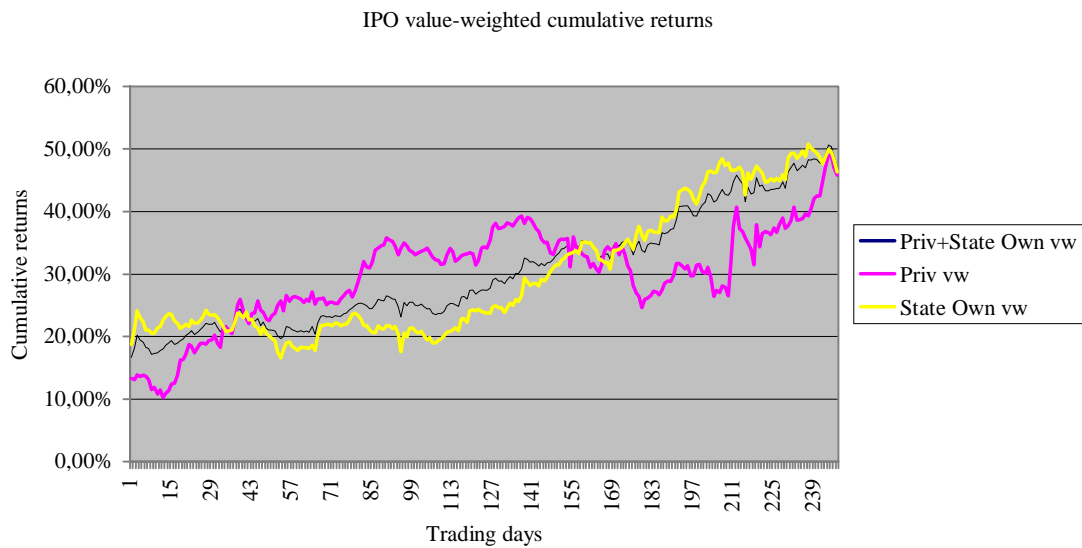
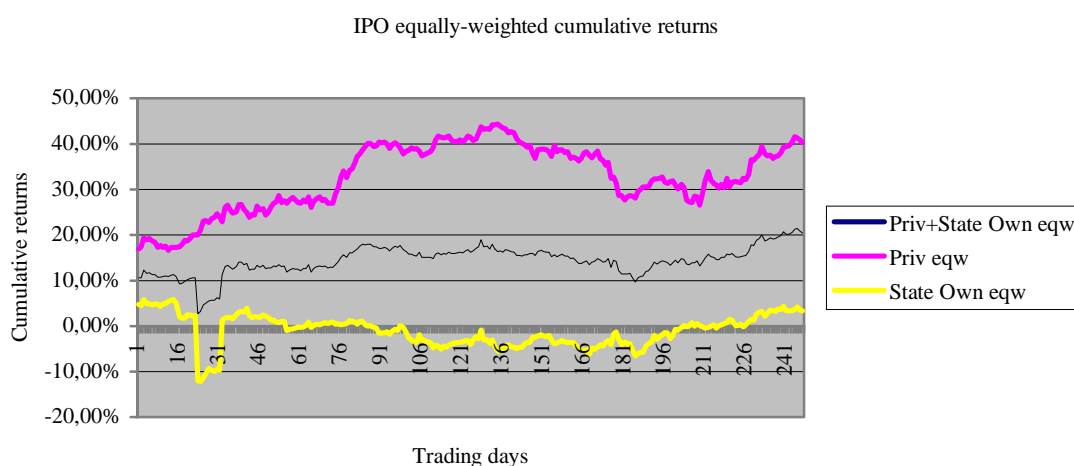


Figure 3 -



Notes: [1] Priv+Sate Own = sample of private plus state owned IPOs, Priv = sample of private IPOs and State Own = sample of state owned IPOs; [2] Private plus state owned IPOs (Priv+Sate Own) figures are from Almeida (1999); [3] eqw = equally-weighted, vw = value-weighted.

As observed in figures 2 and 3, the weighting method seems to interfere on the results. When using the equally-weighted methodology, the cumulative returns of the state owned IPOs are lower than the private IPOs, whichever the time period in observation. When using the value-weighted method the private IPOs dominance is less obvious and depends on the time period under consideration. Until the 43<sup>th</sup> and after the 154<sup>th</sup> trading days, the stated owned IPOs have higher returns. Between them, it is the private IPOs which performs better. In this case, we can not reject the null hypothesis that the mean difference between stated owned and private IPOs equals zero ( $t$ -statistic = 0.0032).

As described earlier in the paper, we used cumulative abnormal returns (CAR) and the wealth relatives (WR) with two methodologies. We started by assuming that portfolios were composed with stocks bought at the IPO subscription price (with time period represented by [0; 247]). Then, in a second version, we assumed that stock portfolios were composed with stocks bought at the first trading day closing price after the IPO (time period represented by [1; 247]). After studying the CAR and WR in the 247<sup>th</sup> trading, we looked to the initial day abnormal return anomaly.

When studying the IPO abnormal returns at the end of 247 trading days, results are dependent on the sample and method under consideration. When observing the entire sample, investors buying stocks in the IPO, would obtain positive abnormal returns if a

value-weighted portfolio was composed, but negative abnormal returns if they have chosen an equally-weighted portfolio. However, when buying stocks on the first day the results have been negative whatever the method under consideration.

When comparing the results of private and state owned IPOs, we found that whatever the method, it has been more profitable, in average, to invest on portfolios composed by private company IPOs than by state owned company IPOs. This seems to contradict our expectations since we were expecting state owned IPOs to perform better than companies placed in IPOs by private firms. However, as standard deviations observed in all samples are high, and sample sizes are small, the cumulated abnormal returns (CAR) and the *wealth relatives* (WR) are not statistically strong to reject the null hypothesis of the mean equal to zero<sup>5</sup>.

Table 7 – Cumulative abnormal returns (CAR) and weighted relatives (WR) when investors buy the stocks: (a) at the IPO price ([0;247]) or (b) at the closing price of the first trading day after the IPO ([1;247]). Stocks are assumed to belong to the portfolio until the 247<sup>th</sup> trading day after the IPO.

IPO	CAR vw	CAR eqw	WR vw	WR eqw
(a) investors buy the stock in the IPO [0;247]				
Priv+State Own	10.87% (1.34)	-2.80% (-0.18)	110.78% (1.80)	97.04% (-0.19)
Priv	17.42% (1.41)	19.46% (1.17)	116.36% (1.49)	126.68% (1.21)
State Own	7.98% (0.80)	-20.50% (-0.83)	107.80% (1.14)	71.07% (-1.56)
(b) investors buy the stocks in the first trading day after the IPO [1;247]				
Priv+State Own	-4.83% (-0.70)	-13.75% (-0.91)	94.16% (-1.17)	83.73% (-1.24)
Priv	6.67% (0.62)	3.56% (0.26)	103.36% (0.45)	106.21% (0.41)
State Own	-10.71% (-1.33)	-26.96% (-1.11)	89.36% (-1.69)	64.62% (-1.84)

Notes: [1] Priv+State Own = sample of private plus state owned IPO, Priv = sample of private IPO and State Own = sample of state owned IPO; [2] Private plus state owned IPO (Priv+State Own) figures are from Almeida (1999); [3] eqw = equally-weighted, vw = value-weighted; [4] *t*-statistic in parentheses (.). In the *wealth relatives* (WR) method the *t*-statistic is computed by the difference between the return of the stock (*i*) and its expected return (see above [eq.4]).

Brav and Gompers (1997) and Fama (1998) support that long-term underperformance of IPOs is a size effect, observed for small market value issues. Our results of the private plus state owned IPOs and the state owned IPOs samples seem to

support those authors. The equally-weighted samples show worst results than the value-weighted samples (except for the private IPO samples). For a 5% significance level we reject the null hypothesis that the value-weighted samples mean are lower than the equally-weighted samples (except for the private IPO samples).

Tables 8 – Hypothesis test for private IPO mean returns being lower than the state owned IPO mean returns. Portfolios are assumed to be composed with stocks bought at the IPO price ([0;247]) or at the closing price of the first trading day after the IPO ([1;247]). Stocks are assumed to belong to the portfolio until the 247<sup>th</sup> trading day after the IPO.

<i>t</i> -statistic	Samples		
	Priv+State Own	Priv	State Own
(a) IPO [0;247]			
CAR	22.66	-25.23	36.96
WR	28.42	-34.24	47.89
(b) IPO [1;247]			
CAR	10.11	-10.17	17.10
WR	20.11	-18.60	31.63

Note: eqw = equally-weighted, vw = value-weighted.

We also reject the hypothesis of the private IPO mean being lower than the state owned IPO mean whichever the buying date (IPO [0;247] or IPO [1;247]).

Tables 9 – Hypothesis test for private IPO mean returns being lower than the state owned IPO mean returns. Portfolios are assumed to be composed with stocks bought at the IPO price ([0;247]) or at the closing price of the first trading day after the IPO ([1;247]). Stocks are assumed to belong to the portfolio until the 247<sup>th</sup> trading day after the IPO.

<i>t</i> -statistic	Weighting methodology	
	eqw	vw
(a) IPO [0;247]		
CAR	54.09	2.08
WR	71.01	8.00
(b) IPO [1;247]		
CAR	38.45	23.33
WR	54.73	25.54

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<sup>5</sup> We tested each sample with the non-parametric rank statistic, as Corrado (1989) and Campbell and Wasley (1993) did. We still do not reject the null hypothesis.

Note: eqw = equally-weighted, vw = value-weighted.

Aggarwal, Leal and Hernandez (1993) showed that in Chile, the state owned IPOs underperformed the market over one year no matter the methodology used (CAR or WR and buying the stocks indifferently from the IPO or the first trading day). This state owned IPO sample presented poorer results than the mixed sample of private plus state owned IPO. This behaviour is consistent with what we found for the Portuguese market.

From Table 9, we conclude that it makes a difference the way investors weight the investment portfolio and the day in which they buy the stocks. Buying the stocks in the first trading day after the IPO perform worst than buying the stocks in the IPO.

Table 10 shows that the first trading day has positive abnormal returns significant at the 5% level, assuming normality and independence.

Table 10 – Abnormal returns ( $CAR_{1,1}$ ) and *wealth relatives* ( $WR_{1,1}$ ) on the first trading day after the IPO ([0;1]).

IPO	$CAR_{0,1}$ vw	$CAR_{0,1}$ eqw	$WR_{0,1}$ vw	$WR_{0,1}$ eqw
Priv+State Own	15.70%* (36.78)	10.95%* (12.86)	115.55%* (4.70)	111.00%* (2.79)
Priv	10.75%* (17.52)	15.90%* (19.50)	110.48%* (2.28)	115.73% (2.21)
State Own	18.69%* (34.54)	6.46%* (4.55)	118.68%* (4.20)	106.57% (1.83)

Notes: [1] Priv+State Own = sample of private plus state owned IPO, Priv = sample of private IPO and State Own = sample of state owned IPO; [2] Private plus state owned IPO (Priv+State Own) figures are from Almeida (1999); [3] eqw = equally-weighted, vw = value-weighted; [4] *t*-statistic in parentheses (·). In the *wealth relatives* (WR) method the *t*-statistic is computed by the difference between the return of the stock (*i*) and its expected return (see above [eq.4]); [5] \* significant at the 5% level, assuming normality and independence.

In contrast, the state owned IPOs present a first day return above the private IPOs. This seems to provide us information about the way Government and private managers fix the offering price. The state owned offerings present higher initial abnormal returns and lower one-year abnormal returns than the private offerings. And, the initial abnormal returns are a key element to the performance result of investing in IPOs. The value-weighted methodology outperforms the equally-weighted methodology, except the case of private IPOs. The initial returns behaviour is equivalent to that observed by Ibbotson (1975) and many other authors. It seems that investors could take advantage

from this market inefficiency flipping the stocks in the first trading day. Interestingly, the state owned IPOs initial results with the equally-weighted methodology are similar to the ones presented by Aggarwal, Leal and Hernandez (1993) (CAR = 7.6% and WR = 108%).

The analysis of the CAR and WR series between the IPO and the 247<sup>th</sup> trading day shows that the value-weighted methodology is always positive during this time period. This does not happen with the equally-weighted methodology due to small state owned IPOs underperformance. Whatever the market value of state owned IPOs, the initial performance dilutes with time. The rejection rate of the null hypothesis locates in the first half of the series and the statistical results of the private IPO sample are stronger than the state owned offerings.

Table 11 – Descriptive statistics of the cumulative abnormal returns (CAR) and wealth relatives (WR) of the IPO between the offering and the 247<sup>th</sup> trading day (t = 0;...;247) – maximum, minimum, relevant trading day, frequency of rejection of the null hypothesis and number of trading days higher than zero.

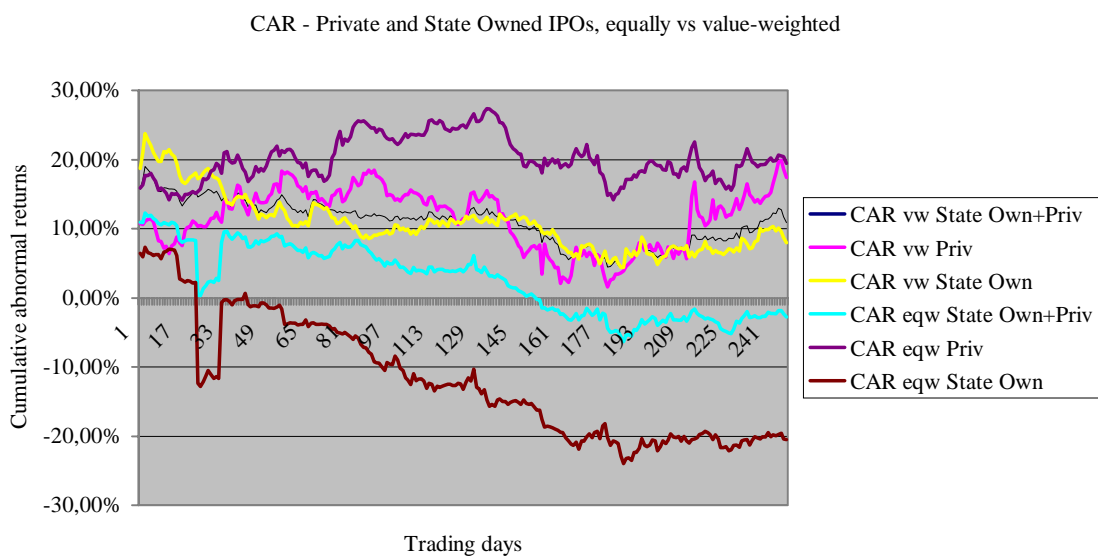
IPO		CAR <sub>0,247</sub> vw	CAR <sub>0,247</sub> eqw	WR <sub>0,247</sub> vw	WR <sub>0,247</sub> eqw
Priv + State Own	Maximum [trading day]	18.96% [3]	12.22% [3]	119.94% [3]	113.24% [3]
	Minimum [trading day]	4.35% [184]	-6.37% [185]	104.92% [187]	94.52% [226]
	Rejects $H_0$ [CAR or WR >0]	130 [247]	20 [151]	86 [247]	6 [151]
Priv	Maximum [trading day]	19.93% [245]	27.38% [133]	121.61% [55]	138.53% [116]
	Minimum [trading day]	1.54% [179]	14.10% [17]	104.80% [179]	115.73% [1]
	Rejects $H_0$ [CAR or WR >0]	90 [247]	110 [247]	1 [247]	0 [247]
State Own	Maximum [trading day]	23.74% [3]	7.27% [3]	125.35% [3]	107.59% [3]
	Minimum [trading day]	4.36% [184]	-23.99% [185]	104.38% [176]	69.17% [233]
	Rejects $H_0$ [CAR or WR >0]	77 [247]	4 [23]	33 [247]	0 [22]

Notes: [1] Priv+State Own = sample of private plus state owned IPO, Priv = sample of private IPO and State Own = sample of public IPO; [2] Private plus public IPO (Priv+State Own) figures are from Almeida (1999); [3] eqw = equally-weighted, vw = value-weighted; [4] the indices in each

method represents the period of analysis; [5] the  $t$ -statistic is in parentheses ( $\cdot$ ). In the *wealth relatives* (WR) method the  $t$ -statistic is computed by the difference between the return of the stock ( $i$ ) and its expected return; [6] rejects  $H_0 =$  number of trading days in which the null hypothesis is rejected from being equal to zero. The statistical test is continuously repeated all over the trading days  $t=0,2,3,\dots,247$ ; [7] [CAR or WR  $>0$ ] = number of trading days in which each method is positive or higher than 100%, correspondingly; [8] [trading day] = sequential number of the first trading day in which the value was registered.

There is another difference between the private and state owned IPOs. While the private IPOs show a higher result in the second half of the period under scope, the state owned IPOs present higher results in the beginning (also associated with the previously reported first day abnormal return). Figure 4 depicts the cumulative abnormal returns (CAR) evolution during 247 trading days.

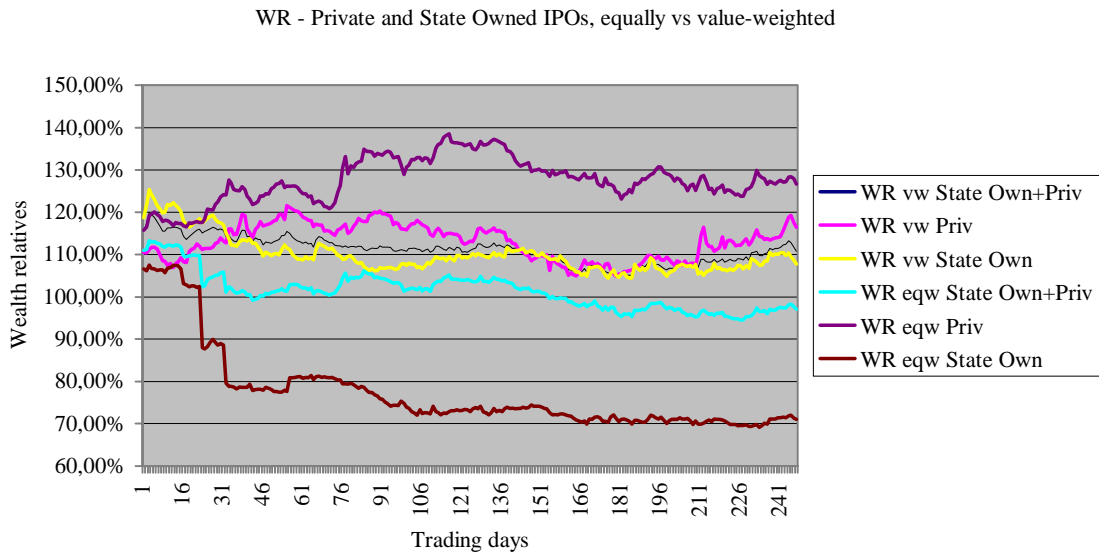
Figure 4 -



Notes: [1] State Own+Priv = sample of private plus state owned IPO, Priv = sample of private IPO and State Own = sample of state owned IPO; [2] eqw = equally-weighted, vw = value-weighted.

Figure 5 shows a similar evolution for the *wealth relative* (WR).

Figure 5 -



Notes: [1] Priv+State Own = sample of private plus state owned IPO, Priv = sample of private IPO and State Own = sample of state owned IPO; [2] eqw = equally-weighted, vw = value-weighted.

If investors bought the stock on the first trading day after the IPO, we observe a similar data pattern as previously. However, in this case, every sample registers a larger number of negative results with less positive results. The rejection rate is non-relevant.

Table 12 – Descriptive statistics of the cumulative abnormal returns (CAR) and *wealth relatives* (WR) of the IPO between the first trading day after the offering and the 247<sup>th</sup> trading day (t = 1;...;247) – maximum, minimum, relevant trading day, frequency of rejection of the null hypothesis and number of trading days higher than zero.

IPOs		CAR <sub>1,247</sub> vw	CAR <sub>1,247</sub> eqw	WR <sub>1,247</sub> vw	WR <sub>1,247</sub> eqw
Priv + State Own	Maximum [trading day]	3.27% [3]	1.26% [3]	103.31% [3]	101.26% [3]
	Minimum [trading day]	-11.35% [184]	-17.32% [185]	89.45% [179]	81.59% [226]
	Rejects $H_0$ [CAR or WR >0]	4 [10]	4 [5]	33 [14]	0 [9]
Priv	Maximum [trading day]	9.18% [245]	11.48% [133]	108.54% [55]	115.39% [116]
	Minimum [trading day]	-9.21% [179]	-1.80% [17]	93.37% [164]	98.86% [17]
	Rejects $H_0$ [CAR or WR >0]	0 [154]	0 [221]	0 [148]	0 [234]

State Own	Maximum [trading day]	5.05% [3]	0.82% [3]	105.12% [3]	100.74% [2]
	Minimum [trading day]	-14.33% [184]	-30.45% [185]	86.40% [212]	62.59% [233]
	Rejects $H_0$ [CAR or WR >0]	12 [15]	9 [7]	44 [16]	0 [6]

Notes: [1] Priv+State Own = sample of private plus state owned IPO, Priv = sample of private IPO and State Own = sample of state owned IPO; [2] Private plus State Owned IPO (Priv+State Own) figures are from Almeida (1999); [3] eqw = equally-weighted, vw = value-weighted; [4] the indices in each method represents the period of analysis; [5] the  $t$ -statistic is in parentheses ( $\cdot$ ). In the *wealth relatives* (WR) method the  $t$ -statistic is computed by the difference between the return of the stock ( $i$ ) and its expected return; [6] rejects  $H_0$  = number of trading days in which the null hypothesis is rejected from being equal to zero. The statistic test is continuously repeated all over the trading days  $t=1,3,\dots,247$ ; [7] [CAR or WR >0] = number of trading days in which each method is positive or higher than 100%; [8] [trading day] = sequential number of the first trading day in which the value was registered.

Alpalhão (1988), from a sample taken between 1986 and 1987, rejects the null hypothesis for the Portuguese IPOs market efficient. His initial abnormal return was 54.4% when using the BTA Index as the benchmark. Imposing the additional criteria of at least 20 quotes out of 30 initial trading days after the IPO, the author found an initial abnormal return of 72.6% and a cumulated abnormal return of 36.2% at the end of 20 quotes. Mello (1994), for a sample taken between 1989 and 1993, found that the Portuguese IPO average annual return was +8.3% against a market average return of – 8.0%.

Our results go a step further than those reported by both authors. We show that the initial abnormal returns are positive and statistically significant, but over one year the abnormal returns depend on the weighting methodology chosen. After one year, we were not able to prove any market inefficiency.

## V – Conclusion

This study aims to answer to three different questions. First, whether we could observe the short-term abnormal return anomaly or the long-term underperformance in IPOs of a small economy. Second, if these anomalies seem to exist whether they are

distinct when ownership categories (private versus state owned) are compared. And third, if these categories show different patterns, whether private placements show a significantly different under / overpricing phenomena than placements made by state owned companies. In order to do so, we selected the Portuguese market testing whether cumulative abnormal returns (CARs) or the wealth relative (WR) of a set of portfolios were statistically and significantly different from zero.

We concluded that there have been significant abnormal returns on the short-term for IPOs in the Portuguese market and they seem to be more pronounced if value-weighted portfolios were composed. These findings seem to support previous studies on the field such as Ibbotson (1975), among others. In addition, state owned IPOs have been more profitable for short-term investments than private IPOs.

In a one-year time period study, we found that abnormal returns obtained from Portuguese IPOs were not statistically different from zero, either for private either for state owned IPOs. However, we found that there are significant signs that private IPOs perform better in a one-year term than state owned IPOs. This seems to confirm the empirical results observed by Aggarwal, Leal and Hernandez (1993) for the Chilean market but seems to reject our pre-expectations about their relative performance based on a research of Megginson, Nash, and Van Randenborgh (1994). According to these authors privatised companies improve significantly their economic and financial performance. Therefore, we would expect privatised firms to perform better than private firms after being listed. We believe that in small economies (like the Portuguese or the Chilean) where privatised firms were basically monopoly utilities, the change in the ownership structure did not affect deeply the firms' environment or its management. On the top of that, these privatised monopolies tend to become regulated by recently created regulatory structures that impose them strong price limits. Therefore the ownership structure did not affect their operational structure so quickly as the market and regulators would prefer. As a consequence markets penalised them.

## **Bibliography**

Aggarwal, R., Leal, R. e Hernandez, L. (1993), The aftermarket performance of initial public offerings in Latin America, *Financial Management*, 22, pp. 42-53.

- Almeida, M. (1999), *A venda de acções em bolsa pelas entidades emitentes portuguesas. Evidência sobre a eficiência do mercado português.*, Master Thesis, Lisboa: UTL - Universidade Técnica de Lisboa, ISEG – Instituto Superior de Economia e Gestão.
- Alpalhão, R. (1988), *Ofertas públicas iniciais: o caso português*, working paper n. 100, Lisboa: UNL – Universidade Nova de Lisboa / Faculdade de Economia.
- Banz, R. (1981), The relationship between return and market value of common stocks, *Journal of Financial Economics*, 9, pp. 3-18.
- Barber, B. e Lyon, J. (1997), Detecting long-horizon abnormal stock returns: the empirical power and specification of test statistics, *Journal of Financial Economics*, 43, pp. 341-372.
- Beatty, R. e Ritter, J. (1986), Investment banking, reputation and the underpricing of initial public offering, *Journal of Financial Economics*, 15, pp. 213-232.
- Benveniste, L. e Spindt, P. (1989), How investment bankers determine the offer price and allocation of new issues, *Journal of Financial Economics*, 24, pp. 343-362.
- Benveniste, L. e Wilhelm, W. (1997), Initial public offerings: going by the book, *Journal of Applied Corporate Finance*, 10, pp. 98-108.
- Brav, A. e Gompers, P. (1997), Myth or reality? The long-run underperformance of initial public offerings: evidence from venture and non-venture capital-backed companies, *Journal of Finance*, 52, pp. 1791-1821.
- Brennan, M. e Franks, J. (1997), Underpricing, ownership and control in initial public offerings of equity securities in the UK, *Journal of Financial Economics*, 45, pp. 391-413.
- Brown, S. e Warner, J. (1985), Using daily stock returns. The case of event studies, *Journal of Financial Economics*, 14, pp. 3-31.
- Campbell, C. e Wasley, C. (1993), Measuring security price performance using daily NASDAQ returns, *Journal of Financial Economics*, 33, pp. 73-92.
- Corrado, C. (1989), A nonparametric test for abnormal security-price performance in event studies, *Journal of Financial Economics*, 23, pp. 385-395.
- Drake, P. e Vetsuypens, M. (1993), IPO underpricing and insurance against legal liability, *Financial Management*, 22, pp. 64-73.
- Fama, E. (1998), Market efficiency, long-term returns, and the behavioral finance, *Journal of Financial Economics*, 49, pp. 283-306.

- Fama, E. e French, K. (1992), The cross-section of expected returns, *Journal of Finance*, 47, pp. 427-465.
- Garfinkel, J. (1993), IPO underpricing, insider selling and subsequent equity offerings: is underpricing a signal of quality?, *Financial Management*, 22, pp. 74-83.
- Ibbotson, R. (1975), Price performance of common stock new issues, *Journal of Financial Economics*, 2, pp. 235-272.
- Ibbotson, R. e Jaffe, J. (1975), "Hot issue" market , *Journal of Finance*, 4, pp. 1027-1042.
- Ibbotson, R. e Ritter, J. (1995), Initial public offerings, in Jarrow, R., Maksimovic, V. e Ziemba, W. (eds.), *Handbooks in operation research and management science*, Amsterdam: North-Holland.
- Ibbotson, R., Sindelar, J. e Ritter, J. (1988), Initial public offering, *Journal of Applied Corporate Finance*, 1, pp. 37-45.
- Jegadeesh, N., Weinstein, M. e Welch, I. (1993), An empirical investigation of IPO returns and subsequent equity offerings, *Journal of Financial Economics*, 34, pp. 153-175.
- Jung, K., Kim, Y. e Stulz, R. (1996), Timing, investment opportunities, managerial discretion, and the security issue decision, *Journal of Financial Economics*, 42, pp. 159-185.
- Kothari, S. e Warner, J. (1997), Measuring long-horizon security price performance, *Journal of Financial Economics*, 43, pp. 301-339.
- Loughran, T. (1993), Nyse vs Nasdaq returns: markets microstructure on the poor performance of initial public offerings? , *Journal of Financial Economics*, 33, pp. 241-260.
- Loughran, T. e Ritter, J. (1995), The new issues puzzle, *Journal of Finance*, 50, pp. 23-51.
- Loughran, T., Ritter, J. e Rydquist, K. (1994), Initial public offerings: international insights, *Pacific-Basin Finance Journal*, 2, pp. 165-199.
- Meggison, W., Nash, R. C. and Van Randenborgh, M. (1994), The Financial and Operating Performance of Newly Privatised Firms: Na International Empirical Analysis, *Journal of Finance*, 49, 2, pp. 403-452.
- Mello, S. (1994), *A competitividade do mercado de acções português*, Lisboa: Associação da Bolsa de Valores de Lisboa.

- Miller, E. (1977), Risk, uncertainty and divergence of opinion, *Journal of Finance*, 32, pp. 1151-1168.
- Ritter, J. (1991), The long-run performance of initial public offerings, *Journal of Finance*, 46, pp. 3-27.
- Rock, K. (1986), Why New Issues Are Underpriced, *Journal of Financial Economics*, 15, pp. 187-212.
- Ruud, J. (1993), Underwriter price support and the IPO underpricing puzzle, *Journal of Financial Economics*, 34, pp. 135-151.
- Shiller, R. (1990), Speculative prices and popular models, *Journal of Economics Perspectives*, 4, pp. 55-65.
- Tiniç, S. (1988), Anatomy of initial public offerings of common stock, *Journal of Finance*, 43, pp. 789-822.
- Welch, I. (1992), Sequential sales, learning, and cascades, *Journal of Finance*, 47, pp. 695-732.