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DINIS SANTOS

Faculty of Economics of the University of Coimbra, Portugal

PAULO GAMA

Faculty of Economics of the University of Coimbra, Portugal

CAN FIRMS TIME THE MARKET? EVIDENCE USING OWN STOCK TRANSACTIONS.

Abstract:

Can firms time the market? This paper uses hand collected data on 37997 own stock transactions from 2005 to 2015 of Euronext Lisbon listed companies to detect market timing for selling and buying transactions. Following Dittmar and Field (2015) the paper uses relative prices to ascertain the relative performance of own stock transactions. Results show that firms can time both repurchases as well as resales. Firms repurchase (resell) at lower (higher) prices than those prevailing in the market. Moreover, market timing ability proves to be higher after the bailout period and to be influenced by the own stock trading frequency. Trading on the open market allows for increased timing ability for own stock repurchasing and reselling activity. Finally, results show seasonality both in repurchases and resales performance.

Keywords:

Repurchases, Reselling, Own Stock, Opportunistic Behavior, Market Timing, Own Stock Transaction Performance, Repurchase, Resale

JEL Classification: G14, G15

1 Introduction

Can firms time the market? Recent literature shows ambiguous results when it comes to the firms' ability to time the market through own stock transactions.

While some authors defend that firms have market timing abilities (see, for example, Stephens and Weishbach (1998); Ikenberry, Lakonishok and Vermaelen (1995); Vermaelen and Ikenberry (1996); Chan, Ikenberry and Lee (2004) and Bonaimé and Ryngaert (2013), others are not so keen of its presence while trading own stock; Huang, Liano, and Manakyan (2013).

Although the subject of taking advantage of information asymmetries for market timing through own stock transactions is object of very relevant studies such as Lakonishok and Vermaelen (1990), Clark and Miller (2004), Niessner (2014), and Dittmar and Field (2015), where some of these authors even targeted insider trading¹ particularities also important to the repurchase literature, there is no real example of a study focusing on both repurchase and resell operations at the same time for the same firms. Thus, in this work, we try to cover this lack in results.

This paper contributes to the literature on own stock transactions and market timing, in several ways. First, we study both the repurchasing activity as well as the reselling activity of the same set of firms. Second, we extend the relative transaction price approach of Dittmar and Field (2015) to the daily frequency to avoid smoothing the data within the month. Third, we study the impact of the trading market that firms choose to trade (open market or over-the-counter), the impact of a significant economic event (the country bailout) and the impact of the trading frequency. Fourth, we study the existence of seasonality in the market timing performance. Fifth, we study a small European market, Portugal, a relatively overlooked market in relevant literature.

Why do firms trade own stock? There are several research pieces focusing not only on the profitability of own stock trading, but also on justifying what lead firms to trade own stock.

However, the related literature provides us with three main motivations for trading: the insider trading option model (Vermaelen and Ikenberry, 1996), the free-cash-flow hypothesis (Jensen, 1986), and the market-signaling hypothesis (Vermaelen, 1981).

Concerning the insider trading model (also called mispricing theory in the related literature, see Vermaelen and Ikenberry, 1996) the information is the key aspect. With privileged information, insiders can buy stock that is undervalued by not having reflected all the information. When this happens, the announcement period return is the option value of taking advantage from the uninformed outsiders. This concept is applicable to firms themselves.

¹ For more depth on insider trading see: Levine and Smith (2003); Balmforth, Burton, Cross, and Power (2007); Jagolinzer (2009); Henderson, Jagolinzer, and Karl A. Muller (2012) and Gong and Liu (2012).

The second main motivation for repurchasing, the free-cash-flow hypothesis (Jensen, 1986), suggests that repurchasing stock may increase the market value of the firm by decreasing free-cash-flow. Nonetheless, there is also disagreement among researchers. Contrarily to Jensen (1986), which was supported by Stephens and Weisbach (1998), other authors do not share the same opinion. When studying repurchase transactions via fixed price offers, Hower, He and Kao (1992) find that the market response to repurchases does not show major differences between firms both overinvesting and value-maximizing.

Finally, the third main motivation for repurchasing, the signalling hypothesis, shows that firms may use repurchases to signal positive information to the market. Vermaelen, (1981) shows that firms tend to offer a premium when repurchasing stock mainly to signal positive information. Consequently, the market uses that premium, as a signal for pricing the stock. This motivation is also defended by Comment and Jarrell, 1991, which add that the stock price increase coming from repurchases is even greater when insider wealth is at risk, and by Stephens and Weisbach (1998) which show that the repurchase activity of firms is negatively correlated with the previous performance of its stock. However, repurchasing own stock also increases the amount of risk on which the firm is involved, due to the simple fact that there is a higher exposure of the firms to the financial markets. Thus, because the risk exposure is higher, firms also want to keep positively signalling the market (McNally, 1999).

Along with these three main motivations, there some authors defending other advantages of repurchasing. The literature shows that by repurchasing firms are able to increase their leverage ratios (Opler and Titman (1996) and Dittmar (2000)), as well as to fend for takeovers and to dilute the effects of stock options (Bagwell (1991) and Dittmar (2000)). More, Jolls (1996), Fenn and Liang (1997), and Dittmar (2000) also defend that by repurchasing stock, firms are also diminishing the effects of the employees' stock options.

Although most of the related literature shows results in favour market timing capabilities when trading own stock, there are also some results that do not present such linearity.

Supporting the market timing hypothesis by showing positive results associated with trading own stock, Ikenberry, Lakonishok and Vermaelen (1995) analysed the long run performance of the stock prices of firms following market repurchase announcements. The authors found that the average abnormal return associated to a four-year buy and hold position was 12.1%. More specifically, the authors also pointed out undervaluation as the main motive for "value" stocks repurchase where the abnormal performance reached 45.3%. However, "glamour" stocks did not show any abnormal returns directly associated.

Focusing on the same subject, Stephens and Weisbach (1998) measured abnormal returns and found that share repurchases are related to prior stock performance, and that it suggests that firms increase their repurchasing activity based on the undervaluation degree of the stock.

Later on, and complementing their previous work, Ikenberry, Lakonishok and Vermaelen (2000) contributed to the literature by focusing outside the US. Thus, using a sample on Canadian firms, and accounting for the fact that Canadian laws require a monthly basis disclosure of the repurchase operations, they use a Fama-French three-factor model and find that firm's managers are sensitive to mispricing. Thus, repurchase activity is higher when undervaluation is present. They also find that, whenever prices fall (rise) impacts directly on the repurchase activity of managers.

In the same year, Chan Ikenberry and Lee (2004) also used the market reaction to earnings and the long-term returns to study the initial market reaction and reaction completion of the repurchasing activity. In their study, they firstly found abnormal returns linked to larger programs and more significant when firms repurchase in the year after the respective repurchase announcement.

On a more transversal note, Bonaimé and Ryngaert (2013) studied that sometimes, both insider trading and repurchasing work together. When using a sample of crossed operations, and by means of multinomial logit modelling and abnormal returns, they found that the insider trading frequency is linked to higher repurchasing activity. Also, repurchases made when insiders are selling are commonly used to support the stock price. But more, the authors find that there are abnormal returns associated with firms repurchasing when there is net insider buying. This happens on the first quarter after the repurchase operation and for the three years after the event.

More recently, Dittmar and Field (2015) studied the repurchasing activity in the United States using monthly data. They show that firms are in fact able to time the market. However, the ability to take advantage of timing strategies seems to diminish with the frequency of the repurchases. Moreover, making the bridge with insider trading, firms repurchasing in months with higher insider trading activity also buy at a significantly lower price.

However, there are also different results. As an example of an alternative justification for firms' performance while trading own stock, and in a way disfavoring the market timing hypothesis, Huang, Liano and Manakyan (2013) defend that abnormal returns are, in fact, due to undervaluation by the market and not due to positive information when announcing repurchases. They also state that firms repurchasing own stock do not tend to outperform other traders in the long run. Furthermore, these researchers also contribute by showing that there is a different interpretation of the signal from investors from different market industries, both in the short and long run reactions. Meaning that repurchasing own stock may not have the same impact on investors from different industries.

Following Dittmar and Field (2015), this paper uses relative prices to ascertain market timing. In relation to the typical approach² of using long-term returns, the use of relative

² For example, Ikenberry et al., (1995, 2000); Lakonishok and Vermaelen (1990), and also Peyer and Vermaelen (2009) and Ikenberry and Lee (2004) make use of abnormal returns to measure the performance of firms while trading own stock and therefore their ability to time the market.

prices as two main advantages. First, it allows to compare the firm's trading performance directly with other traders' performances. This while trading the same stock. Second, by using different benchmark periods, one can study the firms forecasting ability when it comes to its own stock price, as well as study how do firm comply while analysing its own past performance in order to decide its future transactions.

We use daily data to establish the event-date and the benchmark windows (with different lengths). This extension to the monthly approach of Dittmar and Field (2015) is designed to capture dissimilar trading activity within the month, and because calendar stock return effects can mitigate market timing due to excessive smoothing over the month. In an ever-growing speed of the financial markets and its transactions, monthly intervals may be missing too much information.

This paper focus on the Portuguese market, and uses a newly created dataset comprising 37997 own stock transactions from 2005 to 2015 of Euronext Lisbon listed companies. Our main results can be summarized as follows.

First, on the aggregate, firms show market timing capabilities when it comes to repurchasing own stock, at all benchmark periods (quarterly, monthly and weekly). The strongest result is find for the quarterly benchmark (the longest period) with a median relative transaction price of -0.0121296. However, while reselling, firms we only have evidence of market timing skills at the monthly and quarter benchmark periods. Also, firms proved to have the capacity to anticipate market moves, but only when repurchasing and for the shortest benchmark window (weekly).

Second, focusing on the subsampling studies, we show that firms could time the market both when repurchasing and reselling depending on the market. While repurchasing we find evidence of market timing capabilities on both open market and over the counter transactions. While reselling, evidence of market timing is find only on open market transactions. In both cases trading on the open market proved more favourable to firms. Once again, the best results are find on the quarterly median (RTP of -0.0123579 and 0.0044337 for repurchases and resells respectively). Regarding the bailout subsamples, results suggest that the bailout also influence the timing skills of firms. Results show that after the 1st of April 2011 firms obtained better results while both repurchasing and reselling own stock. Once again, the quarterly median RTP's presented the best results (RTP of -0.0173129 and 0.00456 for repurchases and resells respectively). Frequency wise, there is an unlikely effect coming from an increase in own stock trading. Within our study, moderate and frequent traders were the ones obtaining better results while trading own stock. This is true when repurchasing and reselling. Overall, the best results came from moderate traders, which suggests that there although a higher frequency influences positively the market timing ability of firms, there is also a threshold where this ability decays with an increase in frequency.

Third, we focus on the seasonality of trades. We show that, for repurchases, results are more favourable between August and December. Regarding the resales sample,

results are stronger in April and May. We also confirmed the previous findings (market, bailout and frequency) within a multivariate analysis framework.

The remaining of this paper is organized as follows. Section 2 describes the sample, the data-collection process and the calculation procedures. Section 3 presents and discusses the empirical results. Section 4 concludes.

2 Research Design

This section presents the data collection process, the calculation of the relative transaction price, the frequency classification criteria, and describes the sample.

2.1 Data collection

In order to study the ability to time the market when transacting own stock, we collected and individually analysed 821 disclosure documents, corresponding to a sample of 33 firms, containing data on own stock transactions from 2005 to March 2015.

These documents are made available by the CMVM on their website³ and correspond to the original PDF form uploaded by the firm. Because the number of disclosing firms may vary each year, so does the number of firms present in our sample.

According to the CMVM regulation Section II of the n. ° 5/2008 firms are required to disclose their own shares transactions (either repurchases or resells) when one of two thresholds is surpassed. The first threshold refers to the cumulative value of own shares transactions. The obligation arises when the corresponding value of such transactions adds up to 1% or successive multiples of the total nominal value of their shares (calculated since the last effective disclosure). The second threshold refers to market liquidity of the title. The obligation to disclose own shares transactions exists if in the same session, the transacted quantity goes beyond 0.05% of the listed shares transaction quantity.

Furthermore, there is a specific requirement accounting for the disclosure to held place within three days counting from the transaction date that surpassed one of the two thresholds above.

Because we work with data on a daily basis⁴, the items that occur within the same day were aggregated by calculating the weighted average daily trade price, separately for repurchase and resales in the open market, or over the counter.

³ The Portuguese Securities Market Commission, also known by its initials "CMVM", was established in April 1991 with the task of supervising and regulating securities and other financial instruments markets (traditionally known as "stock markets"), as well as the activity of all those who operate within said markets.

<http://www.cmvm.pt/en/Pages/homepage.aspx>,

⁴ The original pdf's may disclose own stock transactions' data trade by trade (the vast majority), or aggregated daily, or aggregated order by order (where each order may have been executed in several trades). The daily aggregation allows for comparability of these different situations.

Thus, the average daily transaction price, or trade price (TP), is calculated⁵ using the following formula:

$$\text{Average Daily Operation Price} = \sum_{i=0}^n \frac{\text{Operation Volume}_i \times \text{Operation Price}_i}{\text{Total Daily Volume Transacted}} \quad (1)$$

Where i stands as the identifier of a specific transaction, buy or sell, within a day and market, open market or over-the-counter.

Because each firm discloses its own operations, disclosing documents may contain errors from human origin. To minimize this bias, we apply several filters to the data. These filters checked for outbound price variations within each disclosure, incoherence between disclosure date and operation date within the disclosure, and mismatches between operation dates and dates where the market was open for transactions.

Also, because the reported documents contain historical values (prevailing at the time of the own stock transactions), the reported information is unadjusted to any capital event. To overcome this problem, we adjust the relevant price and volume information from the reported documents, to every capital change event with an adjustment factor different from zero, in the Thomson Reuters Eikon database. By doing so, we had a robust sample to compare with benchmarks produced with fully adjusted price and volume data, also from Thomson Reuters Eikon database.

2.2 Relative transaction price and frequency status

The Relative Transaction Prices (RTP) compares the average repurchase prices (average resale price) paid (received) by a firm during a specific period of time, the trade price (TP), and a chosen benchmark, the benchmark price (BP). We use the daily period to compute trade prices and 5-day, 22-day and 66-day length windows to compute the benchmark prices.

The sign of the relative transaction prices allows for an evaluation of the trading performance of firms, when buying or selling own stock in the context of this paper, in relation to other traders. A neutral performance is shown when the trade price (or average trade price) is insignificantly different from the benchmark price.

If the difference between the average trade price and the benchmark price is negative (positive) and statically significant, then we have evidence that firms are performing better than the other traders repurchasing (reselling) own stock, and thus are able to time the market.

⁵ We use PHP programing (Hypertext Preprocessor) to aggregate information more efficiently.

Specifically, inspired by Dittmar and Field (2015), we computed a set of event-centred benchmark prices (BP) using the following equation:

$$benchmark_{a-b} = \sum_{i=a}^b \frac{Daily\ Volume_i \times Daily\ Price\ Close_i}{Total\ Volume_{a-b}} \quad (2)$$

Where $a, b = \pm 5, \pm 22, \text{ or } \pm 66$ and corresponds to the day counter of the relevant estimation window. We use three windows: centered weekly window, $a = -5$ to $b = +5$; centered monthly window, $a = -22$ to $b = +22$; and, centered quarterly window, $a = -66$ to $b = +66$.⁶

The use of event centered estimation windows allows for the identification of local minima or local maxima in the series of market prices, thus taking into account into account not only the historical performance of prices but also its future expectations.

Specifically, we compute the relative transaction prices as follows:

$$Relative\ Transaction\ Price_{i,a-b} = \frac{Average\ Daily\ Operation\ Price_i}{benchmark_{a-b}} - 1 \quad (3)$$

Where the *Average Daily Operation Price_i*, corresponds to the specific transaction day average price (see equation 1) and the *Benchmark_{a-b}* corresponds to the average close price in one of the previously calculated benchmarks (see equation 2).

To better understand the timing skills of firms, we also calculated forward looking relative transaction prices by dropping the minus part of the centered estimation window for the benchmark prices. Specifically, we use the following equation:

$$Relative\ Transaction\ Price\ (fwd)_{i,0-b} = \frac{Average\ Daily\ Operation\ Price_i}{benchmark_{0-b}} - 1 \quad (4)$$

Where the *Average Daily Operation Price (fwd)_i*, corresponds to the specific transaction day average price (see equation 1) and the *Benchmark_{0-b}* corresponds to the average close price in one of the benchmarks weekly, 0 to +5, monthly, 0 to +22, and quarterly, 0 to +66.

Also, variation of trading activity across firms and over time, is an issue that we expected to find, and thus influencing traders timing skills. Different firms with different trading frequencies may attain different results when trading own stock, and although one may think of a small own stock trading frequency to be associated with lack of experience, thus a lower capacity of market timing, one may also believe that the market can learn the pattern of a firm with a very high own stock trading frequency reducing the market timing capabilities. Adding to this, trading very frequently reduces

⁶ These are the typical number of trading days per week (5-day window), month (22-day window) and quarter (66-day window).

the available market timing windows due to simple time constraints. Thus, there are pros and cons of trading at a given frequency.

For this reason, to classify the frequency status of each firm, we look at the typical trading days per year (255 days) in the Portuguese market (Euronext Lisbon) and, each year, we classify a firm as a frequent trader, a moderate trader or an infrequent trader.

In a given year, a frequent trader is a firm that in that year trades in more than 15% of the typical year trading days. Likewise, in a given year, a moderate trader is a firm that trades in more than 5% of the typical year trading days but in less than 15% of the typical year trading days. Finally, in a given year, an infrequent trader is a firm that trades in less than 5% of the typical years trading days.⁷

2.3 Sample description

Table 1 presents a description of our sample. We ended up with 3740 aggregated daily observations, regarding four distinct types of transactions. Thus, our sample has data on 2839 repurchase transactions from which 2730 took place on the open market and 109 over the counter.

Regarding the resales transactions, we account for 899 total transactions from which 591 were made on the open market and 308 over the counter.

Table 1: Sample description

| Year | Transactions (daily) | | Market | | Firms trading own stock | | | |
|--------------|----------------------|---------|-------------|-----|-------------------------|------------|------------|--------------|
| | Repurchase | Resales | Open Market | OTC | N | Frequent % | Moderate % | Infrequent % |
| 2005 | 282 | 139 | 289 | 132 | 26 | 25.00% | 8.33% | 66.67% |
| 2006 | 185 | 209 | 304 | 90 | 26 | 25.00% | 16.67% | 58.33% |
| 2007 | 218 | 193 | 312 | 99 | 29 | 21.43% | 14.29% | 64.29% |
| 2008 | 421 | 93 | 456 | 58 | 28 | 33.33% | 26.67% | 40.00% |
| 2009 | 268 | 33 | 290 | 11 | 28 | 21.43% | 21.43% | 57.14% |
| 2010 | 215 | 41 | 253 | 3 | 28 | 18.18% | 36.36% | 45.45% |
| 2011 | 646 | 122 | 766 | 2 | 27 | 38.46% | 7.69% | 53.85% |
| 2012 | 256 | 9 | 257 | 8 | 27 | 18.18% | 54.55% | 27.27% |
| 2013 | 47 | 6 | 52 | 1 | 29 | 0.00% | 14.29% | 85.71% |
| 2014 | 183 | 52 | 225 | 10 | 29 | 9.09% | 36.36% | 54.55% |
| 2015 | 118 | 2 | 117 | 3 | 29 | 25.00% | 0.00% | 75.00% |
| Total | 2839 | 899 | 3321 | 417 | | | | |

Source: Authors Calculations.

This table presents the number of observations after daily aggregation available for each year between 2005 and 2015, regarding all the distinct types of transactions; Repurchases, and Resales, as well as segmentation by market type (Open Market vs Over the Counter).

⁷ We note that the frequency status is evaluated year by year and not for the full sample. As such, one firm may have one status in one year and another in a different year.

It also presents the number of firms that traded in each year and the % distribution of firms classified as Infrequent, moderate and frequent by each year. This classification is based on the daily transaction count over the total transaction days available in each year. Firms that transacted in less than 5 % of all available transaction days are considered infrequent traders, the ones that transacted in between 5% and 15% of the total available transition days are considered moderate traders, and finally the ones that transacted in more than 15% of all the transaction days are considered frequent traders.

Table 1 also presents the firms' frequency distribution as a percentage of the total firms that traded in each year of the sample. Here we notice that globally, we have a larger group of infrequent traders, followed by the moderate and at last the frequent traders group. Curiously, 2012 was the only year where we did not have a larger group of infrequent traders within the sample. In this year the moderate group accounted for more than 54% of the total trading firms.

Furthermore, table 1 also shows us that total firm trading day events⁸ is relatively high in all sample years except in 2013 where it only reaches 52.

3 Empirical results and discussion

In this section, we present the results of each one of our analysis. Firstly, at an aggregate level, secondly the subsample analysis, and thirdly the seasonality results.

3.1 Aggregate Results

Table 2 presents the mean and median RTP results. Since we do not know the distribution pattern of the relative transaction prices, we firstly applied the Shapiro – Wilk W^9 test for normality to the different RTP's samples. The results of the tests presented in Table 2 show that, both the repurchase and resell samples did not follow a normal distribution. Therefore, these results support our decision of using medians instead of averages as a measure for comparing performance throughout the remaining of this work.

⁸ The number of total firm trading day events corresponds to the summation of daily hits in which the companies that traded in the corresponding year went to the market independently of repurchasing, reselling or if the transaction was made on the open market or over the counter.

⁹ The Shapiro–Wilk test is a test of normality in frequentist statistics. Published in 1965 by Samuel Sanford Shapiro and Martin Wilk it is commonly used to test series follows or not a normal distribution.

Table 2: Aggregate results

| Panel A: Centered RTP's | | | | | |
|---------------------------------------|-----------------|------------------------|-------------------|------------------------------------|---------------------------------|
| Panel A1: Repurchase Activity | | | | | |
| | Mean RTP | Shapiro –Wilk W | Median RTP | Wilcoxon Signed Rank Test z | Statistical significance |
| LT: RTP -66to66 | -0.0168227 | 0.000 *** | -0.0121296 | -10.094 | 0.000 *** |
| MT: RTP -22to22 | -0.0088257 | 0.000 *** | -0.0054182 | -9.350 | 0.000 *** |
| ST: RTP -5to5 | -0.004491 | 0.000 *** | -0.0022183 | -8.407 | 0.000 *** |
| Panel A2: Selling Activity | | | | | |
| LT: RTP -66to66 | -0.0164343 | 0.000 *** | -0.0035075 | -3.443 | 0.0006 *** |
| MT: RTP -22to22 | -0.0031594 | 0.000 *** | -0.0014954 | -1.786 | 0.0741* |
| ST: RTP -5to5 | .0027049 | 0.000 *** | -0.0007297 | -0.094 | 0.9253 |
| Panel B: Forward looking RTP's | | | | | |
| Panel B1: Repurchase Activity | | | | | |
| | Mean RTP | Shapiro –Wilk W | Median RTP | Wilcoxon Signed Rank Test z | Statistical significance |
| LT: RTP 0to66 | .0096029 | 0.000 *** | .0050427 | 3.194 | 0.0014*** |
| MT: RTP 0to22 | -0.0006419 | 0.000 *** | -0.0002739 | -1.248 | 0.2122 |
| ST: RTP 0to5 | -0.0022432 | 0.000 *** | -0.0010304 | -5.005 | 0.0000*** |
| Panel B2: Selling Activity | | | | | |
| LT: RTP 0to66 | -0.0070957 | 0.000 *** | -0.0040907 | -2.360 | 0.0183** |
| MT: RTP 0to22 | -0.0040189 | 0.000 *** | -0.0044258 | -1.552 | 0.1207 |
| ST: RTP 0to5 | .0009379 | 0.000 *** | -0.0018215 | -0.863 | 0.3883 |

Source: Authors Calculations.

This table presents the Mean and Median Results for the Relative Transaction Prices corresponding to the all the selected transactions and benchmarks (indicated in column 1). Panel A focus on centered RTP's and panel B on forward looking RTP's. RTP stands for Relative Transaction Price. -5to5, -22to22, -66to66, 0to5, 0to22 and 0to66 stands for the time interval of the benchmark used in the calculation, that is, centered or forward-looking benchmarks respectively. The Shapiro –Wilk W test for normality was used to test data distribution. Median statistical significance levels were calculated with recourse to the Wilcoxon Signed Rank. P-values are presented in italics. ***, ** and * show statistical significance at a level of 1, 5 and 10% respectively.

Panel A1 of Table 2 present the results for the centered benchmarks and repurchasing activity. On the aggregate, the results show that regarding the repurchase activity, we find negative median RTP's and therefore proof of market timing capabilities when it comes to repurchasing own stock. The price firms paid for transaction when compared to other traders was indeed smaller. This is true for all benchmarks quarterly, monthly and weekly. Here, the quarterly median RTP presented the most negative result (RTP = -0.0121296), suggesting better market timing skills at the longest benchmark time period, rather than at the shortest benchmarking period. At the aggregate, this result goes hand in hand with what was previously found by Dittmar and Field (2015) regarding the repurchase activity.

Panel A2 of Table 2 present the results for the centered benchmarks and reselling activity. With the exception of the short-term window non-significant positive RTP, the other RTP are negative. On the reselling activity, negative RTP show that, on the aggregate, firms have been reselling their stock at a relatively lower price when compared to other traders on the market. Thus, showing no market timing capabilities. When trying to benchmark our results with the related literature, we noticed that there are no studies focusing on reselling activity using our approach to measure market timing skills. Thus, no comparison is possible.

We also questioned ourselves on the forecasting skills of firms while trading own stock. Panel B1 of Table 2 presents the results concerning the forward looking benchmarks and repurchasing activity. The results show that only in the shortest term, that is in the week following the event day, firms can anticipate market upturns. The only statically significant negative is $RT=0$ to 5. Panel B2 of Table 2 presents the results concerning the forward looking benchmarks and reselling activity. The statistical insignificance of the median RTP and the negative sign, suggest that, on the aggregate, firms have no forecasting skills at all benchmarks periods when deciding to resell own stock. In what concerns the repurchase activity, this is similar to Dittmar and Field (2015) where the authors show that the ability to time the market is limited to short horizons.

Within this first set of results, we find that firms, while repurchasing can time the market, and that this result is valid using centered or forward looking RTP's. The same cannot be concluded regarding the reselling activity. However, not all firms trade the same way. Thus, further analysis is necessary.

Overall, and not accounting for applied methodologies, our results support the findings of Ikenberry, Lakonishok and Vermaelen (1995), Stephens and Weishbach (1998), Ikenberry, Lakonishok and Vermaelen (2000), Chan Ikenberry and Lee (2004) and Bonaimé and Ryngaert (2013), when focusing on the performance of repurchasing.

3.2 Subsample analysis

First, we test for differences between own stock market timing in the open market and over the counter, either for repurchases as well as resells.

Panel A of Table 3 presents the results for repurchases. Concerning timing repurchases, no statistical significant differences are found between markets. However, median RTP are negative in the open market and negative or indistinguishable from zero over the counter, suggesting higher timing performance when trading in the organized exchange.

Table 3: Market related subsamples

| Panel A: Repurchase Activity | | | |
|-------------------------------------|-------------------------|-------------------------|---------------------|
| | Open Market | Over the Counter | W |
| RTP -66 to 66 | -.0123579 (0.000***) | .0051324 (0.2426) | -0.448 (0.6539) |
| RTP -22 to 22 | -.0054968 (0.000***) | -.0012642 (0.0517*) | 0.844 (0.3986) |
| RTP -5 to 5 | -.0022147 (0.000***) | -.0023762 (0.0417**) | 1.034 (0.301) |
| Panel B: Resell Activity | | | |
| | Open Market | Over the Counter | W |
| RTP -66 to 66 | .0044337 (0.9386) | -.0183972 (0.000***) | 5.230 (0.000***) |
| RTP -22 to 22 | .0043257 (0.0216**) | -.0128251 (0.000***) | 6.417 (0.000***) |
| RTP -5 to 5 | .0010544 (0.0004***) | -.0038421 (0.000***) | 5.761 (0.000***) |

Source: Authors Calculations.

This table shows the median RTPs for both repurchases and Resells on the open market as well as over the counter. Panel A refers to repurchases operations and Panel B refers to reselling operations. RTP stands for Relative Transaction Price and -5 to 5, -22 to 22, -66 to 66, stands for the time interval of the benchmark used in the calculation giving us centered relative transaction prices.

Open market and OTC transactions are identified in the mandatory disclosure form. W columns refer to the two sample Wilcoxon rank-sum test for crossed sample statistical significance (open market vs over the counter). We also present the results for the Wilcoxon signed rank test for individual statistical significance of medians. P-values are presented in *italics*. ***,** and * show statistical significance at a level of 1, 5 and 10% respectively.

Panel B of Table 3 presents the results for the reselling activity. Results show that positive median RTP's characterize open market activity, while negative median RTP characterize over the counter transactions. Moreover, differences are statistically significant. As such, the results suggest that firms can time selling own stock only in the open market.

Second, we test for the impact of the 2011 bailout by the European Union (EU) and the International Monetary Fund (IMF) and the economic crisis that follows.¹⁰

Panel A of Table 4 presents the results for repurchases. All median RTP's (weekly, monthly and quarterly) display a negative signal and are individual statistically significant, which can be considered evidence of market timing capabilities of firms both previously and after the bailout. However, when we compare the RTP's from both subsamples, we notice that after the bailout the RTP's were negatively stronger (except

¹⁰ The bailout period can be identified as having started in April 2011 (Fernandes, Gama and Vieira, 2015).

for the short term window), meaning that the firms did, in fact, obtained better results while repurchasing stock after the bailout. In the short term, the period after the bailout yielded economically more interesting timing results, but statistically indifferent from the previous period.

Table 4: Bailout related subsamples

| Panel A: Repurchase Activity | | | |
|-------------------------------------|---------------------------------------|---------------------------------------|------------------------------------|
| | Pre-bailout | Bailout | W |
| RTP -66 to 66 | -.0086097 (0.000 ^{***}) | -.0173129 (0.0003 ^{***}) | 4.361 (0.000 ^{***}) |
| RTP -22 to 22 | -.0034995 (0.000 ^{***}) | -.0081729 (0.000 ^{***}) | 3.454 (0.0006 ^{***}) |
| RTP -5 to 5 | -.001196 (0.000 ^{***}) | -.0030477 (0.000 ^{***}) | 1.551 (0.1209) |
| Panel B: Resell Activity | | | |
| | Pre-bailout | Bailout | W |
| RTP -66 to 66 | -.0095921 (0.0034 ^{***}) | .00156 (0.0124 ^{**}) | -1.343 (0.1793) |
| RTP -22 to 22 | -.0072303 (0.0108 ^{**}) | -.000751 (0.4236) | -1.834 (0.0667) |
| RTP -5 to 5 | -.0058525 (0.0085 ^{***}) | .0000699 (0.2643) | -3.143 (0.0017 ^{***}) |

Source: Authors Calculations.

This table shows the forward looking RTPs for both repurchases and Resells during the pre-bailout period and after the bailout period. Panel A refers to repurchases operations and Panel B refers to reselling operations. RTP stands for Relative Transaction Price and -5 to 5, -22 to 22, -66 to 66, stands for the time interval of the benchmark used in the calculation giving us centered relative transaction prices. Pre-bailout ends in April 2011. W columns refer to the two sample Wilcoxon rank-sum test for crossed sample statistical significance (pre bailout vs pos bailout). We also present the results for the Wilcoxon signed rank test for individual statistical significance of medians. P-values are presented in *italics*. ^{***}, ^{**} and ^{*} show statistical significance at a level of 1, 5 and 10% respectively.

Panel B of Table 4 presents the results for the reselling activity. Previously to the bailout, firms do not show any skills in timing the market. This is shown by the negative RTP's for all the benchmarked periods. However, after the bailout, the quarterly RTP (which is the only result showing statistical significance), presents a positive value (0.00156) and therefore shows market-timing abilities while reselling own stock.

Overall, the post-bailout period proved to be when firms obtained better results while trading own stock, both repurchasing and reselling.

Finally, we compare market-timing performance across the frequency status classification of trading firms: infrequent, moderate or frequent trading groups.

Panel A of Table 5 presents the results for repurchases. It is noticeable that all median RTP's show a negative sign, suggesting market timing skills of firms in all categories of trading frequency. However, statistically robust results are found only for the infrequent and moderate groups and at the long-term window for the frequent group. Moreover, economically, results are stronger for the moderate group (median RTP more negative). Median RTP's in the moderate group take the minimum (negative) value of -0.0030655

and the maximum (negative) value of -0.0224125 in the weekly and quarterly RTP's respectively. On the other groups, both infrequent and frequent, the trend is also the same. Best results are shown by the quarterly RTP and less satisfactory results by the weekly RTP.

Table 5: Frequency related subsamples

| Panel A: Repurchase Activity | | | | |
|------------------------------|--------------------------|-------------------------|--------------------------|-------------------------------|
| | Infrequent | Moderate | Frequent | W (Frequent vs Infrequent) |
| RTP -66 to 66 | -.0056012 (0.5205) | -.0224125 (0.000***) | -.0097314 (0.000**) | -2.373 (0.0177**) |
| RTP -22 to 22 | -.0009408 (0.2637) | -.0061654 (0.000***) | -.0056772 (0.000**) | 0.083 (0.6480) |
| RTP -5 to 5 | -.0010331 (0.2793*) | -.0030655 (0.000***) | -.0021062 (0.000**) | 0.359 (0.7198) |
| Panel B: Resell Activity | | | | |
| | Infrequent | Moderate | Frequent | W (Frequent vs Infrequent) |
| RTP -66 to 66 | -.0127128 (0.3534) | -.0080087 (0.4110) | -.0028848 (0.0007***) | 0.193 (0.8473) |
| RTP -22 to 22 | -.0118154 (0.0233**) | .0131428 (0.0050***) | -.0035409 (0.0114**) | 1.851 (0.0641*) |
| RTP -5 to 5 | -.0072374 (0.0182***) | .0047086 (0.0253**) | -.0010814 (0.5997) | 0.690 (0.4902) |

Source: Authors Calculations.

This table shows the forward looking RTPs for both repurchases and Resells for different groups of firms classified according to the frequency of own stock trading. Panel A refers to repurchases operations and Panel B refers to reselling operations. RTP stands for Relative Transaction Price and -5 to 5, -22 to 22, -66 to 66, stands for the time interval of the benchmark used in the calculation giving us centered relative transaction prices.

In a given year, a firm is classified as frequent (infrequent) if she trades in more than (less than) 15% (5%) of the typical year trading days. A firm is classified moderate if she trades in more (less) than 5% (15%) of the typical year trading days.

W columns refer to the two sample Wilcoxon rank-sum test for crossed sample statistical significance (frequent vs infrequent). We also present the results for the Wilcoxon signed rank test for individual statistical significance of medians. P-values are presented in *italics*. ***,** and * show statistical significance at a level of 1, 5 and 10% respectively.

Panel B of Table 5 presents the results for the reselling activity. Only moderate firms seem to show market timing capabilities (statistical significant positive median RTP), and at the weekly (median RTP = 0.0047086) and monthly (median RTP = 0.0131428) benchmarking periods.

Differently to Dittmar and Field (2015), where less frequent firms were the one obtaining lower prices when repurchasing, our results suggest that although a higher frequency as a positive impact on the market timing skills of firms while trading own stock, this effect is only valid when the initial frequency is very low. After a moderate threshold, an increase on the trading frequency seems to have a contrary effect, decreasing the firm's ability to time the market.

No other study was found regarding the market where the transaction is made, the bailout effect or even the activity frequency.

3.3 Seasonality

In this section, we look at seasonal effects on the distribution of median RTPs. Are there better months for timing the market? That is, do firms achieve different results conditional on the month of trading? If so, we collect evidence on seasonality on market timing skills.

For this, we estimate by OLS, separately for repurchases and resells, a pooled regression on the medians using the RTP's as dependent variables and monthly dummy as independent variables. We also used three additional variables to control for the previously identified effects: one dummy for transactions made OTC; another dummy for transactions made after the bailout; and two dummy variables accounting for frequent traders and infrequent ones.

To deal with collinearity present by including all monthly dummies in the model, we decided to drop July from the analysis due to its lower number of observations and thus reducing the loss of data. The model equation is as follows:

$$RTP_{it} = \alpha + \beta_1 January_{it} + \beta_2 February_{it} + \beta_3 March_{it} + \beta_4 April_{it} + \beta_5 May_{it} + \beta_6 June_{it} + \beta_7 August_{it} + \beta_8 September_{it} + \beta_9 October_{it} + \beta_{10} November_{it} + \beta_{11} December_{it} + \beta_{12} Afterbailout_{it} + \beta_{13} Frequent_{it} + \beta_{14} Infrequent_{it} + \beta_{15} OTC_{it} + \mu_{it} \quad (5)$$

Where, RTP_{it} – Stands for the Relative Transaction Price for each benchmark; α – is the model constant; β_n – is the coefficient coming from the respective regressor; the monthly regressors are dummy variables which take the value 1 if the trade is made on the specific month and 0 otherwise; Afterbailout is a dummy variable turning 1 if the transaction is made after the bailout; Frequent is a dummy variable turning 1 if the transaction is made by firms which are classified as frequent traders and 0 otherwise; Infrequent is a dummy variable turning 1 if the transaction is made by firms which are classified as infrequent and 0 otherwise and; OTC is a dummy variable turning 1 if the transaction is made over the counter.

Increases in the market timing capabilities are measured in negative (positive) impacts on the repurchase (resell) related RTP's.

Table 6 presents the results. We notice that, for repurchases, and although scattered, results are more favourable between August and December, thus, through these month firms show higher capabilities of timing the market. Our regression coefficient proved more powerful within these months (a higher negative value) and present higher levels of statistical significance.

Table 6: Seasonality

| | Panel A: Repurchase Activity | | | Panel B: Resell Activity | | |
|-----------------------------|------------------------------|-------------------------|-------------------------|--------------------------|-------------------------|-------------------------|
| | RTP -66 to 66 | RTP -22 to 22 | RTP -5 to 5 | RTP -66 to 66 | RTP -22 to 22 | RTP -5 to 5 |
| January | .0077215 (0.175) | -.0081391 (0.030**) | -.0024838 (0.014**) | -.0204791 (0.169) | -.0161622 (0.037**) | -.0037373 (0.322) |
| February | .0033615 (0.555) | -.0015389 (0.683) | -.002128 (0.035**) | -.0886516 (0.000***) | -.0417091 (0.000***) | -.0014612 (0.699) |
| March | .0108889 (0.049**) | -.0078227 (0.032**) | -.0038385 (0.000***) | .0082434 (0.581) | -.0119612 (0.125) | -.0038806 (0.307) |
| April | .0140974 (0.014**) | -.0088915 (0.019**) | -.0022189 (0.029**) | .0384367 (0.019**) | .0077616 (0.362) | -.0006535 (0.876) |
| May | .0190461 (0.001***) | -.0058283 (0.140) | -.0015673 (0.138) | .0761653 (0.000***) | .0038347 (0.640) | -.0011315 (0.777) |
| June | -.0023885 (0.687) | -.0087529 (0.026**) | -.0012889 (0.218) | .0006463 (0.976) | .0111327 (0.332) | .0101958 (0.068) |
| August | -.0182276 (0.005***) | -.020026 (0.000***) | -.0080865 (0.000***) | .0364635 (0.028**) | -.0014506 (0.866) | .000251 (0.952) |
| September | .0047029 (0.460) | -.0102986 (0.014**) | -.0054908 (0.000***) | .0227484 (0.187) | .0034499 (0.700) | .0023524 (0.590) |
| October | -.0016871 (0.775) | -.0040391 (0.301) | -.0036985 (0.000***) | .0393372 (0.029**) | .0102362 (0.274) | .0041412 (0.364) |
| November | -.0309623 (0.000***) | -.0165801 (0.000***) | -.0030582 (0.003***) | .0071418 (0.661) | -.0080021 (0.345) | -.0022994 (0.577) |
| December | -.0306831 (0.000***) | -.0226992 (0.000***) | -.0050312 (0.000***) | -.0709992 (0.000***) | -.0344793 (0.000***) | -.0045148 (0.273) |
| AfterBailout | -.0050852 (0.027**) | -.0060276 (0.000***) | -.0012616 (0.002***) | .0251073 (0.004***) | .0205665 (0.000***) | .010676 (0.000***) |
| Frequent | .0126036 (0.000***) | .0025651 (0.148) | .0004681 (0.325) | -.0069413 (0.494) | -.010472 (0.045**) | -.0035888 (0.157) |
| Infrequent | .0183367 (0.000***) | .0088136 (0.005***) | .0025687 (0.002***) | -.0087179 (0.590) | -.0363206 (0.000***) | -.0104772 (0.010***) |
| OTC | .0051504 (0.363) | -.0003282 (0.930) | .0004527 (0.652) | -.0202508 (0.003***) | -.0147819 (0.000***) | -.0058363 (0.001***) |
| Const | -.0184254 (0.001***) | .0043432 (0.220) | .0008209 (0.386) | -.0198548 (0.216) | .0053894 (0.514) | -.0029215 (0.470) |
| Pseudo R² | 0.0420 | 0.0193 | 0.0045 | 0.1261 | 0.0578 | 0.0168 |

Source: Authors Calculations.

This table presents in Panel A (Panel B) the median regressions for the repurchase (resell) operations over the dummy variables for each month within the sample. At the sample level the month of July was chosen as to drop variable due to its smaller number of observation, thus avoiding collinearity in the regression. The aim of the estimation is to find seasonality evidence. RTP stands for Relative Transaction Price and -5 to 5, -22 to 22, -66 to 66, 0 to 5, 0 to 22, 0 to 66, stands for the time interval of the benchmark used in the calculation giving us forward looking relative transaction prices. Heteroskedasticity and autocorrelation robust standard errors are used. ***, ** and * show statistical significance at a level of 1, 5 and 10% respectively.

Regarding the resales sample, results are less concluding. However, April and May do show strong results when looking at the quarterly RTP regression.

Also, results confirm our previous conclusion on what concern the market, bailout, frequent and infrequent classifications.

For the statistical significant coefficients, we show that over the counter transactions have a negative impact on the market timing ability of firms while reselling own stock, the bailout positively impacts on the firm's ability to time the market in both types of operations, and an increase (decrease) large enough to change the moderate threshold

regarding the frequency of trading negatively impacts the market timing capabilities of firms when trading own stock. Once again, increases on market timing capabilities are given by negative coefficients when reading the repurchase median RTP's regressions results and positive ones when reading the reselling median RTP's regressions results.

4 Conclusions

The present study uses a relative transaction price approach to study a never used sample of trading data comprising both repurchase and reselling operations, as well as transactions made on the open market as well as over the counter.

Our dataset comprises 37997 individual own stock transactions made by Portuguese firms, between 2005 and 2015.

On the aggregate, we find that firms are, in fact, capable of market timing, although at first, this result is true only for repurchase operations. Additionally, firms also showed forecasting capabilities when it comes to repurchasing own stock.

Concerning the market chosen for trading, results show that firms proved to be able to time the market through repurchasing operations both on the open market and over the counter and through reselling on the open market also. Focusing on the bailout effect, we found that after the bailout firms obtained better results while both repurchasing and reselling own stock. Moreover, when we focused our attention to the frequency of trades, we found that moderate traders were the ones obtaining better results while trading own stock. This is true when repurchasing and reselling. It seems to exist an increase of market timing capabilities with an increase in the frequency of trading but only until a certain point, from which afterwards the effect is the contrary and reduced the market timing capabilities of firms. These results also corroborate in a multivariate setting.

At last, our analysis of seasonality, suggests that August and December are months more favourable for repurchasing, while April and May are months more favourable for reselling own stock.

These results suggest an opportunistic behaviour by firms when trading both in the open market as well as over the counter, thus, this is a direct contribute to the own stock transactions literature. Moreover, we also contribute by showing that, repurchasing and reselling are found to be an efficient tool for timing the market individually, that the frequency of trading is indeed a factor to account for while attempting to time the market while trading own stock, and that firms do perform better in different periods of time within the year, depending if repurchasing or reselling.

At last, we also help on the Portuguese bailout literature by showing that, indeed, after the bailout firms performed better while trading own stock.

For future studies, we aim to explain the previous results using focus on the daily effects of trading own stock (day trading) we also aim to identify which firm specific characteristics explain market timing skills. Could it be a corporate governance failure?

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