Do International Institutions Affect Financial Markets?: Evidence from the Greek Sovereign Debt Crisis

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Abstract

This paper investigates the effects of the policy announcements from the International Monetary Fund (IMF), and European Union (EU) offices including the European Commission (EC), the European Central Bank (ECB), the Euro Area ministers (EA) on financial and real sectors during the recent Greek Sovereign Debt Crisis. We also include the reactions of financial and real sectors to Rating Agencies, Greek government and Greek public that were actively involved. We find that financial sectors have stronger reactions to international institutions and Greek government policy action announcements than the real sectors. Banking and Financial sectors react predominantly negatively to unfavorable announcements, while real sector responses are mixed. . The immediate reaction to EU offices and Troika policy announcements are the highest in Banking with negative abnormal returns of more than 1.5% per day. Public riots following unfavorable EU announcements also generate high falls in Banking and Financial sectors. . The results show that favorable effects of an announcement from an international organization can be offset by negative effects arising from protests from the public and negative responses of the local government to announcements from international organizations.

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1. Introduction

The recent Greek crisis provides an excellent laboratory to study the reactions of financial markets and real sectors to policy related news from major international institutions: the International Monetary Fund (IMF), and the European Union (EU) offices including the European Commission (EC), the European Central Bank (ECB), the Euro Area ministers (EA) and the European Union itself. While the previous literature on the crisis has mostly focused on policy related news from local authorities such as domestic central banks and the Fed announcements, this paper provides evidence from some key international financial institutions' actions. We also include the reactions of the local government and the public into the analysis. Greek government's actions both conformed and conflicted with the views of international lenders and thus provide an excellent framework to study the complexities of a major financial crisis. Additionally, the Greek citizens were heavily involved in the crisis, staging strikes and holding demonstrations to express their views. Examining Greece not only enables us to examine the relative impact of IMF programs, the so called Troika and several EU offices between financial and real sectors of the economy, but also permits us to find evidence to whether local responses affect investors' actions during a financial turmoil. Overall, this paper provides comprehensive evidence on role of international institutions, regional policymakers, and the public responses in driving financial market behavior during a major financial crisis. Another contribution of this study is that it examines the impact of several institutions (the IMF and the EU institutions) on financial markets in a monetary union setting. It also helps us to improve our understanding of the effects of international institutions on financial markets including not only IMF but also the ECB, Troika, and EU offices in general and also their relative importance in private financial markets during a financial crisis.

Although Greece experienced rapid growth for the period 2000-2009 and the real GDP-growth averaged 4%, against the euro area average of 2%, this growth was generated by unsustainable drivers. Private consumption boosted as a result of large real wage increases, high credit growth and low interest rates obtained with acceptance to the euro. Public spending also increased significantly. However, rather than investing in projects that would pay off in the future the money was used to cover current consumption. Health and pension systems were financially unsustainable in the long run and tax evasion significantly hurt government income. For the same period Greek public sector wages rose by more than 50% in real terms, with no improvements in efficiency or output to support the wage increase. As a

result, the nation's international competitiveness eroded, reducing exports from 25% to 19% of GDP, negatively affecting the current account. Fiscal and external imbalances resulted in increased accumulation of debt. Government debt increased from 103% to 115% of GDP from 2000 to 2009, while external debt increased from 45% to 100%. With consistent overspending and optimistic projections, Greece repeatedly missed its fiscal targets. In addition, the country frequently revised its reported numbers making its statistics questionable. These factors, in combination with an uncompetitive economy and fiscal imbalances, made Greece vulnerable to the global credit crisis of 2008 (European Commission, 2010).

When the global credit crisis hit, investor confidence weakened and global capital markets dried up. Following the Greek general election in October 2009, the newly elected government announced that the 6.7% budget deficit reported by the previous government in reality amounted to 12.7% of GDP, significantly higher than the 3.7% forecasted in April. Although long suspected, the revelation that Greece had been falsifying its numbers deteriorated investor confidence. The large increase in government debt left investors concerned whether Greece could repay its loans, significantly increasing interest rates on Greek bonds. As Greece relied on borrowing from capital markets to repay its debts, such a shift in investor confidence could eventually threaten a Greek default. In December 2009, Greek bonds were classified as "junk" by the rating agencies, further increasing the governments' borrowing costs. With a budget deficit of 13.6% and the national debt level at 115% of GDP, Greece requested bailout talks from the IMF, EU, and ECB (hereafter the troika). As of June 29, 2012 the country had received two bailout packages.

On May 2, then Managing Director of the IMF, Dominique Strauss-Kahn, announced that a deal had been reached between the Greek government and the Troika. In exchange for an extensive Greek economic program the Euro Area members committed €80 billion in loans to Greece and the IMF provided €30 billion in a three-year stand-by agreement. The short-term aim of the program was to "restore confidence and maintain financial stability" (European Commission 2010, p. 10), while improved competitiveness and economic growth were goals to be met in the medium term. [1]

[1] At heart of the economic program were the following policies: "Fiscal policy and pro-growth measures are the two main pillars of the government's program. A combination of spending cuts and revenue increases… are designed to achieve a turnaround in the public debt-to-GDP ratio beginning in 2013, and will reduce the fiscal deficit to below 3% of GDP by 2014. Measures for 2010 involve a reduction of public sector wages and pension outlays… Pro-growth measures … include strengthening income and labor markets policies; better managing and investing in state enterprises and improving the business environment. Reforms to fight waste and corruption… are also being undertaken. In addition, the government is taking decisive steps to strengthen and safeguard the financial system. A Financial Stability Fund—

In July 2011, it was publicly recognized that Greece would be in need of another bailout, and on February 22, 2012 the details of a second bailout package were announced. The EU stated that Greece had made "mixed progress" under the first bailout program, and blamed political instability, social unrest, and a recession that was deeper than initially anticipated to be the major factors behind its limited success. Despite a reduction in the government deficit from 15.75% in 2009 to 9.25% in 2011, measures to fight tax evasion, restore competitiveness and control expenditures lagged behind. [2] The goals of the second program were similar to those of the first bailout; however the EU announced the strategy had been adjusted to focus more on growth-enhancing reforms. Different from the first bailout was also that sovereign debt holders had to accept losses on their bonds. This significantly affected Greek banks which held approximately €32 billion in government bonds.

The effectiveness of international institutions' financial assistance to crisis countries is highly debated. For example, supporters of IMF involvement argue that such assistance helps restore investor confidence and maintain world financial order. For example, the goal of Greece's first bailout package was to "restore confidence and maintain financial stability" (European Commission, 2010). Observers claim that liquidity support encourages investors to retain funds in the program country, preventing a liquidity run and supporting recovery. Such support may also encourage the implementation of efficiency-enhancing reforms, as these policies might be too costly and risky without IMF support (Evrensel and Kutan, 2008, Corsetti, Guimarães and Roubini, 2006). Opponents of IMF intervention disregard these positive effects of IMF involvement and argue that IMF funding induces moral hazard and has limited effects on recovery. Research finds that excessive lending and borrowing increases with the probability of IMF support, and it is argued that the implicit guarantees by the IMF reduce the incentive to stay solvent and avoid mistakes (Döbeli and Vanini, 2004 and Vaubel, 1983). On the other hand, some researchers provide evidence that IMF loans cannot

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fully financed under the program—will ensure a sound level of bank equity. There will be a more progressive tax scale for all sources of income; a clampdown on tax evasion and a step up in prosecution of the worst offenders. Finally, there will be a significant reduction in military expenditures during the program period" (IMF Press Release No.10/176. May 2, 2010).

[2] The second program involved the following measures: "The program focuses on restoring competitiveness and growth, fiscal sustainability, and financial stability… Greece's priority is to undertake competitiveness-enhancing structural reforms. The government's bold labor market measures will play a crucial role in this regard, complemented by measures to liberalize professions and product markets, improve the business environment, and privatize state-owned assets. Significant further fiscal adjustment is necessary to put debt on a sustainable downward trajectory. Reaching a primary surplus of 4½ percent of GDP by 2014 will require politically difficult cuts in government spending, as well as decisive measures to address tax evasion… Securing financial sector stability and depositor confidence is also a priority. The program secures liquidity support for Greek banks, and provides funds for their recapitalization, alongside incentives to preserve private ownership"(IMF Press Release No. 12/85. March 15, 2012).

generate significant moral hazard because of its limited resources (Lane and Phillips 2000, and Zettelmeyer, 2000).Yet others highlight the role of IMF as a lender of last resort, functioning as a financial institution to crisis countries securing financial order, while opponents disregard this role due to limited resources and moral hazard effects. During the Greek crisis, not only IMF but also several EU institutions were involved enabling us to generalize these discussions to International organizations rather than being limited to IMF involvement alone. Our paper not only studies the impact of IMF-related news on financial and real sector stock returns, but also the effects of the EU-based institutions that are alternative lenders of last resort for Greece. Hence this study determines whether a global lender of last resort (i.e. the IMF) or regional lenders of last resort (i.e. EU institutions here) can be more effective by restoring confidence in case of a financial crisis in a monetary union setting.

In a press release associated with Greece's first bailout package, then IMF Managing Director Dominique Strauss Kahn stated that "the success of Greece's recovery program will depend, first and foremost, on the commitment of its government and people" (IMF Press Release 10/176. May 2, 2010). Therefore, news regarding the reaction by the local government and the public are also included in the analysis. We focus on Greece because the Greek government's actions both conformed and conflicted with the views of not only the IMF but also other international lenders, mainly several EU institutions. Additionally, the Greek citizens were heavily involved in the crisis, staging strikes and holding demonstrations to express their views. By examining Greece not only are we able to examine the relative impact of IMF programs and help from EU institutions between sectors, but we can also find evidence to whether local responses affect investor confidence.

This paper contributes to the existing literature in three respects. First, there is hardly any published research on the effects of IMF programs and of other international institutions on the Greek stock market. Greece differs from most other countries that have received IMF assistance in that it is part of a monetary union. As such, the country cannot use monetary policies to stimulate the economy. Additionally, as a Greek default would question the credibility of the entire Euro Area the EU has an incentive to support Greece. It is therefore interesting to examine whether the presence of EU and the ECB cause investors to react differently to IMF-news. Second, the paper examines the impact of the EU and IMF programs across different (real and financial) sectors, investigating whether some sectors benefited more from IMF assistance than others. To our knowledge, such an analysis has only been

completed on the Asian crisis and only studying IMF involvement by Evrensel and Kutan (2007), Kutan and Muradoglu (2007), and Kutan, Muradoglu and Sudjana (2012).[3] By studying the recent crisis in Greece we can lend support to whether their findings can be generalized to other countries in a currency union setting, and also discuss the importance of regional international (such as EU) institutions during a financial crisis. We also investigate whether some sectors benefited more from the bailouts than others. Third, extending the recent study by Kutan, Muradoglu and Sudjana (2012) on the Asian crisis, the paper examines the relationship between IMF and EU offices' actions and responses by the local government and the public. Investors may expect the local response to influence the success of the IMF and EU programs, thus ultimately affecting the stock market. By including news regarding local responses we can examine whether an IMF or an EU program is affected by negative public reactions which has implications for the overall effectiveness of programs by international organizations.

Our results have significant implications for investors and policy makers. For investors, our results lend support to whether involvement of international institutions in financial markets creates wealth effects in terms of gains or losses in the stock market. By differentiating between the impact on real and financial sectors, and examining whether local and international institutional news affect stock returns, the study produces more comprehensive information about investor behavior than previous studies that could be beneficial when developing investment strategies. For policy makers, the results are interesting because they imply whether the EU and IMF bailouts can be successful under tense local conditions. Greece responded to the programs with demonstrations, strikes, suicides and fires. For example, if an IMF program can be successful even under such negative responses from the public, the role of the IMF may be more important than initially thought. Similarly the Greek crisis was the first test of the European Union under stressful circumstances and our results highlight the importance of EU institutions in a crisis situation.

This study attempts to answer the following specific questions: Did the IMF and EU involvement affect all sectors similarly, or did some sectors benefit more than others? Did different types of local and global news have the same effect on all sectors? Further, did local responses offset the positive effect of good news? Our results suggest during the recent debt

[3] During the writing of this paper we obtained a working paper by Kosmidou, Kousenidis and Negakis (2013) similar to our study. They also examine the effectiveness of the IMF and EU bailout programs on the Greek stock market. However, their analysis focuses only on three sectors (banking, financial, and real sectors) and identifies good and bad news subjectively. In this paper we include multiple real sectors and use the market definition of good and bad news which is less subjective. We also use a broader set of events and event windows than those reported in Kosmidou et al. (2013).

crisis in Greece that international involvement significantly affected returns in all sectors, and that the banking and financial sectors had stronger responses to these events than the real sectors. Further, the real and financial sectors had asymmetric responses to different categories of news, with bad news from the Troika and EU institutions having the strongest effect on the financial sectors. Similarly financial sectors responded to public riots following EU announcements most significantly in economic terms. We also find evidence that negative government and public responses offset the positive effect of good news from international organizations.

The paper is organized as follows. Relevant literature is discussed in section 2, while our hypotheses are explained in Section 3. Sections 4 and 5 describe the data and methodology, respectively. Section 6 presents and discusses the results and Section 7 concludes.

2. Literature Review

A limited but growing number of related studies focus on the effects of IMF-related news on financial markets, in particular banking sector shares. For example, Kho and Stultz (2000) study the impact of IMF-programs on domestic and international bank stocks during the Asian crisis. They conclude that the IMF-programs had an insignificant effect on domestic bank values, and a small, positive effect on international bank values. Kho, Lee and Stultz (2000) examine the effects of IMF program announcements in Mexico, Brazil, South Korea and Russia on US bank equities. Consistent with the findings of Kho and Stultz (2000), they find that US banks with exposure to the bailout country earn positive abnormal returns, whereas the abnormal returns for US banks without exposure are insignificant. Zhang (2001) examines the financial crisis in South Korea and reports that international banks with exposure to the crisis country earned the largest gains following IMF announcements. Overall, these studies suggest that IMF related news have a positive impact on international bank values. Lau and McInish (2003) study the impact of IMF bailout announcements on international and domestic bank returns during the Asian crisis. Contrary to Kho and Stultz (2000) they find that domestic banks experienced significant, positive abnormal returns following bailout-related announcements, whereas banks in non-bailout countries experienced negative or insignificant returns. The contradictory findings of Lau and McInish (2003) and Kho and Stultz (2000) can be attributed to different methodologies and data sets. Brealey and Kaplanis (2004) examine the effect of IMF support on a variety of asset classes in 16

emerging countries, including the effect on international bank stocks. Similarly to Lau and McInish (2003) they find no significant effect on international bank stocks in response to announcements of IMF support. Further, they observe a decline in asset prices in the period leading up to the announcement of IMF involvement which is not reversed after the IMF intervenes. They conclude that investors' losses cannot be regained by IMF involvement. Following these articles, the impact of IMF involvement on bank stock stocks is ambiguous.

While much research focus on bank stock indices, other literature employ aggregate market indices when examining the impact of IMF programs of stock returns. Hayo and Kutan (2005) study the impact of IMF news on market returns and volatility during the crises in Asia, Brazil and Russia. Examining the stock markets of six emerging countries, they find that on average, negative IMF news reduce daily stock returns by one percentage point, whereas good IMF news increase daily stock returns by one percentage point. The most influential events are delays of IMF loans and delays in negotiations with the IMF. However, the authors find no evidence of a long term impact of the events, and show that the effects were neutralized within one day after the event. Further, they fail to report increases in volatility, concluding that IMF actions affect short-term returns but not risk.

Kutan and Sudjana (2003) investigate the financial market's response to IMF related news during the crisis in Indonesia and find that loan requests, negotiations with the IMF, unfavorable IMF announcements, and IMF visits significantly affected stock returns. Like Hayo and Kutan (2005) they found no evidence that IMF news increased the variance of returns during the crisis period.

A minority of papers regarding the effects of IMF involvement examine the impact on financial and real sectors. Evrensel and Kutan (2007) study the impact of IMF-related news on financial and real sector returns in Indonesia, Korea and Thailand during the Asian crisis. They find that news of IMF negotiations and program approval positively affected both the real and financial sectors. The exception was Thailand where only program approval had this effect .In a related study, Kutan and Muradoglu (2007) examine the impact of IMF programs across sectors in Indonesia, Korea, and Thailand. In general, they found mixed responses in the real sectors and declining returns in the financial sector. As both financial and real sectors reacted significantly to IMF related news, these studies suggest the importance of including real sectors when investigating the wealth effect of IMF programs.

Kutan, Muradoglu and Sudjana (2012) examine the response of financial and real sector returns to IMF-related news in Indonesia during the Asian crisis. Using a more extensive set of events, they find that IMF-related news had significant effects on both financial and real sectors; however the impact was greater on the financial sector. The financial sector's reaction was greater to good news than to bad news. Kutan et. al. (2012) include news regarding public responses to the IMF events, and report that the positive effect from IMF programs may be reversed by a negative reaction from the government, suggesting the importance of including this information to capture IMF wealth effects.

More recent related studies focus on the recent global financial crisis since 2007 and market responses to policy actions taken by policymakers. For example, Rose and Spiegel (2012) examine the impact of major announcements concerning international swap lines by the Federal Reserve, including with the European Central Bank, during the recent global crisis period on CDS spreads as an indicator of liquidity risk. They find that several of the important announcements concerning the international swap programs disproportionately benefited countries holding more opaque US asset portfolios. Abbassi and Linzert (2012) study the effectiveness of the European Central Bank's monetary policy in affecting short-term money market rates during the global crisis of 2007. They find that the ECB's crisis-related, non-standard monetary policy measures have been effective by reducing money market rates. Aït-Sahalia et al. (2012) study the impact of major policy initiatives announced by country authorities in the United States, the United Kingdom, the ECB, and Japan in response to the 2007 global financial crisis on risk premia in interbank markets and they report a decline in the risk premia. A paper closely related to ours is that of Aizenman et al. (2012) who focus on spillover effects of good and bad news stemming from the financial or Eurozone crisis to developing countries' stock and bond markets. They find financial crisis news have a negative effect on both markets but the effect of the Eurozone crisis is limited. Our paper focuses on real and financial sectors in the Greek stock market.

This paper differs from previous research in four respects. First, most studies on international institutions' involvement in crisis resolution focus explicitly on IMF news' impact on stock returns without considering the effect of local reactions. Following, Kutan, Muradoglu and Sudjana (2012) we also examine the effects of public reactions on stock returns as this factor is likely to influence investors' expectations of the success of the IMF loans, and thus the stock market. Second, we include news not only from the IMF but also from several EU offices that were influential in the resolution of the first crisis encountered in

a Eurozone member country enabling us to generalize our results to international institutions. Third, while most research focus on the banking industry or market indices, we investigate the effect of IMF and EU institutions' announcements across both financials and real sectors to capture a broader wealth effect of loans from international institutions. Third, to our knowledge this is the first study to examine the effects of IMF and EU offices involvement to resolve the recent Greek crisis. Overall, this paper fills the gap in the literature as it is uncertain whether previous research on IMF as the lender of last resort can be generalized to include other international organizations, in this case the EU institutions that act as lender of last resort in the Euro Area.

3. Interpretation of Results and Hypothesis Development

Interpreting market responses to IMF-related and other international institutional news is difficult as one response can have several interpretations. Therefore, following Evrensel and Kutan (2008) and Kutan et. al.(2012), we follow Corsetti, Guimarães and Roubini (2006)'s theoretical model as a basis for deriving our hypothesis and interpreting the results. This section is divided into two parts. The first subsection discusses the interpretation of results, while the second focuses on developing the hypothesis. The structure and ideas of the subsections draw on Kutan et. al. (2012).

3.1 Interpretation of Results

A positive financial market response to IMF and EU programs can be interpreted in multiple ways. First, the catalytic effect, which refers to large-scale liquidity support by the IMF to establish financial stability in countries that go through financial crises, suggests that not only IMF but also EU packages would catalyze private capital inflows, positively affecting returns in Greece during the crisis. This happens when liquidity support from IMF and/or EU or joint actions restores investor confidence and attracts new investment. Second, stock returns can increase due to moral hazard. For moral hazard effects, the literature differentiates between debtor and creditor moral hazard. Debtor moral hazard suggests that because the IMF/EU may prevent a bad outcome of a crisis, the local government would avoid incurring the costs associated with implementing good reforms. Creditor moral hazard implies that investors invest more in a crisis country in anticipation of liquidity support. This is due to the implicit guarantees inherent in such assistance as the government can use a portion of the IMF or EU loans to cover eventual losses. Third, some industries may have close relationships with the government and expect that part of the loan will benefit that sector.

Overall, one of these factors or all of them could explain increased returns following IMF- and or EU-related news. Related to catalytic effects, Corsetti et. al. (2006) find that international liquidity provision can hinder a destructive liquidity run because it encourages investors to keep their investments in the country. Thus, such support can provide financial stability and reduce the amount of investments that have to be liquidated. According to the model, these effects increase expected gross national product (GNP) in a crisis country and thus market returns. Concerning moral hazard effects, the authors find that moral hazard only takes place when the likelihood of a speculative run is high. In absence of speculative runs, they find that IMF programs encourage crisis countries to implement necessary political reforms as such would be too costly and risky without IMF support. In turn, this increases expected GNP and thus market returns.

Following Corsetti et. al. (2006) we assume that the probability of a speculative run in Greece during the crisis period was low. Thus, if the abnormal return to a sector is positive we interpret it such that IMF/EU support encourages the implementation of reforms in that sector, positively affecting the sector's fundamentals and thus expected sector GDP and stock returns in a crisis country. Similarly, if the abnormal return to a sector is negative or unchanged, we interpret it such that the government is not likely to implement costly reforms in that sector. This should put a negative or unchanged outlook for sector GDP, and thus stock returns.

3.2 Hypothesis Development

Given the above interpretation of results, our main hypothesis is that events signaling forthcoming aid by the EU or IMF, and events in support of the EU/IMF programs have a positive impact on returns. On the other hand, events signaling conflict or delay in aid or an EU/IMF program have a negative impact on returns. In regards to the different sectors, we hypothesize that all sectors benefit from IMF/EU support. However, we anticipate that the banking and financial sectors will have greater reactions, both positive and negative, to crisis-news than the real sectors for two reasons. First, the bailout packages provided by the Troika included money and reforms targeting the banks. Thus, the banking and financial sectors were directly impacted by the programs. Second, Greek banks had significant exposure to sovereign debt. Therefore, events that would help the Greek government repay its liabilities should have a positive impact on bank values, whereas events signaling a halt in support or loss in value of bonds should have a negative effect. Further, events signaling creditor losses would have a negative impact on the returns in the banking and financial sectors. Based on

these reasons we expect the banking and financial sectors to have stronger responses to crisis news than the real sectors.

4. Data and Methodology

4.1. Data

Data includes daily stock returns and crisis related news during the Greek Crisis. It is very difficult to identify a crisis period for Greece as distinct from the Global Crisis triggered by the sub-prime crisis in the US and the more general Euro-zone crisis observed in Europe which Greece belongs to. We identify the starting point of our research period as the date when then newly elected Greek government revealed its true budget which was initially underreported on October 19, 2009 and was followed by violent riots in Athens, downgrades in Greek credit ratings and eventually unfolded as the Greek Crisis. Our research period ends on June 29 2012 when the EU finally announced that it wishes continued Greek membership in the EU, and the Euro and Greek government and public expressed similar views. Stock returns have been collected from DataStream for the Greek Market index and for a variety of sectors in order to capture different aspects of the Greek economy. The analysis includes the following sector indices: (1) Banking, (2) Financials; including real estate, banks, and investment companies, (3) Basic Materials; including metals and mining, and basic resources, (4) Consumer Goods; composed of personal goods, beverages, leisure goods and tobacco, (5) Industrials; including construction and building materials, engineering, and industrial transportation, and (6) Travel & Leisure; including airlines, hotels, ferries, and cruise ships. Tourism is included into the analysis as it is one of Greece's major industries and reflects not only the tourism industry but also related activities in airlines and ferry companies. All the indices are expressed in the local currency Euro, so that foreign exchange movements will not affect the comparison across sectors.

The evolution of the sector indices and the market index are depicted in Figure 1. Banking sector suffered most from the crisis with a decline from an index value of 100 to 27.7. The Greek Market index declined from an index value of 100 to 50.3 while the decline in all other sectors are similar with, Financials declining to 51, Consumer Goods to 49.5, Industrials to 50.4, , Basic Materials to 49.8, and Travel & Leisure to 50.3 respectively. Summary statistics for stock returns in different sectors are presented in Table 1. The mean and median values are negative for all sectors. Mean returns are lowest for Banking and Financials with -0.15% per

day. Mean returns are highest in Consumer goods with 0.02% per day although still negative. Mean returns are -0.06% per day for Travel and Leisure sector and -0.05% for Basic Materials and Industrials. The standard deviations are highest for Banking (1.9%), and Financials (1.7%) while they are about 1% for all the other indices, and the Greek market. All sector returns have leptokurtic distributions and positive skewness while Travel and Leisure has negative skewness. Jarque-Bera statistics in all sectors and the market, indicate non-normal distributions of returns.

Insert Figure 1 and Table 1 here

News about crisis events are collected from a variety of sources. News regarding EU and IMF programs and reports are mainly from the EU and IMF webpages. For news regarding downgrades, Greek government events, and local reactions the Financial Times has been used as the main source. The dates and events have been cross checked with articles from Reuters, Bloomberg, BBC, the Wall Street Journal and CNN. In total 237 events are analyzed; 47 Greek government events, 17 credit rating agency events, 88 events involving public reactions, 44 events with policy announcements, and 41 troika events. When events take place during non-trading days, including weekends and public holidays, or after the market closes, we identify the event day as the next trading day.

We first classify the events with respect to the source of crisis events. This is a difficult task due to the complex nature of events and how they unfold with the involvement of various parties. During the crisis period a series of institutions including the IMF, and several EU offices and the Greek government were involved with their policy actions and responses to each other. Also rating agencies and the Greek public responded to those crisis events and became an important source of information themselves to those agents in unfolding the crisis. We first classify crisis events into five categories according to the source of announcement as follows:

1. The Greek Government: Events classified as attributed to Greek government include government actions such as announcements of government policy and budget approvals, cabinet changes, and announcements made to the general public and reactions to international organizations and the Greek public demonstrations. For example, on January 13, 2011 the Greek government announced a 3-year stability program in an effort to get the economy back on track.

2. Credit Rating Agencies: These events include the several changes in the Greek credit ratings by the three rating agencies, S&P, Moody's and Fitch

3. Public Reactions: These events include reactions from the Greek public to announcements from various institutions on several aspects of the unfolding crisis such as independent strikes, demonstrations, and riots. These public reactions including riots were sometimes in response to an action of a policy action by various institutions but at others could not be related to an announcement and developed independent of them. Due to the importance of riots in the unfolding of the Greek crisis we do not want to miss this detail and classify them again as follows:

3.1 Public reactions that cannot be attributed to a single crisis event. For example, on March 29, 2011 a bomb went off outside a government building killing one person.

3.2. Public reactions following EU offices announcements. For example, on February 10, 2012, a 48-hour strike was launched in response to the Euro Area ministers' disapproval of proposed Greek austerity measures.

3.3. Public reactions following Troika announcements. For example, on May 11, 2011 a nationwide strike and demonstrations were held when the Troika visited Greece to discuss the release of the next tranche of the bailout agreement.

3.4. Public reactions following Greek government announcements. For example on February 12, 2012 the Greek government passed a new austerity deal. The announcement was followed by riots and 45 buildings were set on fire.

4. Joint Policy Announcements: Throughout the crisis period the Greek Government and Several EU institutions and the IMF made announcements. Some of those announcements were on the same day whereby we cannot isolate the effect of either. For example on September 10, 2010, Greece's finance minister announces that the country is on track to reduce budget deficit this year and the IMF approves the second installment of the stand-by agreement. Regardless of the source of the event, whether Greek Government, IMF or Several EU institutions, events about policy actions that happen in the same event window are classified in this category.

5: Troika: These events include announcements and actions from the so called Troika that includes policy action from the European Union (EU), the European Central Bank (ECB), and

the IMF. In order to understand the impact each agent of the Troika separately we further classify this category into the following subcategories:

5.1. IMF events. For example, on March 15, 2012 the IMF approved a €28 billion loan to Greece.

5.2. EU offices events. For example, on February 28, 2012 the ECB announced that Greek bonds would no longer be accepted as collateral from banks needing funds from the central bank.

5.3. Troika events. For example, on August 5, 2010 the troika announced that Greece had met the qualifications to receive the second tranche of the first rescue package.

In each major category described above we further classify each event as either favorable (good) news or unfavorable (bad) news. It is difficult to classify an event as good or bad as it might be perceived as good news in some sectors and bad news in others. The approach we use in classifying events as "good news" and "bad news" is the "market approach" that allows the market to define whether an event is good or bad (Kutan, Muradoglu, Sudjana, 2012). We use this approach because the market may not view conformity to Troika policies as "good" news. This can be for various reasons, for example that austerity measures challenge growth and the adoption of troika policies may confirm Greece's inability to handle its crisis. Thus, for the market approach a positive market response indicates good news whereas a negative market response indicates bad news. Accordingly we defined an event as good news if the market reaction as measured by the General Market Index was positive on the day of the event and bad news otherwise.

In Appendix 1 we provide the chronological list of events during the Greek Crisis and the several event classifications we employ.

4.2. Methodology

We use event-study methodology to determine the impact of international financial institutions on financial and real sector stock returns during the Greek Crisis. Event studies rely on the presumption that markets are efficient, such that the impact of an event will be reflected in stock prices immediately. Thus, the impact of an event can be measured by using stock market data for the period of interest. The initial step in an event study is to identify the event and the event window. As described in the data section, the events are hand collected

from a variety of sources. We perform our analysis using various different event windows. First we define the event window as the event day (t=0), assuming that the full impact of the event is reflected as soon as the event happens. Next we use a three day event window (t=-1,0,+1) that also contains the day before the announcement, the day of the announcement and the day following the announcement. This is done to capture expectations of the event and the price effects of announcements which occur after the stock market closes on the announcement day (Campbell, Lo andMacKinlay, 1997, p.151)[4]. We use the market-adjusted return model, to calculate abnormal returns in each sector following the procedure described in Campbell et al (1997). Stock returns are calculated as log differenced prices and assume continuous compounding. The Abnormal Return to sector s at time t ($AR_{st,}$) is defined as the difference between the sector return and the market return on day t, $AR_{st}=R_{st} - R_{mt}$. To capture the event's impact over the event window (t=-T,0,+T) we calculate cumulative abnormal returns and test whether they are significantly different from zero as follows:

$$CARst = \sum_{t=-T}^{+T} ARs \quad (1)$$

$$t = \frac{CARst}{\frac{SD(ARs)}{N}} \quad (2)$$

where SD(ARs) is standard deviation for the sector abnormal returns with N observations.

5. Financial and Real Sector Reactions to Crisis Events

We present a chronological analysis of the events during the Greek Crisis in Appendix 2. This enables us to appreciate the complexity of crisis events and the several interactions between diverse parties. We show how the Greek Crisis unfolds with a government announcement of the true extent of the budget deficit into an international crisis where various EU institutions, several rating agencies and the IMF gets involved. At the background we show the importance of the Greek Public reactions in the form of strikes, demonstrations and riots until finally the EU confirms that Greece will stay in the Euro and the Greek government and public welcome this decision. Next, we analyze the impact of actions of these diverse

[4] We use various alternative event windows up to 5 days before and 5 days after the event. Conclusions do not change. Results are available from authors upon request.

actors on the different sectors of the Greek economy. We identify the impact of each agent, the Greek Government, the Greek Public Rating Agencies, the IMF, the ECB, and the other EU offices on the real and financial sectors of the Greek stock market. We report results using good news and bad news categories allowing the market reactions to represent what is perceived as good or bad news by the market.

5.1.Financial and Real Sector Reactions to Crisis Events

First, we analyze market reactions to crisis events by classifying them according to the source of announcement. Table 2 reports abnormal returns in all sectors. In response to good news from Greek Government announcements, abnormal returns increased in financial sectors but declined in real sectors. Abnormal returns in Banking increases by 0.62%, Financials increase by 0.48% while Consumer Goods (-0.15%), Industrials (-0.20%) and Travel and Leisure (-0.26%) decline. The Banking and Financial sectors respond negatively to bad news from Greek Government with abnormal returns falling sharply by-1.17% and -1.00%, respectively. Response from real sectors is mixed. Abnormal returns in Consumer Goods (0.73%) and Industrials (0.30%) and Travel and Leisure (0.29%) increase while those in Basic Materials (-0.10%) declines.

The reactions to good news from Credit Rating Agencies are reflected in higher abnormal returns in Banking (0.45%) and Financials (0.41%) and negative in real sectors with abnormal returns declining by -0.14% in Consumer Goods, -0.26% in Industrials, and -0.28% in Travel and Leisure. The reaction to bad news from rating agencies is negative in Banking (-0.92%) and Financials (-0.71%) but positive in real sectors Consumer goods (0.50 %) and Industrials (0.26%) with abnormal returns increasing.

Greek public reactions involving good news generate higher abnormal returns in Banking (0.51%) and Financials (0.43%), but a decline in abnormal returns in real sectors. Consumer Goods (-0.08) Basic Materials (-0.09%) and Travel and Leisure (-0.26%) decline. Response to bad news from Greek public's reactions to crisis events generate a decline in abnormal returns in Banking (-0.65%) and Financials (-0.57%) while the response is mixed in real sectors. Abnormal returns in Consumer Goods increase by 0.48%, Industrials increase by 0.23%, and Travel and Leisure by 0.36% while Basic Materials decline by -0.10%.

Combined policy events include announcements related to policy action proposed by more than one agent including the international institutions such as the IMF, ECB, EU, and

the Greek Government. Bad news from combined policy events generate a decline in abnormal returns from the Banking (-0.33%) and Financials (-0.28%) while they generate positive abnormal returns from real sectors such as Industrials (0.41%) and Travel and Leisure (0.23%).

Response to announcements from Troika are most significant as before for Banking and Financial Sectors. Abnormal returns increase in Banking (1.05%) and Financials (0.87%) with high daily abnormal returns in the range of 1% to good news from the Troika. The reaction from real sectors are all negative to good news from the Troika with a fall in abnormal returns by -0.33% in consumer goods, -0.47% in Industrials, -0.13% in Basic Materials and -0.51% in Travel and Leisure. Bad news from the Troika are also most effective in Banking and Financials generating a fall in abnormal returns by -1.18% per day on average in Banking and -1.02% in Financials. Bad news from the Troika, in contrast generate increase in abnormal returns in the real sectors. Abnormal returns in Consumer Goods increase by 0.58% in Industrials by 0.27% and in Travel and Leisure by 0.49%

****insert Table 2 here***

In Table 3 we breakdown public reactions during the crisis in Greece according to their triggers. First we look into public reactions that are not triggered by a particular crisis related event. Abnormal returns increase in the Banking sector (0.66%) and the Financials (0.58%) due to good news while abnormal returns decline in all sectors; Consumer Goods (-0.17%), Industrials (-0.10%), Basic Materials (-0.06%) and Travel and Leisure (-0.27%). Abnormal returns decline in Banking (-0.60) and Financials (-052%) in response to bad news while real sector reactions are mixed. Abnormal returns in Consumer Goods (0.41%), Industrials (0.23%) and Travel and Leisure (0.28%) increase while abnormal returns in Basic Materials (-0.15%) decline.

Public reactions in response to bad news form the EU are the most economically significant and negative: Abnormal returns decline in both Banking (-1.23%) and Financials (-1.09%) while some real sectors positively with an increase in abnormal returns of 1.06% in Consumer Goods, 0.28% in Industrials and others negatively such as Basic Materials that experiences a decline in abnormal returns by -0.22%.

Public reactions following Troika announcements whether good or bad caused a decline in abnormal returns Banking (-66% and -0.92% respectively) and Financials (-0.60%

and -0.92%). Real sector responses are mixed. Riots following good news from troika generated higher abnormal returns in the Consumer Goods (1.09%) and Travel and Leisure (0.73%) but a decline in abnormal returns in Industrials (-0.11%) and Basic Materials (-0.34%) When Greek public reacted to bad news from the Troika real sector response was mixed again. Abnormal returns increased in Consumer Goods (1.47%), Industrials (0.39%) and Basic Materials (0.33%) while abnormal returns in Travel and Leisure sector declined (-0.66%).

Public reactions that followed Government announcements reveal a similar picture. Public reactions in response to good news from the Greek Government generate positive abnormal returns in Banks (0.35%) and Financials (0.29%) while generating mixed results in real sectors. Industrials earn positive abnormal returns (0.06%) while Consumer Goods (-0.13%) and Travel and Leisure (-0.38%) earn negative abnormal returns. When Greek public reacted to bad news from the government abnormal returns declined in Banks (-0.35%) and Financials (-0.34%) and increased in real sectors such as Industrials (0.42%) and Basic Materials (0.27%).

****insert table 3 here****

In Table 4, we look into the market reactions to announcements from the IMF, the EU offices and the Troika separately. In response to good news from the IMF abnormal returns declined in Banking (-0.33%), Financials (-0.30%) and Industrials (-0.43%) while among the real sectors abnormal returns increased in Consumer Goods (0.32%) and Basic Materials (0.25%). In response to bad news from the IMF, Banking and Financials abnormal returns fall by -0.49% and -0.48% respectively while in real sectors abnormal returns increase. Consumer goods' abnormal returns increase by 0.34%, Industrials by 0.10%, Basic Materials by 0.36% and Travel and Leisure by 0.48%.

Similar to results reported in the previous section when EU announcements are good news, abnormal returns are higher in Banking (1.62%) and Financials (1.32%) while abnormal returns decline in real sectors respond. Consumer goods' abnormal returns decline by 0.85% Industrials by -0.51%, Basic Materials by -0.32% and Travel and Leisure by -0.84%. When announcements from EU offices constitute bad news Banking (-1.37%) and Financials (-1.17%) experience negative and economically significant abnormal returns while most abnormal returns in real sectors increase with the exception of Basic Materials (-0.30%). Abnormal returns per day are 0.65% in Consumer Goods, 0.28% in Industrials and 0.51% in Travel and Leisure.

Good news from the Troika generate positive abnormal returns in both financial and real sectors. Banks' abnormal returns increase by 0.92%, and Financials by 0.83%. Real sector response is negative. Consumer Goods' abnormal returns decline by -0.85% Industrials by -0.50, Basic Materials by -0.32% and Travel and Leisure by -0.29%. When the Troika announces bad news we observe a sharp fall in abnormal returns in Banking (-1.57%) and Financials (-1.30%) while real sector experience higher abnormal returns. Abnormal returns in Consumer Goods increase by 0.85%, Industrials by 0.43%, Basic Materials by 0.37% and Travel and Leisure by 0.45%.

***** insert table 4 here****

5.2. Financial and Real Sector reactions to Crisis events using wider event windows (t=-1,0,+1)

In Table 5 we report robustness tests using cumulative abnormal returns (t=-1, 0, +1).[5] Due to the wider event windows we use and the several event clusters the number of observations in each category is reduced and for some categories we do not have any events. Also due to event clusters in wider event windows we define an additional category for mixed events whereby a series of events from different categories take place in the same event window. Overall, results reported in Table 5 are similar to those reported for the shorter event window of t=0. In response to good news from Greek Government announcements abnormal returns increase in Banking and Financials and abnormal returns are economically significant while those in real sectors decline. The abnormal returns in Banking are 3.5% and in Financials are 2.82% in our three day event window. The reactions to bad news from the Greek government generate a fall in abnormal returns in Banking (-1.92%) and Financials (-1.62%) while abnormal returns in real sectors increase. Greek public reactions involving bad news generate a decline in abnormal returns in Banking (-0.40%) and Financials (-0.39%) and mixed results in real sectors. Response to bad news from joint policy action causes a decline in abnormal returns in Banking (-0.53%) and Financials (-0.47%) and mixed in real sectors. Response to good news from the Troika is associated with positive and economically significant abnormal returns in Banking (1.60%) and Financials (1.40%) while responses in real sectors are mixed. Bad news from the Troika generate economically significant decline in

[5] We have estimated different event windows up to 5 days before and 5 days after the event. Due to the complexity of the agents involved and the frequent arrival of information from the diverse parties involved as the event windows become larger the number of events reduce dramatically and some event classifications do not contain any observations. We report results for event windows t=-1,0, +3 and t=-1,0, +5 in Appendix 3 and Appendix 4. Other results are available from authors upon request.

abnormal returns in Banking (-2.37%) and Financials (-2.03%) and positive abnormal returns in real sectors. Responses to good news from mixed events are associated with higher abnormal returns in Banking (1.19%) and Financials (0.92%) but are mixed in real sectors. Response to bad news is an economically significant fall in Banking (-1.70%) and Financials (-1.70%) while 'real sectors' abnormal returns increase.

****insert Table 5 here****

6. Conclusion and suggestions for further research

This paper provides evidence on the impact of IMF and EU policy news on the unfolding of the recent crisis in Greece. To our best knowledge, this is the first comprehensive analysis studying the impact of not only the IMF but other international institutions to resolve a major crisis episode. It is important to study Greece during the crisis because the country is a part of the Euro and the EU which complicates the crisis events as the number of parties involved is large and their interactions are complex. The study also differs from previous studies in two respects. First, we investigate the impact of not only the IMF policy announcements but also the various EU offices policy announcements on real and financial sectors during the recent Greek Crisis. Most other recent studies do not take this information into account, possibly overestimating either the effects of the IMF or the EU or local policy makers. Second, we examine market responses across real and financial sectors, better capturing the total wealth effect of international institutions' involvement.

In accordance with our hypothesis, we observe that Banking and Financial sectors had greater reactions to the crisis news compared to the real sectors. In most cases, Banking and Financials had the most economically significant response with abnormal returns that reached more than one percent per day on average. Also, Banking and Financials mainly earned negative returns in response to bad news from international institutions and positive returns in response to good news from them, suggesting asymmetric effects of IMF/EU actions. The real sector reactions were mixed in most instances suggesting that better economic fundamentals were expected in some real sectors but not in others.

We find evidence that public reactions conflicting with the IMF and EU programs produce mainly negative returns. In general, violent or large demonstrations have the greatest effects. It is well known that an increase in the level of political risk is expected to reduce returns. Regarding the effect of conflicting actions from the local government, we find some

evidence such reactions can offset the positive effect of good news, however the evidence is not strong and further research is needed to confirm this effect.

The results also indicate that IMF-related news during the Greek crisis had a relatively smaller impact on financial and real sectors relative to the EU-wide news. This result suggests that in case of a financial crisis in a regional setting like the euro zone, regional (euro-area) institutions play a larger role in affecting investor behavior. This has important implications for designing policy strategies by the IMF and EU-wide institutions to deal with financial crises.

In this paper, we used the theory developed by Corsetti et al. (2006) to interpret our results. However, there might be moral hazard present in financial markets. Hence, it would be interesting to examine moral hazard effects in Greece during the crisis. Such results could contribute to a better understanding of the sectors' responses to IMF/EU-related news and of investor behavior. It would also be interesting to study whether the findings for Greece can be generalized to other Euro-area countries by examining the responses to IMF and EU institutions' news in other Euro Area countries (such as Spain and Ireland) that have received bailouts.

References

Abbassi, P. & Linzert, T., (2012). The effectiveness of monetary policy in steering money market rates during the financial crisis. *Journal of Macroeconomics* 34 (2012) 945–954.

Ait-Sahalia, Y., Andritzky , J., Jobst, A., Nowak, S., & Tamirisa, N., (2012). Market response to policy initiatives during the global financial crisis. *Journal of International Economics* 87(1), 162-177.

Aizenman, J., Jinjarak, Y. & Lee, M. P. D., (2012). Developing countries' financial vulnerability to the Euro crisis: An event study of equity and bond markets. NBER Working Paper 18028, pp. 1-34.

Brealey, R. and Kaplanis, E. (2004) "The impact of IMF programs on asset values" *Journal of International Money and Finance*, 23 pp.253-270.

Campbell, J.Y., Lo, A.W, MacKinley, A.C. (1997). The econometrics of financial markets. New Jersey: Princeton University Press.

Corsetti, G., Guimarães, B. and Roubini, N. (2006) "International lending of last resort and moral hazard: A model of IMF's catalytic finance". *Journal of Monetary Economics*, 53 pp.441-471.

Döbeli, B. and Vanini, P. (2004) "An analysis of IMF-induced moral hazard".*Journal of Banking and Finance*, 28 pp.2933-2956.

European Commission, Directorate-General for Economic and Financial Affairs (2010) "The economic adjustment programme for Greece". *European Economy, Occastional Papers* 61

European Commission, Directorate-General for Economic and Financial Affairs (2012) "The second economic adjustment programme for Greece". *European Economy, Occastional Papers* 94

Evrensel, A (2002) "Effectiveness of IMF-supported stabilization programs in developing countries".*Journal of International Money and Finance, (21),* pp. 565-587

Evrensel, A. and Kutan, A. (2008) "How do IMF announcements affect financial markets in crises? Evidence from forward exchange markets".*Journal of Financial Stability*, (4), pp.121-134.

Evrensel, A. and Kutan, A. (2007) "IMF-related announcements and stock market returns: Evidence from financial and non-financial sectors in Indonesia, Korea, and Thailand". *Pacific-Basin Finance Journal*, 15 pp.80-104.

Evrensel, A. and M Kutan, A. (2006) "Creditor moral hazard in stock markets: Empirical evidence from Indonesia and Korea". *Journal of International Money and Finance*, 25 pp.640-654.

Featherstone, K. (2011). "The Greek sovereign debt crisis and EMU: A failing state in a skewed regime". *Journal of Common Market Studies*,49 pp.193-217.

Hayo, B. and Kutan, A. (2005) “IMF-related news and emerging financial markets”.*Journal of International Money and Finance*, 24 pp.1126-1142.

IMF (2012) *IMF Executive Board Approves €28 Billion Arrangement Under Extended Fund Facility for Greece*. Press release no. 12/85. March 12, 2012.

IMF (2012) *IMF Reaches Staff-level Agreement with Greece on €30 Billion Stand-By Arrangement.* Press release no. 10/176. May 2, 2010.

Kho, B., Lee, D. and Stultz, R. M .(2000). “U.S banks, crisis, and bailouts: from Mexico to LTCM”. *American Economic Review,* 90 pp.28-31

Kho, B. and Stultz, R. M (2000) “Banks, the IMF, and the Asian crisis”.*Pacific-Basin Finance Journal*, 8 pp.177-216.

Kosmidou, K. V. Kousenidis, D.V. and Negakis, C. I. (2013) “The effectiveness of the EU/IMF bailout programs for Greece: Risk and wealth effects on the financial and real sectors of the ASE during the Greek sovereign crisis. Mimeo.

Lane, T. and Phillips, S. (2000) “Does IMF financing result in moral hazard?”.*IMF Working Paper 00/168*

Kutan, A.M. and Muradoglu, G. (2007) “Sectoral stock returns, the IMF, and the Asian crisis”. Working paper.

Kutan, A.M. and Sudjana, B.G. (2003) “Investor reaction to IMF actions in the Indonesian financial crisis”.*Journal of Economic Policy Reform,* 6 (3), pp.181-190.

Kutan, A.M., Muradoglu, G., and Sudjana, B.G. (2012) “IMF programs, financial and real sector performance, and the Asian crisis”.*Journal of Banking and Finance*, 36 pp.164-182.

Lau, S. and McInish, T. (2003) “IMF bailouts, contagion effects, and bank security returns”. *International Review of Financial Analysis,* 12 pp.3-23.

Nelson, R. and Belkin, P. (2011) “Greece's debt crisis: Overview, policy responses, and implications”. *Congressional Research Service*.

Rose, A. K. and Spiegel, M. M., (2012). Dollar illiquidity and central bank swap arrangements during the global financial crisis. Journal of International Economics.

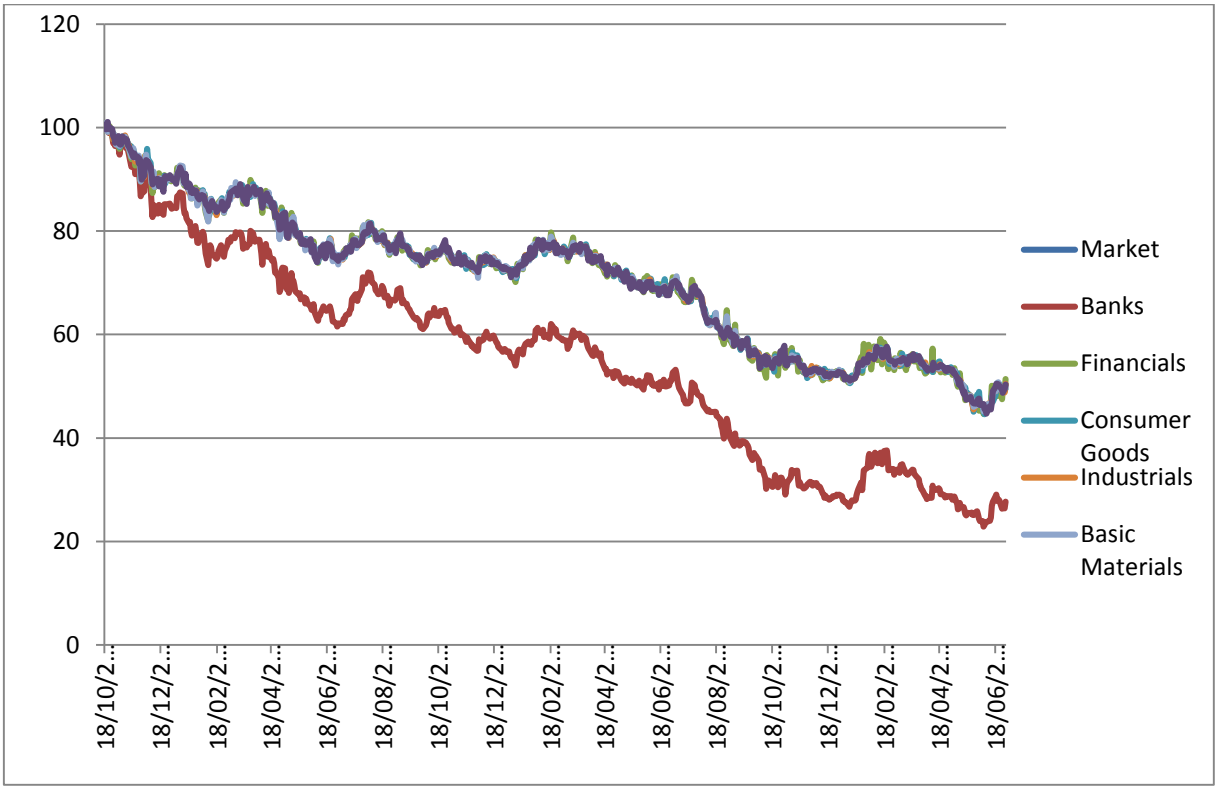
Vaubel, R (1983) “The moral hazard of IMF lending”. *The World Economy,* 6pp. 291-303

Zettelmeyer, J. (2000) “Can official crisis lending be counterproductive in the short run?”.*Economic Notes,* 29 pp. 13-29

Zhang, Z. (2001) “The impact of IMF term loans on US bank creditors’ equity values: an event study of South Korea’s case”. *Journal of International Financial Markets, Institutions and Money,* 11 pp.363-394.

Zwart, S. (2007) “The mixed blessing of IMF intervention: Signalling versus liquidity support”. *Journal of Financial Stability*, 3 pp.149-174.

Figure 1: Sector Indexes during the Greek Crisis



Evolution of sector indices for the period October 19th, 2009 – June 29, 2012. Banking, Financials; including real estate, banks, and investment companies, Basic Materials; including metals and mining, and basic resources, Consumer Goods; composed of personal goods, beverages, leisure goods and tobacco, Industrials; including construction and building materials, engineering, and industrial transportation, Travel & Leisure; including airlines, hotels, ferries, and cruise ships, and the DataStream Greek Market index

Table 1: Summary Statistics

	Greek Market	*Banks*	*Financials*	*Consumer Goods*	*Industrials*	*Basic Materials*	*Travel & Leisure*
Mean	-0.000928	-0.001629	-0.001571	-0.000235	-0.000513	-0.000536	-0.000674
Median	-0.000855	-0.001766	-0.001544	-0.00014	-0.000189	-0.000232	0
Maximum	0.05411	0.095782	0.093128	0.045301	0.04584	0.073121	0.027824
Minimum	-0.030268	-0.070861	-0.062836	-0.03322	-0.033305	-0.047724	-0.043176
Std. Dev.	0.00955	0.019197	0.017607	0.009277	0.008256	0.011288	0.00956
Skewness	0.493647	0.544103	0.593625	0.236192	0.411497	0.194018	-0.267418
Kurtosis	5.548735	6.40023	6.199574	5.241895	5.843439	6.758739	4.485133
Jarque-Bera	219.4547	374.4066	342.1257	154.1964	257.3975	419.4366	73.19283
Probability	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
Observations	705	705	705	705	705	705	705

Summary statistics of returns for the period October 19, 2009 – June 29, 2012. Banking, Financials; including real estate, banks, and investment companies, Basic Materials; including metals and mining, and basic resources, Consumer Goods; composed of personal goods, beverages, leisure goods and tobacco, Industrials; including construction and building materials, engineering, and industrial transportation, Travel & Leisure; including airlines, hotels, ferries, and cruise ships, and the DataStream Greek Market index

Table 2: Financial and real sector reactions to good and bad news defined by market reactions (t=0)

	Banks	Financials	Consumer Goods	Industrials	Basic Materials	Travel & Leisure
The Greek Government						
Good news	0.62 %***	0.48 %***	-0.15 %***	-0.20 %***	0.07 %*	-0.26 %***
Bad news	-1.17 %***	-1.00 %***	0.73 %***	0.30 %***	-0.10 %***	0.29 %***
Credit Rating Agencies						
Good news	0.45 %***	0.41 %***	-0.14 %***	-0.26 %***	0.08 %**	-0.28 %***
Bad news	-0.92 %***	-0.71 %***	0.50 %***	0.26 %***	0.03 %	0.06 %**
Public Reactions						
Good news	0.51 %***	0.43 %***	-0.08 %**	-0.06 %*	-0.09 %**	-0.26 %***
Bad news	-0.65 %***	-0.57 %***	0.48 %***	0.23 %***	-0.10 %***	0.22 %***
Joint Policy Announcements						
Good news	-	-	-	-	-	-
Bad news	-0.33 %***	-0.28 %***	-0.06 %*	0.41 %***	0.00 %	0.23 %***
Troika						
Good news	1.05 %***	0.87 %***	-0.33 %***	-0.47 %***	-0.13 %***	-0.51 %***
Bad news	-1.18 %***	-1.02 %***	0.58 %***	0.27 %***	0.07 %*	0.49 %***

The definition of good and bad news defines good news as events receiving a positive market return and bad news as events receiving a negative market return. We use 5 event classifications: 1. Greek government: Government actions such as announcements of government policy and budget approvals, cabinet changes, and announcements made to the general public and reactions to international organizations and the Greek public demonstrations. 2. Credit rating agencies: Changes in ratings by S&P, Moody's and Fitch. 3. Public reactions: Reactions from the Greek public to announcements from various institutions such as independent strikes, demonstrations, and riots. 4.Joint policy announcements: Announcements from the Greek government, IMF and EU institutions occurring on the same day such that separate effects cannot be estimated. 5. Troika: Announcements and actions from the troika (IMF, EU, ECB).Due to the importance of riots in the unfolding of the Greek crisis we do not want to miss this detail and classify category 3 again as follows: 1. Public reactions that cannot be attributed to a single event, 2. Public reactions following EU offices announcements, 3. Public reactions following Troika announcements, 4. Public reactions following Greek government announcements. In order to understand the impact each agent of the Troika separately we further classify category 5 into::1. IMF events, 2. EU offices events, 3. Troika events.We report cumulative abnormal returns in chronological order for all sectors during the Greek Crisis. Cumulative abnormal returns are calculated using equations 1 and 2. *** denotes significance at 1%, ** at 5% and * at 10% level

Table 3: Financial and real sector reactions to Greek public's riots, strikes and demonstrations following policy announcements (t=0): Good and Bad news defined by market reactions

	Banks	Financials	Consumer Goods	Industrials	Basic Materials	Travel & Leisure
Public reactions not attributable to single events						
Good news	0.66 %***	0.58 %***	-0.17 %***	-0.10 %***	-0.06 %***	-0.27 %***
Bad news	-0.60 %***	-0.52 %***	0.41 %***	0.23 %***	-0.15 %***	0.28 %***
Public reactions following EU offices announcements						
Good news	-	-	-	-	-	-
Bad news	-1.23 %***	-1.09 %***	1.06 %***	0.28 %***	-0.22 %***	0.04 %
Public reactions following Troika announcements						
Good news	-0.66 %***	-0.60 %***	1.09 %***	-0.11 %***	-0.34 %***	0.73 %***
Bad news	-0.92 %***	-0.94 %***	1.47 %***	0.39 %***	0.33 %***	-0.66 %***
Public reactions following Greek government announcements						
Good news	0.35 %***	0.29 %***	-0.13 %***	0.06 %***	0.05 %**	-0.38 %***
Bad news	-0.35 %***	-0.34 %***	0.42 %***	0.14 %***	0.27 %***	-0.01 %

The definition of good and bad news defines good news as events receiving a positive market return and bad news as events receiving a negative market return. We use 5 event classifications: 1. Greek government: Government actions such as announcements of government policy and budget approvals, cabinet changes, and announcements made to the general public and reactions to international organizations and the Greek public demonstrations. 2. Credit rating agencies: Changes in ratings by S&P, Moody's and Fitch. 3. Public reactions: Reactions from the Greek public to announcements from various institutions such as independent strikes, demonstrations, and riots. 4. Joint policy announcements: Announcements from the Greek government, IMF and EU institutions occurring on the same day such that separate effects cannot be estimated. 5. Troika: Announcements and actions from the troika (IMF, EU, ECB).Due to the importance of riots in the unfolding of the Greek crisis we do not want to miss this detail and classify category 3 again as follows: 1. Public reactions that cannot be attributed to a single event, 2. Public reactions following EU offices announcements, 3. Public reactions following Troika announcements, 4. Public reactions following Greek government announcements. In order to understand the impact each agent of the Troika separately we further classify category 5 into::1. IMF events, 2. EU offices events, 3. Troika events.We report cumulative abnormal returns in chronological order for all sectors during the Greek Crisis. Cumulative abnormal returns are calculated using equations 1 and 2. *** denotes significance at 1%, ** at 5% and * at 10% level

Table 4: Financial and real sector reactions to International Organisations' policy announcements (t=0) Good and Bad news defined by market reactions

	Banks	Financials	Consumer Goods	Industrials	Basic Materials	Travel & Leisure
IMF events						
Good news	-0.33 %***	-0.30 %***	0.32 %***	-0.43 %***	0.25 %***	-0.04 %
Bad news	-0.49 %***	-0.48 %***	0.34 %***	0.10 %***	0.36 %***	0.48 %***
EU offices events						
Good news	1.62 %***	1.31 %***	-0.10 %***	-0.51 %***	-0.23 %***	-0.84 %***
Bad news	-1.37 %***	-1.17 %***	0.56 %***	0.28 %***	-0.30 %***	0.51 %***
Troika events						
Good news	0.94 %***	0.83 %***	-0.85 %***	-0.50 %***	-0.32 %***	-0.29 %***
Bad news	-1.57 %***	-1.30 %***	0.85 %***	0.43 %***	0.36 %***	0.45 %***

The definition of good and bad news defines good news as events receiving a positive market return and bad news as events receiving a negative market return. We use 5 event classifications: 1. Greek government: Government actions such as announcements of government policy and budget approvals, cabinet changes, and announcements made to the general public and reactions to international organizations and the Greek public demonstrations. 2. Credit rating agencies: Changes in ratings by S&P, Moody's and Fitch. 3. Public reactions: Reactions from the Greek public to announcements from various institutions such as independent strikes, demonstrations, and riots. 4. Joint policy announcements: Announcements from the Greek government, IMF and EU institutions occurring on the same day such that separate effects cannot be estimated. 5. Troika: Announcements and actions from the troika (IMF, EU, ECB). In order to understand the impact each agent of the Troika separately we further classify this category into::1. IMF events, 2. EU offices events. 3. Troika events. We report cumulative abnormal returns in chronological order for all sectors during the Greek Crisis. Cumulative abnormal returns and related t-statistics are calculated using equations 1 and 2. *** denotes significance at 1%, ** at 5% and * at 10% level

Table 5: Financial and real sector reactions to good and bad news defined by market reactions (t=-1,0,+1)

	Banks	Financials	Consumer Goods	Industrials	Basic Materials	Travel & Leisure
The Greek Government						
Good news	3.50 %***	2.82 %***	-0.71 %***	-0.64 %***	-0.82 %***	-0.84 %***
Bad news	-1.91 %***	-1.64 %***	0.70 %***	0.40 %***	0.61 %***	0.90 %***
Credit Rating Agencies						
Good news	-	-	-	-	-	-
Bad news	-	-	-	-	-	-
Public Reactions						
Good news	-	-	-	-	-	-
Bad news	-0.40 %***	-0.39 %***	-0.61 %***	0.76 %***	-0.43 %***	1.77 %***
Joint Policy Announcements						
Good news	-	-	-	-	-	-
Bad news	-0.55 %***	-0.47 %***	0.58 %***	0.21 %***	0.69 %***	-0.17 %***
Troika						
Good news	1.60 %***	1.40 %***	-1.41 %***	-1.24 %***	0.43 %***	-0.42 %***
Bad news	-2.37 %***	-2.03 %***	1.56 %***	1.02 %***	0.28 %***	1.19 %***
Mixed clusters						
Good news	1.19 %***	0.92 %***	-0.54 %***	-0.35 %***	0.15 %***	-0.57 %***
Bad news	-1.70 %***	-1.38 %***	1.21 %***	0.59 %***	0.10 %***	0.24 %***

The definition of good and bad news defines good news as events receiving a positive market return and bad news as events receiving a negative market return. We use 5 event classifications: 1. Greek government: Government actions such as announcements of government policy and budget approvals, cabinet changes, and announcements made to the general public and reactions to international organisations and the Greek public demonstrations. 2. Credit rating agencies: Changes in ratings by S&P, Moody's and Fitch. 3. Public reactions: Reactions from the Greek public to announcements from various institutions such as independent strikes, demonstrations, and riots. 4. Joint policy announcements: Announcements from the Greek government, IMF and EU institutions occurring on the same day such that separate effects cannot be estimated. 5. Troika: Announcements and actions from the troika (IMF, EU, and ECB).We report cumulative abnormal returns in chronological order for all sectors during the Greek Crisis. Cumulative abnormal returns and related t-statistics are calculated using equations 1 and 2. *** denotes significance at 1%, ** at 5% and * at 10% level

Appendix 1: Crisis-related Events and Classifications

Sources: Financial Times, Wall Street Journal, BBC, CNN, IMF, EU, Reuters, Bloomberg. Category 1: 1-The Greek government, 2-Credit Rating Agencies, 3-Public reactions, 4- Joint Policy Announcements, 5-Troika. Category 2: 1-Public reactions not attributable to single events, 2-Public reactions following EU offices announcements, 3-Public reactions following Troika announcements, 4-Public reactions following Greek government announcements. Category3: 1-IMF events, 2-EU offices events, 3-Troika events

The definition of good and bad news defines good news as events receiving a positive market return and bad news as events receiving a negative market return

Date	Event	Market good/ bad	Cat. 1	Cat. 2	Cat. 3
2009					
19 Oct	Finance Minister Papaconstantinou discloses that the 2009 budget deficit was significantly underreported	Good	1		
7-8 Dec	Violent riots in Athens	Good	3	1	
8 Dec	Fitch downgrades Greece's credit rating from A- to BBB+	Good	2		
14 Dec	Papandreou outlines policies aimed to reduce Greece's budget deficit	Good	1		
16 Dec	S&P cuts Greek credit rating from A- to BBB+	Good	2		
22 Dec	Moody's cuts Greek credit rating from A1 to A2	Good	2		
24 Dec	The Greek parliament approves the 2010 austerity budget	Good	1		
2010					
11 Jan	IMF announces it will send representatives to Greece to advise the government on public finances	Bad	5		1
12 Jan	Euro Area report condemns Greece for falsifying its statistics	Bad	5		2
14 Jan	Greece announces 3-year stability program	Good	1		
16-25 Jan	Farmers block key high way junctions and border crossings	Bad	3	1	
2 Feb	Papandreou announces austerity measures. Protests follow	Good	3	4	
4-5 Feb	Customs officials and tax inspectors hold 48-hour strike	Bad	3	1	
10 Feb	National public sector strike	Good	3	1	
11 Feb	EU reaches deal to support Greece and encourages more austerity measures. Riots follow	Bad	3	2	
24 Feb	General strike in response to austerity measures	Good	3	1	
1 Mar	EU and ECB push Greece to announce further austerity measures	Good	5		2
3 Mar	Greece announces further budget cuts and increased taxes. Riots erupt and the main entrance of the finance ministry is blocked	Bad	3	4	
3-6 Mar	Immediately following the budget cut announcement riots erupt. The following days include riots, strikes, protest marches and attempts to storm the government	Good	3	4	

5 Mar	Greek government approves €4.8bn austerity package	Good	1		
11 Mar	Greece's two major labor unions representing 2.5 million public and private workers call out a nation-wide strike. Protest marches and riots emerge	Bad	3	1	
15 Mar	Euro Area finance ministers announce they will establish an emergency financial support facility to help Greece handle its crisis	Good	5		2
18 Mar	Taxi drivers and petrol workers strike	Bad	3	1	
19-20 Mar	Three bombs go off in Athens, one outside the office of a political party and another outside the police center	Good	3	1	
22 Mar	The ECB offers to make an exception for Greece regarding the credit rating required for collateral in liquidity operations	Bad	5		2
23-24 Mar	Lawyers launch 48-hour strike protesting tax legislation presented to the government the previous day. 3 hour public sector work stoppage	Good	3	1	
25 Mar	The troika agree on a rescue package for Greece should financial assistance be requested	Good	5		3
29 Mar	Athens bomb kills one person outside government building	Bad	3	1	
11 Apr	Euro Area finance ministers agree on lending Greece up to €30bn over the next year. IMF will supplement up to €15bn	Good	5		2
15 Apr	Greece requests bailout talks with the EU and the IMF. On the same day the Greek government passes a law aiming to reduce tax evasion	Good	1		
21 Apr	Troika mission arrives in Greece to discuss a Greek rescue	Bad	5		3
22 Apr	Workers' unions strike	Bad	1	3	
23 Apr	Papandreou asks for Euro Area loan of €30bn to be released	Bad	1		
26 Apr	Protesters hinder tourists from returning to their ships	Bad	3	1	
27 Apr	S&P downgrades Greece's credit rating to BB+	Bad	2		
30 Apr	Newspapers speculate Greece has accepted a €24bn austerity package in negotiations for an EU/IMF loan	Good	1		
1 May	Angela Merkel announces Germany will contribute to Greek bailout. Several demonstrations are held throughout Greece protesting cost cutting measures to be announced the following day	Good	3	2	
2 May	The troika announces €110bn in loans to Greece over the next three years in return for austerity measures aiming to cut the budget by €38bn through 2012. The Euro Area countries will contribute €80bn and the IMF €30bn. €45bn will be released immediately. Protests continue	Good	3	3	
3 May	Local administration members in Greece strike in response to the announcement of the bailout package	Bad	3	1	
4 May	French vote supports contribution to rescue package. German banks also approves of bailout. Greek government hires investment bank Lazard to advise on finances	Bad	4		
4-5 May	A 24-hour general strike is held in Greece. A bank is set on fire and three people are killed during violent protests following further budget cuts	Good	3	1	
6 May	The Greek parliament approves new austerity bill. Public protests follow	Good	3	4	

9 May	IMF approves a €30bn Stand-By Arrangement for Greece with €5.5bn provided immediately. This is a joint financing with the EU which provided an additional €14.5bn on the same day	Good	4		
10 May	The IMF and EU agree on a €750bn emergency fund facility to prevent the Greek crisis from spreading to other Euro Area countries. The funds will come from Euro Area members (€440bn), EU members (€60bn) and the IMF (€250bn)	Good	4		
12 May	IMF disburses €5.5bn to Greece	Good	5		1
18 May	Greece receives EU loan of €14.5bn to be used to repay debt maturing the following day	Bad	5		2
20 May	Greece's two largest unions call for a strike protesting pension and wage cuts under the latest austerity package	Bad	3	1	
21 May	Protesters prevent 7500 tourists from disembarking cruise ships	Good	3	1	
10 Jun	Rail workers strike	Good	3	1	
14 Jun	Greek debt is downgraded to junk by Moody's	Good	2		
14-17 Jun	Troika representatives visit Athens to follow up on the Greek economic program. Discussions imply that the program is on track	Good	5		3
23 Jun	200 union members hinder travelers from returning to their ships at Piraeus, the largest port in Athens. 5000 Communists protested in Athens and marine engineers strike	Bad	3	1	
24 Jun	Bomb explodes outside a Greek minister's office. One person is killed	Bad	3	1	
29 Jun	A general strike demonstrates the public opposition to a draft bill regarding pension and labor reforms. The debate on the bill started on the same day	Bad	3	1	
1 Jul	Transport workers strike over unpaid wages	Good	3	1	
7 Jul	The Greek parliament approves a new pension reform outlined in the troika deal. In a joint report the troika announces the Greek program is on track with the program	Bad	4		
8 Jul	Unions hold 24-hour strike demonstrating a pension reform to be voted through that day. The bill is approved	Good	3	4	
18 Jul	IMF releases report saying Greece is "broadly on track" to meet 2010 budget targets	Good	5		1
25-29 Jul	Truckers strike protesting liberalization of their industry. The strike results in fuel and food shortages	Good	3	1	
5 Aug	The troika says Greece has met requirements to qualify for the second tranche of the rescue package	Bad	5		3
19 Aug	Greece receives second tranche of loan totaling €9bn	Bad	1		
7 Sep	Papandreou reshuffles cabinet after opinion polls show 60% is disappointed with its performance	Bad	1		
10 Sep	Greece's finance minister says the country is on track to reduce budget deficit this year. The IMF approves second installment of Stand-By-Agreement	Bad	4		
11 Sep	Greek unions protest against austerity in Thessalonki where Papandreou is visiting	Good	3	1	
15 Sep	IMF disburses €2.57 billion after first review of Stand-By Arrangement	Bad	5		1
13-30 Sep	Truck drivers strike	Bad	3	1	

22 Sep	The government passes legislation to liberalize the road haulage sector. Demonstrations follow	Good	3	4	
30 Sep	Greece approves law giving tax amnesties. The law is at odds with advise from the troika	Good	1		
4 Oct	Greece unveils the 2011draft budget which aims to cut the deficit by more than what is agreed with the troika	Good	1		
7 Oct	Public sector strike over austerity	Bad	3	1	
14 Oct	Culture ministry workers protest over up to 22 months of unpaid salaries	Bad	3	1	
19 Oct	Rail workers and students demonstrate against privatization and spending cuts in education	Good	3	1	
15 Nov	Eurostat says Greece will not meet the government's 2010 targets	Good	1		
18 Nov	Politicians present the 2011 budget to parliament. Greece will continue to raise taxes and cut expenses to reach 2011 targets	Good	1		
23 Nov	After a 10-day mission in Athens the troika announces Greece's reform program is still "broadly on track"	Bad	5		3
13 Dec	Media and public transport workers launch a one-week strike protesting austerity	Bad	3	1	
14 Dec	The parliament approves law including wage cuts in public and private sectors. Protests all day	Good	3	4	
15 Dec	24-hour general strike	Bad	3	1	
18 Dec	Greece receives €2.5bn from the IMF	Bad	5		1
22 Dec	General strike	Bad	3	1	
23 Dec	The parliament approves the 2011 budget aiming to cut deficit by 2 percentage points. Demonstrations follow	Bad	3	4	
2011					
13 Jan	Transportation workers strike protesting pay cuts	Good	3	1	
14 Jan	Fitch downgrades Greece's credit rating to junk	Good	2		
19 Jan	Greece's finance minister Papaconstantinou reveals draft bill liberalizing 150 closed industries. Lawyers and civil engineers strike	Good	3	4	
19-20 Jan	Railway workers strike, transport workers hold work stoppages	Good	3	1	
19-21 Jan	Pharmacists strike	Good	3	1	
26-28	Pharmacists continue strike	Good	3	1	
1 Feb	Unions launch strike protesting legislation to be approved by the government	Good	3	1	
10 Feb	Civil servants strike	Bad	3	1	
11 Feb	EU and IMF approve new tranche of €15bn from the rescue package Greece announce privatization plans	Bad	4		
15 Feb	Public transportation workers strike	Bad	3	1	
21 Feb	The Greek parliament propose new legislation to reduce tax evasion	Bad	1		

23 Feb	24 hour general strike	Good	3	1	
7 Mar	Moody's cuts Greek credit rating to "highly speculative" status	Bad	2		
11 Mar	European leaders approve cut in interest rates and three-year extension of Greek bailout-loan	Good	5		2
23 Apr	The EC announces the Greek budget deficit has decreased less than expected	Bad	5		2
2 May	Demonstrations protesting tax increases, wage and pension cuts	Bad	3	1	
9 May	S&P downgrades Greece to B	Bad	2		
11 May	Troika mission arrives in Greece to discuss the release of the next tranche of the rescue package. A nationwide strike and protests demonstrates the public opinion to further austerity measures	Good	3	3	
20 May	Fitch downgrades Greece from BB+ to B+	Bad	2		
23 May	Greece announces sale of government stakes in state-companies in an effort to reduce budget deficits	Bad	1		
25 May-2 July	Demonstrations	Good	3	1	
27 May	The Greek government fails to agree on austerity measures that are prerequisite for another bailout	Bad	1		
1 Jun	Moody's downgrades Greece to Caa1	Bad	2		
3 Jun	The troika announces next bailout tranche will be released in July	Good	5		3
5 Jun	Demonstrations against new austerity package	Bad	3	1	
8 Jun	Greek cabinet approves new austerity measures to be voted through parliament the same month	Bad	1		
9 Jun	24 hour general strike	Good	3	1	
13 Jun	S&P gives Greece the lowest credit rating in the world, CCC	Good	2		
15 Jun	Union strike. France and Germany fail to solve dispute over how to resolve Greece's debt crisis in Eurozone meeting	Bad	3	2	
17 Jun	Papandreou makes changes to his cabinet and appoints a new finance minister	Good	1		
20 Jun	Euro Area leaders delay decision on giving Greece a €12bn loan. State-owned electricity firm launch 48 hour strike	Bad	3	2	
22 Jun	The new cabinet is approved by a confidence vote	Bad	1		
28-29 Jun	48-hour public strike protesting the debate of a new austerity package demanded by the EU and IMF	Good	3	1	
29 Jun	The Greek parliament approves second austerity package including spending cuts and €28bn in tax increases. Violent demonstrations follow	Good	3	4	
3 Jul	The EU approves €8.7bn payment to Greece as part of the first rescue package but postponed the decision of a second bailout	Good	5		2
8 Jul	The IMF approves €3.2bn payment to Greece as part of the rescue package	Bad	5		1
21 Jul	The troika agrees on a second bailout package of €110bn. Private sector bondholders will provide up to €50bn. The Euro Area announce ease of terms on rescue loans from the Eurozone Financial Stability Fund	Good	5		3

25 Jul	Moody's cuts Greece's credit rating to Ca	Bad	2		
19 Aug	The Greek prime minister announces that the growth forecast has been revised downward for 2011	Bad	1		
24 Aug	Students march protesting a proposed law opening up competition to universities	Bad	3	1	
2 Sep	Government talks with the troika breaks down and the troika suspends talks for 10 days stating Greece must step up its austerity program in order to receive next bailout tranche	Bad	5		3
4 Sep	The Greek finance minister Venizelos says the government will speed up implementation of delayed reforms	Bad	1		
7 Sep	Venizelos announces immediate cuts of 10,000 public sector jobs and a similar cut to take place a few weeks later	Good	1		
10 Sep	Protests as Greek prime minister gives speech	Good	3	4	
11 Sep	Venizelos announces 2-year property tax and salary cuts for elected officials	Bad	1		
15 Sep	Lagarde says IMF will be withholding its portion of the second bailout tranche until prerequisite reforms are implemented	Bad	5		1
21 Sep	The government unveils new austerity measures. Workers' unions launch 3-hour work stoppage	Good	3	4	
22 Sep	Transport workers strike	Bad	3	1	
23 Sep	Tram and subway workers strike. Venizelos is quoted in a newspaper saying an orderly default with creditors accepting a 50% haircut is Greece's best option. Netherland's governor becomes first ECB member to publicly speculate s Greek default	Bad	4		
27 Sep	The government passes property tax law	Good	1		
27-28 Sep	Taxi drivers strike	Good	3	1	
27-30 Sep	Access to Greece's statistical agency building is blocked by striking workers. Access to other government buildings are also blocked hindering the 2012 budget figures to be finalized on time	Good	3	1	
28 Sep	Merkel warns that if Greece does not meet its deficit targets the second bailout package has to be renegotiated	Good	5		2
2 Oct	Greece announces inability to meet deficit targets. Protests all day	Good	3	4	
3 Oct	2012 draft budget is unveiled. Transport workers strike and large demonstrations are held	Bad	3	4	
4 Oct	The EU delays decision of new bailout payment. 24 hour general strike	Bad	3	2	
5 Oct	Violent protests in Athens	Good	3	1	
6-16 Oct	Municipal workers strike	Good	3	1	
10 Oct	EU summit to discuss the debt crisis is delayed	Bad	5		2
11 Oct	The troika announces agreement to release next bailout tranche in November	Bad	5		3
13-14 Oct	Transport workers strike	Good	3	1	
16 Oct	Demonstrations in Athens	Bad	3	1	

19 Oct	100,000 striking workers demonstrate as the Greek parliament passes the latest austerity package	Good	3	4	
19-20 Oct	48 hour general strike and violent protests	Good	3	1	
21 Oct	The Euro Area finance ministers approve the next tranche of the rescue package of €8bn	Good	5		2
27 Oct	The EU, IMF and ECB approve a new €130bn bailout package while Greek debt-holders agree on a 50% cut in the face value of their bonds	Good	5		3
28 Oct	Anti-austerity protests	Good	3	1	
31 Oct	Papandreou calls for a referendum on the latest austerity package without previously having informed the troika	Bad	1		
2 Nov	Papandreou wins approval from the cabinet to hold referendum. European leaders suspend next tranche of bailout loan and demand Greece decides whether it wants to stay in the Euro Area	Bad	4		
3 Nov	Papandreou cancels referendum after critics from Europe and calls for a parliamentary confidence vote instead	Good	1		
4 Nov	Papandreou wins confidence vote in parliament. Socialist groups call for a government under a new leader	Bad	3	4	
5 Nov	A new government is formed under the leaders of Greece's two main political parties	Good	1		
8 Nov	Greek leaders fail to meet their own deadline of appointing a new prime minister	Good	1		
9 Nov	Papandreou stands down as prime minister	Bad	1		
10 Nov	Lucas Papademos, former ECB vice-president, is appointed as the new prime minister	Bad	1		
16 Nov	Papademos wins confidence vote	Bad	1		
30 Nov	EU approves disbursement of €8bn loan tranche	Good	5		2
2 Dec	24-hour general strike	Good	3	1	
6 Dec	Demonstrations are held in Athens in response to talks in Brussels of further austerity measures	Bad	3	1	
7 Dec	The Greek government passes the 2012 austerity budget	Good	1		
14 Dec	IMF announces reforms are working slower than anticipated slowing Greek recovery	Good	5		1
2012					
13 Jan	Greek negotiations with creditors to write off debt stalls. A write off is necessary for further release of bailout funds	Good	1		
18 Jan	Write-off talks with creditors resume	Good	1		
28 Jan	Creditors accept lower coupon payments on their bonds	Good	1		
6 Feb	Merkel rushes Greece to accept terms for new bailout package	Good	5		2
7 Feb	24 hour general strike	Good	3	1	
8 Feb	Greece fails to meet deadline to approve bailout conditions	Good	1		
9 Feb	Greek political leaders agree on a new austerity package including a 22% cut in minimum wage, 15% cut in pensions and 15,000	Good	3	4	

	public sector jobs. Five ministers resign in protest and the public holds demonstrations				
10-11 Feb	Euro Area ministers disapprove of the austerity measures proposed by Greece claiming them to be incomplete. Unions launch 48-hour strike	Bad	3	2	
12 Feb	Greece passes new austerity deal as several thousand protesters demonstrate in Athens. Riots erupt and 45 buildings are set on fire	Good	3	4	
15 Feb	Political parties give written undertakings to implement the austerity measures	Bad	1		
20-21 Feb	The troika finalizes the terms under the €130bn bailout package	Good	5		3
22 Feb	Fitch lowers Greek rating from CCC to C	Bad	2		
24 Feb	Greece launches debt swap offer	Good	1		
27 Feb	The German government votes in favor of contributing to second bailout program. S&P downgrades Greek rating to "selective default"	Good	4		
28 Feb	The ECB announces Greek bonds are no longer accepted as collateral from banks who seek funds from the central bank	Bad	5		2
29 Feb	The parliament passes a new round of wage and pension cuts. Demonstrations follow	Good	3	4	
1 Mar	The parliament approves cuts in health care. Protests follow. The Euro Area postpones approval of its €71.5bn portion of Greek bailout	Good	3		
2 Mar	Moody's lowers Greek rating to C	Good	2		
9 Mar	Lenders agree to bond swap. The Euro Area agrees to release €35.5bn to complete the swap and IMF director Christine Lagarde says she will recommend the IMF to support Greece with €28 bn. Fitch downgrades Greece to "restricted default"	Bad	4		
13 Mar	Euro Area leaders sign off the bailout package. Fitch upgrades Greek rating by four notches to B-	Good	2		
15 Mar	IMF approves €28bn loan to Greece	Good	5		1
21 Mar	The Greek parliament approves the €130bn loan agreement	Bad	1		
25 Mar	Citizens protest during parade marking Greece's independence day	Bad	3	1	
30 Mar	The Euro Area agrees to increase the size of its bailout system by 40% to €700bn to prevent contagion of the crisis	Bad	5		2
4 Apr	A 77-year old man shoots and kills himself outside the parliament in Athens. He blames politicians and financials for taking his life. Demonstrations follow	Bad	3	1	
5 Apr	Pharmacy workers strike protesting €370 million in unpaid debts owed by government insurance schemes	Good	3	1	
7 Apr	Protesters attack a police man in Athens after the funeral of a senior citizen who committed suicide earlier in the week	Good	3	1	
19 Apr	€25bn is released from the European Financial Stability Facility to strengthen Greek banks	Bad	5		2
22 Apr	A 44-year old teacher commits suicide leaving behind a note blaming the government's handling of the crisis for his death	Bad	3	1	
2 May	S&P raises Greek rating from "selective default" to CCC	Bad	2		

6 May	Pro-austerity New Democracy wins general election, but parties opposing the bailout increase their share of votes	Bad	1	
8 May	The leader of the political party Syriza, which came second in the election, outlines plan to reverse implemented policies required by the troika. The troika cancels upcoming visit to Athens	Bad	4	
16 May	The elected parties fail to form a coalition government and announce new elections in June. The ECB excludes four Greek banks from its liquidity operations. Greece's highest ranking judge Pikrammenos replaces Papademos as prime minister	Good	4	
17 May	Fitch downgrades Greek rating to CCC	Bad	2	
21 May	The Financial Times reports that Greek banks have secretly received an estimated €100bn in emergency liquidity from the Greek central bank under approval from the ECB. In a Euro Area conference call each country is asked to detail its treasury's preparation plan for a Greek exit from the euro	Bad	4	
28 May	Greek banks receive €18 billion agreed under the second bailout with the troika	Good	5	3
14 Jun	EU unveils plan to offer Greece reduced interest rates and extended loan periods if Samaras, head of New Democracy, leads the new government	Good	5	2
17 Jun	New Democracy wins election	Good	1	
20 Jun	Three political parties committed to staying in the euro forms a coalition government	Good	1	
23 Jun	Greece unveils plan to ease terms of the bailout loan	Good	1	
24 Jun	The troika postpones mission to Athens as the Greek prime minister and finance minister are hospitalized	Good	4	
25 Jun	The Greek finance minister resigns due to health problems	Bad	1	
26 Jun	Stournaras is appointed as the new finance minister	Good	1	
29 Jun	EU summit welcomes Greece to stay in the Euro and EU	Good	5	

Appendix 2: Chronological Analysis of Real and Financial Sector Responses to Crisis events in Greece

In Appendix 2-Table A we report significant events and abnormal returns in all sectors for t=0, +1. We identify the start date of the Greek Crisis as 19 October 2009 when Finance Minister Papaconstantinou discloses that the 2009 budget deficit was significantly underreported. Market participants do not give a significant reaction to this important news immediately. The first significant reaction is observed almost two months later following December 7 when violent demonstrations were held in Athens marking the anniversary of a police killing and protesting the worsening economic climate. The following day Fitch cut Greece's credit rating from A to BBB+. Banking sector reacted to these events with a cumulative abnormal returns of-3.15% and Financials with a -2.84% cumulative abnormal return for December 7-9. In contrast, the real sectors yielded positive abnormal returns. Consumer Goods reported abnormal returns of 2.60%, while Industrials and Travel & Leisure showed abnormal returns of 0.94% and 2.07% respectively. When Moody's cut the Greek credit rating on December 22, only Basic Materials reacted with abnormal returns of -1.80%. On December 24, the Greek parliament approved the 2010 budget aiming to cut the deficit by €8 billion. Only Travel & Leisure reacted with an abnormal return of 1.38%.

insert Appendix 2- Table A here

On January 11, 2010 the IMF announced it would send representatives to Greece to advise the government on its public finances. The following day the Euro Area countries released a report condemning Greece for falsifying its statistics. Banking and Financials reacted negatively to the events, reporting abnormal returns of -1.93% and -1.77% respectively. In contrast, Consumer Goods and Industrials had abnormal returns of 2.17% and 1.22% respectively. It is difficult to separate the effects of these events. According to our interpretation of IMF news, the IMF visit to Greece could be a signal of forthcoming aid, thus the positive responses in the real sectors. For Banking and Financials, this effect may have been offset by the negative news on January 12. The EU statement further undermined investor confidence in Greece, directly affecting Banking and Financials. However, it could also be that investors in Banking and Financials did not expect beneficial reforms from forthcoming aid.

On January 16, farmers blocked key highway junctions and border crossings in protest to austerity measures announced on the previous days. Industrials and Travel & Leisure

reacted with abnormal returns of -1.09% and 1.06% respectively. On February 4, customs officials and tax inspectors held a 48-hour strike in response to new austerity measures. Banking, Financials, and Basic Materials reported negative abnormal returns of -3.07%, -2.74%, and -1.25% respectively. In contrast, Consumer Goods reported abnormal returns of 3.22%, while Industrials and Travel & Leisure had abnormal returns of 1.59% and 3.58% respectively. It is difficult to compare the responses to the two strikes as they had very different consequences. Blocked highway junctions hinder transportation and directly affect Industrials (industrial transportation) and Travel & Leisure (travelers). This could explain why these industries had negative responses to the first strike and positive responses to the second one. More events must be analyzed to understand the sectors' responses to strikes.

On February 10, a national public sector strike was held. The following day, the EU reached agreement to support Greece should the country request financial assistance. The EU also encouraged Greece to implement more austerity measures. The announcement was followed by protests. Only Basic Materials and Industrials reacted to the news with abnormal returns of 1.17% and 1.73%, respectively. Another general strike was held on February 24. Industrials reacted with a positive abnormal return of 1.12% while Basic Materials realized abnormal returns of -1.03%.

On April 15, Greece requested bailout talks with the troika. A law aiming to reduce tax evasion was passed on the same day. Only Industrials reacted with a positive 0.96% abnormal return. On April 21, a troika mission arrived in Greece to discuss a potential rescue. They were met with protests that continued into the following day, when one of the major workers' unions launched a strike. On April 23, Papandreou asked for a Euro Area loan of €30 billion to be released. On April 26, protesters hindered tourists from returning to their ships, and on April 27 S&P further downgraded Greece's credit rating to BB+. In response to the events, Banks, Financials and Basic Materials reported abnormal returns of -2.43%, -2.21% and -2.42% respectively, while Consumer Goods and Industrials had abnormal returns of 4.54% and 0.74%, respectively. According to our interpretation of IMF news, the positive responses of Consumer Goods and Industrials could reflect the anticipation that forthcoming aid would improve the fundamentals in those sectors, whereas Financials and Basic materials had no such expectations.

A series of events took place in the beginning of May. We use an event window from April 30 – May 6. On April 30, the Financial Times speculated that Greece had accepted a

€24 billion austerity package in exchange for an EU/IMF loan. On May 1, Germany's Chancellor Angela Merkel announced that Germany would contribute to a Greek bailout and on May 2, the troika announced €110 billion in loans to Greece, conditional on austerity measures. On May 3, the ECB announced that Greek government debt would be accepted as collateral regardless of its rating. On May 6, the Greek parliament approved the austerity bill. The period May 1-6 involved protests and general strikes. On May 4, protests turned violent when a bank was set on fire and three people were killed. Only Industrials had a positive response to the events with abnormal returns of 1.54%. In contrast, Financials, Basic Materials, and Travel & Leisure recorded abnormal returns of -1.63%, -2.79% and -1.35% respectively. Following our interpretation of IMF news, this may indicate that Industrials expected the aid to improve the fundamentals in that sector. This is in line with Industrial's responses to events leading up to the bailout announcement. The negative reactions from the other sectors could either be a response to the public demonstration or signal that the sectors did not expect fundamentals to improve under the program. As Banking does not report significant abnormal returns, and the bailout targets the financial sector, we suspect the demonstrations may have had an offsetting role of the response.

On May 9, the IMF approved a €30 billion stand-by agreement to Greece. The following day the IMF and EU agreed on a €750 billion Emergency Funding Facility designed to prevent the Greek crisis from spreading to other Euro Area countries. Only Basic Materials reacted to the news with abnormal returns of 1.12%. On May 12, the IMF disbursed €5.5 billion to Greece. Basic Materials reported abnormal returns of 2.72%. When Greece received an EU loan of €14.5 billion on May 18, only Industrials reacted with abnormal returns of 1.36%.

On July 25-29, truckers held strikes protesting liberalization of their industry. The strike resulted in fuel and food shortages. Banking, Financials, and Basic Materials reported positive abnormal returns of 1.92%, 1.75% and 2.84% respectively. On the other hand, Consumer Goods and Industrials had abnormal returns of -1.46% and -1.23%, respectively. On August 5, the troika announced that Greece had met the requirements to qualify for the second tranche of the rescue package. Consumer Goods reacted with positive abnormal returns of 1.40%.

On September 7, Papandreou reshuffled his cabinet after opinion polls showed that 60% of the Greek population was disappointed with its performance. Banking and Financials

reacted negatively with abnormal returns of -1.40% and -1.66% respectively. In contrast, Industrials and Basic Materials reported positive abnormal returns of 0.91% and 1.18% respectively. The Greek government approved a law giving tax amnesties on September 30. The law was at odds with advice from the troika. Industrials reacted positively with abnormal returns of 1.08%.

When the Greek Finance Minister Papaconstantinou revealed a draft bill liberalizing 150 closed industries on January 19, lawyers, civil engineers, railway workers and pharmacists responded with strikes. In the financial market only Travel & Leisure reacted to the events with abnormal returns of -1.59%. Pharmacists continued their strike on January 26-28. Basic Materials had abnormal returns of 3.33% for the period.

General strikes continued in February. On February 1, a union strike was launched protesting legislation to be approved by the government. Industrials and Basic Materials had abnormal returns of -1.44% and -1.03% respectively. On February 10, civil servants launched a strike. The following day the troika approved the next tranche of the bailout package and the Greek government announced privatization plans. Only Travel & Leisure reacted to the events with a 1.49% abnormal return. On February 21, the Greek parliament proposed new legislation to reduce tax evasion. Industrials responded positively with abnormal returns 1.08%.

On March 11th, the troika eased the terms of the Greek bailout package. The interest rate on the loans was reduced and Greece was given a three-year extension to repay the loans. The financial sectors reacted positively to the news with Banking and Financials reporting abnormal returns of 2.06% and 1.97% respectively. In contrast, the real sectors had negative responses. Consumer goods, Industrials and Travel & Leisure had abnormal returns of -2.03%, -1.54% and -1.35%, respectively. These results can be interpreted such that Banking and Financials benefited directly from the announcement because of their exposure to sovereign debt, producing positive returns. For the real sectors the announcement had no direct impact, but could suggest that future aid to those sectors were less likely as resources was being focused on the financial sectors.

When the EU approved a €8.7 billion payment to Greece as part of the first bailout package on July 3, Basic Materials responded with abnormal returns of 1.67%. A few days later on July 8, the IMF approved a €3.2 billion payment to Greece as part of the first rescue package. The financial sectors reacted negatively with Banking and Financials reporting

abnormal returns of -2.02% and -1.84% respectively. In contrast, Industrials and Travel & Leisure reported abnormal returns of 0.86% and 1.36% respectively.

On July 21, the Euro Area ministers agreed on a second bailout package to Greece amounting to €110 billion. The terms would be determined later in the fall, but the ministers revealed that the terms of the bailout loans would be eased, cutting the interest rate with about one percentage point and increasing the maturity from 7.5 to 15 years. Holders of Greek debt were also likely to be involved in the deal. Banking and Financials reported abnormal returns of 4.12% and 3.71% respectively, while Consumer Goods and Industrials had abnormal returns of -3.55% and -1.73% respectively. Similarly to the announcement easing bailout terms on March 11, the financial sectors reacted positively while the real sectors produced negative abnormal returns.

On September 2, talks between the Greek government and the troika regarding the payment of the next bailout tranche broke down. The troika suspended talks for 10 days explaining that Greece had to step up its austerity program to receive the next bailout tranche. On September 4, the Greek Finance Minister Venizelos announced that the government would speed up the implementation of delayed reforms. Banking and Financials reacted negatively to the events reporting abnormal returns of -3.25% and -2.91% respectively. On the other hand, Consumer Goods and Travel & Leisure showed abnormal returns of 2.62% and 1.59% respectively. A few days later on September 7, Venizelos announced an immediate cut of 10,000 public sector jobs. He also declared that a similar cut could be expected a few weeks later. Only Basic Materials reacted with abnormal returns of 1.33%.

On September 21, the Greek government unveiled new austerity measures. In response unions launched a 3-hour work stoppage, and on September 22-23 transport workers held strikes. On September 23, Venizelos was quoted in a Greek newspaper saying an orderly default with creditors accepting a 50% haircut was Greece's best option, and for the first time an ECB governor speculated publicly about Greek default. Following the news, Banking and Financials reported negative abnormal returns of -4.73% and -4.59% respectively. In contrast, Consumer Goods had positive abnormal returns of 4.58%. The negative responses by Banking and Financials may be explained by their exposure to sovereign debt.

On October 2, Greece announced inability to meet deficit targets. In response, protests immediately arose. The following day the government revealed the 2012 draft budget. Demonstrators protested outside the parliament and transport workers launched a strike. The

chaos continued on October 4 when the EU delayed its decision of a new bailout payment and a 24-hour general strike took place. Violent protests continued on October 5, and on October 6 municipal workers launched a 10 day strike. This period was dominated by news opposing the EU/IMF program. Banking and Financials responded to the sequence of events with abnormal returns of -8.59% and -7.07%. In contrast, Consumer Goods and Industrials reported abnormal returns of 2.16% and 2.17% respectively.

A sequence of events took place on October 10-16. On October 10, the EU announced that the summit to discuss the Greek debt crisis was delayed. On October 11, the troika agreed on releasing the next bailout tranche in November. Transport workers launched a 48 hour strike on October 13, and large demonstrations were held in Athens on October 16. For the period, Banking and Financials reported abnormal returns of -7.40% and -5.92% respectively. In contrast, the real sectors had positive responses. Basic Materials reported abnormal returns of 1.45%, while Travel & Leisure and Industrials had abnormal returns of 2.91% and 1.51% respectively. Even though the troika reached agreement to release the next bailout tranche, this event cluster was dominated by bad news. Any positive effect from the loan tranche announcement was likely offset by the negative news around the event.

On October 27, the EU and IMF approved a €130 billion bailout package for Greece (the same bailout that was discussed on July 21). However, it was announced that it would still take weeks to sort out the details of the deal, one of the reasons being that private investors would be involved. On October 28, anti-austerity protests were held throughout Greece. Unexpectedly, on October 31, Papandreou called for a referendum on the latest austerity package. The announcement was met with fury from European leaders. The events produced negative abnormal returns in the financial sectors and positive abnormal returns in the real sectors. Banking and Financials reported cumulative abnormal returns of -6.53% and -5.03% respectively. For the real sectors, Consumer Goods, Industrials and Travel & Leisure had abnormal returns of 1.54%, 1.05% and 2.16% respectively. It is difficult to distinguish between the effects of the events. Looking at event day abnormal returns, Banking and Financials had ARs of 0.53% and 0.41% respectively on October 27. In contrast the real sectors reported slightly negative abnormal returns. On October 31, the one-day abnormal returns were -4.28% and -3.43% for Banking and Financials respectively, while the abnormal returns were positive for the real sectors, Travel & Leisure being the most significant with abnormal returns of 2.52%. According to the interpretation of results, these results may

suggest that Banking and Financials anticipate the sector fundamentals to improve under a new program, whereas the real sectors have no such expectations.

A sequence of crisis-related events took place in the beginning of November. We use an event window from November 2– 11. On November 2, Papandreou won approval from the cabinet to hold the referendum announced a few days earlier. European leaders responded by suspending the next tranche of the bailout loan and demanding that Greece had to decide whether it was committed to staying in the Euro. On November 3, Papandreou canceled the referendum, instead calling for a parliamentary confidence vote. The confidence vote was won on November 4, however socialist groups called for a new government under a different leader. On November 5, a new government was formed with a new Prime Minister to be announced within three days. On November 8, the Greek leaders failed to meet this deadline. On November 9 Papandreou resigned as Prime Minister, and on November 10 Lucas Papademos, a former ECB vice-president, was appointed the new Prime Minister. The financial and real sectors had opposite responses to the events, with financial sectors reporting positive abnormal returns and the real sectors negative abnormal returns. Banking and financials reported abnormal returns of 13.38% and 10.86% respectively. For the real sectors, Industrials, Basic Materials and Travel & Leisure reported abnormal returns of -2.64%, -1.30% and -3.94%, respectively. Consumer Goods was down -3.97%.

On January 13, 2012, negotiations with Greek creditors to write off debts stalled. Only Consumer Goods reacted with abnormal returns of 1.55%. On January 18, the talks resumed. Banking and Financials reacted positively with abnormal returns of 3.17% and 2.43% respectively. For the real sectors, only Travel & Leisure had abnormal returns of -1.42%. On January 28, the creditors accepted lower coupon payments on their bonds. Banking and Financials reported abnormal returns of 4.74% and 4.03% respectively. In contrast the real sectors had negative responses. Industrials and Basic Materials had abnormal returns of -2.49%, and -1.72%, respectively.

A sequence of events occurred in the beginning of February. We use an event window from February 6 – 13. On February 6, Merkel pushed Greece to accept terms for a new bailout package. A 24-hour general strike was held in Greece on February 7, and on February 8 the Greek government failed to meet the deadline to approve new bailout conditions. On February 9, Greek leaders agreed on a new austerity package. In response, five ministers resigned and the Greek public held demonstrations. On February 10, the Euro Area ministers disapproved

of Greece's austerity measures claiming them to be incomplete. In Greece, unions launched a 48-hour strike. On February 12, Greece passed new austerity measures. Massive riots erupted and in Athens 45 buildings were set on fire. Banking and Financials responded to the events with abnormal returns of 4.09% and 3.20% respectively, while Travel & Leisure had abnormal returns of -3.81%.

On February 20, Euro Area leaders met to negotiate Greece's second bailout package. On the same day the French Finance Minister, Francois Baroin, announced the committee expected a deal to be reached. On February 21, the parties agreed on the terms under a €130 billion bailout package. The following day Fitch lowered the Greek credit rating to C. The financial and real sectors had opposite responses to the events. While Banking and Financials reported abnormal returns of -5.98% and -4.99%, respectively, Basic Materials and Travel & Leisure reported abnormal returns of 1.42% and 2.74%, respectively. Consumer Goods was up 1.95% and Industrials had abnormal returns of 2.53%.This result conflicts with the responses to events leading up to the final bailout announcement, which have suggested that Banking and Financials were the sectors that benefit most from the bailout. However, the negative responses may be explained by the bailout conditions for Greek sovereign debt holders. The €130 billion bailout was conditional on sovereign debt holders voluntarily accepting a nominal loss of 53.3% in a bond swap. An EU report from 2010 states that Greek banks' exposure to sovereign debts totaled to €40 billion, with €32 billion held in bonds. This exposure amounted to of 8% banks' values. Thus, a sovereign debt restructuring would negatively affect the financial sector. For the real sectors, the positive abnormal returns could reflect a change in perception of the benefits for these sectors from forthcoming aid.

On March 9, it became clear that a great majority of lenders had agreed to write off parts of their loans by swapping existing bonds for new ones. Consequently, the Euro Area ministers agreed to release €35.5 billion to complete the swap and IMF director Christine Lagarde announced she planned to recommend the IMF to support Greece with €28 billion. On the same day, Fitch downgraded Greece to "restrictive default." Banking and Financials reacted negatively to the news reporting abnormal returns of -3.24% and -2.69%. In contrast, the real sectors had positive abnormal returns. Industrials, Basic Materials, and Travel & Leisure reported abnormal returns of 1.02%, 1.28% and 1.90% respectively.

On March 21, Greek citizens protested the recently approved €130 billion loan agreement with a parade marking the independence day. Banking and Financials reported

abnormal returns of -4.53% and -3.76%, respectively. For the real sectors, Industrials and Travel & Leisure had abnormal returns of 1.14% and 1.89%, respectively. The responses are in line with previous explanations of banks' exposure to sovereign debts.

On May 6, pro-austerity New Democracy won the general election. However, the election was inconclusive and political parties opposing the bailout increased their share of votes. On May 8, the leader of the political party Syriza which came second in the election outlined plans to reverse implemented policies required by the troika. On the same day EU and IMF officials canceled an upcoming visit to Athens. Banking and Financials reacted with abnormal returns of -3.96% and -3.31%, respectively. In contrast, Consumer Goods and Travel & Leisure reported abnormal returns of 1.79% and 1.38%, respectively.

The newly elected parties failed to form a coalition government on and announced new elections in June. On June 14th, the EU revealed a plan to offer Greece reduced interest rates and extended loan periods if Samaras, the head of New Democracy, lead the new government. Banking and Financials responded with abnormal returns of 7.40% and 5.96%. In contrast, the real sectors had negative abnormal returns. Of statistical significance, Consumer Goods, Basic Materials and Travel & Leisure reported abnormal returns of -3.22%, -1.28% and -1.98%, respectively. The reactions are similar to news of announcements easing repayment terms in 2011.

New Democracy won the election on June 17. The response in the financial and real sectors was mixed. Banking and Travel & Leisure both reported positive abnormal returns 2.07%. In contrast, Consumer Goods, Industrials, and Basic Materials had abnormal returns of -2.29%, -1.49%, and -1.12%, respectively. On June 20, a coalition government was formed by three parties committed to staying in the euro. Banking and Financials reported abnormal returns of -3.87% and -3.39%, respectively, while Basic Materials had abnormal returns of 2.00%.

Overall, examining the sectors' responses to IMF-and EU institutions news, Banking and Financials seem to move in the opposite direction as the real sectors. However, there seem to be no systematic response to the events. This changes if the bailout packages are examined individually. For events relating to the first bailout, Banking, Financials, and Basic Materials seem to move together, producing negative returns for good news and positive returns for bad news. Industrials, Consumer Goods, Basic Materials and Travel & Leisure have no systematic response to the events, but seem to react positively to bailout

announcements. According to our interpretation of results, this could indicate that investors in Banking, Financials, and Basic Materials did not expect sector fundamentals to improve under the first bailout program. The first bailout program included restructuring of the financial sector; strengthening regulations and supervision, and recapitalizing banks. Further, a Financial Stability Fund was established providing equity support to Greek banks. The negative reaction by Banking and Financials could be a response to closer monitoring, losses associated with restructuring, and an economy in recession, offsetting a potentially positive effect of the Financial Stability Fund. For the other real sectors, the positive responses to bailout announcements may indicate expectations of aid improving the sector fundamentals.

The results are different for events leading up to the second bailout. From July 21 onwards, 2011 when the second bailout was announced (but not finalized),Banking and Financials generally produced positive abnormal returns for events in line with the IMF/EU program and negative returns for events in conflict with it. The real sectors had opposite responses, in general reporting positive returns for events opposing the bailout and negative returns for events in line with the program. This pattern changed on February 21, 2012 when the details of the second bailout were finalized. From then on, the real sectors in general reacted positively to good news and negatively to bad news, whereas the financial sectors had opposite responses. The results diverge from our expectations and predictions. This is at first difficult to reconcile as a uniform explanation does not seem to apply. However, during the crisis there were several factors that affected the development and reactions to news. First, one issue with the analysis is that the arrival of news is not random. That is, there are certain investor expectations to the development of policy responses. Therefore, if investors expect stronger measures from the IMF or EU, the arrival of "good" news can have a negative impact on the market if it does not adhere to expectations. Second, investors' and policymakers' sentiment towards Greece was different coming up to the second bailout package. At that time the possibility of a Greek euro-exit was significantly higher, and this could help explain some of the divergences in results between the first and the second bailout.

By analyzing the individual events we find that for the events leading up to the second bailout, the financial sectors produced positive returns in response to events in line with the bailout. This was because these sectors were directly targeted under the bailout program, and possibly because a Euro-exit may have significant negative effects on the sectors. For the real sectors, Evrensel (2002) find that the economies of countries receiving multiple bailouts are generally in a worse state when it receives the second bailout than it was when it received the

first one. Assuming that this holds for Greece, the investors in real sectors may have questioned the success of a second program, and according to our hypothesis not expected the fundamentals of these sectors to be improved under further aid. When the details of the second bailout were announced, it was confirmed that the financial sectors and private lenders had to accept significant losses. For the real sectors, the details of the second bailout may have shifted the perception of another program, thus the change in patterns of responses. According to the interpretation of results, investors may have anticipated forthcoming aid to be spent on implementing reforms improving the fundamentals in the real sectors. For the financial sectors the good news that reforms were targeted on the financial system was likely offset by the large losses the banks and other lenders had to incur.

Appendix 2-Table A: Chronology of Greek Crisis and Cumulative Abnormal Returns

Date	Banking	Financials	Consumer Goods	Industrials	Basic Materials	Travel &Leisure
2009						
7-9 Dec	-3.15 %***	-2.84 %***	2.60 %***	0.94 %*	0.35 %	2.07 %***
22-23 Dec	0.82 %	0.77 %	-0.64 %	-0.73 %	-1.80 %***	0.38 %
28-29 Dec	-0.30 %	-0.29 %	0.54 %	0.15 %	-0.23 %	1.38 %*
2010						
11-13 Jan	-1.93 %*	-1.77 %*	2.17 %***	1.22 %**	0.58 %	-0.84 %
16-17 Jan	-0.07 %	-0.11 %	-0.07 %	-1.09 %**	-0.58%	1.06** %
10-12 Feb	-0.87 %	-0.70 %	1.32 %	1.17 %**	1.73 %***	0.40 %
24-25 Feb	-0.75 %	-0.69 %	0.82 %	1.12 %**	-1.03 %*	0.00 %
15-16 Apr	0.16 %	0.18 %	-0.11 %	0.96 %*	0.68 %	0.16 %
22-28 Apr	-2.43 %**	-2.21 %**	4.54 %***	0.74 %	-2.42 %***	0.10 %
30 Apr-7 May	-1.81 %	-1.63 %*	-0.18 %	1.54 %***	-2.79 %***	-1.35 %*
10-11 May	0.96%	0.84%	-0.32%	0.36%	1.12%*	-0.13%
12-13 May	-0.57 %	-0.51 %	0.61 %	-0.40 %	2.72 %***	0.79 %
18-19 May	0.16 %	0.16 %	-0.19 %	1.36 %***	0.48 %	0.83 %
26-28 Jul	1.92 %*	1.75 %*	-1.46 %*	-1.23 %**	2.84 %***	-0.58 %
7-8 Sep	-1.90 %*	-1.66 %*	0.81 %	0.91 %*	1.18 %*	0.83 %
30 Sep-1Oct	-0.25 %	-0.28 %	0.51 %	1.08 %**	-0.35 %	-0.26 %
2011						
19-21 Jan	1.29 %	1.18 %	-0.97 %	-0.54 %	-0.40 %	-1.59 %**
26-31 Jan	-0.28 %	-0.21 %	-1.16 %	-0.24 %	3.33 %***	1.04 %
1-2 Feb	1.63 %	1.49 %	-1.04 %	-1.44 %***	-1.03 %*	-0.07 %
10-12 Feb	-0.63 %	-0.51 %	-0.40 %	0.33 %	0.99 %	1.49 %*
21-22 Feb	-0.24 %	-0.33 %	-0.34 %	1.08 %*	-0.76 %	0.56 %
11-12 Mar	2.06 %*	1.97 %**	-2.03 %**	-1.54 %***	0.42 %	-1.35 %*
3-4 Jul	-0.18 %	-0.19 %	0.33 %	0.57 %	1.67 %***	0.09 %
8-9 Jul	-2.02 %*	-1.84 %*	0.98 %	0.86 %*	0.08 %	1.36 %*
21-22 Jul	4.12 %***	3.71 %***	-3.55 %***	-1.73 %***	0.55 %	-0.97 %
2-6 Sep	-3.25 %***	-2.91 %***	2.62 %**	0.85 %	-0.95 %	1.59 %**
7-8 Sep	1.29 %	1.24 %	-0.75 %	-0.42 %	1.33 %**	-0.60 %
21-26 Sep	-4.73 %***	-4.59 %***	4.58 %***	0.27 %	-0.96 %	0.27 %
2-9 Oct	-8.59 %***	-7.07 %***	2.16 %***	2.17 %***	-0.23 %	0.67 %
10-12 Oct	-7.40 %***	-5.92 %***	1.16 %	1.51 %***	1.45 %**	2.91 %***
27 Oct-1 Nov	-6.53 %***	-5.03 %***	1.54 %*	1.05 %**	-0.29 %	2.16 %***
2-11 Nov	13.38 %***	10.86 %***	-3.97 %***	-2.64 %***	-1.30 %**	-3.94 %***
2012						
13-16 Jan	0.22 %	-0.12 %	1.55 %*	-0.74 %	-0.58 %	-1.05 %
18-19 Jan	3.17 %***	2.43 %**	0.76 %	0.06 %	0.36 %	-1.42 %*
30-31 Jan	4.74 %***	4.03 %***	-0.93 %	-2.49 %***	-1.72 %***	-0.45 %
6-13 Feb	4.09 %***	3.20 %***	-0.09 %	-0.74 %	-0.40 %	-3.81 %*
15-16 Feb	-1.18 %	-1.01 %	2.85 %***	-0.23 %	-0.37 %	-0.57 %
21-23 Feb	-5.98 %***	-4.99 %***	1.95 %**	2.53 %***	1.42 %**	2.74 %***
9-12 Mar	-3.24 %***	-2.69 %***	0.12 %	1.02 %**	1.28 %**	1.90 %**
21-22 Mar	-1.87 %	-1.49 %	0.32 %	0.75 %	1.05 %*	-0.74 %
25-26 Mar	-4.53 %***	-3.76 %***	-0.12 %	1.14 %**	0.51 %	1.89 %**
6-9 May	-3.96 %***	-3.31 %***	1.79 %**	0.66 %	-0.70 %	1.38 %**
14-15 Jun	7.40 %***	5.96 %***	-3.22 %***	-0.29 %	-1.28 %**	-1.98 %***
17-19 Jun	2.07 %*	1.56 %	-2.29 %***	-1.49 %***	-1.12 %*	2.07 %***
20-21 Jun	-3.87 %***	-3.39 %***	0.63 %	0.12 %	2.00 %***	0.99 %

We report cumulative abnormal returns (t = 0,1) in chronological order for all sectors during the Greek Crisis. Cumulative abnormal returns are calculated using the market adjusted abnormal returns as described in equation 1 with related t-statistics as described in equation 2.The indices include Banking, Financials; real estate, banks, and investment companies, Basic Materials; metals and mining, and basic resources firms, Consumer Goods; composed of personal goods, beverages, leisure goods and tobacco, Industrials; including construction and building materials, engineering, and industrial transportation, Travel & Leisure; including airlines, hotels, ferries, and cruise ships, and the DataStream Greek Market index. ***denotes significance at 1%, **at 5% and *at 10% level

Appendix 3: Financial and real sector reactions to good and bad news defined by market reactions (t=-1,0,+3)

	Banks	Financials	Consumer Goods	Industrials	Basic Materials	Travel & Leisure
The Greek Government						
Good news	5.46 %***	4.47 %***	-1.28 %***	-0.38 %***	-1.97 %***	-1.46 %***
Bad news	-1.46 %***	-1.35 %***	0.54 %***	0.73 %***	-0.41 %***	0.58 %***
Credit Rating Agencies						
Good news	-	-	-	-	-	-
Bad news	-	-	-	-	-	-
Public Reactions						
Good news	1.71 %***	1.68 %***	-1.50 %***	-0.94 %***	4.27 %***	-0.68 %***
Bad news	-1.15 %***	-1.04 %***	0.22 %***	1.05 %***	0.02 %	2.34 %***
Joint Policy Announcements						
Good news	-	-	-	-	-	-
Bad news	-	-	-	-	-	-
Troika						
Good news	-4.71 %***	-4.72 %***	3.50 %***	-3.00 %***	-3.06 %***	1.35 %***
Bad news	-1.38 %***	-1.22 %***	1.80 %***	0.16 %***	-1.10 %***	0.58 %***
Mixed clusters						
Good news	2.03 %***	1.70 %***	-1.13 %***	-0.45 %***	1.04 %***	-0.35 %***
Bad news	-3.12 %***	-2.65 %***	2.24 %***	1.22 %***	0.56 %***	0.64 %***

The definition of good and bad news defines good news as events receiving a positive market return and bad news as events receiving a negative market return. We use 5 event classifications: 1. Greek government: Government actions such as announcements of government policy and budget approvals, cabinet changes, and announcements made to the general public and reactions to international organisations and the Greek public demonstrations. 2.Credit rating agencies: Changes in ratings by S&P, Moody's and Fitch. 3. Public reactions: Reactions from the Greek public to announcements from various institutions such as independent strikes, demonstrations, and riots. 4.Joint policy announcements: Announcements from the Greek government, IMF and EU institutions occurring on the same day such that separate effects cannot be estimated. 5. Troika: Announcements and actions from the troika (IMF, EU, ECB).We report cumulative abnormal returns in chronological order for all sectors during the Greek Crisis. Cumulative abnormal returns and related t-statistics are calculated using equations 1 and 2. *** denotes significance at 1%, ** at 5% and * at 10% level

Appendix 4: Financial and real sector reactions to good and bad news defined by market reactions (t=-1,0,+5)

	Banks	Financials	Consumer Goods	Industrials	Basic Materials	Travel & Leisure
The Greek Government						
Good news	8.32 %***	5.98 %***	-0.33 %***	-0.34 %***	-1.70 %***	-0.38 %***
Bad news	-0.53 %***	-0.59 %***	0.33 %***	-0.10 %***	-0.70 %***	1.54 %***
Credit Rating Agencies						
Good news	-	-	-	-	-	-
Bad news	-	-	-	-	-	-
Public Reactions						
Good news	-	-	-	-	-	-
Bad news	-	-	-	-	-	-
Joint Policy Announcements						
Good news	-	-	-	-	-	-
Bad news	-	-	-	-	-	-
Troika						
Good news	-	-	-	-	-	-
Bad news	-2.04 %***	-1.87 %***	1.89 %***	-0.26 %***	-0.69 %***	1.57 %***
Mixed clusters						
Good news	3.94 %***	3.42 %***	-3.27 %***	-0.94 %***	2.88 %***	-0.12 %***
Bad news	-5.25 %***	-4.61 %***	3.26 %***	0.95 %***	1.17 %***	2.10 %***

The definition of good and bad news defines good news as events receiving a positive market return and bad news as events receiving a negative market return. We use 5 event classifications: 1. Greek government: Government actions such as announcements of government policy and budget approvals, cabinet changes, and announcements made to the general public and reactions to international organisations and the Greek public demonstrations. 2.Credit rating agencies: Changes in ratings by S&P, Moody's and Fitch. 3. Public reactions: Reactions from the Greek public to announcements from various institutions such as independent strikes, demonstrations, and riots. 4.Joint policy announcements: Announcements from the Greek government, IMF and EU institutions occurring on the same day such that separate effects cannot be estimated. 5. Troika: Announcements and actions from the troika (IMF, EU, ECB).We report cumulative abnormal returns in chronological order for all sectors during the Greek Crisis. Cumulative abnormal returns and related t-statistics are calculated using equations 1 and 2. *** denotes significance at 1%, ** at 5% and * at 10% level