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Operating Measures, IPO Valuation and The Aftermarket Performance: *Perspective From Internet Bubble Period*

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In this paper, we empirically investigate European and United states initial public offerings (IPOs) to provide a comparative case on the international evidence on the long-run performance of IPOs. Specifically, the paper examines the relation between initial returns and long-term performance in the IPO market. We also examine whether the choice of a performance measurement methodology directly determines both the size and power of statistical test, as documented in previous studies (Mitchell and Stafford (2000); Loughran and Ritter (2000); and Brav, et al. (2000). We use two samples, the first one consists of 277 IPOs realised between 1997 and 1999 in the Euro.NM and the second one consists of 277 paired IPOs realised during the same period in NASDAQ. We use all long term performance measures and we observe the existence of long term abnormal returns for our two samples. While, the fads or investor' overreactions and divergence of opinions hypotheses do not apply in explaining the aftermarket performance of our IPOs samples.

Keywords: Initial public offerings; Underpricing; Aftermarket performance;

1. Introduction :

Numerous studies has demonstrated that investors purchasing initial public offerings (IPO's) of common stocks earn a large positive abnormal return in the early aftermarket period. However, researchers have documented that the gains from early price appreciation are not sufficient to compensate the losses that occur throughout subsequent price declines. This article focuses on the empirical investigation of long-term performance and survival patterns of IPO's on Euro.NM market during the internet bubble period.

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Most of the previous research in this area has been based on IPOs in U.S. stock market, which focused on NYSE and NASDAQ. These studies used cumulative abnormal returns (CAR) as performance measures of in documenting IPO long-term performance and considered market index and matching firms, based on market capitalisation and market-to-book ration, as benchmarks for evaluating the relative performance. The conclusions about long-term performance of IPOs have differed considerably across studies ranging from a poor performance to a somewhat neutral performance.

Ritter (1991) finds a significant mean market-adjusted return of -29.13% at the end of the third year following the listing for a sample of 1,526 IPO's over the period from 1975 to 1984. Further, Ritter (1991) reports that the underperformance is concentrated among younger firms and firms that went public in the heavy-volume years. Indeed, for more established firms going public, and for those that went public in the light-volume years of the mid and late 1970's, there is no long run underperformance. IPO's that are not associated with venture capital financing, and those not associated with high-quality investment bankers, also tend to do especially poorly. These findings are in conformity with Loughran and Ritter (1995) who, for 4,753 U.S companies in the period from 1970 to 1990, document the underperformance of IPO's relative to seasoned firms with the same market capitalization. Aggarwal and Rivoli (1990) similarly find negative aftermarket performance of -13.73% in the first year following the initial offering for 1,435 IPO's in the period from 1977 to 1987. However, the underperformance of new issues in the aftermarket has not been documented in all studies and the international evidence is varied (Loughran*, et al.* (1994)). These international variations are due, in part, to the differences in regulations, contractual mechanisms, and characteristics of companies going public (Firth (1997)). Further research on the long-term stock return performance of IPO's and in different market settings seems warranted.

This paper aims at (1) documenting European IPO long-term performance with comparing to the U.S. IPOs; (2) investing the sensitivity of performance results to the choice of benchmark as well as the choice of methodology; (3) identifying, if any, the individual IPO characteristics that explain the long-term abnormal return of European or U.S. IPOs. IPO characteristics include size, market capitalisation, first-day underpricing, industry, capital raised, immediate post-issuance volatility, retained capital by the founder and year of issuance. Moreover, the study of the IPOs in the two markets is very interesting, since they differ by the system of corporate governance (outsider system versus insider system).

2. LONG-TERM PERFORMANCE OF IPOS

The purpose of this research is not to explain underperformance in general or witch measurement techniques are appropriate; rather, it aims to understand patterns of performance in IPOs. Despite this, understanding how measurement affects the findings of underperformance is useful in setting up the experiments.

2.1. Empirical Evidence

Three methods have been utilized to measure the long term performance of IPOs. Ritter (1991) and Loughran and Ritter (1995) show that investment in IPOs generates lower returns than investing in the market or investing in firms matched based on industry and market capitalization. Using buy-and-hold abnormal returns (BHARs), they examine the realized returns of investors who purchased each IPO in the sample period at the first day closing price and sold after a three and five year to investors in matching firms.

BHARs suffer from several statistical problems. Because the returns are aggregated at the firm level, they fail to account for the cross-correlation in the returns of IPOs. This is troubling, as I will show that there is a strong cross-sectional co-movement between IPOs that is not explained by the Fama and French (1993) three-factor model. Also, due to the long horizon and compounding, there is an increase in variability of returns. As a result of this, the BHARs have a right skewed distribution, and calculating reliable standard errors requires bootstrapping. Also, matching firms on size alone neglects book-to-market effects which are predictive of future returns, and IPO firms are more likely to be low book-to-market growth firms then size matched firms which are more likely to be small due to financial distress. Because growth firms have lower expected returns in the F&F model, this would drive a negative bias in BHAR returns relative to those firms they are matched with. Finally, Schultz (2003) points out that, if firms are more likely to issue following IPO market increases will cause a negative bias as there is a higher number of issues from before a decline than after it. Brav*, et al.* (2000) use a cumulative abnormal return (CAR) to correct for the statistical unreliability of BHARs due to compounding. Like BHARs, CARs are also aggregated at the firm level, but they use the simple sum of the excess returns from the time following the issue. By giving equal weight to each month following the issue, this controls the variability of longer period returns. Despite their statistical properties, CARs can be an inaccurate reflection of an investor’s realized return. For example, assuming market returns are flat, a 50% loss in one month followed by a 100% return the following month results in a CAR of 25%, despite the fact that the stock is now trading exactly at its initial price. Using the CARs and using value weighted instead of equal weighted averages greatly reduces aggregate underperformance. The CAR also does not correct for the cross-correlation of returns.

In order to evaluate a time series portfolio relative to a factor model, rolling calendar time portfolios can be used. Calendar time average returns (CTARs) are aggregated by the time period instead of the firm level. Jaffe (1974) and Mandelker (1974) were first to use this method of analyzing stock returns to evaluate returns following insider trading and mergers respectively. Brav and Gompers (1997) use calendar time returns to measure long-term returns following IPOs, and find that the underperformance diminishes when this method is used. CTARs are useful in avoiding the statistical issues encountered with BHARs as well as CARs. Because the returns are aggregated at a monthly level, the cross-sectional correlations among issuing firms are accounted for and excess volatility due to long horizon returns is not present. Also, by giving an equal weighted to each month, the Schultz (2003) pseudo market timing bias in BHARs does not affect CTARs. Although CTARs are statistically preferable, they do not have the convenient interpretation of a buy-and-hold strategy return, and they can also yield positive excess returns when stocks are falling concurrently with the market, even if their fall is dramatically larger than that of the board market. Although BHARs do suffer from the statistical troubles seen above, there are two utilizations that are pertinent to the study. The first is as an "investor-experience" return, showing how an investor actual wealth would have been affected by investing in the new issues. A second usage involves the skewed of long term returns which is not observable in the CTARs. Barberis and Huang (2004) point out that if investor have cumulative prospect theory performances defined buy Tversky and Kahneman (1992), they may overweight the small probability of high success and be more willing ton invest in strategies with an average underperformance in the tail of the distribution.

2.2. Theories of Performance

Miller (1977) posits that if there are constraints on short-sellers and heterogeneous expectations of a firm's valuation, the stock will go to those investors with the highest valuation, and as the divergence of opinion decreases and the selling constraints are lifted, the price will fall towards the median valuation. Duffie*, et al.* (2002) implement this into a theoretical model and drive price patterns for issues based on the constraints. As referenced earlier, Barberis and Huang (2004) argue that because investors may have non-expected utility preferences, lower expected returns may be compensated for by a right skewed distribution in long term returns. While these reasons that IPOs may actually underperform the market. Several other explanations may explain the underperformance seen in some works. For example, the Schultz (2003) pseudo-market timing explanation as well as theories in witch managers actually have the ability to time the markets will predict underperformance when observations are averaged by firms, but not when each time period is weighted equal. Further, if IPOs were reflective of a common risk factor of concern to investors similar to size and book-to-market factors in Fama and French (1993), then patterns of systematic performance would be seen, if investor usually required a lower rate of return for holding new issues, this would show up as a general underperformance, when in fact the problem is that the appropriate stock pricing model is not used in tests.

2.3. Cross Section of Performance

Recent IPO literature has turned to observing the patterns in the performance of IPOs, either in addition to or instead of answering the question of whether and why there is underperformance in general. Several studies focus on issue quality, for example, Barberis and Huang (2004) finds underperformance only in issue without venture capitalists backing. Carter*, et al.* (1998) find that underwriters with a better reputation offer issues with lower underperformance and better long term performance. Neither study establishes causation, so it is uncertain whether a venture capitalists or higher quality underwriter chooses issues that will have lower underperformance or actually controls these phenomena. The closest study to mine is that of Krigman*, et al.* (1999) who observe a smaller sample set (1988-1995) and find that sorting on absolute initial returns, one-year returns are increasing in initial returns with the exception of the highest initial return category. They also find that the higher institutional flipping of shares predicts greater long-term underperformance. Other analysis focus on friction such as in Miller (1977) that can sustain a price above fundamental valuations as long as shorting constraints are effective. Teoh*, et al.* (1998) use earnings management proxied for by discretionary accruals, to find that firms more aggressively managing their earnings are able to receive a higher price for the issue through the IPO period, but fall following the offering. Houge*, et al.* (2001) use proxies for divergence of investor opinion and finds that, in each case, lower divergence of opinion predict less long-run underperformance. The proxies used are percentage opening spread measured by the spread at open divided by the bid/ask midpoint, the time of the first trade, and the flipping ratio, measured as the proportion of sell-signed large block volume.

3. DATA AND METHODOLOGY

3.1. Sources of data and descriptive statistics

This study focuses on initial public offerings listed on the Euro.NM and NASDAQ. We have selected a group of operations in Euro.NM, and a paired sample of operations in the two compartments of NASDAQ during the same period. This sample has thus been established over a period of 36 months after the IPO. This sampling enabled us to use a group of 277 IPOs in each market, for which, we made a study of the initial low par rating, of the process of capital allocation, of the ownership structure and of the liquidity of IPOs.All the observations in our two samples, the data, the price, the number of shares made available to the public by the company or by its shareholders, the capital raised and the lead underwriter of the market, have been collected from the prospectus. The opening and closing prices, the highest, the volume dealt with, and the MTBV ratio have been extracted from *Datastream*. Table 1 shows the descriptive statistics for the IPOs sample during the period of study.

Table – 1: Statistics of our two samples

Panel A: Euro.NM sample								
Sector	**1997**		**1998**		**1999**		**Total**	
	N	Total (in M€)	N	Total (in M€)	N	Total (in M€)	N	Total (in M€)
Biotechnology	4	445.237	4	402.359	7	371.872	15	1.219.468
Financial Services					7	1.272.005	7	1.272.005
Industrial & industrial Services	7	229.183.	11	379.707	5	185.118	23	794.008
IT Services	3	454.832	17	1.327.968	58	3.649.518	78	5.432.318
Media & Entertainment	3	98.978	8	497.858	22	1.672.904	33	2.269.741
Medtech & Health Care	2	93.200	6	225.889	5	174.701	13	493.790
Software	9	449.564	19	800.484	34	1.849.697	62	3.099.746
Technology	8	714.832	25	1.077.136	32	2.623.560	65	4.415.528
Telecommunications	2	85.590	11	1.021.023	10	1.084.854	23	2.191.468
Others without indexes	1	18.241.921	1	24.772.958	1	17.581.700	3	60.596.579
Total	**39**	**2.589.659**	**102**	**5.757.198**	**181**	**12.901.812**	**322**	**21.248.669**

Panel B: NASDAQ sample								
Sector	1997		1998		1999		Total	
	N	Total (in M$)	N	Total (in M$)	N	Total (in M$)	N	Total (in M$)
Biotechnology	25	2.411.347	7	1.390.651	9	2.370.490	41	6.172.488
Industrial & industrial Services	92	8.271.946	36	7.191.375	35	14.458.650	163	29.921.973
IT Services	9	809.511	19	6.446.229	55	23.489.651	83	30.745.391
Media & Entertainment	3	83.675	1	96.350	4	2.481.741	8	2.661.766
Medtech & Health Care	29	2.654.793	9	2.150.677	3	254.844	41	5.060.314
Software	61	9.016.394	41	8.101.645	86	32.842.087	188	49.960.126
Technology	48	8.740.420	16	6.824.308	52	59.393.624	116	74.958.352
Telecommunications	23	7.530.467	13	9.922.635	58	48.393.007	94	65.846.110
Total	**290**	**39.518.554**	**142**	**42.123.871**	**302**	**183.684.094**	**734**	**265.326.520**

Table 2 shows the characteristics of the IPOs for the two samples. Our results show that the IPO volume of the NASDAQ's companies is more important than those of the Euro.NM. Moreover, in order to ensure a high level after market liquidity, these companies fix a low IPO price. The average IPO size for Euro.NM is 35 million Euros and 36 million dollars. Finally, table 3 shows that the old shareholders of Euro.NM companies offer an average of 21.45% of the IPO. On the other hand, those of our NASDAQ sample take part only of 5.22% in the operation. These companies prefer to increase the capital, contrary to the Euro.NM companies, where their shareholders tend to privilege the immediate liquidity.

Table – 2: Descriptive statistics

Panel A. IPO characteristics of Euro.NM sample (N=277)						
	Mean	**Median**	**Standard deviation**	**Min**	**Max**	**Skew**
IPO Volume	1.774.705	1.050.000	2.249.935	133.334	21.000.000	4,18
New Shares (% of IPO)	78,63	80,90	21,67	0,00	100,00	-1,16
Old shares (% of IPO)	21,45	19,42	21,64	0,00	100,00	1,16
Green-Shoe	231,778	147,000	293,407	0	2.225.000	2,87
IPO price (€)	25,73	21,00	35,66	0,76	559,87	12,37
IPO size (en millions d'€)	34,89	20,90	44,39	2,96	447,90	4,50
Market value at IPO (in M€)	123,39	72,00	14.167	10,12	899,50	2,68

Panel B. IPO characteristics of NASDAQ sample (N=277)						
	Mean	**Median**	**Standard deviation**	**Min**	**Max**	**Skew**
IPO Volume	3.202.306	2.880.000	1.924.788	700.000	14.678.000	1,93
New Shares (% of IPO)	94,91	100,00	12,27	26,32	100,00	-2,73
Old shares (% of IPO)	5,22	0,00	12,40	0,00	76,68	2,67
Green-Shoe	406.179	375.000	299.487	0	1.406.250	0,72
IPO price ($)	10,19	9,50	4,43	3,50	30,25	1,11
IPO size (M€)	36,26	29,17	31,27	3,50	187,00	1,85
Market value at IPO (in M€)	157,79	99,60	176,72	9,17	1.053,3	7,54

Table – 3: Abnormal returns observed on the Euro.NM and NASDAQ between 1997 and 1999

This table presents the average and the median of the abnormal adjusted and non-adjusted returns IPOs for the whole of the period 1997-1999 on the various segments of Euro.NM (Amsterdam, Brussels, Frankfurt, Milan and Paris) and the paired IPOs carried out on the NASDAQ for the same period. The outputs are measured over various periods: 1st, 7th, 21st, 30th, 60th and 90th day of the negotiations. The non adjusted returns are computed according to equation 12 and market adjusted returns according to the equation 13. α, β and γ indicate respectively the significant levels to the threshold of 10%, 5% and 1% of the Student test-statistics. The test is carried out to test if the average of returns is different from zero. It is estimated by the ratio: mean/standard deviation; where, the standard error represents the standard deviation divided by the square root of the number of observations.

	Mean; Median (*t*-statistic; simple size)											
	Non-adjusted returns (%)						Market adjusted returns (%)					
Market	1st day	7th day	21st day	30ème day	60ème day	90th day	1st day	7th day	21st day	30th day	60th day	90th day
All Euro.NM sample	43,98 ; 19,35 (9,49$^{\gamma}$; 277)	48,20 ; 20,40 (9,73$^{\gamma}$; 277)	56,04 ; 24,94 (10,85$^{\gamma}$; 277)	61,27 ; 25,52 (10,82$^{\gamma}$; 277)	93,71 ; 29,63 (8,84$^{\gamma}$; 277)	131,86 ;43,08 (8,07$^{\gamma}$; 277)	43,99 ; 19,32 (9,50$^{\gamma}$; 277)	45,78 ; 18,02 (9,29$^{\gamma}$; 277)	49,67 ; 17,42 (9,95$^{\gamma}$; 277)	51,78 ; 20,66 (9,64$^{\gamma}$; 277)	72,42 ; 21,34 (7,70$^{\gamma}$; 277)	96,64 ; 27,40 (6,70$^{\gamma}$; 277)
Germany	51,30 ; 24,02 (8,48$^{\gamma}$; 167)	52,70 ; 28,93 (8,82$^{\gamma}$; 167)	60,06 ; 32,52 (9,95$^{\gamma}$; 167)	66,32 ; 39,09 (9,79$^{\gamma}$; 167)	101,52 ; 52,27 (8,34$^{\gamma}$; 167)	136,44 ; 64,21 (8,56$^{\gamma}$; 167)	51,41 ; 25,84 (8,48$^{\gamma}$; 167)	50,82 ; 27,03 (8,57$^{\gamma}$; 167)	54,97 ; 30,38 (9,33$^{\gamma}$; 167)	58,49 ; 35,13 (8,99$^{\gamma}$; 167)	80,44 ; 35,59 (7,57$^{\gamma}$; 167)	99,57 ; 42,60 (7,34$^{\gamma}$; 167)
Belgium	3,17 ; 1,16 (0,75 ; 10)	1,95 ; -2,06 (0,29 ; 10)	-2,78 ; -1,89 (-0,58 ; 10)	-6,91 ; -5,85 (-0,95 ; 10)	-3,90 ; -8,38 (-0,40 ; 10)	-8,92 ; -14,35 (-0,74 ; 10)	4,10 ; 4,94 (0,92 ; 10)	0,07 ; -1,55 (0,01 ; 10)	-6,15 ; -6,13 (-1,59 ; 10)	-9,12 ; -9,91 (-1,48 ; 10)	-8,56 ; -10,58 (-0,99 ; 10)	-16,19 ; -28,19 (-1,57 ; 10)
France	25,95 ; 10,13 (5,90$^{\gamma}$; 80)	29,86 ; 8,76 (4,71$^{\gamma}$; 80)	38,62 ; 12,07 (4,17$^{\gamma}$; 80)	42,15 ; 9,69 (4,38$^{\gamma}$; 80)	64,73 ; 10,74 (3,52$^{\gamma}$; 80)	98,87 ; 12,09 (3,40$^{\gamma}$; 80)	25,83 ; 9,47 (5,89$^{\gamma}$; 80)	26,87 ; 6,80 (4,30$^{\gamma}$; 80)	31,17 ; 9,37 (3,51$^{\gamma}$; 80)	30,91 ; 6,14 (3,45$^{\gamma}$; 80)	45,14 ; 5,86 (2,78$^{\gamma}$; 80)	68,98 ; 9,63 (2,78$^{\gamma}$; 80)
Italy	132,06 ; 21,62 (1,39 ; 7)	143,82 ; 94,35 (2,45$^{\alpha}$; 7)	218,93 ; 247,7 (4,27$^{\gamma}$; 7)	251,53 ; 245,9 (4,13$^{\gamma}$; 7)	422,76 ; 235,1 (2,43$^{\alpha}$; 7)	739,30 ; 264,9 (2,15$^{\alpha}$; 7)	130,84 ; 20,42 (1,39 ; 7)	134,51 ; 81,53 (2,25$^{\alpha}$; 7)	191,76 ; 217,8 (3,82$^{\gamma}$; 7)	158,81 ; 17,23 (3,58$^{\beta}$; 7)	335 ; 422,76 (2,00$^{\alpha}$; 7)	593,27 ; 76,81 (1,75 ; 7)
Netherlands	44,76 ; 29,87 (4,15$^{\gamma}$; 13)	134,09 ; 45,29 (1,98$^{\alpha}$; 13)	69,08 ; 31,22 (2,44$^{\beta}$; 13)	64,00 ; 27,08 (2,58$^{\beta}$; 13)	69,57 ; 28,09 (2,42$^{\beta}$; 13)	57,27 ; 44,14 (2,26$^{\beta}$; 13)	44,32 ; 28,72 (4,13$^{\gamma}$; 13)	127,83 ; 37,14 (1,87 ; 13)	61,76 ; 25,83 (2,14$^{\alpha}$; 13)	53,22 ; 17,09 (2,08$^{\alpha}$; 13)	57,68 ; 22,55 (1,95$^{\alpha}$; 13)	48,66 ; 30,29 (1,78$^{\alpha}$; 13)
All NASDAQ market	30,69 ; 10,00 (8,31$^{\gamma}$; 277)	28,65 ; 8,69 (8,10$^{\gamma}$; 277)	38,26 ; 11,11 (7,60$^{\gamma}$; 277)	33,92 ; 8,80 (6,64$^{\gamma}$; 277)	38,54 ; 7,60 (5,92$^{\gamma}$; 277)	51,53 ; 8,44 (6,00$^{\gamma}$; 277)	30,57 ; 9,86 (8,30$^{\gamma}$; 277)	27,97 ; 8,45 (8,02$^{\gamma}$; 277)	36,21 ; 11,85 (7,40$^{\gamma}$; 277)	30,36 ; 6,49 (6,17$^{\gamma}$; 277)	30,45 ; 2,18 (4,84$^{\gamma}$; 277)	38,36 ; -2,50 (4,60$^{\gamma}$; 277)
NASDAQ NNM	33,85 ; 10,71 (7,53$^{\gamma}$; 216)	32,28 ; 10,12 (7,49$^{\gamma}$; 216)	45,75 ; 12,50 (7,32$^{\gamma}$; 216)	41,22 ; 10,65 (6,49$^{\gamma}$; 216)	50,19 ; 17,98 (6,21$^{\gamma}$; 216)	66,65 ; 22,92 (6,32g ; 216)	33,68 ; 10,29 (7,51$^{\gamma}$; 216)	31,51 ; 10,11 (7,41g ; 216)	43,46 ; 15,04 (7,14$^{\gamma}$; 216)	37,31 ; 8,62 (6,08$^{\gamma}$; 216)	41,42 ; 10,69 (5,30$^{\gamma}$; 216)	52,76 ; 10,23 (4,15$^{\gamma}$; 216)
NASDAQ SCM	19,53 ; 9,33 (3,84$^{\gamma}$; 61)	15,81 ; 7,33 (3,36$^{\gamma}$; 61)	10,53 ; 4,08 (2,67$^{\gamma}$; 61)	8,05 ; 5,00 (1,92$^{\alpha}$; 61)	-2,71 ; -7,81 (-0,60 ; 61)	-2,00 ; -12,40 (-0,25 ; 61)	19,58 ; 9,36 (3,87$^{\gamma}$; 61)	15,40 ; 6,32 (3,35$^{\gamma}$; 61)	10,53 ; 4,08 (2,74$^{\gamma}$; 61)	5,75 ; -1,25 (1,52 ; 61)	-8,42 ; -9,55 (-1,90 ; 61)	-12,64 ; -19,86 (-1,60 ; 61)

Table 4 presents the statistics on IPO underpricing for the 544 observations. The average market adjusted returns (MAR) observed the first trading day on our Euro.NM sample is higher than that observed on NASDAQ. With an average adjusted return of 130.84%, the Italian segment of Euro.NM is the highest. On the other hand, the Belgian segment presents the lower average return (4.10%) with a tendency to become negative after three weeks following the IPO date. However these two segments represent only 6% of our Euro.NM sample. The German segment represents the second higher average (51.41%) after the Italian market, in spite of the fact that it represents 60 % of our Euro.NM sample. The average market adjusted return observed on the segment of Paris is only 25.83%. It is even lower than the average observed on the two compartments of NASDAQ which is 33.68% for NASDAQ NNM and 19.58 % for NASDAQ SCM. The averages adjusted or non adjusted returns are positive for the both samples. For the European IPO sample, the average market adjusted returns is 43.99% at the significant level of 0.01. On the other hand, for our NASDAQ sample, the average is 30.57% at the significant level of 0.01. These results prove that it is more interesting for the shareholders to carry on an IPO on the NASDAQ market than on Euro.NM. Our results corroborate the results of Dewenter and Malatesta (1997).

3.2. Initial Public Offering Performance Measurement

We have calculated the abnormal returns for IPOs in the periods of 6, 12, 18, 24, 30 and 36 months. The choice of these different time scales enabled us to examine the long-term behaviour of several categories of investor. Numerous recent studies have analysed long-term abnormal returns by using different methods. More recently, Barber and Lyon (1997), Kothari and Warner (1997), Lyon*, et al.* (1999), Fama (1998), Loughran and Ritter (2000), Brav*, et al.* (2000) and Mitchell and Stafford (2000), have all demonstrated that the method for measuring abnormal returns influences both the size and the strength of the statistical test. Given that each of these measuring methods used in the literature has, up to now, shown its limitations, we will use all the methods for our research. Thus, we will be able to examine the long-term performance of IPOs by referring to a variety of models. We will rely on the papers of de Barber and Lyon (1997), Kothari and Warner (1997), Fama (1998) and Lyon*, et al.* (1999), and we will use four measures to evaluate the long-term performance of initial public offerings.

To calculate the aftermarket long-term performance, Loughran and Ritter (2000) exclude from their calculations the first day returns. However, we consider that the abnormal behaviour of IPOs is correlated to the phenomenon of under-pricing. In order to distinguish the valuation “error” made by the investors during the first market day to that committed by the lead underwriter, we suggest that aftermarket performance should also be measured by using the IPO price. On the one hand, this procedure will enable us to observe the aftermarket performance of the offers often acquired by institutional investors who have the privilege of buying at the subscription price. On the other hand, it will enable us to examine the aftermarket performance of those acquired by individual investors at the market price.

3.2.1. Cumulative Average Adjusted Returns (CAR)

The adjusted abnormal return, $AR_{i,t}$, for the company ***i*** over a period of ***t*** calendar months following the first trading month is calculated in the following manner:

$$AR_{i,t} = R_{i,t} - E(R_{i,benchmark}) \quad (1)$$

Where $\boldsymbol{R_{i,t}}$ is the return for firm ***i*** in event month ***t*** and $\mathbf{E(R_{i,benchmark})}$ is the return on the benchmark during the corresponding time period. The average benchmark-adjusted return on a portfolio of n stocks for event month *t* is the equally-weighted arithmetic average of the benchmark-adjusted returns:

$$\overline{AR_t} = \frac{1}{n_t}\sum_{i=1}^{n_t} AR_{i,t} \quad (2)$$

The cumulative benchmark-adjusted return for the aftermarket performance from event month ***q*** to event month ***s***, $\boldsymbol{CAR_{i,q}}$ (that implicitly supposes the monthly portfolio rebalancing) is the summation of the average benchmark-adjusted returns:

$$CAR_{q,s} = \sum_{t=q}^{S} \overline{AR_t} \quad (3)$$

The statistical test carried out on the cumulated abnormal returns is obtained by using the following formula:

$$t_{CAR_{1,t}} = \frac{CAR_{i,t}}{\sigma(CAR_{i,t})/\sqrt{n_t}} \quad (4)$$

Where $\sigma(CAR_{i,t})$ is the cross-sectional sample standard deviations of abnormal returns for the sample of ***n*** firms and $\boldsymbol{n_t}$ is the number of IPOs on month ***t***. Following Barber and Lyon (1997), we prefer the use of cross-sectional standard errors because requiring pre-event return data, from which a time-series standard errors can be estimated, intensifies the new listing bias. More specifically, the statistical test for the $\boldsymbol{CAR_{1,t}}$ is:

$$t_{CAR_{1,t}} = \frac{CAR_{it}\times\sqrt{n_t}}{\sqrt{[t\times \text{var} + 2\times(t-1)\times \text{cov}}} \quad (5)$$

Where ***var*** is the average of the cross-sectional variations over 36 months of the $\boldsymbol{AR_{it}}$, and ***Cov*** is the first order auto-covariance of the $\boldsymbol{AR_t}$ series.

3.2.2. Buy-and-Hold Abnormal Returns (BHAR)

The second measure we use is based on the calculation of the *T* holding period return as an alternative to the use of the cumulative benchmark-adjusted returns (no portfolio rebalancing is assumed in these calculations), defined as:

$$R_{i,T} = \prod_{t=1}^{T}(1 + r_{i,t}) \quad (6)$$

This measure makes it possible to calculate the total returns procured by a strategy called “Buy-and-Hold” in which a share acquired at the closing price on the first trading day is retained up to month *T* after the IPO date. The average Buy and Hold returns (no rebalancing is assumed in this calculation) for all the companies in each of our two samples, during the month *T*, is simply equal to the average of the returns of each firm in the same period:

$$R_T = \frac{1}{n}\sum_{i=1}^{n} R_{i,T} \quad (7)$$

Where ***n*** is the number of companies in the sample. The abnormal "buy and hold" returns adjusted from the normal performance of the returns rate E($R_{benchmark,t}$) over the same period is defined by:

$$BHAR_{i,T} = \left[\prod_{t=1}^{T}(1+r_{i,t})-1\right]-\left[\prod_{t=1}^{T}(1+E(R_{benchmark,t})-1\right] \quad (8)$$

The average of adjusted abnormal returns for the period *t* is defined by:

$$BHAR_t = \sum_{i=1}^{nt} x_{i,t} BHAR_{i,t} \quad (9)$$

The weight $\boldsymbol{x_{i,t}}$ is $\boldsymbol{1/n_t}$ when abnormal returns are equally-weighted and $MV_{it} / \sum_{i=1}^{nt} MV_{it}$ when abnormal returns are value weighted, ***MV*** is the market value and $\boldsymbol{n_t}$ is the number of companies during the period.

The null hypothesis $\boldsymbol{H_0}$ states that the *BHAR* for all the companies in each of our two samples for the month *T* is equal to zero:

H_0: $BHAR_T = 0$

To test the null hypothesis, we prefer to use the statistical test t adjusted from the skewness recommended by Neyman and Pearson (1928) and recently used by Lyon*, et al.* (1999). The test is defined by:

$$t = \sqrt{n} \times (S + \frac{1}{3}\hat{\gamma}S^2 + \frac{1}{6n}\hat{\gamma}) \quad (10)$$

Where: $S = \frac{Moyenne\ (BHAR)_t}{\sigma(BHAR)_t}$; *t* = 6, 12, 18, 24, 30 and 36 months ; $\hat{\gamma}$ is an estimator of the coefficient of the skewness : $\hat{\gamma} = \frac{\sum_{i=1}^{n}(BHAR_{it} - \overline{BHAR_t})^3}{n\sigma(BHAR_t)^3}$

3.2.3. The calendar-time portfolio methods

Loughran and Ritter (1995) and Brav and Gompers (1997) use Fama-French's three- factor model to measure the returns in the "Calendar-Time Portfolios" of IPOs. Jaffe (1974) and Mandelker (1974) use several of these method types. As well as the CARs and the BHARs, method, we will consider as a third alternative, two types of methods among the "Calendar-Time Portfolio": the first, based on the use of the three-factor models developed by Fama and French (1993) and the second based on the monthly average of the "Calendar-Time Abnormal Returns". Fama (1998) and Lyon*, et al.* (1999) confirm that the "Calendar-Time Portfolio" methods offer two advantages. The first is that it eliminates the problem of cross-sectional dependence between the returns of the companies in the sample. The second is that they make the test statistics more robust on the samples. In the next two sections, we will present the methodological procedure that we have followed to apply these two methods.

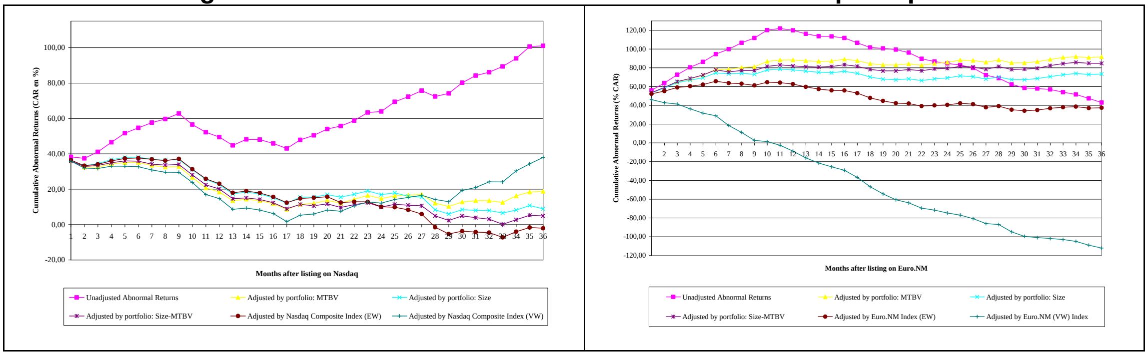
4. EMPIRICAL RESULTS

4.1. The Aftermarket Performance of Initial Public Offerings

4.1.1. Results by using the cumulated abnormal returns (CAR)

Figure 1 presents the average of non-adjusted returns (***R_t***) and the average of cumulated abnormal returns (***$CAR_{1,\ t}$***) for the 36 months that follows the IPO date. The data in Panel A indicates the results for 277 IPOs realized on the Euro.NM during the period 1997-99. Panel B shows the results for the 277 equivalent IPOs made in the NASDAQ during the same period.

Figure 1: Cumulative abnormal returns from subscription price



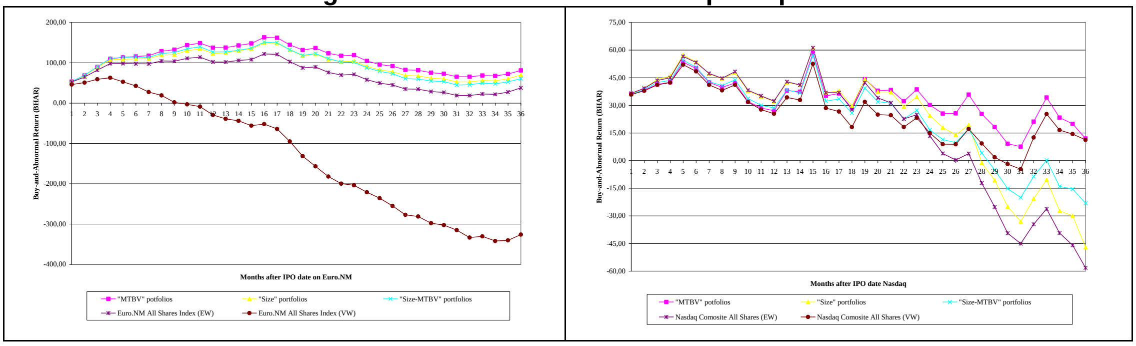
By using the reference portfolio for the adjustment of the returns, it appears, at first sight, that the companies that float shares in the stock market in the Euro.NM do not show a decline in their performance. This observation seems to go against our results for equivalent NASDAQ companies as well as the results of Ritter (1991) et Loughran and Ritter (1995). In fact, of the 36 non-adjusted average returns calculated for the companies in the Euro.NM, the first 11 observations showed positive signs. Apart from these high returns, the decline in the performance of companies of the size and / or the same MTBV ratio has repercussions on the abnormal returns and gives a positive cumulative average return over the 36 months of the study. The use of the “Euro.NM All Shares” EW and VW indexes qualifies these results and does not make it possible to reach a conclusion concerning the continually high stock market performances of Euro.NM companies. As for our NASDAQ sample, the results show, on the whole, a durable decline in the performance of companies with a stock market floatation during this period. By adjusting the returns of this sample by 25 “Size –MTBV” portfolios, we find an average of cumulative abnormal returns of –32.38 % over 36 months.

The initial non-adjusted average return is 56.04% on the Euro.NM, followed by a monthly average return that varies between + 8.80 and – 7.66%. The average cumulated returns reach a maximum of 121.9 % the eleventh month, then decrease. This decline can partly be attributed to the speculative bubble which has affected the technological values during this period. As for the NASDAQ companies, we observe a lower initial return than that observed in the Euro.NM. We find an initial return of 38.26%, followed by a monthly average return that varies between + 6.69 and – 6.26%. The cumulative abnormal returns also reach a high level of 101.08% in the 36th month and seem to continue after that. However, this increase is much lower and slower than that observed on our Euro.NM sample. This difference can be explained by the fact that the speculative bubble is much larger in the NASDAQ than in the Euro.NM.Apart from the three reference portfolios, figure 1, retraces the evolution of the cumulated abnormal returns adjusted by the market return. Each month, we subtract the return observed in the market from the return of each security, by using two indexes that are: the equally-weighted index and the value-weighted index. The graph for the Euro.NM shows a big difference in the results obtained by these two indexes. In fact, if the adjustment is made by equally-weighted index, the results are almost the same as those obtained by the different reference portfolios. On the other hand, the use of the value- weighted index shows a durable decline over the 36 months that follow the stock marker listings. Our results can be explained by a performance largely superior for the large companies to that in the small-sized companies. The NASDAQ results are more or less the same using the two indexes.

4.1.2. Results by using the "Buy-and-Hold" method

The figure 2 enables us to study the profits and losses of the investor who acquires and retains shares, for a given period, of companies that float shares on the stock market. For the Euro.NM sample, we note a great improvement in the performance of these companies over the first sixteen months but that they later decline considerably. We observe the same phenomenon for the NASDAQ sample with the exception of the instability in the first 18 months, where we observe a decline in performance in the fifth and twelfth months. This contrast enables us to confirm that the impact of the speculative bubble that affected the two markets was not the same for all the companies. In fact, only the small-sized companies suffered the consequences of the speculative bubble.

Figure 2: BHAR with the subscription price



4.1.3. Results according to the Calendar-Time Portfolios methods

In this section, we respectively present the results of our two samples by using Fama-French's three-factor model and the results according to the CTAR method. The table 4 presents the results of the three-factor regression for the time series. The annual returns of portfolios made up from IPO date have diminished in the surplus returns for the CAPM or in the excess returns, the *SMB* and the *HML* in Fama-French's three-factor model. For our Euro.NM sample (panel A), we observe that the intercepts for the CAPM regression are almost equal to zero, but they are not statistically significant. Fama-French's three-factor model does not provide further explanations. In fact, whatever the weighting factor, (EW or VW): the intercepts are very close to zero and they are not statistically significant. On the Calendar-Time basis; IPOs seem neither to perform very well nor perform very badly. The table also shows the results for the pre-weighted regressions by the square root of the number of companies in the portfolio. If the portfolios of the IPO are equally-weighted, the intercepts are significantly different to zero for the CAPM and for the three-factor model. However; if the portfolios are value-weighted, the intercepts are equal to zero but not significant. The weighting has the effect of increasing the coefficients for the excess returns to reflect the market motions.

Table – 4: Abnormal returns

The first two columns present the results for the CAPM estimation. The following two columns present the estimation of Famma-French's three-factor model (the *t* test is in brackets) α, β and γ respectively designate the significant level of 10%, 5% and 1%.

Panel A : Results for the IPOs in the Euro.NM

Regressions OLS

	CAPM		Fama-French Model	
	Equal-Weighted	Value-Weighted	Equal-Weighted	Value-Weighted
Intercept (α)	-0,018	0,013	-0,015	0,018
	(-1,11)	(0,94)	(-0,93)	(1,22)
Excess return (β)	0,783	1,084	0,846	1,065
	(9,26)$^{\gamma}$	(14,93)$^{\gamma}$	(8,51)$^{\gamma}$	(12,41)$^{\gamma}$
SMB (*s*)			0,018	-0,153
			(0,13)	(-1,27)
HML (*h*)			-0,19	-0,171
			(-1,49)	(-1,58)
Adjusted R^2	**0,585**	**0,787**	**0,595**	**0,790**

Regressions WLS

	CAPM		Fama-French Model	
	Equal-Weighted	Value-Weighted	Equal-Weighted	Value-Weighted
Intercept (α)	-0,035	-0,0002	-0,037	0,0004
	(-4,29)$^{\gamma}$	(-0,029)	(-4,79)$^{\gamma}$	(-0,08)
Excess return (β)	0,780	1,068	0,843	1,080
	(19,33)$^{\gamma}$	(40,42)$^{\gamma}$	(20,13)$^{\gamma}$	(35,92)$^{\gamma}$
SMB (*s*)			0,216	0,039
			(3,32)$^{\gamma}$	(0,84)
HML (*h*)			0,015	-0,002
			(0,26)	(-0,04)
Adjusted R^2	**0,861**	**0,965**	**0,882**	**0,964**

Panel B : Results for the floatation offers in the le NASDAQ

Regressions OLS

	CAPM		Fama-French Model	
	Equal-Weighted	Value-Weighted	Equal-Weighted	Value-Weighted
Intercept (α)	-0,006	0,050	-0,026	0,041
	(-0,67)	(4,09)$^{\gamma}$	(-3,31)$^{\gamma}$	(3,38)$^{\gamma}$
Excess return (β)	1,178	1,554	1,096	1,473
	(17,58)$^{\gamma}$	(18,38)$^{\gamma}$	(20,49)$^{\gamma}$	(17,82)$^{\gamma}$
SMB (*s*)			0,503	0,154
			(6,36)$^{\gamma}$	(1,26)
HML (*h*)			-0,331	-0,088
			(-6,22)$^{\gamma}$	(-1,07)
Adjusted R^2	**0,837**	**0,849**	**0,905**	**0,868**

Regressions WLS

	CAPM		Fama-French Model	
	Equal-Weighted	Value-Weighted	Equal-Weighted	Value-Weighted
Constant (α)	-0,006	0,054	-0,027	0,045
	(-0,61)	(4,53)$^{\gamma}$	(-3,33)$^{\gamma}$	(3,67)$^{\gamma}$
Surplus return (β)	1,156	1,527	1,076	1,459
	(16,94)$^{\gamma}$	(18,45)$^{\gamma}$	(19,98)$^{\gamma}$	(18,00)$^{\gamma}$
SMB (*s*)			0,491	0,182
			(6,50)$^{\gamma}$	(1,60)
HML (*h*)			-0,323	-0,107
			(-6,35)$^{\gamma}$	(-1,40)
Adjusted R^2	**0,827**	**0,850**	**0,900**	**0,867**

As regards our NASDAQ (panel B), sample, we note that the CAPM intercept for the OLS and WLS regressions is also equal to zero but not significant. On the other hand, for the other regressions, the constants are significantly different to zero. If the IPOs are equally-weighted, the constants for the regression in the three-factor model (*OLS* or *WLS*) are negative and statistically significant. On the other hand, when the portfolios are value-weighted, the constants are positive and statistically significant. Our results reinforce the efficient market hypothesis.

4.2. CROSS-SECTIONAL PATTERNS

In this section, we will make a cross-sectional analysis in order to explain, on the one hand, the long-term performance of IPOs in the Euro.NM and on the other hand, the underperformance of IPOs in the NASDAQ. We have taken into consideration the performance of the samples over several time scales. The table 5 presents the performance calculated, according to the BHAR method, by sector, by market size and by underpricing. On the basis of a first segmentation of the sample by activity sector, we note that the performance of IPOs varies considerably from one sector to another. However, we observe similarities in the two markets. For example, we note an underperformance in technological and telecommunication companies in the two markets. What is more, the companies in the different sectors of the Euro.NM show a better performance than that of our NASDAQ sample. With a BHAR of 161.2% over 36 months, we equally note that the companies in the telecommunications sector of the Euro.NM show the best performance of all the companies in different sectors in the two samples. On the other hand, the worst performance was realized by the companies in the Industrial & Industrial services sector.

When the segmentation is created according to the size of the stock market floatation operation, we note that the large-size NASDAQ IPOs, (that is to say, less than or equal to 36 M€ which corresponds to the average in the samples) show a higher performance that the small-sized listings. This result corroborated the theory that the ex-ante asymmetric information is positively correlated to the underperformance. This result is not confirmed for our Euro.NM sample, nevertheless, according to this segmentation, the results are more significant in the NASDAQ sample. By using models based on the asymmetry of information, Grinblatt and Hwang (1989) show that the companies, where there is a high underpricing, perform significantly better than the others. Therefore, we will create a third segmentation based on the positive or negative underpricing level. Table 5 shows that the performance after six months of the initially underpriced IPOS in the Euro.NM is twice as high as that of overpriced operations. After the twelfth month and up to the 36th month, we note an inversion that is to say that the underpriced operations show a worse performance than the others. This observation seems to go against that observed in the NASDAQ sample. This result partly maintains the theory of excessive reactions. In fact, this difference in returns cannot be explained by the additional risk that the underpriced companies would have taken; this observation appears to us to be incompatible with the theory of market efficiency. De Bondt and Thaler (1985), De Bondt and Thaler (1987) also provide empirical proof of this point of view by analysing the three-year performance in the two portfolios, one is successful, the other is not. The authors confirm the idea that the prices in these portfolios are not fixed in a rational manner but are partly guided by the excessive reactions of the investors. They have also provided proof, by using holding periods of one year or more, of the existence of a negative relationship between the past and future abnormal returns for the low individual capitalisations.

We conclude that the performance of IPO appears to be different in the two markets, with the exception of the technological and telecommunications sector. We can also deduce the performance varies according to the type of industrial sector. Therefore, we can say that the underpricing of these IPOs can explain the long-term performance.

Table – 5: Long term performance of the sample

The buy and hold method is used to estimate the long-term performance of companies that float shares on the stock market. The long-term performances are calculated when the returns are determined in the companies with the same « Size-MTBV » quintile. α, β and γ are respectively significant for the de 1%, 5% and 10%.levels.

Panel A Nominative returns (in %) in the Euro.NM							
Sample	**Month 6**	**Month12**	**Month 18**	**Month 24**	**Month 30**	**Month 36**	**Underpricing**
BHAR :							
Biotechnology	52,89	140,82	76,02	24,04	48,96$^{\gamma}$	161,25	19,99
Industrial & Ind Services.	33,18	59,68	78,09	-3,15	-20,08	-24,50	34,41
IT Services	47,05	30,16	71,69	41,79	2,01	-4,65	65,89$^{\alpha}$
Medtech & Health Care	26,51	69,38	33,72	7,83	-2,58	28,94	15,93
Software	61,91	31,79	17,21	-4,13	-13,26	-18,73$^{\gamma}$	37,37
Technology	39,71	86,32	114,59	53,44	47,90	64,11	39,94
Telecommunication	61,43	123,63	191,78	181,26$^{\alpha}$	100,02$^{\beta}$	198,40$^{\alpha}$	40,61
Size of operation ≤ 35 M €	43,81	77,88$^{\gamma}$	115,92$^{\beta}$	55,78	21,33	38,08	42,53
Size of operation > 35 M €	56,85	27,66$^{\gamma}$	0,13$^{\beta}$	5,74	11,10	25,95	47,03
All the sample	48,00$^{\alpha}$	61,74$^{\alpha}$	78,71$^{\alpha}$	39,71$^{\alpha}$	18,05$^{\beta}$	34,16$^{\alpha}$	43,98$^{\alpha}$
Underpriced IPOs	55,21$^{\gamma}$	61,82	69,16	29,58	12,54	22,45	57,65$^{\alpha}$
Overpriced IPOs	22,45$^{\gamma}$	61,48	112,54	75,54	37,53	75,60	-4,46$^{\alpha}$
Panel B. Nominative returns (in %) in the NASDAQ							
Sample	**Month 6**	**Month12**	**Month 18**	**Month 24**	**Month 30**	**Month 36**	**Underpricing**
BHAR :							
Biotechnology	-3,20	-2,41	-28,51	-60,14	-101,76	-109,65	14,57$^{\beta}$
Industrial & Ind Services.	-23,62	-49,27	-87,33$^{\gamma}$	-154,89$^{\beta}$	-268,19$^{\alpha}$	-305,08$^{\alpha}$	14,91
IT Services	-10,47	-33,61	-28,98	-22,64	-18,32	-22,50	64,58$^{\alpha}$
Medtech & Health Care	-36,69	-60,00	-75,37	-163,30$^{\gamma}$	-213,88	-305,26$^{\beta}$	19,17
Software	8,47	-18,62	-25,85	-47,10	-89,22	-111,75	15,25$^{\beta}$
Technology	35,43$^{\alpha}$	20,86$^{\alpha}$	28,04$^{\beta}$	64,60$^{\alpha}$	82,88$^{\alpha}$	114,18$^{\alpha}$	30,25
Telecommunication	3,25	-1,09	47,47	46,69	16,40	19,11	0,83$^{\alpha}$
Size of operation ≤ 36 M €	-0,21	-15,71	-36,23$^{\beta}$	-48,50$^{\beta}$	-91,91$^{\alpha}$	-109,31$^{\alpha}$	15,25$^{\alpha}$
Size of operation > 36 M €	10,35	-10,53	19,91$^{\beta}$	25,03$^{\beta}$	44,33$^{\alpha}$	48,36$^{\alpha}$	57,19$^{\alpha}$
All the sample	3,68	-13,80	-15,56	-21,42	-41,75$^{\beta}$	-51,25$^{\beta}$	30,69$^{\alpha}$
Underpriced IPO	2,62	-13,26	-23,49	-28,57	-36,37	-44,82	42,85$^{\alpha}$
Overpriced IPO	7,26	-15,63	11,37	28,55	-60,00	-73,10	-10,60$^{\alpha}$

5. CONCLUSIONS

Many studies are interested by aftermarket performance of initial public offerings. The essential of published works concerns the United States markets. We still often miss answers to the questions raised by this set of themes about the European markets. Our objective in this article is to present and explain the long-term performance of initial public offerings made up by the European companies in the Euro.NM stock market and to compare them with paired IPOs realised during the same period on NASDAQ. We study a first sample constituted of 277 European IPOs between 1997 and 1999. We carry out the same study on a second sample of 277 American equivalent companies IPOs in Nasdaq during the same period. The study shows the existence on average an underpricing for the Euro.NM sample relatively more significant than that of the Nasdaq sample. We also observe the existence of significant long-term underperformance; witch is missing the Euro.NM sample. For the two markets, it seems that the underpricing is not immediately corrected after the flotation. Independently of the reference portfolio used to adjust returns, we observe long-term abnormal returns for the two samples. It arises from our study that the companies who's controlled by the founder shareholder don't have a better long-term performance than the others. This result reject agency theory initiated by Jensen and Meckling (1976) nor the signal theory initiated by Leland and Pyle (1977). The analysis of the multiple regressions shows that there is no relation between the underpricing level and the long-term performance. This result goes against the predictions of the founded models (Grinblatt and Hwang (1989) and Welch (1989)) on the asymmetric information.

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