Contagion during the Greek Sovereign Debt Crisis

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Abstract

Using an event study approach, we examine the impact of news about Greece and news about a Greek bailout on bank stock prices in 2010 using data for 48 banks included in the European stress tests. We identify the twenty days with extreme returns on Greek sovereign bonds and categorise the news events during those days into news about Greece and news about the prospects of a Greek bailout. We find that news about Greece does not lead to abnormal returns while news about a bailout does, even for banks without any exposure to Greece or other highly indebted euro countries. This finding suggests that markets consider news about the bailout to be a signal of European governments' willingness in general to use public funds to combat the financial crisis. Sovereign bond prices of Portugal, Ireland, and Spain respond to both news about Greece and news about a Greek bailout.
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1 Introduction

In the course of 2010, the financial problems of Greece became so severe that the euro countries agreed to provide bilateral loans for a total amount of EUR 80 billion to be disbursed over the period May 2010 through June 2013. In addition, the International Monetary Fund (IMF) financed EUR 30 billion under a stand-by arrangement. An important motivation to provide financial support to Greece despite the no-bailout clause in the Maastricht Treaty was fear of contagion, see for instance ECB Vice-president Constâncio (2011). It was feared that a restructuring of Greek debt could lead to a new banking crisis in the EU as several banks, notably in France and Germany, had a high exposure to Greece. In addition, policymakers were afraid that a Greek default would spill over to other highly indebted countries in the euro area.

The threat of contagion from a sovereign default is however not undisputed. According to Cochrane (2010), "we're told that a Greek default will threaten the financial system. But how? Greece has no millions of complex swap contracts, no obscure derivatives, no intertwined counterparties. Greece is not a brokerage or a market-maker. There isn't even any collateral to dispute or assets to seize. This isn't new finance, it's plain-vanilla sovereign debt, a game that has been going on since the Medici started lending money to Popes in the 1400s. People who lent money will lose some of it. Period." With respect to a Greek default spilling over to other countries, Cochrane argues "we're told that a Greek default will lead to 'contagion.' The only thing an investor learns about Portuguese, Spanish, and Italian finances from a Greek default is whether the EU will or won't bail them out too. Any 'contagion' here is entirely self-inflicted. If everyone knew there wouldn't be bailouts there would be no contagion."

The argument by Cochrane (2010) closely resembles the main message from research by Aharony and Swary (1983). These authors perform an event study to examine contagion to other banks when a large bank goes bankrupt. Their analysis indicates that "when the failure of a large bank is caused primarily by problems specific to the bank, such as fraud, no contagion effects are observed. When the failure of a large bank is caused by problems whose revelation is correlated across banks, the observed fall in prices of solvent bank stocks may be interpreted as investors' response to a common type of unfavourable signal, rather than a contagion effect" (p. 305). In the context of a Greek sovereign default, this 'unfavourable signal' would be the revelation that euro area governments apparently are not willing anymore to shield private investors from losses when countries

are about to default on their debt obligations.

There is, as yet, surprisingly limited research on contagion in the current euro area debt crisis.[1] As pointed out by Corsetti, Pericoli, and Sbracia (2011), there is much disagreement among economists about what contagion is and how it should be tested empirically.[2] To identify contagion it is necessary to identify a country-specific event that affects asset prices other than the sovereign bond price of the country concerned. We adopt the standard event study approach reviewed by MacKinlay (1997) and used in earlier work on contagion by, for instance, Aharony and Swary (1983), Kho, Lee, and Stulz (2000) and Brewer III, Genay, Hunter, and Kaufman (2003). As an innovation to this approach, we identify the events as the trading days in 2010 with the largest volatility in yields on Greek government bonds and relate those days to the 'news' that caused these fluctuations. This approach circumvents a major problem of event studies, which for sovereign rating changes was most recently illustrated by Michaelidis, Milidonis, Nishiotis, and Papakyriacou (2012), namely how to identify major event days during which there is really an event that is not expected (and therefore not priced in). The news reports, taken from Reuters, were classified into two categories: news about Greek public finances and news about the willingness (or lack thereof) of European countries to provide financial support to Greece. This way we can distinguish between market reactions due to fears of contagion from a Greek default and reactions reflecting moral hazard

[1] Exceptions include Arezki, Candelon, and Sy (2011), Missio and Watzka (2011) and Afonso, Furceri, and Gomes (2011). Arezki, Candelon, and Sy (2011) examine the spillover effects of sovereign rating news on European financial markets during the period 2007–2010. They find that sovereign rating downgrades have statistically and economically significant spillover effects both across countries and financial markets. Downgrades to near speculative grade ratings for economies such as Greece have a systematic spillover effect across euro area countries. Missio and Watzka (2011) use a dynamic conditional correlation model (DCC) to study contagion in the euro area. Their results show that Portuguese, Spanish, Italian and Belgian yield spreads increase along with their Greek counterpart. Afonso, Furceri, and Gomes (2011) examine whether sovereign yields and CDS spreads in a given country react to rating announcements of other countries. They conclude that there is evidence of contagion, especially from lower rated countries to higher rated countries.

[2] See Pericoli and Sbracia (2003) for a survey. A widely used approach consists of identifying breaks in the international transmission of shocks indirectly, inferring them from a significant rise in the correlation of asset returns in 'crisis' periods compared to 'tranquil' periods. However, a higher correlation between asset prices does not necessarily imply contagion, see Forbes and Rigobon (2002). If, for instance, a crisis is driven by large shocks to a common factor, the co-movement of different asset prices will also increase if markets are integrated (interdependence).

caused by the prospect of a sovereign bailout.[3]

In the empirical analysis, we start with examining the impact of news about Greece and its potential bailout on bank stock prices. As pointed out by Davies and Ng (2011), there are several channels through which deteriorating sovereign creditworthiness may affect banks.[4] First, increases in sovereign risk cause losses on banks' government bond holdings, thereby weakening their balance sheets. This holds, of course, for Greek banks that have a large exposure to the Greek government, but also banks outside Greece hold significant quantities of Greek debt. Second, a fall in the market price of Greek sovereign bonds reduces the value of the collateral that banks can use to secure wholesale funding, and can trigger margin calls from counterparties. Third, deteriorating creditworthiness of Greece may reduce the value of government guarantees to Greek banks, be they explicit or perceived. Finally, sovereign downgrades often flow through to lower ratings for domestic banks because banks are more likely than other sectors to be affected by sovereign distress. The extent to which these channels affect bank stock prices depends on whether markets believe that other EU countries will support Greece. It was widely believed that other euro area countries would support Greece so as to avoid any contagion effects, despite the no-bailout clause of the Maastricht Treaty. If certain statements by leading European politicians cast doubt on such a bailout, however, bond prices of other sovereigns might be also affected. That is why we also examine whether Greek news affects bond prices of other highly indebted countries in the euro area. Increasing doubts about a general bailout would also make the last two of the above channels effective outside Greece. In our empirical analysis we therefore not only take banks' exposure to Greece into account, but also their exposure to other highly indebted euro area countries.

Using data for 48 European banks, our findings suggest that only news about the Greek bailout has a significant effect on bank stock prices, even

[3]Market reactions reflecting changing expectations about a potential bailout could be considered to be a form of contagion as well. Taking a stance on this particular issue is not the objective of the current paper. Instead, for presentational purposes we follow Cochrane (2010) and loosely define contagion as the markets' reaction to news about the economic situation of Greece as opposed to news about the country's potential bailout.

[4]Acharya, Drechsler, and Schnabel (2011) find that after several bank bailouts in 2008, bank CDS spreads declined across all countries with a corresponding increase in sovereign CDS spreads, suggesting a transfer of default risk from the banking sector to the sovereign. However, thereafter both spreads increased together while the sovereign spread increase was larger for countries whose financial sectors were more distressed (see also Ejsing and Lemke 2011). In view of the large exposure of the banking sector to these sovereigns, the rise of sovereign CDS spreads has led to fears of a renewed banking crisis in the euro area.

on stock prices of banks without any exposure to Greece or other highly indebted euro area countries. News about the economic situation in Greece does not lead to abnormal returns. These results are similar to the ones by Aharony and Swary (1983) and provide some support for Cochrane's (2010) argument. However, we also find that the price of sovereign debt of Portugal, Ireland, and Spain responds to both news about Greece and news about a Greek bailout. Still, the finding that news about the economic situation in Greece affects sovereign bond yields of other highly indebted countries does not necessarily imply contagion as it is also in line with the so-called 'wake-up call' view. According to this view a crisis initially restricted to one country may provide new information prompting investors to reassess the vulnerability of other countries, which spreads the crisis across borders (see, for instance Bekaert, Ehrmann, Fratzscher, and Mehl 2011).

The remainder of the paper is structured as follows. Section 2 outlines our methodology, while Section 3 describes the data used. Section 4 presents the estimation results and robustness analyses. The final section concludes.

2 Method

We adopt an event study approach as is commonly used in finance (see MacKinlay (1997) for an overview). In particular, we estimate a regression equation similar to the one used by Kho, Lee, and Stulz (2000) and Brewer III, Genay, Hunter, and Kaufman (2003), which for time t reads

$$R_{pt} = \alpha + \beta R_{mt} + \sum_{j=1}^{J} \gamma_j D_{jt}^{G} + \sum_{k=1}^{K} \delta_k D_{kt}^{B} + \epsilon_t, \tag{1}$$

where R_{pt} is the bank portfolio's daily excess return (i.e. the return minus the risk-free rate), R_{mt} is the excess return on the market portfolio, the event dummies D_t^G and D_t^B indicate trading days during which there was news about Greece and, respectively, news about the willingness of other countries to bailout the country. As a result, the abnormal returns associated with these events are given by the γ_j and δ_k coefficients.

Our estimation window runs from the start to the end of 2010. A common difficulty in event studies is how to select the individual event dates in this window, and how to be certain that the news during these days was not anticipated and thus priced in by financial markets already during earlier days. We circumvent this problem by taking as our event dates the twenty trading days in 2010 during which the 10-year Greek government bonds

experienced the largest price changes. These are the days during which markets priced in the largest news developments. We classify this news as news about Greece, to construct the D_{jt}^G dummy variable, or as news about the likelihood that Greece will be bailed out by other European countries, to construct the D_{jt}^B dummy variable. We obtain our news information from the Reuters U.K. archive of high-frequency news messages. Table 1 reports the selected event dates and the type of news that was most prominent during these days . The table shows that the changes in bond price fluctuations on the event days range from 2.6 to 32 percent in absolute value, which is large by conventional standards (the standard deviation of bond prices changes over the preceding year equals 0.6 percent). By using this approach to select our event dates, we avoid arbitrary judgement about which days to select as the date of an event, and also need not to worry about whether news during these days was already priced in by the markets before.[5]

The aim of our analysis is to examine the overall impact of news about Greece and of news about Greece's bailout, and compare the impact of both types of news on bank stock prices. This way we can distinguish the impact of fiscal instability in Greece on bank market values from the impact of politicians' willingness to provide financial support to Greece. To facilitate doing so, we modify Equation (1) by omitting the twenty news dummies, and instead including one variable N_t^G for news about Greece, and one variable N_t^B for news about the bailout. We construct these variables such that $N_t^G = \sum_{j=1}^{J} D_{jt}^G R_{gt}$ and $N_t^B = \sum_{k=1}^{K} D_{kt}^B R_{gt}$, where R_{gt} denotes the change in the price of the 10-year Greek government bonds. As a result, the coefficient estimates for these variables, which we refer to as γ and δ respectively, can be interpreted as the abnormal return associated with a 1 percentage point change in the value of Greek government debt.

[5]We have to make a subjective judgement about attributing fluctuations in bond prices during those days to the two categories of news events that we distinguish. Fair (2002) show that the news driving even extreme price fluctuations is not always easy to identify. However, in the current analysis this issue is somewhat mitigated by the fact that we only have to establish whether or not during an event day there was news about the bailout. If not, we automatically consider the news event as referring to the economic situation in Greece, without the need to precisely pin down the reason for the change in the Greek bond price. Still, we examine the robustness of our classification in the empirical section by identifying event dates using Greek sovereign CDS-spreads as well.

Table 1: Events inferred from changes in Greek government bond prices.

Event date	News description	Bailout	Return
27-01-2010	Greece on Wednesday denied press reports it had chosen Goldman Sachs to sell up to 25 billion euros of bonds to China, sending Greek government debt prices sharply lower and hitting the euro.	No	-3.50
28-01-2010	Germany and France denied a media report that they were planning to give financial aid to Greece, whose budget deficit hit an estimated 12.7 percent in 2009. Athens says it is seeking funds only through the markets, mainly in Europe.	Yes	-3.10
10-02-2010	European shares rose on Wednesday on hopes of a possible European Union rescue plan for Greece.	Yes	2.63
06-04-2010	Markets pushed Greece's risk premium to a euro lifetime high amid growing doubts over the country's capacity to resolve its debt crisis and fresh scepticism about a European Union-International Monetary Fund aid mechanism.	No	-3.17
12-04-2010	The euro zone agreed on a 30-billion-euro package of three-year loans at interest of about 5 percent if Greece seeks help. The International Monetary Fund would also be expected to supply 15 billion euros in the first year.	Yes	3.35
23-04-2010	Greek bank shares erased gains posted earlier in the day on concerns over possible delays in the activation of an EU/IMF aid package.	Yes	-3.04
26-04-2010	Germany said on Monday it could offer aid for Greece within days if it agreed to painful new austerity measures, but rescue jitters pushed the cost of insuring against a Greek debt default to a record high.	Yes	-5.50
03-05-2010	Markets reacted to a record 110 billion euro bailout for Greece, although investors doubted it would offer more than temporary relief to a euro zone shaken by divisions and saddled with high debt.	Yes	4.17
04-05-2010	Doubts whether debt-stricken Greece has the resolve to make sharp spending cuts fuelled safe-haven demand for bonds.	No	-6.26
05-05-2010	Fear that a euro-zone debt crisis may spread beyond Greece knocked the euro below the $1.29 level for the first time in more than a year on Wednesday and rattled bond markets in Portugal and Spain as anxious investors snapped up U.S. dollars.	No	-5.74
06-05-2010	Investors rushed to the perceived safety of the U.S. dollar and Japanese yen as the European Central Bank offered no new measures to ease a Greek debt crisis after a meeting earlier the day.	Yes	-2.86
07-05-2010	Greece's drastic belt-tightening to secure emergency aid risks plunging the economy into a deeper recession, threatening delivery of key fiscal targets and prolonging the debt crisis.	No	-10.59
10-05-2010	Investor sentiment receives a boost from news of an European Union plan to halt the spread of Greece's fiscal woes.	Yes	31.97
14-05-2010	European bank shares fell over 3 percent on Friday as renewed concerns about losses from exposures to Greece unsettled investors.	No	-4.08
18-05-2010	Greece received a 14.5 billion euro loan from the European Union and can now repay its immediate debt, a development that helped to steady global investor's jitters.	Yes	4.01
15-06-2010	A recovery in stocks and the euro fizzled out after Moody's downgraded Greece to junk status.	No	-5.82
23-06-2010	Communist trade unionists blocked travellers from boarding ships at Greece's largest port on Wednesday, stranding tourist ferries as part of protests against austerity measures in the debt-choked nation.	No	-3.42
11-10-2010	The International Monetary Fund said on Sunday that bailout loans to Greece could be stretched out or replaced if refinancing worries lingered in markets, but it currently has no concrete plans to do so.	Yes	3.47
27-10-2010	Greece's 2009 budget deficit, whose wildly gyrating figures triggered the country's fiscal crisis, will be set "once and for all" at above 15 percent of GDP, the finance minister said.	No	-4.51
04-11-2010	Greece resumes air freight after parcel bomb spate. Greek authorities have blamed leftist militants for the bombs, which may be intended to spur an anti-government vote in Sunday's local elections in protest against austerity plans.	No	-2.66

3 Data

We select the portfolio of banks using the stress tests performed by the Committee of European Bank Supervisors in July 2010. These stress test aimed to assess the resilience of the EU banking system to possible adverse economic developments, and include a representative sample of 91 European banks which account for 65 percent of the European market in terms of total assets, see CEBS (2010). We use all banks included in the stress test for which Thomson Datastream reports a stock price quote during at least 90 percent of the 261 trading days in 2010, which results in a sample of 48 banks. These banks and their exposures on Greece and three other highly indebted countries, i.e. Ireland, Portugal, and Spain (GIPS-countries), are listed in Table 2. The table shows that there is quite some heterogeneity in the sample with respect to the exposures of individual banks, which range from 0 to 417 percent of their core tier 1 capital buffers.

For the banks in the table we obtain from Datastream daily time series for 2010 with market capitalisation expressed in local currencies. To construct the returns on the bank portfolios that are included as the dependent variable in Equation (1), we use these time series to construct five portfolios with logarithmic changes in market capitalisation averaged over: i) all banks, ii) all banks with an exposure to Greece, iii) all banks without an exposure to Greece, iv) all banks with an exposure to at least one of the four GIPS-countries, and v) all banks without an exposure to any of the GIPS-countries. In addition to focusing on the impact of Greek news on bank portfolios, we analyse the impact of news on bond prices of Ireland, Portugal, and Spain as well. To this end, we use as the dependent variable Thomson Datastream price changes of these countries' 10-year government bonds.

When analysing abnormal returns on the portfolios of bank equity we use the return on the FTSEurofirst 300 index as the market index. When analysing the impact on sovereign bond prices we use as the market index the J.P. Morgan Index of European Government Bonds with yields to maturity between 7 and 10 years. We express the returns on bank portfolios, government bonds, and stock and bond price indices in excess of the risk-free rate, for which we take the one-day EONIA interest rate.

Table 2: Banks included in the sample.

Bank name	Country	Exp. Greece	Exp. PIGS
Austria	Erste Group Bank	6.58	11.88
	Raiffeisen Zentralbank Oesterreich	0.22	0.31
Belgium	Dexia	21.33	48.57
	KBC Bank	6.76	24.01
Cyprus	Bank of Cyprus	74.77	88.83
	Marfin Popular Bank	122.07	126.34
Denmark	Danske Bank	0.00	4.45
	Jyske Bank	5.06	6.44
	Sydbank	0.00	0.00
Finland	Op-Pohjola	0.40	1.19
France	BNP Paribas	7.96	17.66
	Credit Agricole	1.63	10.58
	Société Générale	12.18	17.28
Germany	Commerzbank	9.82	25.74
	Deutsche Bank	4.89	12.80
	Deutsche Postbank	27.25	58.56
Greece	Alpha Bank	85.64	85.64
	EFG Eurobank Ergasias	139.43	139.43
	National Bank of Greece	260.29	260.29
	TT Hellenic Postbank	417.18	417.18
Hungary	FTB Mortgage Bank	0.00	0.00
	OTP Bank	0.00	0.00
Ireland	Allied Irish Banks	0.48	56.49
	Bank of Ireland	0.00	12.39
Italy	Banco Popolare	1.25	3.37
	Intesa Sanpaolo	2.74	5.18
	Monte dei Paschi di Siena	0.38	2.72
	UBI Banca	0.37	0.37
	Unicredit	2.05	4.17
Netherlands	ING Bank	7.13	16.25
	SNS Bank	3.54	17.25
Poland	PKO Bank Polski	0.00	0.00
Portugal	Banco BPI	22.67	232.22
	Banco Comercial Portugues	11.77	30.66
Spain	Banco de Sabadell	0.00	95.45
	Banco Pastor	2.03	144.28
	Banco Popular Español	0.00	97.33
	Bankinter	0.00	75.73
	Grupo BBVA	1.08	194.78
	Grupo Santander	0.54	95.84
Sweden	Nordea	1.27	1.46
	Swedbank	0.00	0.00
	Svenska Handelsbanken	0.00	0.00
	Skandinaviska Enskilda Banken	1.51	3.02
United Kingdom	Barclays	0.78	11.99
	HSBC	1.58	2.91
	Lloyds Bancking Group	0.00	0.30
	Royal Bank of Scotland	3.20	12.35

4 Results

4.1 Main results

The fear for contagion by policy makers is easy to understand once taking a quick look at the raw data. Of the twenty days with extreme returns on Greek sovereign bonds, the average bank experienced a return equal to 3.26 percent when the news was positive, and -1.62 percent when the news was negative. Hence, it is easy to conclude from these casual observation that bank stock prices are strongly driven by the risk that Greece might go bankrupt.

Table 3 reports the abnormal returns associated with news about Greece and news about the bailout of Greece. They are obtained as the coefficient estimates obtained when regressing the time series of daily portfolio returns during 2010 on the news variables (as well as on a constant and the market index discussed above). The table also reports $t-$statistics calculated from Newey-West standard errors. Two observations stand out from the first row in the table. First, news about the economic situation of Greece does not have a significant impact on the market value of the equity portfolio including all banks in the sample. Second, news about the bailout of Greece does significantly affect the market value of this portfolio. A one percent change in the Greek government bond price induced by news about a bailout on average leads to a 0.124 percent change in banks' market value.

The first finding implies that expectations by financial markets regarding losses for banks do not change when the probability of a Greek default changes due to news about Greece's economic situation. This includes losses expected from direct exposures to Greece, but also losses expected from indirect exposures via other banks. This result suggests that market participants do not expect bank losses associated with an actual Greek default to be large in magnitude.

The second finding implies that the prospect of a bailout has a stabilising impact on bank stock prices. When Greek bonds rise in value due to positive news about a bailout, bank stock prices rise as well (and vice versa). Apparently, financial markets attach a substantial value to the willingness of governments to shield banks from losses on their sovereign exposures by bailing out failing euro countries.

To examine the impact of news about Greece and news about a Greek bailout in more detail, the next two rows in the table distinguish banks with an exposure to Greece from banks without an exposure to Greece. The results do not differ qualitatively from those for the average sample of banks,

Table 3: Impact of bond-based news about Greece and about the bailout of Greece on bank equity and sovereign bonds

Regression equation: $R_{pt} = \alpha + \beta R_{mt} + \gamma N_{gt}^{G} + \delta N_{gt}^{B} + \epsilon_t$

	News about Greece		News about the bailout	
	γ	t-stat.	δ	t-stat.
Abnormal return on bank equity				
All banks	0.016	0.23	0.124	9.45
Banks exposed to Greece	0.017	0.23	0.132	9.41
Banks not exposed to Greece	0.012	0.18	0.101	4.62
Banks exposed to PIGS	0.016	0.21	0.132	9.15
Banks not exposed to PIGS	0.015	0.25	0.072	3.63
Abnormal return on sovereign bonds				
Portugal	0.214	3.51	0.282	30.40
Ireland	0.160	2.79	0.234	20.61
Spain	0.052	1.96	0.113	24.64

as news about the economic situation of Greece never leads to significant abnormal returns, while news about the bailout of Greece always leads to such abnormal returns. As the table shows, even banks without an exposure to Greece respond to news about Greece's bailout. The next two rows consider banks with or without an exposure to any of the GIPS-countries. The results confirm the previous results: banks with an exposure to any of the GIPS-countries do not respond to news about Greece, while even banks without such an exposure respond to news about the bailout. Our finding that news about Greece does not have an impact on bank stock prices while news about a bailout does, suggests that markets consider news about the bailout to be a signal of European governments' willingness in general to use public funds to protect private investors against losses. When governments indicate, for instance, that they will not rescue Greece, markets consider this to be a disturbing signal mainly because it might imply governments also will not engage in any other financial sector rescue operations anymore.

The last three rows of the table examine to what extent the prices of sovereign debt of the other three GIPS-countries, Ireland, Portugal, and Spain, respond to news about the economic situation in Greece and news about a Greek bailout. In this case we do find significant abnormal returns associated with news about the economic situation in Greece, while as before

news about the bailout leads to abnormal returns as well. The t-statistics for news about the bailout are a factor ten larger than those for news about Greece itself, although results from a Wald-test show the absolute returns of both types of news are not statistically different from each other.

That news about the bailout leads to abnormal returns in other countries as well is not surprising, as the willingness of euro countries to bailout Greece obviously says a lot about their willingness to bailout other GIPS-countries as well. However, that news about the economic situation in Greece leads to abnormal returns on other countries' bond prices might be more surprising, as it does not lead to abnormal returns on bank stock prices (including the sub-sample with an exposure to the GIPS). An explanation for the impact of news about Greece on other countries is that there is a learning effect. Others refer to this as a 'wake-up call': a crisis initially restricted to one country may provide new information prompting investors to reassess the vulnerability of other countries, which spreads the crisis across borders (Goldstein, Kaminsky and Reinhart, 2000). According to this view, domestic fundamentals are likely to play a dominant role in the transmission of the crisis (Bekaert, Ehrmann, Fratzscher and Mehl, 2011). The ability of Greece to reduce its budget deficit and government debt, and the response of rating agencies to these attempts, after all are quite informative about the likelihood that other indebted countries will be able to quickly reduce their debt levels as well. If Greece does not succeed to credibly commit to a sustainable fiscal policy, the probability that other GIPS-countries will manage to do so may be small as well. Our results suggest that the abnormal returns in GIPS-countries after news about Greece's economic situation are especially due to such learning effects.

4.2 Robustness analyses

As a robustness analysis, we also use changes in Greek 10-year senior sovereign CDS-spreads to identify event dates, instead of changes in Greek sovereign bond prices. This way we examine the robustness of our results to using a different measure of sovereign default risk. As the days with extreme returns in CDS-spreads differ in several cases from the days with extreme returns in sovereign bond prices, while sometimes there seems to be no clear news driving the event, we this way also examine the robustness of our results to the identification and classification of the news events. All CDS-spreads are obtained from Thomson Datastream. Table 4 shows the outcomes. The results are similar to the ones presented above, as for banks news about Greece does not lead to abnormal returns while news about the bailout

Table 4: Impact of CDS-based news about Greece and about the bailout of Greece on bank equity and sovereign CDS-spreads

Regression equation: $R_{pt} = \alpha + \beta R_{mt} + \gamma N_{gt}^{G} + \delta N_{gt}^{B} + \epsilon_t$

	News about Greece		News about the bailout	
	γ	t-stat.	δ	t-stat.
Abnormal return on bank equity				
All banks	-0.203	-0.92	-1.165	-7.00
Banks exposed to Greece	-0.217	-0.89	-1.197	-7.26
Banks not exposed to Greece	-0.160	-0.47	-1.068	-5.14
Banks exposed to PIGS	-0.229	-1.01	-1.209	-6.74
Banks not exposed to PIGS	-0.021	-0.06	-0.854	-6.14
Abnormal return on sovereign bonds				
Portugal	0.180	2.97	0.367	4.72
Ireland	0.070	1.62	0.129	3.39
Spain	0.088	3.02	0.130	4.18

does.[6] Interestingly, for all bank portfolios the coefficients for news about Greece and news about a bailout are now significantly different from each other. Abnormal returns in countries' CDS-spreads, which we use as the dependent variable instead of changes in bond prices, are significant as well for both types of news (although for Ireland only at the ten percent level). These results thus confirm those from our main analysis.

We also perform a robustness analysis where we include additional news variables for events where the news is negative, i.e. for those days where the Greek bond price declines. This way we examine whether investors respond asymmetrically to news events. Neither for bank portfolios nor for government bonds is there evidence for such an asymmetric response (results available on request).

Finally, we do a robustness analysis where we construct a weighted average portfolio of bank equity returns, using as weights the exposure to Greece as a percentage of their core tier 1 equity buffers. As these exposures are likely to change over time instead of being equal to the values in Table 2 throughout the entire sample period, we do this exercise for robustness only. The results show that both types of news have a significant impact on the

[6] The signs of the values in the table are opposite to the signs in Table 3, since when default risk increases CDS-spreads rise while bond prices decline.

weighted portfolio, although for news about Greece only at the ten percent level. However, once we remove the four banks for which the exposure was larger than 100 percent of their equity, of which three are Greek and one is from Cyprus, only news about the bailout has a significant impact. When we construct weighted portfolios with weights equal to the combined exposure to the GIPS as a percentage of core tier 1 equity, the results confirm the finding from our main analysis that only news about the bailout has a significant impact (results available on request).

5 Conclusion

Using an event study approach, we examine the impact of news about Greece and news about a Greek bailout on bank stock prices in 2010 using data for 48 European banks. We first identify the twenty days with extreme returns on Greek sovereign bonds and categorise the news events during those days into news about Greece and news about the prospects of a Greek bailout. Our findings suggest that only news about the Greek bailout has a significant effect on bank stock prices, even on stock prices of banks without any exposure to Greece or other highly indebted euro area countries. News about the economic situation in Greece does not lead to abnormal returns in bank stock prices. This combination of results suggest that financial markets consider news about the bailout to be a signal of European governments' willingness in general to use public funds to combat the financial crisis. In contrast, the price of sovereign debt of Portugal, Ireland, and Spain, responds to both news about the economic situation of Greece and news about a Greek bailout. A plausible explanation for the impact of news about Greece on the bond prices of other countries is that there is a 'wake-up call': a crisis initially restricted to one country may provide new information prompting investors to reassess the vulnerability of other countries, which spreads the crisis across borders.

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