



Share Repurchases During The Financial Crisis

ΓΕΩΡΓΟΠΟΥΛΟΥ ΒΑΣΙΛΙΚΗ

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ως μέρος των απαιτήσεων για την απόκτηση

Μεταπτυχιακού Διπλώματος Ειδίκευσης

Αθήνα

{Οκτώβριος, 2016}

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«Δηλώνω υπεύθυνα ότι η συγκεκριμένη πτυχιακή εργασία για τη λήψη του Μεταπτυχιακού Διπλώματος Ειδίκευσης στη Λογιστική και Χρηματοοικονομική έχει συγγραφεί από εμένα προσωπικά και δεν έχει υποβληθεί ούτε έχει εγκριθεί στο πλαίσιο κάποιου άλλου μεταπτυχιακού ή προπτυχιακού τίτλου σπουδών, στην Ελλάδα ή στο εξωτερικό. Η εργασία αυτή έχοντας εκπονηθεί από εμένα, αντιπροσωπεύει τις προσωπικές μου απόψεις επί του θέματος. Οι πηγές στις οποίες ανέτρεξα για την εκπόνηση της συγκεκριμένης διπλωματικής αναφέρονται στο σύνολό τους, δίνοντας πλήρεις αναφορές στους συγγραφείς, συμπεριλαμβανομένων και των πηγών που ενδεχομένως χρησιμοποιήθηκαν από το διαδίκτυο».

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ΠΕΡΙΛΗΨΗ:

Η επαναγορά ιδίων μετοχών (stock repurchases or stock buybacks) σχετίζεται με την τακτική μιας εταιρίας να αγοράζει τις δικές της μετοχές.

Η επαναγορά ιδίων μετοχών έχει πολλαπλές χρήσεις. Η σηματοδότηση για τη μελλοντική κερδοφορία μιας εταιρίας ή η σηματοδότηση υποτίμησης αυτής αποτελούν κυρίαρχο κίνητρο για την υλοποίηση προγραμμάτων επαναγοράς μετοχών. Τα διευθυντικά στελέχη χρησιμοποιούν την επαναγορά ιδίων μετοχών ως μέσο για να μεταφέρουν στους επενδυτές τις θετικές τους προβλέψεις για τα μελλοντικά κέρδη της εταιρίας ή επειδή θεωρούν ότι η οικονομική αξία της επιχείρησης υπερβαίνει την αγοραία αξία της (Υπόθεση της σηματοδότησης και Υπόθεση της πληροφόρησης). Ένας επιπρόσθετος λόγος είναι η υπόθεση της διανομής των ελεύθερων ταμειακών ροών. Οι επαναγορές μετοχών μειώνουν τη δυνατότητα των διοικητικών στελεχών να επενδύσουν το πλεόνασμα μετρητών που διαθέτουν σε επενδύσεις με αρνητική Καθαρή Παρούσα Αξία. Επιπλέον, η επαναγορά ιδίων μετοχών επιτρέπει με έναν έμμεσο τρόπο την ανακατανομή των αδέσμευτων ταμειακών ροών της εταιρίας πίσω στην αγορά και στους μετόχους (Υπόθεση της ανακατανομής κεφαλαίου). Από την άλλη μεριά, οι επαναγορές ιδίων μετοχών μπορούν να χρησιμοποιηθούν ως εναλλακτικός τρόπος πληρωμής μερισμάτων (Υπόθεση της υποκατάστασης) ή ως χρηματοδότηση δικαιωμάτων ανταλλαγής (Υπόθεση του δικαιώματος ανταλλαγής). Επίσης οι επαναγορές ιδίων μετοχών παίζουν πολλές φορές ένα σημαντικό ρόλο στις εξαγορές και συγχωνεύσεις ως αμυντικός μηχανισμός (Υπόθεση της άμυνας από επιθετική εξαγορά). Τέλος οι επαναγορές ιδίων μετοχών μπορούν να βελτιώσουν το βαθμό μόχλευσης μίας εταιρίας (Υπόθεση του βέλτιστου βαθμού μόχλευσης), τη ρευστότητα της αγοράς και να στηρίξουν τη χρηματιστηριακή τιμή μιας εταιρίας (Υπόθεση της ρευστότητας και της στήριξης της χρηματιστηριακής μετοχής).

Στις Ηνωμένες Πολιτείες Αμερικής το φαινόμενο της επαναγοράς μετοχών ξεκίνησε στις αρχές του 1970 και το 1990 έγινε ευρέως γνωστή η χρήση τους ανά το κόσμο. Ωστόσο, στην Ελλάδα τα προγράμματα επαναγοράς ιδίων μετοχών έχουν αυξηθεί τα τελευταία οχτώ χρόνια. Επίσης, η μόνη μέθοδος που χρησιμοποιείται στην Ελλάδα για επαναγορά μετοχών είναι η αγορά μετοχών μέσω της χρηματιστηριακής αγοράς. Γενικά υπάρχουν τρεις κύριες μέθοδοι επαναγοράς μετοχών: η αγορά ιδίων μετοχών μέσω της χρηματιστηριακής αγοράς, η αγορά ιδίων μετοχών μέσω δημοπρασίας και η αγορά ιδίων μετοχών μέσω δημόσιας προσφοράς.

Η διπλωματική αυτή εργασία εξετάζει τη βραχυπρόθεσμη αντίδραση της αγοράς γύρω από την ανακοίνωση προγραμμάτων ιδίων μετοχών στην Ελλάδα, καθώς και ποιοι παράγοντες επηρεάζουν την ένταση αυτής της αντίδρασης. Το χρονικό διάστημα το οποίο μελετήθηκε είναι από το 2008 έως και το 2010, δηλαδή κατά τη διάρκεια της χρηματοοικονομικής κρίσης στην Ελλάδα. Στην περίοδο αυτή ανακοινώθηκαν 110 προγράμματα επαναγοράς μετοχών από 77 εταιρίες. Το τελικό δείγμα περιλαμβάνει 104 ανακοινώσεις για πρόθεση επαναγοράς μετοχών από 72 εταιρίες. Από τα αρχικά δεδομένα εξαιρέθηκαν τρεις εταιρίες, οι οποίες δραστηριοποιούνται πλέον στο Χρηματιστήριο Αξιών Αθηνών καθώς και δύο εταιρίες για τις οποίες δεν βρέθηκαν τα αντίστοιχα λογιστικά στοιχεία τους.

Για την ανάλυση των δεδομένων χρησιμοποιήθηκε η “ανάλυση επιχειρηματικών γεγονότων”. Οι μη κανονικές αποδόσεις και οι συσσωρευτικές μη κανονικές αποδόσεις υπολογίστηκαν με βάση το “προσαρμοσμένο μοντέλο της αγοράς”:

$$A_{jt} = R_{jt} - R_{mt} \text{ , όπου}$$

R_{mt} = Η παρατηρούμενη απόδοση του δείκτη της αγοράς για την ημέρα t.

R_{jt} = Η απόδοση της κοινής μετοχής για την απόδοση της μετοχής της εταιρίας j την ημέρα t.

Επιπρόσθετα χρησιμοποιήθηκε το “Time-series standard deviation test” καθώς και το “Cross-sectional standard deviation test”, με σκοπό να προσδιοριστούν οι στατιστικά σημαντικές μη κανονικές αποδόσεις και οι συσσωρευτικές μη κανονικές αποδόσεις, σε επίπεδο στατιστικής σημαντικότητας 10%, 5% και 1%. Συνοπτικά, παρατηρήθηκαν στατιστικά σημαντικές έκτακτες αποδόσεις τρεις μέρες πριν την ανακοίνωση και δύο μέρες μετά από αυτή. Αναλυτικότερα, την ημέρα ανακοίνωσης η έκτακτη απόδοση ήταν 0.97%, ενώ τρεις μέρες πριν ήταν 1.02%. Επίσης, όλα τα εξεταζόμενα “παράθυρα μελέτης” είχαν θετικές και στατιστικά σημαντικές συσσωρευτικές μη κανονικές αποδόσεις, εκτός από το “παράθυρο μελέτης” (+1,+20).

Εν συνεχεία, για τον προσδιορισμό των παραγόντων οι οποίοι επηρεάζουν τις μη κανονικές αποδόσεις χρησιμοποιήθηκε ανάλυση παλινδρόμησης. Το οικονομετρικό μοντέλο παλινδρόμησης είχε ως ανεξάρτητες μεταβλητές τις ακόλουθες: την απόδοση κέρδους για κάθε εταιρία (ROA), την απόδοση ιδίων κεφαλαίων για κάθε εταιρία (ROE), το Tobin’s q ratio για κάθε εταιρία, το μέγεθος της εταιρίας, τη λογιστική αξία της εταιρίας προς τη χρηματιστηριακή αξία της εταιρίας (book-to-market ratio), τα κέρδη της εταιρίας προς τη

χρηματιστηριακή της τιμή (earnings-to-price ratio), το δείκτη μόχλευσης της εταιρίας, τη μεταβλητότητα της εταιρίας και τη μερισματική απόδοση της εταιρίας. Ταυτόχρονα, οι συσσωρευτικές μη κανονικές αποδόσεις για κάθε εταιρία, για το “παράθυρο μελέτης” (-20,+20), χρησιμοποιήθηκαν ως εξαρτημένη μεταβλητή. Αποτέλεσμα της παλινδρόμησης ήταν να επιβεβαιωθεί η υπόθεση της στήριξης της χρηματιστηριακής τιμής ως κύριο κίνητρο για την επαναγορά μετοχών στη Ελλάδα σε περιόδους κρίσης.

Τέλος, προστίθεται, ότι στη Ελλάδα ο ισχύων νόμος για την επαναγορά μετοχών είναι ο νόμος 3604/2007. Οι εταιρίες των οποίων οι μετοχές διαπραγματεύονται στο Χρηματιστήριο Αξιών Αθηνών μπορούν, ύστερα από απόφαση της γενικής συνέλευσης των μετόχων, να επαναγοράζουν τις δικές τους μετοχές μέσω του Χρηματιστηρίου Αξιών Αθηνών. Το συνολικό ποσό που δικαιούνται να επαναγοράσουν ανέρχεται στο 10% του συνόλου των μετοχών τους. Σκοπός της επαναγοράς ιδίων μετοχών είναι η στήριξη της χρηματιστηριακής τιμής τους σε περιπτώσεις που θεωρείται ότι η εν λόγω τιμή είναι σημαντικά χαμηλότερη από την τιμή που αντιστοιχεί στα πραγματικά δεδομένα της αγοράς και στην οικονομική κατάσταση και προοπτικές της εταιρίας. Στο ανωτέρω ποσό συμπεριλαμβάνονται και οι μετοχές τις οποίες έχει προηγουμένως αποκτήσει η εταιρία, καθώς και εκείνες που έχουν αποκτηθεί από πρόσωπο το οποίο ενεργούσε επ’ ονόματί του αλλά για λογαριασμό της εταιρίας.

SUMMARY:

A share repurchase (or share buyback) is a program through which a company buys back its own shares from the marketplace. The company buys shares directly from the market or offers its shareholders the option of tendering their shares directly to the company at a fixed price.

Share repurchases are a financial mechanism which has multiple usages. The most prevalent reason for share repurchases is the signaling or the undervaluation. Managers use share repurchase programs to convey positive beliefs to investors regarding the future cash flows of earnings or because the former ones believe that the firm is undervalued (Cash Flow Signaling Hypothesis and Market Undervaluation Hypothesis). An additional reason for the use of the share repurchase program is the decrease of agency costs of free cash flows (Agency Costs of Free Cash Flows Hypothesis). Share repurchases decrease the ability of managers to over-invest or invest in projects with negative NPV. Furthermore, firms with low investment opportunities are more possible to announce share repurchase programs (Capital Market Allocation Hypothesis). Share repurchases are an efficient mechanism that allows the capital allocation in a free competitive market, as it returns capital to shareholders. Also, share repurchases are used as an alternative form of dividends (Dividend Substitution Hypothesis) or as fund for stock option programs (Option-Funding Hypothesis). In addition, they play an important role to mergers and acquisitions as a takeover defense (Mergers and Acquisitions Hypothesis). Lastly, share repurchases can improve the leverage ratio of firms (Capital Structure Adjustments Hypothesis), the liquidity of the market (Share Repurchases and Stock Liquidity Hypothesis) and support falling prices of stocks (Financial Flexibility and Completion Rates Hypothesis).

In the U.S.A, the phenomenon of share repurchase began in the early of 1970. In the 1990s, share repurchase programs widely spread around the world. However, in Greece, share repurchase programs have risen during the last eight years and the only method applied is the open market share repurchase method. In general, there are three methods that companies can buy back their stocks: Open Market Repurchase, Tender Offer Share Repurchase and Dutch Auction Share Repurchase.

This dissertation aims to examine the short market reaction around the firm's announcement of open market share repurchase program. The novelty of this study relies on the period

around which it examines the correlation of buy backs in the vicinity of the Greek economic crisis. The data span from 2008 until 2010. The final sample includes 104 announcements of open market share repurchase programs by 72 firms. For the data analysis, the event study methodology has been used. The abnormal returns and the cumulative abnormal returns are measured according to the Market adjusted returns model. In addition, the Time-series standard deviation test and the Cross-sectional standard deviation test were used in order to define the statistical significant abnormal returns and cumulative average abnormal returns at a level of 10%, 5% and 1%. In short, it was observed that statistical significant abnormal returns exist three days before the announcement, and two days afterwards. Specifically, on the announcement day the abnormal return was 0.97%, and three days before that the abnormal return was 1.02%. All the examined event windows have positive and statistical significant cumulative abnormal returns except of the event window (+1, +20).

Furthermore, this dissertation examines the factors which affect the stock abnormal returns. The factors used are similar to the ones which are commonly used in international and domestic literature. These are the return on equity ratio, the return on asset ratio, the Tobin's q ratio, the book-to-market ratio, the earnings-to-price ratio, the size of the firm, the leverage ratio, the volatility of firm, and the dividend yield. The aforementioned elements are used as control variables in the econometric model which has the dependent variable in place of the cumulative abnormal return. Using regression analysis, the hypothesis of price support has been confirmed.

Lastly, it is worth mentioning that the Law 3556/2007 is the commonly applied law with regards to share repurchases in Greece. Companies whose shares are quoted on the Athens Stock Exchange may acquire, by resolution of the General Meeting of Shareholders, of their own shares through the Athens Stock Exchange up to 10% of the total of their shares. The purpose of such acquisition is the support of the stock exchange value in the case it is deemed that the value in question is significantly lower than the value of the share corresponding to the market data, the financial situation and the prospects of the company. Shares previously acquired by the company as well as shares acquired by a person acting in his own name but on the company's name are included in the aforesaid amount.

CHAPTER 1: INTRODUCTION

1.1. General

One of the most popular financial strategies is the share repurchases or share buybacks. Share buybacks give the opportunity to managers and firms to distribute profits and transfer wealth to shareholders. By definition, stock buyback means the auction in which firms repurchase their own stocks that are held by other investors.

Share buybacks have multiple components. They can operate as investment or pay-out decisions. Moreover, they influence the capital structure of firms and sometimes this auction has impact on the ownership structure.

In the U.S.A., share buyback is a widespread practice. As Grullon and Ikenberry (2000) highlighted, firms started to use share repurchase programs after the early 1980s. In 1990s, share repurchase programs widely spread around the world. It is remarkable that in 1998, the cash, that are distributed by U.S. corporations to investors through share repurchases, exceeded cash dividends.

However, the recent literature studies methods of share repurchase, that are more controlled and stricter regulatory framework (Dutch auction offers, fixed-price tender offers). In European countries, the regulatory frameworks, which exist for buybacks, include provisions and laws, which aim towards transparency and non-market manipulation. On the other hand, in the U.S.A, there is more freedom in the regulatory frameworks. Firms are not obliged to announce share repurchase details and their incentives. But, this freedom is not always endorsed by enterprises. Grullon and Michaely (2002) observed that share repurchases had raised after the adoption of Rule 10b-18 in the U.S.A., because this rule instructs corporations on the appropriate way of managing share repurchase programs without displaying manipulate behaviour.

In Greece, firms are not fully familiar with this particular tactic. This investigation has as goal to study share repurchases in Greece and particular during financial crisis.

Many researchers exclude from their data the periods following stock market crashes, as Brokman and Chung (2001) and Ikenberry et al. (1995). Jaganathan, Stephens and Weisbach (2000) noticed that economy affects the share repurchases. After the October Market Crash in 1987, the number of share repurchase program announcements had increased. Respectively, during the early 1990s, it was observed a decrease because of the recession in the U.S.A.

So, the results of this research will be a function of economic events that occurred in Greece from 2008 until 2010.

The study is divided into five distinct chapters. In chapter 1 an introduction to the topic is made, where the general methods and the dominant hypothesis of share repurchases are described. In chapter 2 a detailed analysis of the literature mainly focusing on the U.S.A market has been conducted. In chapter 3 the legislative framework of share repurchases in Greece and their change over time have been described. In chapter 4 the methods with which the data were collected have been described, as well as the event study benchmarks and the event study test statistics that were used. In chapter 5, the main results are presented and analysed. Further, the main hypotheses with regards to share repurchases are cross-checked through the regression analysis. In chapter 6 the primary conclusions of this project are outlined and suggestions for future research are made.

1.2. Methods of share repurchases

Generally, there are three (3) ways that companies can buy back their shares:

1. Open Market Repurchase: *“Open market purchases involve a gradual process of buying back small quantities of stock from day to day in the open market through a broker. The firm pays the normal commission rates and the seller of the stock is not aware that he is selling to the corporation. It is not uncommon that repurchase plans take place over several years and the amounts repurchased are generally smaller than via tender offers.”* (Vermaelen, 1981).
2. Tender Offer Share Repurchase: *“In a tender offer, the company offers to buy a specified amount of stock at a given price (typically above the market price) until the expiration date (generally three weeks to one month after the offer). The company generally reserves the right to buy more than the amount specified, to extend the offer or to purchase the shares pro rata. It can set maximum or minimum limits on the amount sought. Minimum constraints are typically designed for control purposes (often to stop an outsider from gaining control): if fewer shares are tendered than desired by the firm, the firm may withdraw the offer. The vast majority of tender offers are ‘maximum limit’ offers: management agrees to buy all the shares tendered if fewer than the amount specified are tendered. A peculiar type of limit is set in tender offers designed to eliminate small stockholdings in order to reduce shareholder servicing costs. Because these offers are executed at the market price and extended*

over a long time-period, they are very similar to open market purchases.” (Vermaelen, 1981).

3. Dutch Auction Share Repurchase: *“The introduction of the Dutch auction share repurchase in 1981 allows an alternative form of tender offer. A Dutch auction offer specifies a price range within which the shares will ultimately be purchased. Shareholders are invited to tender their stock, if they desire, at any price within the stated range. The firm then compiles these responses, creating a demand curve for the stock. The purchase price is the lowest price that allows the firm to buy the number of shares sought in the offer, and the firm pays that price to all investors who tendered at or below that price. If the number of shares tendered exceeds the number sought, then the company purchases less than all shares tendered at, or below the purchase price on a pro rata basis to all who tendered at or below the purchase price. If too few shares are tendered, then the firm either cancels the offer (provided it had been made conditional on a minimum acceptance), or it buys back all tendered shares at the maximum price.”* (Comment and Jarell, 1991).

In total, as stated in the comparative study of Grullon and Ikenberry (2000), the open market approach is more of a favorable method. However, tender offer indicated on the situations that companies wish to change their capital structure. Moreover, the fixed-price tender offer is a more agreeable method when managers believe that the firm is undervalued or in the case which they wish to inform the investors about the future earnings. In addition, Comment and Jarell (1991), assuming that the motive of repurchases is the undervaluation of stocks, concluded that the signaling hypothesis was not evident to investors through the Dutch auction share repurchase than the fixed price tender offer, but more apparent compared to the open market method.

1.3. Reasons for repurchasing

The crucial question about share repurchases is why companies buy back their stocks. Aggregately, there are eleven (11) explanations which are mentioned in bibliography. The terminology which is used follows the structure of Grullon and Ikenberry (2000).

1. Increase Earnings per Share: The managers repurchase their shares because through this way they increase earnings per share, as the number of outstanding stocks is declining.
2. Cash Flow Signaling: This hypothesis is based on information asymmetry. Managers comprehend better the company's true value than outside shareholders. So, share

repurchase programs are used by managers to transfer to investors the positive beliefs about the future cash flows of earnings.

3. Market Undervaluation: This explanation implies that managers decide to repurchase their stocks when they believe that the firm is undervalued.
4. Agency costs of free cash flows: In modern environment of corporations the rationale with which managers make decisions, that increase shareholder wealth, is not validated in absolute terms. The cost that arises from this conflict between growth and value maximization is known in finance theory as agency cost. As a consequence, the fourth hypothesis reports that share repurchases decrease the ability of managers to over-invest or invest in projects with negative NPV.
5. Capital Market Allocation: This hypothesis suggests that firms which use share repurchase programs have lower investment opportunities. Specifically, share repurchases are an efficient mechanism that allows the capital allocation in a free competitive market, because it returns capital to shareholders. The shareholders are more capable to make optimal decisions as they have a broader view of economy-wide opportunities.
6. Dividend Substitution: As the name implies, in this hypothesis, share repurchases are used instead of dividends. The reason behind that is the different tax that is applied to capital gains and dividends. One other reason is that share repurchase programs are a more flexible method of distributing non-recurring cash flows.
7. Capital Structure Adjustments: In this case, corporations repurchase their own stocks because they want to adjust their debt-to-equity ratios.
8. Share Repurchases and Stock Liquidity: Share repurchases programs can support falling stock markets. A large buyer, such as a corporation, may increase the investment confidence and decrease the number of sellers.
9. Price Support Hypothesis: In this case, corporations might use share repurchase program announcements to support their stock prices and supply liquidity during a downturn.
10. Option-Funding Hypothesis: In 2001 Kahle (2001) suggested and investigated this particular hypothesis. In general, repurchases of shares are made, when managers want to fund increasingly dominant employee stock option programs, which are currently exercisable.
11. Mergers and Acquisitions: The firms, which are more likely to be take-over targets, have greater incentive to apply a share repurchase program. Through stock buybacks,

the cost of merger or acquisition increases. As a result, the share repurchase programs can be used as a defense.

CHAPTER 2: LITERATURE REVIEW

The stock buyback has been a problem of concern for financial analysts for the last three years. It is apparent that there is a rich literature concerning this topic. In this subsection, are listed, chronologically, the most important research conducted.

One of the most popular studies is that of **Vermaelen (1981)**. The main subject of this article is to investigate the change in the level of financial assets of firms which repurchase their own shares. It focused on two methods of repurchasing: the open market method and the tender offer.

For the analysis of the tender offer, the data used span from 1962 to 1977; accordingly, for the open market method the data span from 1970 until April 1978. The testing procedure resulted in 131 tender offers made by 111 firms; and 243 open market repurchases made by 198 firms. Studying the daily excess returns of the repurchasing firms around in the vicinity of the event date, Vermaelen (1981) concluded that the «two-day» abnormal portfolio return of the open market repurchases was 3.62%, on days -1 and 0. Respectively, in the overall sample the abnormal return was 3.37%. Moreover, the results for the tender offers showed that the portfolio abnormal returns were significant four days before the announcement date and 1 day afterwards. In the article, the dominant hypothesis, which could explain the abnormal returns, was the information hypothesis. This result was more evident in the tender offer.

In 1981, using the almost same time period as that of Vermaelen (1981), **Dann (1981)** investigated the changes in common stock returns, senior security returns and total firm value in combination with the announcement of a tender offer. Statistically significant positive returns were observed, by common stockholders of the repurchasing firms, the next day of the repurchase announcement. On a smaller scale, positive returns were observed by owners of convertible debt and convertible preferred stocks. In contrast, positive returns were not confirmed by owners of straight debt and straight preferred stock. As a consequence, the firm value increments owe to common stockholders at 95%. Finally, the most influential hypothesis has been the signalling hypothesis but without any explanation of the nature of the information.

In 1991, **Comment and Jarell (1991)** compared three methods of common stock repurchases: Dutch-auction share repurchase, open market share repurchase and fixed-price self-tender offer. For the analysis, 72 self-tender offers were used, ranging from 1984 to 1989; 93 fixed-price self-tender offers from 1984 to 1989 and 1,157 open market share repurchase programs from 1984 to 1988. Generally, Comment and Jarell (1991) reported significant positive excess stock returns in the vicinity of the announcement date. On average, the excess return of the fixed-price tender offer was 11%. For the Dutch auction share repurchase program the return was 8% and for the open market share repurchase programs it was 2%.

In the same year, **Dann et al. (1991)** examined how the announcements of stock repurchases affected the firm's future earnings and the market risk levels. For the analysis, there were used 122 repurchase tender offers by 101 firms, from 1969 to 1978. In addition, the authors chose two different approaches for measuring the earning: The annual earnings before interest and taxes, and the annual and quarterly earnings per share before extraordinary items and discontinued operations.

The main financial theories of this article were confirmed and supported by the following results. First of all, on average, forecast errors of past earnings were positive during the post-repurchase period and larger than prior repurchase period, especially in the year in which occurs the announcements and three years after that. Moreover, stock price reactions around tender offer announcements linked positively with the subsequent earnings forecast errors and negatively with subsequent changes in equity market risk. Finally, it was observed that stock price reacts in smaller scale after the tender offer announcements than before this event, when unpredicted quarterly earnings are announced. This was relevant with the hypothesis of increases in expected future earnings because of tender offer announcements programs.

Bartov's (1991) research viewpoint is along the lines of Dann's (1991) perspective. It is important to mention, that for the analysis there were used 512 firms which accepted to reveal their information of open market stock repurchase programs. The data used were from 1978 to 1986. Initially, Bartov (1991) compared the unexpected annual earnings per share of the repurchasing firms to the ones of the non-repurchasing firms. The empirical results implied the existence of significantly positive unexpected earnings in year zero (0) for the repurchasing firms. However, the negative earnings change for year +1 and a p-value of only 0.1 for year 0 did not strengthen the above result. Moreover, Bartov (1991) found weak

evidences that analysts revised upward their earnings expectations of repurchasing firms, around the repurchase announcement date. In addition, the hypothesis concerning the decrease in repurchasing firms' stock price was confirmed. Specifically, decay in the stock betas of repurchasing firms was observed and weakly significant and positive bond price reaction. Finally, implying cross-sectional analysis, the results indicated positive correlation between repurchase announcement stock returns and the earning changes and negative correlation with the risk changes.

Alongside, **Sihna (1991)** analysed the share repurchase as a takeover defence. Specifically, he presented the following model assuming that managers have resources. Managers dispose those cash either in the activities of the firm or in perquisite consumption. Meanwhile, investors are not informed about allocations of resources and this is the only information asymmetry in the model. So, in the absence of takeover threat, the most ideal strategy is making use of all the resources for perquisite consumption. On the other hand, managers should use a portion of the resources to increase the investment activity of the firm. This movement increases the value of the firm and makes it a less desirable target. In order to increase investments, managers announce debt-financed share repurchase programs. As a consequence, managers achieve to raise the firm value whilst increasing the probability of bankruptcy. Finally, it is important to mention that this model is independent of the extent of shareholding by target management.

Ikenberry et al. (1995) examined how the open market repurchase announcements affect the stock returns and it mainly focused on long-run performance. The main hypothesis, which was investigated, is the signalling hypothesis. For the analysis there were used 1,239 open market share repurchase announcements between January 1980 and December 1990. Analysing the short-term abnormal returns, it revealed the existence of negative abnormal returns prior to the announcement, at a rate of -3.07%, in total. On average, the market reaction two days prior to the announcement and two days afterwards is 3.54%. Moreover, larger share repurchase programs lead to greater abnormal returns. However, nothing suggests clearly that that the size of the company effects the market reaction. In addition, Ikenberry et al. (1995) reported positive long-term performance. Finally, the dominant objective for firms with high book-to-market ratio is the undervaluation of stocks, while for firms with low book-to-market ratio the existence of other reasons is more likely.

Similarly to Comment and Jarell (1991), the article of **Lie and McConnell (1998)** examined if there are positive earning returns during the announcements of fixed-price offers and self-tender offers. Moreover, it studied if the signalling hypothesis is stronger in fixed price offers than in self-tender offers. For this purpose, Lie and Mc Connell (1998) used 130 fixed-price self-tender offers and 102 Dutch auction self-tender offers. Generally, the 232 self-tender offers were performed by 213 different companies from 1981 to 1994. Both of these two different offers had positive abnormal stock returns, at 8%. In addition, comparing firms that materialized fixed-price offers or Dutch auction self-tender offers to the other companies in the industry, which have similar characteristics, the authors concluded that the first ones had better earnings performance. However, this study did not reveal differences in stock returns or earnings performance between the two types of offers. Finally, it is worth mentioning that the rate of return on assets exceeded their industry medians by 2% to 5% per year.

Stephens and Weisbach (1998) addressed the issue of actual share reacquisitions in open market repurchase programs. Using 450 open market programs announcements between 1981 and 1990, they concluded that the popularity of open market share repurchases was due to the flexibility of this method. In open market share repurchases programs, firms are not obliged to buy back as many stocks as they announced or to complete the program. Consequently, firms have the opportunity to time their share repurchases and adjust their cash flow position into the procedure. The analysis confirmed the prior conclusions. On average, the authors observed that firms buy back 74 to 84% of their announced target level of share repurchases. Moreover, they find positive connection between firms' cash flows and repurchases; and negative connection between actual share repurchases and firm's stock returns, three months before the announcement. The last result is consistent with the undervaluation hypothesis.

Jaganathan, Stephens and Weisbach (2000) examined the increment of open market stock repurchases in U.S.A and the cases which the firms use the stock repurchases instead of dividends. The main results of the cross-sectional analysis were that the basic characteristics of firms that might increase repurchases are the higher net operating income cash flows and the higher standard deviation of cash flows. Finally, it was clear that repurchases do not act as a subsequent of dividends but as an important source of pay-outs.

Dittmar (2000) investigated the reasons which lead one firm to materialize stock buybacks. The investigation covers the period between 1966 and 1977. The author concluded that the principal incentive was the undervaluation. However, in comparing with the article of

Vermaelen (1981), Dittmar found that the dominant repurchasers were the large firms and not the small ones. Moreover, he examined and verified a range of concepts such as the excess capital hypothesis, the leverage hypothesis and the stock option hypothesis. Finally, Dittmar stressed that share repurchases are not use as a replacement of dividends.

The following year, **Brockman and Chung (2001)** investigated the timing of open market share repurchases and if open market share repurchase programs improve or decrease the market liquidity. For the analysis, Brockman and Chung (2001) used data from the Stock Exchange of Hong Kong and the time horizon of those was from November 1991 to September 1997 and from November 1998 to August 1999. The authors preferred the Stock Exchange of Hong Kong, because firms which belong in this market, are obliged to announce all repurchase details and their programming plans. The first thing that authors examined was the managerial timing. The main results implied that timing opportunities increased when there were large price swing and rate reduction. On the other hand, it decreased when there were frequent repurchases. So, timing skills were positive correlated with the overall market conditions and negative correlated with firm-specific variables. The second crucial result reported that managerial trading had negative effect on liquidity. Specifically, when outside investors perceived the existence of informed traders, then they withdraw. As a consequence, this situation drives to bid-ask spread increment and depth reduction. So, consistently with the information asymmetry hypothesis, managerial open market share repurchases do not add liquidity to the market.

In the same year, **Kahle (2001)** suggested the option-funding hypothesis. Kahle (2001) investigated the issue of open market repurchases and employee options. The article examined how the stock options affect the decision to repurchase shares and the amount of actual share repurchases. The main results were consistent with the option-funding hypothesis and the substitution hypothesis; something that can explain why the number of outstanding shares in 1990, remained relatively stable, when repurchases had been increased dramatically. The fact that this period the market reacts with less positive intensity to share repurchase announcements reinforces the belief about option-funding and substitution theory. Generally, the conclusions revealed that stock options connected positively with share repurchases when managers wanted to fund employee stock options programs and when managers wanted to maximize their wealth through stock buybacks, as dividends decreased the value of managerial options.

In 2002, as Jaganathan, Stephens and Weisbach (2000) did before, **Grullon and Michaely (2002)** investigated the substitution hypothesis. They began with clustering the data into two categories; the firms that pay only dividends but do not repurchase shares and the firms that repurchase shares but do not pay dividends. The first group contained firms that were much larger, more profitable and had lower variability of return on assets. On the other hand, the firms, which only repurchase shares, were younger, smaller, with high book-to-market ratio and high earnings volatility. The main results of this study indicated that U.S. corporations preferred share repurchases as pay-out method. Moreover, the negative correlation between dividend forecast errors and share repurchase yield led to the assumption that as share repurchases increased then the actual dividend was lower than the expected dividend. In addition, the market reaction in dividend decrease was less negative for repurchasing firms than for non-repurchasing firms. Grullon and Michaely (2002) also concluded that as the difference in taxes between dividends and capital gains are larger, then the market reaction to repurchases is more positive.

Examining the Australian market, **Otchere and Ross (2002)** not only studied the effects of stock buy backs on announcing firms but also the effects on rival companies which belong in the same industry. The sample, which was used, contains 132 share repurchase announcements, from January 1991 to July 1999. Assuming that the main incentive is the undervaluation, Otchere and Ross (2002) concluded that share repurchase programs reveal and transfer positive information to the market about the values of announcer and rival firms. In specific, statistical significant abnormal returns of 1.25% on the announcement date were observed. In the same way, for other industry counterparts a statistically significant abnormal return of 0.39% was noted two days after the announcement. In addition, from the cross-sectional analysis, the results which arose did not confirm the link between first share buyback announcement and the volume of information that was conveyed.

Thereafter, **Maxwell and Stephens (2003)** examined the abnormal stock returns, the abnormal firms return and the abnormal bond returns, using a sample of firms with publicly traded debt, equity and institutional bond pricing information from the Lehman Brothers Bond Database. The authors organised their data based on the size of share repurchases, the probability of default and the time (before and after “The Tax Reform Act of 1969”). As predicted from the analysis, the positive abnormal return was 1.49% and the negative abnormal bond return was 18.5 basis points. Both of them are statistically significant at 1% level. Moreover, the average increase in total firm value was about 0.97%. This last result

implies that it is important to notice that pure wealth transfer is a zero sum game, so it has no impact on firm value. Furthermore, larger repurchase drove to larger positive market reaction around open market share repurchase programs, greater wealth transfer from bondholders to shareholders and greater increase in total firm's value. Similar, non-investment-grade firms presented greater wealth transfer from bondholders to shareholders and lower gains in firm's value. Finally, the proportions of bond downgrades were greater during large scale share repurchases.

In 2004, the first investigation on repurchase timing and execution is carried out, by **Cook et al. (2004)**. It examined how open market share repurchase programs affect the market's liquidity. In the U.S.A., this research was quite difficult, as firms are not obliged to announce repurchase details and their incentives. The authors used 64 firms which agreed to give details of share repurchases. Those firms are separated in 24 NYSE programs and (41) NASDAQ programs.

Cook et al. (2004) examined the frequency and the timing of repurchase trading. Generally, the share repurchases of NYSE firms occupied the 66% of the total trading volume, while the NASDAC firms occupied the 10.4% of the total trading volume. Moreover, NYSE firms preferred to repurchase during the first hour of trading of the day. In contrast NASDAC firms preferred the final hours of trading. In addition, the authors concluded that there are many factors which determine the number and the time where firms decide to buy back their shares, such as cost minimization, price support, liquidity provision and the strategic use of firm-specific information. The main results implied that NYSE repurchases stabilized the stock price in contrast to NASDAC repurchases. Furthermore, both these categories of firms increased the market liquidity through narrowing of spreads. It was clear that firms avoid making share repurchases around firm specific information announcements and the wide use of limit order contributes to liquidity the support of a falling stock price. Finally, it is important to refer that NYSE firms have improved timing skills compared to NASDAQ ones.

Referred to French market, **Ginglinger and Hamon (2006)** examined the timing and liquidity of actual share repurchases. Using 36,848 repurchases by 352 French firms from 2000 to 2002, the authors concluded in similar results to those of the survey which was conducted by Brokman and Chung (2001). As in Hong-Kong, French firms are obliged to disclose all repurchases details in a given month, at the start of the following month. The main results are as follows: Firms act current to the market reaction. Specifically, it is

observed that companies repurchase after a decline in stock prices. So, the evidence suggests that managers act in order to stabilize or support the price and not in accordance with market timing hypothesis. In addition, Ginglinger and Hamon (2006) reported that open market repurchases reduce the market liquidity, affirming the information asymmetry hypothesis.

In another investigation for the French market, **Ginglinger and L'her (2007)** examined the connection between open market share repurchases programs in France and ownership structure. The authors had the strong belief that those two subjects cannot be investigated separately. Generally, in France, positive market reaction is observed after the announcement of an open market stock repurchase programme. However, it is essential to understand that in European countries, agency conflicts are observed between controlling shareholders and minority shareholders; this positive market reaction affected mainly the firms that probably will not take over. So open market share repurchase programs were positive for controlled firms which guarantee the **minority** shareholder protection and negative for family controlled firms. The last ones were characterized by an absence of influential shareholders, institutional investors and low minority shareholder protection.

In 2012, **De Cesari et al. (2012)** used data from SEC filings that have become available since 2004. A point of interest is that after 2003, U.S. companies must make publicly known the details about their repurchase programs such as the monthly repurchase volume and the monthly repurchase price. In specific, the results implied that there was a positive correlation between the repurchase volume and the price decline. The authors concluded that companies bought back their stocks especially in months where they observed decrease in stock price. Also, there were evidence that open market repurchases decline when there are institutional ownerships. The reason is that an informed ownership leads to an informed trading. As a consequence, the possibilities of undervaluation of the stock decrease. However, insider ownership may have a positive effect on gains from timing open market share repurchases because of the wealth-transfer between selling insiders and non-selling insiders (informed insiders). Finally, it was reported that liquidity is a supporting factor for firms' gains from timing repurchases.

Moving to the European market and in particular in Spain, **Gonzalez and Gonzalez (2012)** analysed the stock abnormal returns in the vicinity of open market share repurchases and sellbacks and the means which determine and affect the choice of the repurchase and sellback method. During this investigation in Spain, traded firms were allowed to buyback and hold up

to 5% of their shares as treasury stock. After the firm buys back its shares, it is free to reissue or cancel them through a capital reduction. This restriction leads firms to choose the open market repurchases as the preferable method. The tender offer repurchases and the Dutch auctions are more desirable for larger-scale buybacks. Using 24 announcements of open market sellbacks and 58 announcements of buybacks from 1990 to 1997, positive abnormal returns were observed. The main incentive for those auctions (sellbacks and buybacks) in Spain was the changes in ownership structures.

In 2014, **Dittmar and Field (2014)** asked the question if managers have the ability to time the market. For the investigation, 2,237 firms were used which repurchase their stocks in the open market, between 20004 and 2011. It is important to highlight, that after 2003 in U.S.A, the low change. Assuming that the primary motive is the undervaluation, the results are summarized below. The authors separated the sample into two main categories: the frequent repurchasing firms and the infrequent ones. The first group included larger, more profitable, with lower volatility, higher dividend pay-outs, higher market-to-book ratio and lower bid-ask spread firms. Firms bought back their stocks at a price which was 1.8% lower than the average closing price six months before and six months after the repurchase. However, this percentage was even higher in the case of infrequent repurchasers or when insiders bought back stock on their account. So, managers can time the market not only based on historical prices but also based on forecasts of future prices. Moreover, it did not disclose evidences that the motivations of stock buy backs affect the ability of timing.

Finally, **Andriasopoulos and Lasfer (2015)** investigated the market reaction of share repurchases in Europe. The sample contained 970 share repurchase announcement programs from open market in France, Germany and the U.K. Andriasopoulos and Lasfer (2015) reported that the market reaction in Europe is lower than in the U.S.A. The primary suppositions for this variance are:

1. the relative large number of recruiting announcement in Europe,
2. the specific governance and corporate cultural issues in France,
3. the regulatory reform that allowed UK firms to keep the repurchased shares as treasury stock,
4. taxation,
5. shareholder protection and
6. the adoption of the European Union's Market Abuse Directive.

However, only the first three of them were confirmed by the analysis. In general, the positive market reaction in Europe was 1.15%, which was 2.39% lower compared to the respective one in the U.S.A.

Table 2.1
Review of bibliography.

Paper	Scope	Share Repurchase Method	Reporting Period	Primary Research Topic(s)	Main Findings
Vermaelen (1981)	U.S.A	Open Market Share Repurchases & Tender Offers	1962-1977	Market Signalling	1. Stock returns around stock repurchase announcements are significant. 2. The information hypothesis is confirmed.
Dann (1981)	U.S.A	Tender Offers	1962-1976	Bondholders and Stockholders wealth	1. Statistically significant returns were observed by common stockholders and by owners of convertible debts and convertible preferred stocks of the repurchasing firms, after the announcement.
Comment and Jarell (1991)	U.S.A	Open Market Share Repurchases, Fixed-Price Self-Tender Offers & Dutch Auction Self-Tender Offers	1984-1989	The Signalling Power	1. Dutch auction self-tender offers and open market share repurchase programs are weaker signal of stock undervaluation than fixed-price tender offers.
Dann et al. (1991)	U.S.A	Tender Offers	1969-1978	Earnings Information	1. Stock price reactions around tender offers announcements link positively with the subsequent earnings forecast errors and negatively with subsequent changes in equity market risk.
Bartov (1991)	U.S.A	Open Market Share Repurchases	1978-1986	Signals for earnings and risk changes	1. Stock returns around open market share repurchase announcements are positively correlated with earnings changes and negatively with risk changes.
Sinha (1991)	-	-	-	Takeover Defense	1. Presented a model about share repurchases as a takeover defense.
Ikenberry et al. (1995)	U.S.A	Open Market Share Repurchases	1986-1990	Market Underreaction	1. The dominant incentive for firms with high book-to-market ratio is the undervaluation of stocks. However the market ignores a substantial portion of this undervaluation signal.
Lie and McConnell (1998)	U.S.A	Fixed-Price Self-Tender Offers & Dutch Auction Self-Tender Offers	1981-1994	Earnings Signals	1. Earnings improve following both types of self-tender offers, but there is not difference in earnings improvement between the two type's offers.
Stephens and Weisbach (1998)	U.S.A	Open Market Share Repurchases	1981-1984	Actual Share Reacquisitions	1. The popularity of open market share repurchases is because of the flexibility of methods. Firms have the power to time their share repurchases and adjust the cash flow position into the procedure.

Jaganathan, Stephens & Weisbach (2000)	U.S.A	Open Market Share Repurchases	1985-1996	Dividends	1. Repurchases do not act as a subsequent of dividends but as an important source of payouts.
Dittmar (2000)	U.S.A	Open Market Share Repurchases, Fixed-Price Self-Tender Offers & Dutch Auction Self-Tender Offers	1966-1977	Incentives	1. The most powerful motive of share repurchases is the undervaluation hypothesis.
Brockman and Chung (2001)	Hong-Kong	Open Market Share Repurchases	1991-1999	Managerial Timing & Corporate Liquidity	1. Managers Exhibit substantial timing ability but, open market repurchases do not add liquidity to the market.
Grullon and Michaelly (2002)	U.S.A	Open Market Share Repurchases, Fixed-Price Self-Tender Offers & Dutch Auction Self-Tender Offers	1972-2000	Substitution Hypothesis	1. Repurchases have become the preferred form of initiating a cash payout.
Otchere and Ross (2002)	Australia	Open Market Share Repurchases	1991-1999	The undervaluation Hypothesis	1. Share repurchases programs reveal and transfer positive information to the market about the values of announcers and rival firms.
Maxwell and Stephens (2003)	U.S.A	Open Market Share Repurchases	1980-1997	The Wealth Effects	1. The evidence is consistent with signaling and wealth redistribution hypothesis.
Cook et al. (2004)	U.S.A	Open Market Share Repurchases	1973-1994	Timing and Execution	1. Firms avoid making share repurchases around specific information announcements. 2. The widely used of limit order contributes to liquidity the support of a falling stock price. 3. Firms increase the liquidity through narrowing of spreads.
Ginglinger and Hamon (2006)	French	Open Market Share Repurchases	2000-2007	Timing and Liquidity	1. Mangers repurchase their shares after a decline in stock prices. 2. Open market share repurchases reduce the market liquidity.
Ginglinger and L'her (2007)	French	Open Market Share Repurchases	1985-1998	Ownership Structure	1. Open market share repurchase programs are positive for controlled firms which guarantee shareholder minority protection and negative for family controlled firms.
De Cesari et al. (2012)	U.S.A	Open Market Share Repurchases	2004-2004	Timing	1. Institutional ownership reduces companies' opportunities to repurchase stocks at bargain prices. 2. At low levels insider ownership increases timing profits and at high levels it reduces them. 3. Stock liquidity increases through open market share repurchases.
Gonzalez and Gonzalez (2012)	Spain	Open Market Share Repurchases and Sellbacks	1990-1997	Legal Restrictions	1. The legal restrictions on the volume of shares firms can repurchase, leads firms to choose the open market repurchases and sellbacks as the preferable method. 2. The main incentive for sellbacks and buybacks is the changes in ownership structure.
Dittmar and Field (2014)	U.S.A	Open Market Share Repurchases	2004-2011	Timing	1. Firms repurchase stocks at a significantly lower price than the average market price. 2. Repurchasing firms earn positive returns.
Andriasopoulos and Lasfer (2015)	France, Germany and the U.K.	Open Market Share Repurchases	1997-2006	Europe	1. The market reaction in Europe is lower than in the U.S.A.

CHAPTER 3: LEGISLATIVE FRAMEWORK

Law 3604/2007 is the law that contains Companies Limited by Shares Law (Societes Anonymes) in Greece and in particular concerning the repurchase of shares. Law 3604/2007 prevailing in jurisprudence until nowadays has brought about changes in the provisions of the pre-existing Law 2190/1920. In particular, in accordance with Article 16 of Law 2190/1920 certain exemptions were stipulated in which the purchase of own shares was allowed by the Societe Anonyme, which assumed the relevant responsibility concerning the administration of the shares in question.

More specifically the cases where the repurchase of shares is permissible pursuant to Law 2190/1920 are as follows: when the aim of acquisition of own shares is the capital reduction, when shares are acquired following a total transfer of property, when own shares are acquired by way of a compulsory enforcement carried out in order to satisfy the company's claim, when own shares derive from banking S.A., when shares are acquired as a gratuity on condition that they have been fully paid-up, and finally when acquisition of own shares aims at allocation of shares to the company's staff or to the staff of an affiliated company. Furthermore, in the case of compulsory enforcement or in the case of gratuity, law establishes the additional terms that such shares must be sold within the shortest time possible, not exceeding one year from their acquisition. If these times limit lapses, such shares must be cancelled immediately. In respect of a total transfer of property, law prescribes that such shares must be cancelled immediately, while in respect of the allocation of shares to the staff the nominal value of these shares plus the nominal value of the company's shares must not exceed the one tenth of the share capital. In addition, the acquisition of own shares must not result in reducing the total of the company's equity and the shares to be acquired must be fully paid-up. The time limit in which the allocation of shares can be carried out is within twelve (12) months from the date of its acquisition.

Presidential Decree 14/1993 amended Law 2190/1920 by inserting new paragraphs which have been incorporated in Law 2892/2001. These additions relate to informing supervisory authorities and investors in respect of the own shares transactions. In more detail, in accordance with paragraph 5 of Article 16 *“companies whose shares are quoted on the Athens Stock Exchange may acquire, by resolution of the General Meeting of Shareholders, of their own shares through the Athens Stock Exchange up to 10% of the total of their shares.*

The purpose of such acquisition is the support of the stock exchange value in the case it is deemed that the value in question is significantly lower than the value of the share corresponding to the market data, the financial situation and the prospects of the company. Shares previously acquired by the company as well as shares acquired by a person acting in his own name but on the company's name are included in the aforesaid amount”.

The Board of Director's resolution in respect of the convocation of the General Meeting of Shareholders as well as the General Meeting's resolution in respect of the own shares purchase must be notified immediately to the Athens Stock Exchange Council. In particular, the aforementioned resolution of the General Meeting of Shareholders must define the following:

1. The maximum number of shares to be purchased,
2. The maximum and minimum price at which the shares are permitted to be purchased,
3. The period of time at which the purchase of shares may be carried out and this time limit may not exceed the 12 months from the date the resolution of the General Meeting of Shareholders is made.

The shares to be purchased must be fully paid-up and be received from the general investing public and the collective investment trusts.

The resolution of the General Meeting vested in the above content must be published at least ten (10) days prior to the commencement of trading in at least two daily newspapers (a political and financial newspaper) and in the Official List of the Athens Stock Exchange. The disclosure of the data must be repeated each time three (3) days before the commencement of transactions for any period of time during which the company applies the decision in respect of the purchase of its own shares. Upon the conclusion of the transactions, the company shall notify the Capital Market Commission and Athens Stock Exchange by a letter of notification of the average purchase price of shares, the total of the own shares that the company holds and the percentage of the share capital that the aforesaid total of shares represent. If the shares are not used within three years (sale or allocation to the employees), the General Meeting shall cancel them.

Supplementary Law 3340/2005 offers also protection of the Capital market from actions of persons that possess privileged information and actions of manipulation of the market.

Decision No. 3/347/12.7.2005 of the Board of Directors of the Capital Market Commission equates on a legal fiction purchase of own shares program with privileged information. For this reason, these must be published:

- on the website of the regulated market,
- on the Official List of the Athens Stock Exchange,
- on the website of the company.

In addition, Law 3556/2007 defines that issuer who acquires or disposes his own shares should notify of the proportion of his own shares, where this proportion fluctuates between the threshold of 5% and 10% on the voting rights. This notification shall be carried out within two (2) days of negotiation.

Finally, it should be noted that Law 3604/2007 introduces two main changes:

1. The extension of the purchase of own shares programs in twenty four (24) months.
2. Establishing fines if own shares are not cancelled beyond the three years.

CHAPTER 4: DATA AND METHODOLOGY

4.1. Data

As described in Chapter I and II, this project aims to examine stock repurchases during the financial crisis in Greece. In this section the methodology and criteria of the data collection will be described.

It is worth mentioning the definition of the term “financial crisis”. A financial crisis is a collapse in the price of financial obligations, which may lead to a collapse in the economy. The selection of filtered data accumulated range from 2008 to 2010. During this period the overall situation, in Greece, was characterized by social unrest and financial turmoil.

The year 2001 is considered to be the starting point of this crisis. In that year Greece became a member of the European Economic and Monetary Union. The forecasts were positive and the standpoint that this auction could rejuvenate and increase the growth of social as well as economic structure of Greece prevailed. In contrast, the trend of non-logic consumerism instead of investing and saving concurrently with the unsuccessful attempts to alter the status quo worked in opposition to the development of projects.

The Bank of Greece, the European Commission and the international organizations had warned time and again about the disadvantages of Greek economy, from 2001 since 2010. The most important weaknesses of Greek reality were the economic growth based on borrowing, the continuing deterioration of the external account deficit and the fact that the public expenditures were larger than incomes.

In 2007, with the advent of global financial crisis, the group of countries with large structural imbalances were affected to a greater extent than others. At the same time, the efforts to reduce the credit risk led to making lending an expensive sport.

Eventually, in 2010, the Greek governance was unable to overcome and cover deficits through refinancing from the market. In April of 2010, the Greek governance decided to request financial support from the countries of Eurozone and from the International Monetary Fund. After one month, the memorandum of economic and financial policies was signed.

The endeavour to avoid bankruptcy and recover the Greek economy has not been easy or painless, until now. The exit from the Eurozone had been discussed many a time as a means to an end. The climax of these discussions was in 2001 and in 2012. Those years were characterized by intense political turbulence (dual elections).

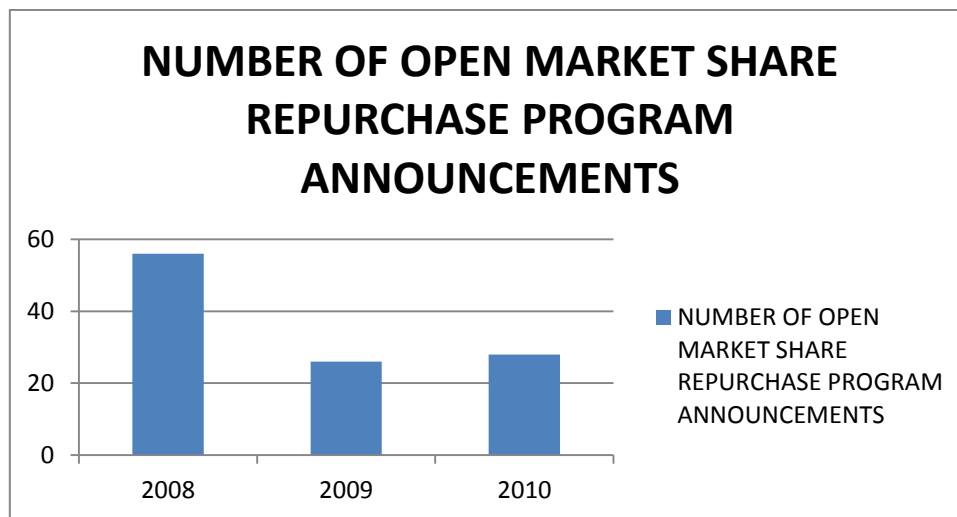
Finally, the year 2013 could be considered a milestone because it was the end of the big depression. However, the efforts to balance the situation are hitherto continued.

For the collection of data, the data-base called “Datastream” is used. The announcement of 110 open market shares repurchases is reported between 2008 and 2010, by 77 firms. The chronological distribution of announcements is as follows: 56 open market share repurchase announcements in 2008, 26 in 2009 and 28 in 2010.

It was excluded from the initial sample 4 open market share repurchase announcements because the respective companies are not trading on the Athens Stock Exchange any more. Also, it was excluded 2 firms because specific accounting and quantitative information of respective firms did not found. So, the final sample contains 104 open share repurchase programs by 72 firms.

In addition, it was collected the daily rate of return of common stocks of firms which are selected and the daily rate of Athens Stock Exchange General Index. The analysis was conducted based on the date of the firm’s public announcement of the intention repurchase shares.

CHART 4.1



4.2 Methodology

This study takes also into consideration the analysis of the firms' abnormal returns and the analysis of short market reaction. Stock buybacks announcements were investigated to find their correlation to abnormal returns around the open market share repurchase announcement and which are the main indexes that are connected to abnormal returns. A more perspicuous description of a well-established methodology is required, to elucidate the one that has been applied.

Event Study Methodology: An event study is a commonly used statistical method to estimate the force of an event on the value of the firm. Brown and Warner (1983, 1985) had used event study methodology in their investigations. In specific, they examined the volatility of stock prices around the date in which the firm's decision about a certain subject is made public. The main idea is to find the abnormal returns which are correlated to the event. The event study methodology contains five (5) basic steps:

1. Statistical sample selection.
2. Determination of the "event" and the event window.
3. Selection of normal return model.
4. Estimation of model parameters.
5. Hypothesis testing.

Event window: The purpose of creating an event window around the crucial "event" originates from the desire/necessity to collect all possible effects that are generated by this specific "event", on the stock price. The announcement date of the General Assembly's intention to repurchase shares is point zero of the event window. Point zero is different for every business that has been included in the sample. The majority of surveys choose a range of (± 10) days around the point zero. For this study, a range of (± 20) days around the announcement days has been chosen.

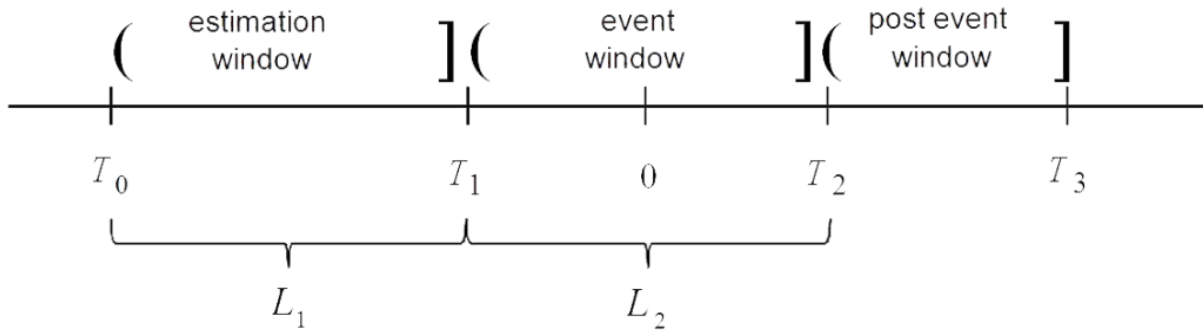
Estimation period: The period which does not coincide with the period of the event. The estimation period is [-260,-31] for this study.

Day -n: (n) days before the announcement.

Day 0: The announcement date.

Date +n: (n) days after the announcement.

Image 4.1



4.2 Event Study Benchmarks

In this subsection the event study benchmarks will be described with particular emphasis to the benchmarks that use a separate estimation period. The most effective method to delve into will be chosen after methods are set against.

In general, event study benchmarks include four models: The market model, the market-adjusted model, the comparison period mean-adjusted model and the view return model. For each security event, all benchmarks are required to have two time series of return data; an estimation period, that is used for estimating the benchmark parameters and an event period that is used for computing prediction errors based upon the estimated parameters. The prediction errors represent the abnormal returns.

Market Model: Substantiating this model is the following equation.

$$R_{jt} = a_j + \beta_j R_{mt} + \varepsilon_{jt} \quad (1a),$$

- R_{jt} = Return rate of the common stock of the j^{th} on day t .
- R_{mt} = Return rate of a market index on day t .
- ε_{jt} = A random variable that by construction must have an expected value of zero, and is assumed to be uncorrelated with R_{mt} , uncorrelated with R_{kt} for $k \neq j$, not auto-correlated and homoscedastic.

So, based on equation (1a), the abnormal return or prediction error (A_{jt}), the average abnormal return (AAR_t) and the cumulative average abnormal return ($CAAR_{T1T2}$) can be defined, for the common stock of the j^{th} firm on day t as:

$$A_{jt} = R_{jt} - (\hat{a}_j + \hat{\beta}_j R_{mt}) \quad (1\beta),$$

$$AAR_t = \frac{\sum_{j=1}^N A_{jt}}{N} \quad (1\gamma),$$

$$CAAR_{T_1 T_2} = \frac{1}{N} \sum_{j=1}^N \sum_{t=T_1}^{T_2} A_{jt} \quad (1\delta).$$

The advantage of this method lies on the opportunity it offers to be specialized on the security analysis of each and every industry. On the other hand, it has overly simplistic decomposition of risk.

Market Model with Scholes-Williams beta estimation: In the market model, betas are estimated by ordinary least squares. An alternative approach is the use of Scholes-Williams beta estimation. The relevant beta estimator is the following:

$$\hat{\beta}_j^* = \frac{\hat{\beta}_j^- - \hat{\beta}_j + \hat{\beta}_j^+}{1 + 2\hat{p}_m} \quad (2\alpha)$$

$$\Rightarrow \hat{a}_j^* = \bar{R}_{jEst} - \hat{\beta}_j^* \bar{R}_{mEst} \quad (2\beta)$$

- $\hat{\beta}_j^-$ = The slope estimated by the simple OLS regression of R_{jt} on R_{mt-1} .
- $\hat{\beta}_j^+$ = The slope estimate by the simple OLS regression of R_{jt} on R_{mt+1} .
- \hat{p}_m = Estimated first order autocorrelation of R_m .
- \bar{R}_{jEst} = Mean return of stock estimation of stock j over the estimation period.
- \bar{R}_{mEst} = Mean market return over the estimation period.

According to Scholes and Williams the main problem was that securities are not traded in continuous basis. For example, there are periods during which trading is paused for the day and periods where the stock is inactive. So, the first point is that some securities trade infrequently, compare to the average security. This problem causes a “lag” effect in true returns. Observed returns will lag behind the true returns. As a consequence, the estimated beta will be biased downwards. The second problem is exactly the reverse problem. Some securities trade frequently compared to the average security. This situation causes a “lead” effect and as a result the estimated beta is biased upwards. The solution is to take into account

both the “lead” and the “lag” effect. This is accomplished by calculating using OLS regression, not only the observed beta during period t, but also calculating the beta during t-1 (lag beta) and t+1 (lead beta).

Market Model with GARCH or EGARCH estimation: This version invokes exponential GARCH or EGARCH errors:

$$R_{jt} = a_j + \beta_j R_{mt} + \varepsilon_{jt} ,$$

where $\varepsilon_{jt} | \Psi_{t-1} \sim (0, h_{jt})$ and Ψ_{t-1} denotes all information available at time t-1. The conditional variance in the GARCH case is:

$$h_{jt} = \omega_j + \delta_j h_{jt-1} + \gamma_j \varepsilon_{jt-1}^2 \quad (3a),$$

with $\omega_j > 0$, $\gamma_j \geq 0$, $\delta_j \geq 0$ and $\gamma_j + \delta_j < 1$. In the case of EGARCH case,

$$\log h_{jt} = \omega_j + \delta_j \log h_{jt-1} + \gamma_j |z_{jt-1}| + \varphi_j z_{jt-1} \quad (3\beta),$$

where $z_{jt} = \frac{\varepsilon_{jt}}{\sqrt{h_{jt}}}$. The parameters are estimated by maximum likelihood.

The advantages of the GARCH Model are the weak stationarity i.e. the fact that volatility clusters are modelled and the simple parametric representation to describe the volatility evolution. On the other hand, GARCH Model is symmetric to both positive and negative prior returns, it provides no explanation as to what causes the variation in volatility and it is not sufficiently adaptive in prediction because it reacts slowly to large isolated shocks. In addition, tail behaviour of GARCH Model remains too short even with a standardized student-t innovation.

Fama-French three- factor model: The Fama-French (1983) three-factor model is as follows:

$$R_{jt} = a + \beta_j R_{mt} + s_j SMB_t + h_j HML_t + \varepsilon_{jt} \quad (4\alpha),$$

$$A_{jt} = R_{jt} - (\hat{a}_j + \hat{\beta}_j R_{mt} + \hat{s}_j SMB_t + \hat{h}_j HML_t) \quad (4\beta), \text{ where}$$

R_{jt} = The return rate of common stock of the jth firm on day t.

R_{mt} = The return rate of a market index on day t.

SMB_t = (The average return on small market capitalization portfolios) – (The average return on three large market capitalization portfolios).

HML_t = (The average return on two high book-to-market equity portfolios) – (The average return on two low book-to-market equity portfolios).

ε_{jt} = A random variable that, by construction, must have an expected value of zero and is assumed to be uncorrelated with R_{mt} , uncorrelated with R_{kt} for $k \neq j$, not correlated and homoscedastic.

Coefficients \hat{a}_j , $\hat{\beta}_j$, \hat{s}_j and \hat{h}_j are ordinary least squares estimates of a_j , β_j , s_j and h_j .

The main benefits of this model are that it is used to explain differences in the returns of diversified equity portfolios, it classifies funds into style buckets and specifying risk factors it helps investors' choices.

Fama-French-momentum four-factor model: The Fama-French-momentum four-factor model is described as follows:

$$R_{jt} = a + \beta_j R_{mt} + s_j SMB_t + h_j HML_t + u_j UMD_t + \varepsilon_{jt} \quad (5\alpha),$$

$$A_{jt} = R_{jt} - (\hat{a}_j + \hat{\beta}_j R_{mt} + \hat{s}_j SMB_t + \hat{h}_j HML_t + \hat{u}_j UMD_t) \quad (5\beta), \text{ where}$$

R_{jt} = The return rate of common stock of the j^{th} firm on day t.

R_{mt} = The return rate of a market index on day t.

SMB_t = (The average return on small market capitalization portfolios) – (The average return on three large market capitalization portfolios).

HML_t = (The average return on two high book-to-market equity portfolios) – (The average return on two low book-to-market equity portfolios).

UMD_t = (The average return on two high prior return portfolios) – (The average return on two low prior return portfolios).

ε_{jt} = A random variable that, by construction, must have an expected value of zero and is assumed to be uncorrelated with R_{mt} , uncorrelated with R_{kt} for $k \neq j$, not correlated and homoscedastic.

Coefficients $\hat{a}_j, \hat{\beta}_j, \hat{s}_j, \hat{h}_j$ and \hat{u}_j are ordinary least squares estimates of a_j, β_j, s_j, h_j and u_j .

In 1997, Charhart (1997) suggested an update version of the Fama-French three-factor model (1993), including a momentum factor. Momentum in a stock describes the tendency of the stock price. Specifically, it is observed that the stock price will continue rising if it is going up and similarly it will continue decreasing if it is going down. The Fama-French-momentum four-factor model is optimal for active management and mutual fund evaluation.

Market adjusted returns model: The equation for this model is:

$$A_{jt} = R_{jt} - R_{mt} \quad (5\alpha), \text{ where}$$

R_{mt} = The observed return on the market index for day t.

R_{jt} = The rate of return of the common stock of the j^{th} firm on day t.

As noted by Binder (1998) “*in some instances there are problems with parameter estimation. For example, beta may change because of the event*”. So, it is clear that the market adjusted return model can be a solution because it does not include any parameter estimation for the abnormal return calculation. As the formula suggests, the market adjusted returns model approach has three main benefits. It does not rely on any pre-event data, it includes only one step and it does not account for the particular risk level of the single firms.

Comparison period mean adjusted returns: The equation for this model is:

$$A_{jt} = R_{jt} - \bar{R}_j \quad (6\alpha), \text{ where}$$

R_{jt} = The return rate of the common stock of the j^{th} firm on day t.

\bar{R}_j = The arithmetic mean return of the common stock of the j^{th} firm computed over the estimation period.

In all cases the definitions of the average abnormal return and cumulative average abnormal return are analogous to those for the market abnormal return above.

Taking into account all the above elements, the Market Adjusted Return Model will be used for the analysis.

4.3 Event Study Test Statistics

The abnormal returns are calculated by using the Market Adjusted Return Model. Consequently, the next step involves the examination of the statistical significance of the days in the vicinity of the announcement day. For this purpose, the time-series standard deviation test and the Cross-sectional standard deviation test will be used.

Time-series standard deviation test: The alternative name of this test is the “crude dependence adjustment” and it was recommended by Brown and Warner (1980). Comparing it to the standardized abnormal return test, this one uses a signal variable estimate for the entire portfolio. However, in this way, unequal return variances across securities are ignored. On the other hand, the potential problem of cross-sectional correlation of security returns is passive. The estimated variance of AAR_t is

$$\hat{\sigma}_{AAR}^2 = \frac{\sum_{t=E_1}^{E_2} (AAR_t - \bar{AAR})^2}{M - 2} \quad (7\alpha),$$

Where the market model parameters are estimated over the estimation period of $M=E_2-E_1+1$ days and

$$\bar{AAR} = \frac{\sum_{t=E_1}^{E_2} AAR_t}{M} \quad (7\beta),$$

The portfolio test statistic for day t in event time is:

$$t = \frac{AAR_t}{\hat{\sigma}_{AAR}} \quad (7\gamma),$$

Assuming time-series independence the test statistic for $CAAR_{T_1 T_2}$ is

$$t = \frac{CAAR_t}{(T_2 - T_1 + 1)^{\frac{1}{2}} \hat{\sigma}_{AAR}} \quad (7\delta)$$

Cross-sectional standard deviation test: The portfolio test statistic for day t in event time is

$$t = \frac{AAR_t}{\frac{\hat{\sigma}_{AAR_t}}{\sqrt{N}}} \quad (8\alpha),$$

where

$$\hat{\sigma}_{AAR_t} = \frac{1}{N-1} \sum_{i=1}^N \left(A_{it} - \frac{1}{N} \sum_{j=1}^N A_{jt} \right)^2 \quad (8\beta).$$

The estimated variance of $CAAR_{T_1T_2}$ is

$$\hat{\sigma}_{CAAR_{T_1T_2}} = \frac{1}{N-1} \sum_{i=1}^N \left(CAR_{i,T_1T_2} - \frac{1}{N} \sum_{j=1}^N CAR_{j,T_1T_2} \right)^2 \quad (8\gamma).$$

The test statistic for $CAAR_{T_1T_2}$ is

$$t_{CAAR} = \frac{CAAR_{T_1T_2}}{\frac{\hat{\sigma}_{CAAR_{T_1T_2}}}{\sqrt{N}}} \quad (8\delta).$$

4.4 Regression Analysis

The analysis' final stage is to capture and measure the market reaction around the announcement day (day 0). This stage will be completed through the regression analysis. The basic steps are as follows:

Assuming that the multivariate model that will be used will have the following form:

$$Y = \alpha + \beta_1 X_1 + \beta_2 X_2 + \dots + \beta_n X_n + \varepsilon_i \quad (9\alpha),$$

where Y is the dependence variable and X_1, X_2, \dots, X_n are the independent variables.

Step 1: Hypothesis Tests.

The goal of regression analysis is to examine if certain factors, such as the size of the buyer firm, have an effect on the stock abnormal returns. For the extraction of indisputable conclusions, the Anova Analysis will be used. The basic hypotheses (null and alternative hypothesis) for each chosen factor will be as follows:

H_0 : The factor does not affect the abnormal returns around the announcement day.

H_1 : The factor affects the abnormal returns around the announcement day.

The examination of the results will be discussed in statistical significance levels (of) 5%. The criteria used to reject or not reject the null hypothesis is the R^2 , the R_{adj}^2 , the F-statistic, the t-statistic and the value of the probability from the Anova Table.

The R^2 generates from the mathematical equation $R^2 = 1 - \left[\frac{\sum \varepsilon_i^2}{\sum (y_i - y)} \right]$, where $0 < R^2 < 1$.

Is the larger the value of R^2 , the greater the interpretive power of the econometric model. However, the value of R^2 tends to one when the number of independent variables increases. The alternative parameter that can be used to overcome this problem is the R_{adj}^2 . Thereinafter, the F-statistic examines if the model is statistical significant as a whole. Examining the value of F-statistic, the hypothesis that none of the control variables have impact on the dependence variable ($H_0: \beta_1 = \beta_2 = \dots = \beta_n = 0$) can be rejected or not rejected. Finally, there are two ways for testing the significance of each and all variables; the t-statistic and the value of the “Probability”.

Step 2: Test of conditional normality.

After the regression analysis, the first think that should be checked is if $u_i \sim N_{i,d}(\sigma, \sigma^2)$. For this project, the Jarqua and Bera test will be used.

$$H_0: u_i \sim N_{i,d}(\sigma, \sigma^2)$$

$$\left\{ \begin{array}{l} JB=n \left[\frac{M_3^2}{6} + \frac{(M_4-3)^2}{24} \right] > X_{2,0.05}^2, H_0 \text{ rejected} \\ JB=n \left[\frac{M_3^2}{6} + \frac{(M_4-3)^2}{24} \right] < X_{2,0.05}^2, H_0 \text{ not rejected} \end{array} \right. \quad (9\beta)$$

where n is the size of the sample and M_3 , M_4 estimates the asymmetry and the kurtosis of residuals respectively.

Step 3: Heteroskedasticity.

In this step, the hypothesis of homoscedasticity will be examined. This hypothesis implies that the variation of typical errors σ_i is stable regardless of the values of control variables. However, the hypothesis of homoscedasticity occurs very often, because it is quite difficult for the residuals of the stochastic error to originate from a distribution with the same variance for all observations in the sample. Usually, the variation of typical errors changes in

accordance with the level of independent variables. The null and alternative hypothesis for this step is as follows:

H_0 : Existence of heteroskedasticity.

H_1 : Existence of homoscedasticity.

The test that will be used for this purpose is the White Test.

Step 4: Autocorrelation.

Associating with the autocorrelation of residuals, it will be applied the Durbin-Watson Test. In particular, in this case it will be examined if the residuals are independent or not between them. The null hypothesis is as follows:

H_0 : No positive autocorrelation.

H_0^* : No negative autocorrelation.

Initially, the value of $d = \frac{\sum (e_i - e_{i-1})^2}{\sum e_i^2} (9\gamma)$, where $0 < d < 4$, will be calculated. The test statistic d is compared to lower and upper critical values ($d_{L,\alpha}$ and $d_{U,\alpha}$):

- If $d < d_{L,\alpha}$, there is statistical evidence that the error terms are positively auto-correlated.
- If $d > d_{U,\alpha}$, there is no statistical evidence that the error terms are positively auto-correlated.
- If $d_{L,\alpha} < d < d_{U,\alpha}$, the test is inconclusive.
- If $(4 - d) < d_{L,\alpha}$, there is statistical evidence that the error terms are negatively auto-correlated.
- If $(4 - d) > d_{U,\alpha}$, there is no statistical evidence that the error terms are negatively auto-correlated.
- If $d_{L,\alpha} < (4 - d) < d_{U,\alpha}$, the test is inconclusive.

The Durbin-Watson Test demands the existence of the stable term in the function of the regression.

In conclusion, the logical order of the procedure of the analysis is as follows:

1. Sample selection.
2. Return Index (RI) selection for each company j on day t, 120 trading days before the announcement day and 21 trading days after the announcement day.
3. Pairing Athens Stock Exchange General Index (PI) in each day t for each company j, 120 trading days before the announcement day and 21 trading days after the announcement day.
4. Calculation of the rate of return of the common stock of the jth company on day t:

$$R_{jt} = \frac{(RI_{j,t} - RI_{j,t-1})}{RI_{j,t-1}} \quad (10\alpha).$$

5. Calculation of the observed return on the market index on day t:

$$R_{mt} = \frac{(PI_t - PI_{t-1})}{PI_{t-1}} \quad (10\beta).$$

6. Calculation of the daily abnormal returns for each company j on day t:

$$AR_{j,t} = R_{j,t} - R_{m,t} \quad (10\gamma).$$

7. Application of Time-series standard deviation test for the average abnormal returns and the cumulative average abnormal returns.
8. Application of Cross-sectional standard deviation test for the average abnormal returns and the cumulative abnormal returns.
9. Regression analysis.

CHAPTER 5: RESULTS

This section aims to demonstrate and interpret the results of this empirical study. The derivation of average abnormal returns and cumulative average abnormal returns were based on observations around the announcement day. In addition, quantitative and accounting characteristics of firms were used in order to reject or not reject specific hypotheses related to share repurchases.

5.1 Results for The Average Abnormal Returns (AARs) and The Cumulative Average Abnormal Returns (CAARs).

The analysis will be performed based on the Market Adjusted Return Model. For the whole sample, significant average abnormal returns were observed on specific days. As expected the analysis revealed the market's positive short reaction around the announcement day. However, the assumption was that, the only "event" that occurred on day 0 is the buyback announcement. "Table 5.1" represents the results for the event window (-20,+20) . The table displays event days, number of observations (N) and daily average abnormal returns (ARs). It further shows cross sectional standard deviation test and time series standard deviation test values for daily ARs, daily cumulative average abnormal returns (CARs), and CARs along with the associated test statistics for the intervals (0,+1), (1,+1), (-2,+2), (-3,+3), (-4,+4), (-5,+5), (10,+10), (-20,+20), (+1,+20), (-20,-1) relative to announcement day. The study period is from 2008 to 2010. ***, **, and * indicate significance at the 1%, 5%, and 10% levels, respectively. On days -16, -1, +2, the AARs are statistically significant at a 10% level. On days -17 and -2, the AARs are statistical significant at a 5% level. Furthermore, on days -3, -2, 0, and +1, the AARs are statistical significant at a 1% level. Specifically, on days -17, -16, -3, -2, -1, 0, +1, and +2, the AARs are 0.68%, 0.52%, 1.02%, 0.88%, 0.45%, 0.97%, 0.97% and 0.57%, respectively. Also, "Chart 5.1" and "Chart 5.2" illustrate high fluctuations of the average abnormal returns and the cumulative abnormal returns in conjunction with the days. Of great interest are day -17 and day -16. On those days, the average abnormal returns are statistically significant, as mentioned. This observation may be consistent with the Greek legislation relative to share repurchases. In Greece, the meeting of firm's board of directors, on share repurchases, occurs eight to ten days before the public announcement. As a result, the possible leak of information presents the investors who have internal information, with the opportunity to make profits at the expense of the remaining shareholders.

Table 5.1

Event day	N	AR(%)	Cross-sectional standard deviation test	Time series standard deviation test	CAR(%)
-20	104	0,43%	1,26	1,43	0,00
-19	104	-0,15%	-0,51	-0,50	0,00
-18	104	0,38%	1,20	1,25	0,01
-17	104	0,68%	2,19**	2,25**	0,01
-16	104	0,52%	1,86*	1,71*	0,02
-15	104	0,45%	1,43	1,48	0,02
-14	104	0,08%	0,27	0,28	0,02
-13	104	0,07%	0,19	0,22	0,02
-12	104	0,14%	0,36	0,46	0,03
-11	104	0,39%	1,15	1,29	0,03
-10	104	-0,42%	-1,54	-1,38	0,03
-9	104	-0,07%	-0,26	-0,23	0,02
-8	104	-0,56%	-1,94	-1,85	0,02
-7	104	0,09%	0,29	0,31	0,02
-6	104	0,14%	0,38	0,46	0,02
-5	104	0,04%	0,14	0,13	0,02
-4	104	0,44%	1,34	1,44	0,03
-3	104	1,02%	3,64***	3,36***	0,04
-2	104	0,88%	3,78***	2,92***	0,05
-1	104	0,45%	1,75*	1,48*	0,05
0	104	0,97%	2,87**	3,20***	0,06
1	104	0,97%	3,38**	3,21***	0,07
2	104	0,57%	1,85*	1,87*	0,08
3	104	0,27%	0,94	0,88	0,08
4	104	0,32%	0,97	1,07	0,08
5	104	-0,32%	-1,17	-1,07	0,08
6	104	0,18%	0,51	0,58	0,08
7	104	0,40%	1,13	1,31	0,08
8	104	-0,06%	-0,20	-0,20	0,08
9	104	0,13%	0,44	0,44	0,08
10	104	-0,21%	-0,82	-0,69	0,08
11	104	0,19%	0,71	0,64	0,08
12	104	0,07%	0,24	0,23	0,08
13	104	-0,20%	-0,74	-0,68	0,08
14	104	-0,36%	-1,35	-1,20	0,08
15	104	-0,29%	-0,91	-0,95	0,08
16	104	-0,07%	-0,24	-0,24	0,08
17	104	-0,42%	-1,49	-1,38	0,07
18	104	-0,38%	-1,31	-1,27	0,07
19	104	-0,19%	-0,56	-0,62	0,07
20	104	0,12%	0,38	0,40	0,07

Event day	N	CAAR(%)	Cross-sectional standard deviation test	Time series standard deviation test
(0,+1)	104	0,019422	4,50***	4,54***
(-1,+1)	104	0,023915	4,86***	4,56***
(-2,+2)	104	0,038424	7,31***	5,68***
(-3,+3)	104	0,051274	8,85***	6,40***
(-4,+4)	104	0,058875	7,62***	6,49***
(-5,+5)	104	0,056035	6,86***	5,58***
(-10,+10)	104	0,052256	4,32***	5,21***
(-20,+20)	104	0,066825	3,92***	3,45***
(+1,+20)	104	0,007121	0,51	0,53
(-20,-1)	104	0,050009	4,55***	3,70***
(-20,+2)	104	0,07509	6,97***	5,17***

Chart 5.1

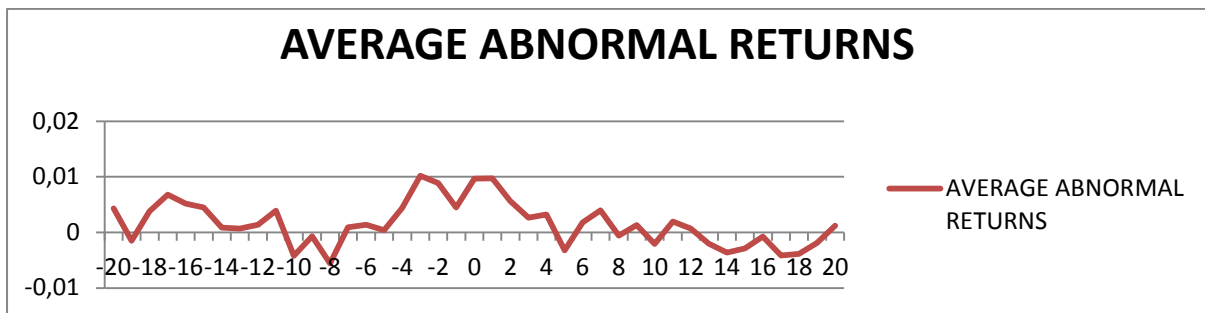
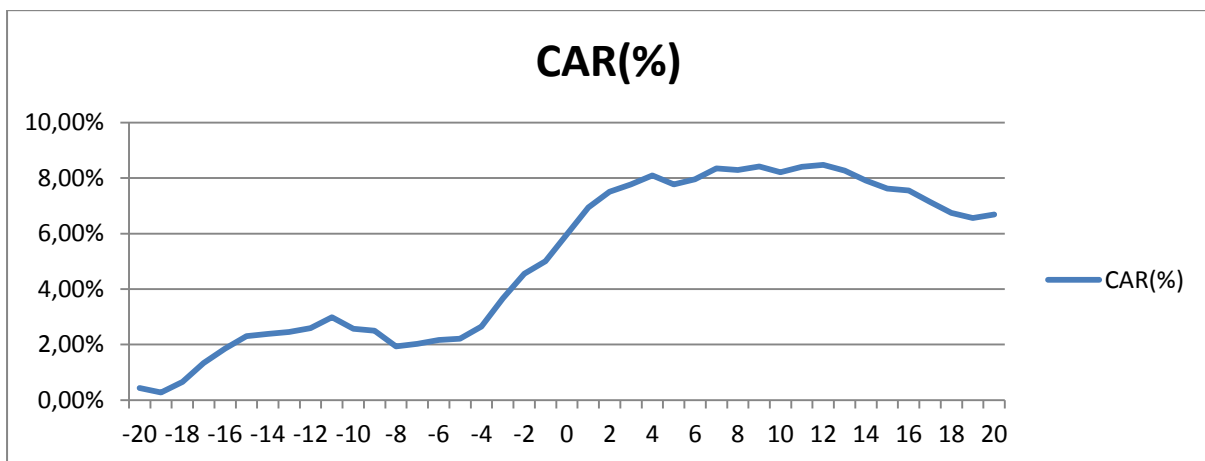


Chart 5.2



Moving forward to the analysis of each event window, both statistic test has as a result statistically significant cumulative average abnormal returns at a 1% level. Exception to this is the event window (+1,+20). The maximum CAARs is 7.5% for the event window (-20,+2) and the minimum one is 0.71% for the event window (+1,+20).

In conclusion it can be reported that the positive market reaction to share buybacks focuses mainly 3 days before the announcement day and 2 days after that.

5.2 Regression Analysis and Hypotheses

In this section, the main factors, that affect the decision of one firm to repurchase - or not to - stocks, will be analyzed via performing the regression analysis. Specifically, the results will make clear why firms announce share repurchase programs during financial crisis. The econometric model that will be used is as follows:

$$CAR_i = a_0 + a_1(ROA)_i + a_2(ROE)_i + a_3(QRATIO)_i + a_4(SIZE)_i + a_5(DY)_i + a_6(E/P)_i + \\ + a_7(B/M)_i + a_8(LEV)_i + a_9(VOL)_i + e_i \quad (5a).$$

(CAR): It is the independent variable and represents the cumulative average abnormal returns for event window (-20, +20) of firm i.

(ROA): It is the return on assets of firm i. It is measured as the operating income divided by total assets of firm i.

(ROE): It is the return on equity of firm i. It is measured as net income before extraordinary items and preferred dividends divided by common equity of firm i.

The control variable ROA as well as the control variable ROE are consistent with the agency costs of free cash flow hypothesis. A high ROA or ROE means that managers have surplus money available to them and they can invest it to project with negative NPV. As a result, a share repurchase announcement is good news, because the possibility of “dangerous” investments is eliminated. Therefore, the coefficient of those variables is expected to be positive.

$$H_0: a_1 > 0$$

$$H_1: a_2 > 0.$$

(QRATIO): It is the Tobin’s q ratio. It is calculated as market value of equity plus value of preferred stocks plus book value of debt, and all this divided by the book value of total assets of firm i. The Tobin’s q ratio represents an estimation of firms’ investment opportunities. It is relevant with the capital market allocation hypothesis. According to this theory, the market reaction around the announcement day is greater for firms with lower investment opportunities. It is expected that the Tobin’s q ratio will be correlated negatively with the cumulative abnormal returns.

$$H_2: a_3 > 0.$$

(SIZE): It is the firm’s size. It is defined as the natural log of the book value of total assets of firm i. This independent variable should have negative correlation with the cumulative abnormal returns. The smaller companies will have greater information asymmetry. So, according to the cash flow signaling hypothesis, the market reaction should be more intense for the smaller companies.

$$H_3: a_4 > 0.$$

(DY): It is the dividend yield. It is computed as total dividends divided by market value of equity of firm i at year-end. Apart from the agency cost of free cash flow hypothesis, the capital market allocation hypothesis and the cash flow signaling hypothesis, the dividend substitution hypothesis is also tested. A supposed dividend reduction will lead to a higher ratio. As a result, firms which use share repurchases instead of dividends will have reduced dividend yield and more positive market reaction around the announcement day.

$$H_4: a_5 > 0.$$

(E/P): It is the price-to-earnings ratio. It is calculated as net income divided by market value of equity at year-end of firm i . A high value of earnings-to-price ratio represents the low expectation of market for a certain firm's growth. This phenomenon is called undervaluation and is relevant with the market undervaluation hypothesis. It is expected that the correlation between cumulative abnormal returns and the earnings-to-price ratio are positive.

$$H_5: a_6 > 0.$$

(B/M): It is the book-to-market ratio. It is defined as book value of equity divided by market value of equity at year-end of firm i . It is an index that measures the correlation between market value of stock and book value of stock. As a consequence, the higher the index is, the more undervalued the stock is. This is connected with the market undervaluation hypothesis and it is expected for the market reaction to be more intense for firms with higher book-to-market ratio.

$$H_6: a_7 > 0.$$

(LEV): It is the leverage ratio. It is measured as total liabilities divided by market value of equity at year-end of firm i . According to capital structure adjustment hypothesis, some firms use share repurchase programs in order to achieve an optimal leverage ratio. Companies with relatively low leverage levels are expected to lever up, in order to take advantage of the tax shield (Dittmar, 2000). Consequently, the coefficient of (LEV) has to be negative.

$$H_7: a_8 > 0.$$

(VOL): It is the return volatility. It is measured as the standard deviation of stock returns for the previous 60 months or the standard deviation of daily stock returns of the current year. It

is expected that firms with greater volatility of stock values, they will have greater possibilities to announce share buyback programs in order to distribute the profits as dividends.

$$H_8: a_9 > 0.$$

Table 5.2

Summary Statistics									
	ROE	ROA	TOBIN'S Q	FIRM'S SIZE	DIVIDEND YIELD	EARNINGS TO PRICE	BOOK TO MARKET	LEVERAGE	VOLATILITY
Average	-0,01	0,02	1,10	12,42	0,04	-0,05	1,71	0,62	255,91
Median	0,03	0,02	0,99	12,11	0,01	0,03	0,98	0,62	17,03
Standard Deviation	0,40	0,07	0,40	1,93	0,07	1,23	2,12	0,18	1.108,15
Standard Error	0,04	0,01	0,04	0,19	0,01	0,12	0,21	0,02	108,66
Minimum Value	-2,89	-0,16	0,35	9,33	-	-7,30	-0,19	0,12	0,66
Maximum Value	1,64	0,44	2,12	18,43	0,48	9,23	11,07	1,04	9.697,64
Observations	104	104	104	104	104	104	104	104	104

However, the control variables: return on equity (ROE), return on assets (ROA) and Tobin's q ratio (QRATIO) measure the same thing. These are indexes associated with the performance of firms. Moreover, there is a strong positive correlation between return on equity and earnings-to-price (65%). Respectively, there is a strong negative correlation between Tobin's q ratio and book-to-market (-66%). This is illustrated at "Table 5.3". This table describes the correlation coefficients among control variables. So, the initial econometric model (equation 5 α) is split into four sub-models:

$$CAR_i = a_0 + a_1(ROE)_i + a_2(SIZE)_i + a_3(DY)_i + a_4(B/M)_i + a_5(LEV)_i + a_6(VOL)_i + e_i \quad (5\beta).$$

$$CAR_i = a_0 + a_1(ROA)_i + a_2(SIZE)_i + a_3(DY)_i + a_4(E/P)_i + a_5(B/M)_i + a_6(LEV)_i + a_7(VOL)_i + e_i \quad (5\gamma).$$

$$CAR_i = a_0 + a_1(QRATIO)_i + a_2(SIZE)_i + a_3(DY)_i + a_4(E/P)_i + a_5(LEV)_i + a_6(VOL)_i + e_i \quad (5\delta).$$

$$CAR_i = a_0 + a_1(SIZE)_i + a_2(DY)_i + a_3(E/P)_i + a_4(B/M)_i + a_5(LEV)_i + a_6(VOL)_i + e_i \quad (5\epsilon).$$

Table 5.3

Correlation Coefficients									
	ROE	ROA	TOBIN'S Q	FIRM'S SIZE	DIVIDEND YIELD	EARNINGS TO PRICE	BOOK TO MARKET	LEVERAGE	VOLATIY
ROE	1								
ROA	0,3814	1							
TOBIN'S Q	-0,0421	0,1427	1						
FIRM'S SIZE	0,1528	0,0155	-0,0795	1					
DIVIDEND YIELD	0,1184	0,1923	-0,2204	0,0549	1				
EARNINGS TO PRICE	0,6564	0,1642	-0,0359	0,0954	0,0161	1			
BOOK TO MARKET	-0,0355	-0,2564	-0,6649	-0,0393	0,0906	0,0331	1		
LEVERAGE	-0,1348	-0,2194	0,2186	0,3359	-0,0621	-0,2067	-0,2374	1	
VOLATILITY	0,0568	0,0068	-0,0433	0,3748	0,0644	0,0341	-0,0487	0,1335	1

5.3 Results of Regression Analysis

The results of the regression analysis are summarized at “Table 5.4”. The numbers in the parentheses are the values of “p-value”. When the “p-value” is lower than 0.05 then the independent variable is statistically significant.

According to this table, the explanation power of the econometric model 1 is at a level of 6% (R Square = 0.06). The explanation power of econometric models 1 2, 3, and 4 is 1.4% (R Square = 0.14), 9% (R Square=0.09), and 1.3% (R Square = 0.13), respectively. Furthermore, the hypothesis that none of the control variables have impact on the dependence variable is rejected for models 2 and 3. This is because the value of probability of the F-statistic test is smaller than 0.05 ($0.04 < 0.05$ and $0.03 < 0.05$). In addition, for all models, it is observed that the statistically significant variables are the earnings-to-price ratio (E/P) and the book-to-market ratio (B/M), both of which have negative coefficients. This result opposes to the market undervaluation hypothesis. It is observed that firms with growth stocks (overvalued stocks) have greater cumulative abnormal returns. This conclusion could be interpreted if it is examined in line with price support and stock liquidity hypothesis. Firms with overvalued stocks, decide to announce open market share repurchases in order to increase the investment confidence and decrease the number of sellers. During financial crisis, stock market declines and the number of sellers increase (panic selling), i.e. an investor wants to get out of an investment with low pay. So, the solution is a big buyer such as a company. As a consequence, the phenomenon of panic selling will be reduced through share repurchase

programs and stock prices will stabilize. Another explanation is the market inefficiency. In this situation, the market underreacts to new information (announcement of share repurchases). As a result, the “growth stocks” will continue to generate higher abnormal returns compared to the “value” stocks.

Furthermore, for all models, the variable of firm’s size, which is consistent with the cash flow signaling hypothesis, is not confirmed. At the same time, it is noted that the dividend substitution hypothesis and the capital structure adjustment hypothesis are not the primary motivational factors for announcing an open market share repurchase program during financial crisis. The observed coefficients of “DY”, “LEV” and “VOL” are not statistically significant. The coefficients of “ROE”, “ROA” and “QRATIO” are not statistically significant too.

Table 5.4

Regression Analysis Results				
	Model 1	Model 2	Model 3	Model 4
Intercept	0,2112 (0,09)	0,1908 (0,11)	0,1061 (0,42)	0,2 (0,09)
ROE	-0,0119 (0,79)	- -	- -	- -
ROA	- -	0,1486 (0,57)	- -	- -
TOBIN'S Q	- -	- -	0,0366 (0,42)	- -
FIRM'S SIZE	-0,0082 (0,43)	-0,0045 (0,65)	-0,004 (0,69)	-0,004 (0,68)
DIVIDEND YIELD	-0,0104 (0,97)	-0,0555 (0,83)	-0,0266 (0,92)	-0,0241 (0,92)
EARNINGS TO PRICE	- -	-0,041 (0,00)	-0,0398 (0,01)	-0,0401 (0,00)
BOOK TO MARKET	-0,0187 (0,03)	-0,0173 (0,05)	- -	-0,0191 (0,02)
LEVERAGE	-0,0189 (0,86)	-0,0704 (0,51)	-0,0534 (0,61)	-0,0875 (0,39)
VOLATILITY	0,00000758 (0,65)	7,87E-06 (0,63)	9,22E-06 (0,58)	7,61E-06 (0,64)
Observations	104	104	104	104
Firms	77	77	77	77
R Square	0,06	0,14	0,09	0,13
F-statistic	1,02	2,16	1,58	2,48
Prob(F-satistic)	(0,42)	(0,04)	(0,16)	(0,03)

Lastly, for models 2 and 4, it should be highlighted that there is an autocorrelation according to White test. The nR^2 is lower than the 5% critical X^2 value, with degrees of freedom equal to the number of slope coefficients, excluding the constant, in the test regression. Further, for models 2, 3 and 4, according to the Durbin Watson test, the test turns out to be inconclusive for positive autocorrelation and there is no statistical evidence that the error terms are negatively auto-correlated. On the other hand, for model 1, there is no statistical evidence that the error terms are positively or negatively autocorrelated. Finally, according to Jarque-Bera test the residuals of model 2, 3 and 4 have skewness and kurtosis matching a normal distribution, except of model 1. The results are summarized in the “Table 5.5”.

Table 5.5

Diagnostic Tests				
	Model 1	Model 2	Model 3	Model 4
White Test	$(nR^2 = 67,92) > (X_{27,0.05} = 40,11)$	$(nR^2 = 45,95) > (X_{35,0.05} = 49,77)$	$(nR^2 = 48,37) > (X_{27,0.05} = 40,11)$	$(nR^2 = 36,70) < (X_{27,0.05} = 40,11)$
Durbin Watson Test	$d=1,76 > du=1,67 \ \& \ (4-d) > du$	$dL=1,4 < d=1.65 < du=1.69 \ \& \ (4-d) > du$	$dL=1,4 < d=1.64 < du=1.67 \ \& \ (4-d) > du$	$dL=1,4 < d=1.65 < du=1.69 \ \& \ (4-d) > du$
Jarque-Bera Test	$JB=5,19 < X_{2,a}=5,99$	$JB=27,5 > X_{2,a}=5,99$	$JB=23,08 > X_{2,a}=5,99$	$JB=30,22 > X_{2,a}=5,99$

CHAPTER 6: CONCLUSIONS

6.1 Conclusions

This study analysed the Greek stock market reaction in the vicinity of the announcement day of open market share repurchase programs. Additionally, it investigated the main hypotheses which are associated with share buybacks. In specific, the following hypothesis were examined: the cash flow signalling hypothesis, the market undervaluation hypothesis, the dividend substitution hypothesis, the agency costs of free cash flow hypothesis, the capital structure adjustment hypothesis and the capital market allocation hypothesis.

Using the Market-adjusted returns model, it was observed that statistically significant abnormal returns exist, three days before the announcement day and two days after that. In particular, on day 0, the abnormal return was 0.97% at the statistically significant level of 1% and on day -3, the abnormal return was 1.02% at the statistical significant level of 1%. Furthermore, all the examined event windows were positive and statistically significant aside from the event window (+1,+20).

The regression analysis showed the existence of price support effects. Firms which have overvalued stocks have more positive market reaction. This result implies that during financial crises, a big company with “growth” stocks decides to repurchase stocks because it wishes to stabilize the prices and support a bearish market

6.2 Further Work

As aforementioned, it must be noted that some of the results from the regression analysis are characterized by heteroskedasticity. Heteroskedasticity owes to the small sample size and the ambiguously defined regression model. Further, for the sake of simplicity the time-series data were used and not the cross-sectional data.

Further considerations must be made with regards to the firm’s long-term price effects on the market reaction. It is also recommended that further studies are conducted on the frequency of share repurchases due to the multiple re-announcements in a short period of time. Last but not least, it is of worth investigating if the share repurchase announcements were eventually materialised, as well as formulate a comparison of the before-and-after crisis abnormal returns.

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