

The Efficient Market Hypothesis and the Anomalies of Long-Term Overreaction and Underreaction: The Study of the Public Offerings in Portugal

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Abstract

We analysed the return rate series from issuing companies in the Portuguese stock market for the period from 1987 till 2000. The purpose was to test whether a public offering firm has been poor long-run investments for investors as Loughran and Ritter (1995) show for USA during 1970 to 1990. We compare two-year buy-and-hold returns on public offerings portfolios with the returns on portfolios that match the public offerings portfolios on size but exclude the public offerings. Apparently the evidence doesn't reveals underperformance of the issuing firms.

JEL classificação: G12; G14

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1. Introduction

The efficient markets hypothesis of Fama (1970), has originated several empirical tests with the aim of analysing if security prices at any time fully reflect all available information.

This is a very strong hypothesis. So, historically, the empirical work has been concerned with whether prices fully reflect particular subsets of available information. According to the dimension of the subset of available information, it's usual to distinguish three levels, degrees or forms of efficiency. In other words, related to the specific content of the set of relevant and available information at t , Φ_t , work on market efficiency is divided into three categories.

The weak form tests analyse the efficiency of the market admitting that Φ_t contains only the historical information about the prices or return rates of the assets. They try to answer the question of how well do past returns predict future returns. At equilibrium, prices reflect all the information contained in the series of past prices. Consequently it's impossible to obtain returns above the ones that could be achieved with a buy-and-hold investments strategy. Recently, Fama (1991) renames this category of tests as tests for return predictability. They are more general because they aren't only concerned with the forecast power of past returns, but also include all the work on forecasting returns with variables like dividend yields and interest rates.

The semi-strong form tests seek to analyse whether publicly available information is fully reflected in current stock prices and how quickly do security prices reflect public announcements. If the semi-strong form of the efficient markets hypothesis holds, then investors would be unable to earn an excess profit by purchasing securities on the basis of such announcements. However, if it takes too long for the prices to fully reflect the announcement of a particular information (for example, the announcement that earnings will be much larger than expected), then investors purchasing securities on the basis of movements away from historical prices would benefit from part of the price increase and make excess returns. On the hand, if returns are not predictable from past returns, then new information is incorporated in the security price

sufficiently fast that, by the time an investor could tell from the price movements themselves that there had been a fundamental change in company prospects, the fundamental change is already fully reflected in price. This means that the series of price variations doesn't reveal profitable patterns, that is, the markets are efficient in the weak form. Due to the enormous amount and variety of public announcements, it's difficult to test the semi-strong form of market efficiency. Conventionally, the work on this subject considers that if markets are efficient regarding some kind of information, then they also will be efficient for a similar type of information. Thus, each test is concerned with price adjustment to a particular event that leads to a specific type or subset of information. Some examples of this kind of events are new issues of common stock, corporate control, changes in dividend policy, stock splits, etc.

Fama (1991) proposes a change in title in this kind of tests to event studies. In fact, event studies become an important part of finance, especially corporate finance. This research stream documents interesting regularities that gave impetus for theoretical work in order to explain them.

The strong form tests question the market efficiency observing the behaviour of stock prices considering all available information, whether public or not. These tests analyse portfolio performance of individuals or professional groups that, possibly, may have confidential information⁴ or that are significant market participants. Fama (1991) classifies these tests as tests for private information

In recent years a body of evidence on security returns has presented a deep challenge to the traditional view that securities are priced to reflect all publicly available information.

The objective of this paper is to discuss the semi-strong efficiency and the anomalies that have been documented in the empirical work related to it. In fact, some of the literature about event studies defies the hypothesis according to which market adjusts rapidly to new information. Instead, it defends that stock prices adjust slowly to new information, so one must examine long-run abnormal returns in order to conclude if the market is inefficient or not. Fama (1998) alleges that long-term over-reaction is

not enough to put aside or discard efficient markets hypothesis. Two reasons are put forward. First, it's possible that an efficient market generates categories of events that individually suggest that the prices over-react to information, either positively, either negatively. The important is that in an efficient market an apparent underreaction will be about as frequent as an overreaction. Market efficiency holds still if anomalies split randomly between underreaction and overreaction

A second reason, and also important, stands that even if long-term return anomalies are so large that can not be attributed to chance, the evidence that shows an even split is a huge argument consistent with market efficiency.

Fama (1998) also suggests that long-term return anomalies are sensitive to the methodology, that is, they tend to become marginal or disappear when exposed to different models for expected (normal) returns or when different statistical approaches are used to measure them. Thus, he concludes that most of them can be endorsed to chance.

Additionally, Fama (1998) criticises the perspective that most long-term return studies assume, since they rarely test a specific alternative to market efficiency, what is not acceptable. Although the hypothesis that prices fully reflect the available information is not an exact description of price formation, it can only be replaced by a better alternative specific model of price formation, itself potentially rejectable by empirical tests.

Recent papers develop alternative models to the efficient markets model that admit rejectable hypothesis. An example is the model of investor sentiment of Barberis et al. (1998).

This paper also studies a particular event, following Loughran and Ritter (1995). We investigate the long-run underperformance of public offering firms.

It's organised as follows. In section two, we briefly consider and present the behavioral model of Barberis et al. (1998) and thus the way they explain how the

judgement biases of investors can produce overreaction to some events and underreaction to others

Section three is entirely dedicated to Portuguese capital market analysis. As mentioned, we study public offerings in this market. In section four, some conclusions are drawn about the results obtained.

2. The behavioural models of underreaction and overreaction

The observation of pervasive regularities of under and overreaction of stock prices to specific news puts market efficiency theory in question. It suggests that several sophisticated investors can obtain abnormal returns.

Behavioural models are an attempt to accommodate investors behaviour that leads to prices underreaction or overreaction. These models perform well on the anomalies they are designed to explain. That justifies the presentation of their main aspects.

Barberis et al. (1998) consider a parsimonious model of investor sentiment or of how investors form their expectations. The model is consistent either with the available statistical evidence, either with the experimental evidence on both the failures of individual judgement under uncertainty and the trading patterns of the investors in experimental situations. Namely, it's inspired in two judgement biases studied by the cognitive psychology:

- (i) the representativeness bias proposed by Tversky and Kahneman (1974) or the tendency of individuals to evaluate particular events as typical or representative of a specific class, ignoring the laws of probability in the process. Therefore people give more weight to recent patterns in the data and too little emphasis to the characteristics of the population that generates the data ; and
- (ii) the conservatism attributed to Edwards (1968) defined as the slow adjustment of the models in face of new facts;

This model considers one investor and one asset and investor beliefs must reflect consensus forecasts even when different investors hold different expectations. The beliefs of this representative investor affect both prices and returns. It admits that arbitrage operations fail to eliminate mispricing. As suggested by De Long et al. (1990) and Shleifer and Vishny (1997), an important reason why arbitrage is limited is that oscillations in investor sentiment are not completely predictable. Thus arbitrageurs trying to bet against mispricing incur the risk, at least in the short term, that the investor sentiment becomes more extreme and that the prices deviate significantly from fundamental values. This situation may result in the reduction of the size of the positions taken by arbitrageurs.

The model assumes that earnings of the asset follow a random walk, although the investor does not know that. The investor believes that the behaviour of earnings moves between two states or regimes. In the first regime they are mean-reverting. In the second state they trend or are likely to rise further after an increase. The investor knows the transition probabilities between the two regimes, as well as the statistical properties of the earnings process in each one of them. Specifically, in any given period, earnings are more likely to stay in a given than to switch. Each period the investor observes earnings, and uses this information to update his beliefs about which state he is. This updating is Bayesian.

When a positive surprise is followed by another positive surprise, the investor increases the likelihood that he is in the trending regime. On the other hand, when a negative one follows a positive surprise, the investor raises the likelihood of being in the mean-reverting regime. The model solution shows that, for an acceptable range of parameter values, it generates the empirical predictions observed in the data.

The model does well on the anomalies it attempts to explain. Most of them comes from the cross-section of stock returns and from United States. However its prediction of long-term reversal does not capture the huge evidence in the literature. The later seems more consistent with the market efficiency prediction that long-term return continuation and long-term return reversal are equally likely chance results.

Underreaction to new announcements is the circumstance in which the average return on the stock in the period after the announcement of good news is higher than the average return in the period following bad news.

Formally, the model assumes that in each time period, the investor hears news about the firm. Denoting the news he hears in period t as z_t , they can be either good, $z_t = G$, or bad, $z_t = B$. When $E(r_{t+1}|z_t = B) > E(r_{t+1}|z_t = M)$, the stock underreacts to the good news. This error is corrected in the following period, giving a higher return at that time. There is considerable evidence of underreaction to several types of news.

Overreaction occurs when the average return following not one but a series of announcements of good news is lower than the average return following a series of bad news announcements. Using the same notation, overreaction verifies $E(r_{t+1}|z_t = B, z_{t-1} = B, \dots, z_{t-j} = B) < E(r_{t+1}|z_t = M, z_{t-1} = M, \dots, z_{t-j} = M)$, where j is at least one a probably high. This means that after a series of announcements of good news, the investors became overly optimistic that future news announcements will also be good and hence overreact. They will be expecting that the following announcements will also be positive and overreacts to them, making that the price assumes high values. After, the new effective announcements probably contradict that optimism, generating lower returns.

The statistical evidence about this two situations is numerous and the survey can be found in Barberis et al. (1998) and in Fama (1998). In this context it must be mentioned the work of Longhran and Ritter (1995), who analysed the overreaction case by studying the under performance of issuing firms.

3. The Public Offerings Event: The Portuguese Case

Following Loughran and Ritter (1995) study, we analysed the return rate series from companies issuing stock. The purpose was to analyse whether a public offering firm has been poor long-run investments for investors as Loughran and Ritter (1995) show for USA during 1970 to 1990. In this section we analyse the portuguese stock market in the period from 1987 till 2000, We compare two-year buy-and-hold returns on public offerings portfolios with the returns on portfolios that match the public offerings portfolios on size but exclude the public offerings.

3.1. Data

We use a sample of 75 operating companies that were listed since 1987 or that entered afterwards in the Lisbon Stock Exchange (Bolsa de Valores de Lisboa – BVL). Data on firms going public come from the book “O Mercado de Capitais Português”, 1999³.

We established two groups of firms, one group of issuing firms, and another of nonissuing firms.

From daily close prices we calculate the daily return rates as following:

$$r_{i,t} = \frac{C_{i,t} - C_{i,t-1}}{C_{i,t-1}},$$

where $r_{i,t}$ is the daily return rate of stock i in moment t and $C_{i,t}$ is the close price of stock i in moment t .

³ “Portuguese Capital Market”.

From issuing firms, we selected those that went public at least 2 years ago so that we could have enough data to analyse the impact in daily returns. This restriction limited our sample to only 10 issuing firms. These firms were separated in 3 sets according the year of the public offering: a set of 1995 public offering, a set of 1996 public offering and a set of 1997 public offering.

The analysis of the performance of issuing firms was for 2 years after the offering date.

3.2. Methodology

We constructed an equally weighted portfolio for the issuing firms in each of the 3 years: 1995, 1996 and 1997.

Then we compute the average return rate of those portfolios for 4 periods:

- P1- the first six months;
- P2 - the second six months;
- P3 - the first year;
- P4 - the second year.

Additionally we constructed equally weighted portfolio for the matching firms. The matching firms were selected from the initial sample. The selection criteria were the dimension of the firm and the fact that they didn't went public for the analysis period.

To assess the size of the companies we used their market capitalisation from the BVL annual bulletin. The firms are ranked by their market capitalisation. The firm with the closest market capitalisation to that of the issuing firm is then chosen as its matching firm.

As a result of these procedures, buy-and-hold rates of returns over identical intervals of time, with firms matched by dimension, are created for both issuing and nonissuing firms.

The matching by industry is not done because the market is too small and we didn't have enough firms in each industry.

3.3. Stock returns evidence

We report buy and hold returns for issuing and nonissuing separately for each of the year.

3.3.1. Issuing firms

For the year of 1995 we selected the following firms:

- Banco Pinto & Sotto Mayor;
- Portucel Industrial;
- SEMAPA – S. Inv. Gestão, SGPS.

We then compute the returns for the periods P1 (first six months), P2 (for the second six months), P3 (for the first year), and P4 (for the second year).

Table I
Buy and Hold Returns for the Issuing Firms
1995

Issuing Firms	Buy and Hold Returns (%)			
	Periods			
	First six months	Second six months	First year	Second year
Banco Pinto & Sotto Mayor	-12,23	9,92	-2,78	41,54
Portucel Industrial	-16,43	16,39	-0,53	41,78
SEMAPA – S. Inv. Gestão, SGPS.	27,96	24,73	57,41	286,56

Equally	-0,23	17,01	18,03	123,29
Weighted portfolio				

For the year of 1996 we selected the following firms:

- CIMPOR;
- Banco Totta & Açores;
- Telecel.

We calculated the rate of return for the four periods.

Table II
Buy and Hold Returns for the Issuing Firms
1996

Issuing Firms	Buy and Hold Returns (%)			
	Periods			
	First six months	Second six months	First year	Second year
CIMPOR	6,11	34,32	43,51	64,89
Banco Totta & Açores	-4,16	33,28	26,69	84,77
Telecel	50,53	29,50	89,05	268,63
Equally	17,49	32,37	53,09	139,43
Weighted portfolio				

For the year of 1997 we selected the following firms:

- Ibersol;
- Portugal Telecom;
- Mota & Companhia;
- Colep.

The returns calculated for the first six months, for the second six months, for the first year, and for the second year for this set are:

Table III
Buy and Hold Returns for the Issuing Firms
1997

Issuing Firms	Buy and Hold Returns (%)			
	Periods			
	First six months	Second six months	First year	Second year
Ibersol	239,27	-10,03	209,81	69,28
Portugal Telecom	37,37	-35,53	-10,11	10,76
Mota & Companhia	0	5,71	5,05	-37,24
Colep	37,00	-13,10	21,54	-48,51
Equally Weighted portfolio	69,16	-9,96	51,19	10,70

3.3.2. Matching Firms

For the year of 1995 we obtained the following matching companies:

- Mundial Confiança;
- Corticeira Amorim;
- Soares da Costa.

Following the same procedure we also calculated the returns for the first six months, for the second six months, for the first year, and for the second year.

Table IV
Buy and Hold Returns for the Nonissuing Firms
1995

Issuing Firms	Buy and Hold Returns (%)			
	Periods			
	First six months	Second six months	First year	Second year
Mundial	-23,60	34,17	3,04	106,48
Confiança				
Corticeira	-19,82	-3,49	-22,66	-8,79
Amorim				
Soares da Costa	-26,09	17,46	-13,69	112,24
Equally	-23,17	16,04	-11,11	69,98
Weighted portfolio				

For the year of 1996 the matching firms were:

- MODELO;
- Mundial Confiança;
- BMC.

The returns calculated for the first six months, for the second six months, for the first year, and for the second year for this set are:

Table V
Buy and Hold Returns for the Nonissuing Firms
1996

Issuing Firms	Buy and Hold Returns (%)			
	Periods			
	First six months	Second six months	First year	Second year
MODELO	24,90	46,15	81,91	-15,11
Mundial	58,15	31,72	106,49	307,46
Confiança				
BMC	0,39	24,45	25,43	47,24
Equally	27,81	34,11	71,28	113,20
Weighted portfolio				

Finally, for the year of 1997 the matching firms were:

- Atlantis;
- Modelo;
- Cin;
- Inapa.

The returns calculated for the first six months, for the second six months, for the first year, and for the second year for this set are:

Table VI
Buy and Hold Returns for the Nonissuing Firms
1997

Issuing Firms	Buy and Hold Returns (%)				
	Periods				
	First six months	Second six months	First year	Second year	
Atlantis	20,11	-14,82	5,08	-42,48	
Modelo	64,81	-76,94	-63,04	-64,57	
Cin	21,43	7,09	30,04	-32,26	
Inapa	3,50	32,97	37,38	7,63	
Equally	26,59	-21,17	-6,98	-34,83	
Weighted portfolio					

3.4. Statistical Tests

We tested the hypothesis of equal return averages for the equally weighted issuing stock ortfolios and the equally weighted matching stock prtfolios.

The test was:

$$H_0: \bar{r}_i = \bar{r}_m$$

$$H_1: \bar{r}_i \neq \bar{r}_m$$

Where \bar{r}_i is the returns average for the equally weighted issuing stocks portfolios and \bar{r}_m is the returns average for the equally weighted matching stocks portfolios.

We compute the t statistic for the difference of averages in each of the four periods in analysis as we can see in the tables VII, VIII and IX.

Table VII
Average Annual Percentage Returns during the four periods considered after the event for Issuing Firms and their Matching Firms

	First six months	Second six months	First year	Second year
(1) Issuing Firms	-0,23	17,01	18,03	123,29
(2) Matching Firms	-23,17	16,04	-11,11	69,98
(3) t-Statistic for difference	1,61	0,08	1,38	0,59
(4) Critical Value at 95%	2,45	2,451	2,45	2,45

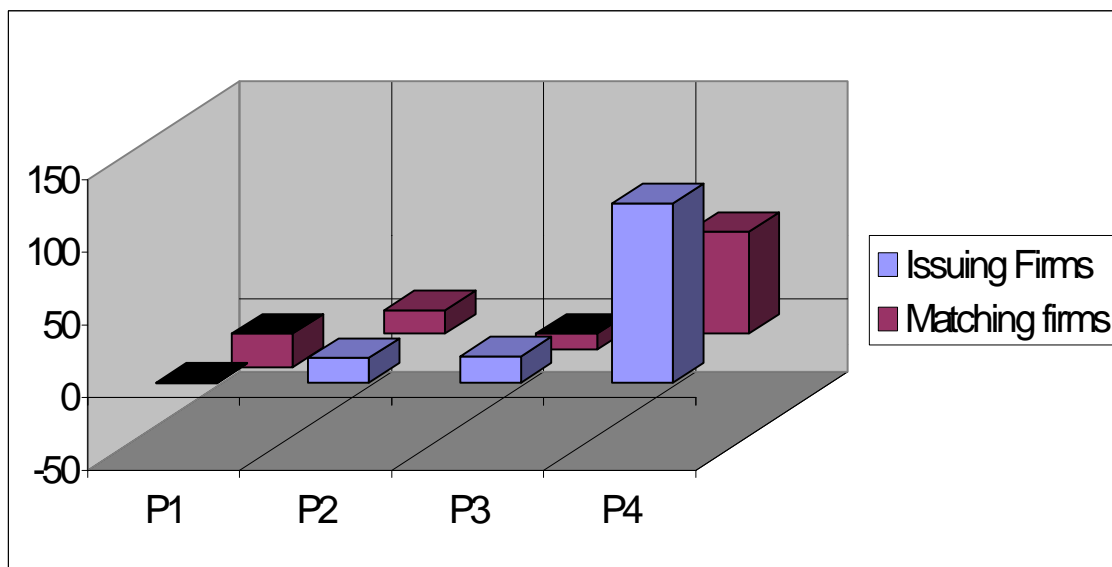


Figure 1

The average returns for issuing firms portfolio and their matching portfolio
1995

The average rates of return are semester for P1 and P2 and annual for P3 and P4. So we can't compare the average rates of return of P1 and P2 with the average rates of

return for P3 and P4. We centre the analysis in the difference between the return of the two portfolios in each period.

Table VIII
Average Annual Percentage Returns during the four periods considered after the event for Issuing Firms and their Matching Firms

		1996			
		First six months	Second six months	First year	Second year
(1)	Issuing Firms	17,49	32,37	53,08	139,43
(2)	Matching Firms	27,81	34,11	71,28	113,20
(3)	t-Statistic for difference	-0,44	-0,27	-0,60	0,22
(4)	Critical Value at 95%	2,45	2,45	2,45	2,45

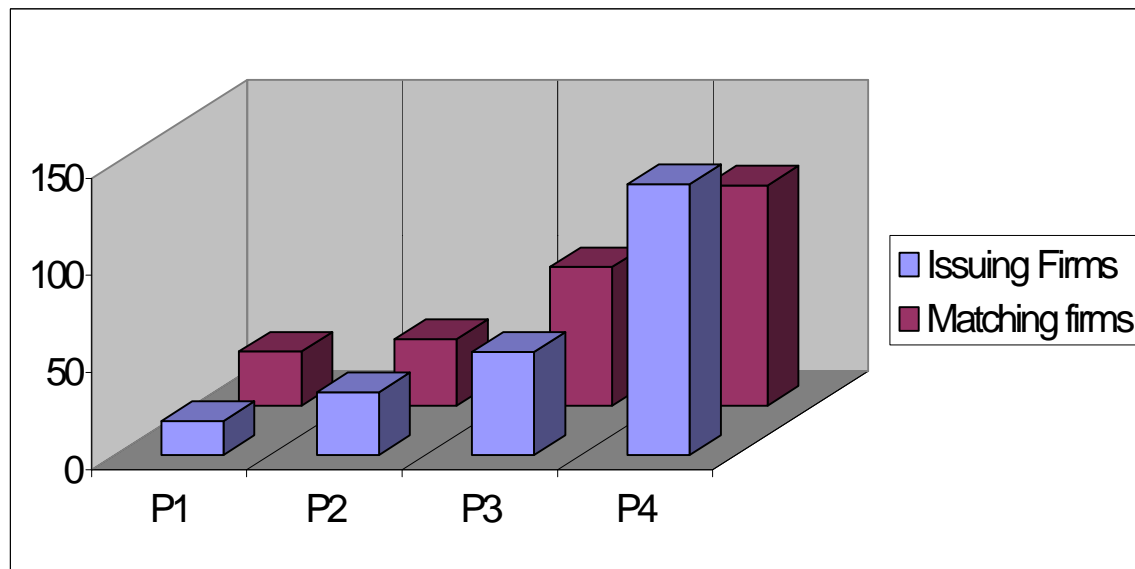


Figure 2

The average returns for issuing firms portfolio and their matching portfolio
1996

Table IX
Average Annual Percentage Returns during the four periods considered after the
event for Issuing Firms and their Matching Firms

1997

	First six months	Second six months	First year	Second year
(1) Issuing Firms	69,16	-9,96	51,19	10,70
(2) Matching Firms	26,59	-21,17	-6,98	-34,83
(3) t-Statistic for difference	0,77	0,56	1,07	1,93
(4) Critical Value at 95%	2,31	2,31	2,31	2,31

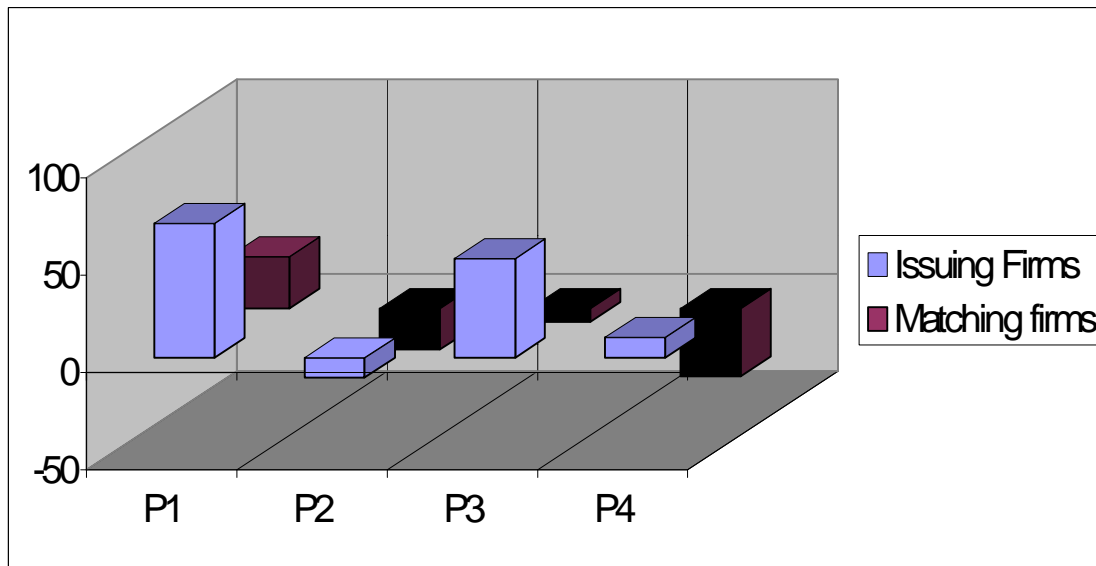


Figure 3

The average returns for issuing firms portfolio and their matching portfolio

1997

For issuing stock, returns are higher during each of the periods under analysis after issuing than on their size matched nonissuing firms. Apparently there is no underperformance relative to nonissuing firms.

The report of t statistics for the null hypothesis that the difference in returns between the issuing firms and their matching firms is zero, reinforces the above result. In fact, we can't reject the null hypothesis for each of the periods under analysis. Nevertheless an investor that invested in companies that recently went public would do a good choice compared with an investment in an equivalent stock.

A possible explanation for the good performance would be that half of the firms that went public registered a privatisation process conducted by the government in order to be a good investment for all investors. The government objectives were behind the economic purpose of getting funds.

4 Conclusions

One of the more striking of the long-term return anomalies is the study of public offerings by Loughran and Ritter (1995). This authors find that companies issuing stock during 1970 to 1990, whether an initial public offering or a seasoned equity offering significantly underperform relative to nonissuing firms for five years after the date of the event.

Our investigation does a similar study and concludes that there isn't a significant performance difference between issuing stock portfolios and nonissuing portfolio stock for two years. So when we consider this results we can't conclude that there is an overreaction phenomena in the Portuguese capital market in the studied period.

This evidence is substantially different from the related evidence in the literature. One of the possible reason to this issue is the process of privatisation in many sectors of the Portuguese economy since 1994.

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