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The role of creditor seniority in Europe's sovereign debt crisis

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Abstract

The share of public debt that is held by lenders with preferred creditor status (i.e. the IMF, ECB, ESM, etc.) has increased substantially during Europe's sovereign debt crisis. Empirically, we document in both, macro and survey data that there exists a close relationship between the increase in senior tranche lending and the interest rates of countries in crisis. With regard to policy implications, we point out a predicament that policy makers are facing: while aiming to stabilize interest rates at a reasonable level, providing further senior loans might achieve just the opposite, as private markets are gradually pushed into a junior position.

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1 Introduction

Interest rate spreads in Europe have evolved in a way that most researchers find hard to reconcile with the underlying economic fundamentals. While some authors take it as evidence of multiple equilibria in government bond markets, or default risk driven by market sentiment, others just point out the large forecast errors that standard empirical specifications of interest rates would generate.[2] In this paper, we argue that an important element is missing in this debate, by pointing out the increasing share of total debt that is held by multilateral creditors (i.e. the ECB, the EFSF/ESM and IMF) due to the ongoing rescue operations. As most of these multilateral creditors are likely to have senior status in case of insolvency, the remaining public debt in the market has become a junior tranche that requires a higher marginal interest rate.

"Preferred Creditor Status" or "Senior Status" means that the preferred lender gets his money back first, in case of insolvency. The subordinated creditor, or junior creditor, on the other hand, receives no or only incomplete repayment of claims. Financial analysts and rating agencies take this question very seriously, and consider the ranking of claims when assessing the risk of a country. In the euro crisis, they have repeatedly referred to this issue when downgrading member countries of the euro area.

In the present article, we analyze the role of creditor seniority in the euro crisis from two different angles. On the one hand, we ask the empirical question whether the seniority of rescue packages had an impact on the level on interest rates and sovereign bond spreads in Europe. We show in the empirical analysis that this effect is statistically significant and quantitatively important. On the other hand, we would like to contribute to the policy debate. Institutions like the ECB, the ESM and the IMF face the following predicament: While aiming to reach reasonably low levels of interest rates, by providing additional senior credit, the ongoing rescue operations might have unintended side effects. Ceteris paribus, an increase in the senior tranche will increase the market interest rate charged by junior lenders[3].

We start our analysis with an assessment of the seniority status of different components of the rescue package. De jure, the preferred creditor status of multilateral lenders is often not unambiguous. The International Monetary Fund (IMF), which has proven its seniority in the financial crises of the past decades, for instance, is *de jure* not senior - it awards its credit lines without corresponding clauses in its contracts or institutional by-laws. Also in the current euro crisis, with various multilateral rescue-components, the rules of seniority are sometimes unclear and have evolved over time. Seniority of multilateral lenders is thus rather a convention that is widely accepted by the markets. In a survey analysis, we show that almost 90% of the respondents expect at least one of the rescue components to be senior to private markets.

In the empirical analysis, we have five main elements to document the effect of senior tranche lending on interest rates and sovereign bond spreads. (i) We point to the fact that the rescue operations have been large in magnitude both, in historical comparison and when compared to the total public debt of the countries in crisis. The share of public debt that is held by multilateral lenders, in countries that were most strongly affected by the financial crisis has exceeded 60% towards the end of our sample period. (ii) We document the reactions of rating

[2] See De Grauwe and Ji (2013), Favero and Missale (2012), Aizenman et al. (2013a) and Beirne and Fratzscher (2013).

[3] The theoretical motivation of the senior tranche explanation has its roots in several academic and policy papers. The closest recent theoretical models that would explain high marginal interest rates in the presence of senior official lending are by Corsetti et al. (2006), as well as Chamley and Pinto (2012). See also Bolton and Jeanne (2009), and Saravia (2010). More generally, the link between bond prices and the seniority of lenders is modeled for government bonds in Bartolini and Dixit (1991) and for corporate bonds in Black and Cox (1976). Chamley and Pinto (2011) as well as Gros (2010) also pointed out the relevance of this literature for the euro crisis.

agencies, which motivated their downgrades explicitly pointing to the seniority issue. (iii) We highlight a striking correlation between interest rate spreads and the share of senior lenders in the total public debt of each country. In the main part of the paper, we analyze this link more formally, in a panel regression analysis. Using various econometric approaches and a range of different control variables, we quantify the impact of senior lending on sovereign bond spreads. (iv) We analyze a survey data set on interest rate expectations. We show that in the countries in crisis, respondents who expect seniority of rescue packages are also characterized by higher interest rate expectations. (v) Finally, we look at two case studies. First, we compare the Securities Markets Programme (SMP) of the ECB with the new Outright Monetary Transactions (OMT) program. Both programs are similar, but differ with respect to the seniority status of the ECB. Secondly, we illustrate the effect of senior lending by considering the price patterns of UK- and domestic-law bonds for the case of Cyprus.

Our panel regression analysis starts with a benchmark regression that is related to earlier specifications of the literature. We explain the interest rate spread by standard variables including public debt ratios, the current account, real effective exchange rate and GDP growth rates, and show that the senior tranche of public debt, i.e. the sum of all multilateral loans relative to general government debt, is statistically significant in a multiple regression setup.[4]

We assess the magnitude of the coefficient in a second regression where we add dummy variables for certain thresholds of debt-to-GDP ratios or the respective European Commission forecasts. We find that higher debt ratios are associated with a higher partial correlation between the senior tranche variable and sovereign bond spreads. Evaluated at the debt ratios that existed at the time of the first rescue packages in Greece, Ireland and Portugal, as well as the actual size of the senior tranche increase, we find that the senior tranche effect explains between 17% (Ireland) and 40% (Greece) of the total increase in interest rate spreads in the same period.

A key question to ask is whether this partial correlation reflects a *causal* impact of the senior tranche on interest rate spreads. From a political economy perspective one could argue the other way – that rescue packages have been targeting interest rates – and we are capturing a policy response, rather than a causal effect. To address this issue, we follow several different approaches.

A first step is to decompose the senior tranche into different components and make use of the survey data set, the World Economic Survey (WES), from the ifo Institute. The ifo-survey shows that not all components are viewed as equally senior by market participants. In a nested-regression setup, we illustrate that the IMF, which is viewed most clearly senior by survey participants, also has the largest coefficient, when used as a proxy for the senior tranche. When adding other elements one by one, in the order of expected seniority, the coefficient declines. Our benchmark proxy that includes all components has the lowest coefficient.

More formally, we address the endogeneity question in a set of instrumental two-stage regressions. As a first step we take the assessment of rating agencies as an external instrument for the senior tranche. Conceptually, it is a good instrument, as it fulfills two key requirements: First, a high correlation with the instrumented variable. As we document in Section 2, rating agencies have repeatedly referred to the preferred creditor status of official lenders when downgrading countries in the euro crisis. Secondly, from a political economy perspective there is no motivation for reverse causality. Unlike the official creditors, rating agencies have no motivation to stabilize

[4] This finding complements some earlier evidence on the role of creditor seniority. For example, Dooley and Stone (1993) document that creditor seniority was an important determinant of secondary market prices of debt in emerging markets during the Latin American debt crisis in the 1980s. For the case of the Russian crisis of 1998 see Kharas et al. (2001). See also Bulow et al. (1992), Sturzenegger & Zettelmeyer (2008).

interest rates of countries in crisis. We find that the senior tranche variable remains statistically significant when instrumented by the rating decisions, as well as other internal instruments, and instruments that are derived from specific characteristics of our dataset.[5]

A second key question is whether our benchmark regression is leaving out the unobserved probability of private sector involvement (PSI) that may have existed during our sample period, at least since the Deauville meeting in the autumn of 2010[6]. Our benchmark regression already includes time fixed effects to address this issue. Furthermore, we use economic sentiment indicators, the number of Google searches for "private sector involvement", as well as CDS spreads as additional control variables. We also take into account contagion and fragmentation as further potentially omitted variables. In all specifications the senior tranche remains statistically significant and roughly similar in size.

As a final step in the regression analysis, we evaluate the survey data set in more detail. As part of the World Economic Survey, participants have been asked about seniority expectations, as well as their interest rate expectation. We find remarkable differences in subsets of respondents to this question.

First, respondents from countries in crisis on average have falling interest rate expectations, while respondents from other countries in the euro area have rising interest rate expectations. Among the first group, however, respondents are less likely to expect falling interest rates when at the same time expecting the rescue packages to be senior. In their (aggregate) view, interest rates will stay nearly constant.

This difference also prevails, when considering the group of IMF loan recipients worldwide. Respondents from countries who make substantial use of IMF credit lines have on average falling interest rate expectations. However, respondents, who expect that the IMF will be able to enforce its preferred creditor status, do not share this expectation. They only expect a very minor decline on average.

We show that these differences are statistically significant in an ordered probit regression setup, when controlling for participants' assessment about the development of public debt levels, GDP growth rates, trade balances and the exchange rate – similar to the panel regressions reported above.

We conclude our empirical investigation by looking at two case studies. First, we compare the Securities Markets Programme (SMP) of the European Central Bank to the Outright Monetary Transactions (OMT). In the former, the ECB announced, and later enforced, its preferred creditor status with respect to private markets during the Greek debt restructuring in early 2012. In the more recent OMT program, however, the ECB announced to be treated "pari-passu" with private markets in case of default. Focusing on the two countries with the largest drop in interest rates following the announcement – Italy and Spain – we analyze the timing of the interest rate decline and the news content of a sequence of announcements that took place in summer of 2012. These include the "whatever it takes" statement, the first announcement of outright open market operations and finally the details of OMT – including the pari-passu status – that have been announced on September 6th, 2012. As the trend-change in interest rate spreads, as well as the single largest drop occurred on September 6th, we argue that the pari-passu clause constituted an important element of the success of OMT in bringing down interest rates.

[5] More specifically, as alternatives to the external rating decision instrument, we use lagged values of the senior tranche and the other exogenous variables as internal instruments. Furthermore, we use the identification approach suggested by Lewbel (2012) that exploits the heteroscedasticity in the first stage of the regression. This IV technique yields consistent estimates by imposing higher moment restrictions even when valid external instruments are unavailable or weak.

[6] See Lane (2012).

A final alternative to illustrate the importance of creditor seniority is to investigate the bonds issued under different jurisdictions – an aspect of seniority also highlighted by Choi et al. (2011). We compare bonds with similar maturity for the case of Cyprus that were issued under UK-law and Cypriot-Law, respectively. We show that in the financial crisis the prices of these two bonds have changed differently over time, indicating that markets have a preference for UK-Law bonds that can be considered safer from subordination.

With regard to policy implications we would like to highlight a predicament that the current process of rescue policies is facing. On the one hand, further loans with explicit senior status are likely to be inefficient in bringing down interest rates of the countries in crisis. On the other hand, the acceptance of pari-passu status entails more risks for multilateral lenders if the reduction in interest rates does not eventually lead to a turn-around of the economy. In the concluding section of the paper, we also discuss what a gradual separation into a junior and a senior tranche – as an unintended by-product of rescue policies – implies for various proposals on Eurobonds. Highlighting these trade-offs and taking stylized facts into account for future policies is in our view very important to sharpen minds for finding a long-lasting solution of the crisis.

2 Seniority of rescue operations

De jure seniority – an institutional overview

There is surprisingly little "de jure" evidence that multilateral lenders are indeed senior to other creditors. It is primarily a convention and follows from the logic that in future crisis, this lender of last resort may be needed again to borrow further resources[7]. The concrete bylaws of the lending institutions are often rather vague and ambiguous.

Box 1 summarizes the de jure seniority status of various rescue packages where the seniority status has been explicitly addressed. A simplified reading of these texts would suggest that the ESM and the SMP program can be classified as *senior* to private creditors, while the first Greek loan facility, the EFSM, Bilateral lenders and the OMT are *pari passu* – thus "on equal footing" with the private sectors. In each case, it gets more complicated, however, when considering the details of the arrangements.

[7] It has been shown by Kletzer & Wright (2000), that this is actually sufficient. In a formal analysis, they derive an equilibrium, where no external enforcement is needed. A result already anticipated by Keynes (1929) when he wrote: "There is, on the part of most foreign countries, a strong tendency to default […] whenever the expectation of further loans no longer exceeds in amount the interest payable on old ones."

Box 1: De jure seniority

Greek Loan Facility	"[…] each Loan shall constitute an unsecured, direct, unconditional, unsubordinated and general obligation of the Borrower and will rank at least pari passu with all other present and future unsecured and unsubordinated loans and obligations of the Borrower arising from its present or future Relevant Indebtedness […]"	Greek Loan Facility Agreement (4), 1, (a), May 8th 2010.
	"The Borrower undertakes not to grant to any other creditor or holder of its sovereign debt any priority over the Lenders."	Greek Loan Facility Agreement (4), 2, (a) ii), May 8th 2010.
EFSM	"The support from the EFSM needs to be supplied on terms and conditions similar to those of the IMF"	EU Council Decision, 17211/1/10 REV 1, December 2010.
Bilateral loans to Ireland from UK	"The Borrower must ensure that its payment obligations under this Agreement at all times rank at least pari passu with all its other present and future unsecured indebtedness."	Credit Facility Agreement 13.3, December 2010.
EFSF	"Financial support shall be provided by EFSF in conjunction with the IMF and shall be on comparable terms to the stability support loans advanced by euro-area Member States to the Hellenic Republic on 8 May 2010"	Recital 1 of the Preamble of the EFSF Framework Agreement, June 07th 2010.
	"all Financial Assistance made available to the Beneficiary Member State shall constitute an unsecured (save to the extent of any security provided in accordance with Clause 5(2)(a)(i)), direct, unconditional, unsubordinated and general obligation of the Beneficiary Member State and will rank at least pari passu with all other present and future unsecured and unsubordinated loans and obligations of the Beneficiary Member State arising from its present or future indebtedness"	EFSF Master Financial Assistance Agreements with Greece, Ireland and Portugal, 5. (1), (a), December 12th 2012.
ESM	"In all cases, in order to protect taxpayers' money, and to send a clear signal to private creditors that their claims are subordinated to those of the official sector, an ESM loan will enjoy *preferred creditor* status, junior only to the IMF loan."	Statement by the Eurogroup, November 28th 2010.
	"Like the IMF, the ESM will provide financial assistance to a Member State when its regular access to market financing is impaired. Reflecting this […] the ESM will enjoy preferred creditor status in a similar fashion to the IMF, while accepting preferred creditor status of IMF over ESM"	European Council Conclusion (EUCO 10/1/11), April 4th 2011.
	"In the event of ESM financial assistance in the form of ESM loans following a European financial assistance program existing at the time of the signature of this Treaty, the ESM will enjoy the same seniority as all other loans and obligations of the beneficiary ESM Member, with the exception of the IMF loans."	Recital 13 of the Preamble in the Treaty establishing the ESM, March 25th 2012.
	"The euro area Member States will support equivalent creditor status of the ESM and that of other States lending bilaterally in coordination with the ESM."	Recital 14 of the Preamble in the Treaty establishing the ESM, March 25th 2012.
OMT & SMP	"it [referring to the OMT] accepts the same (pari passu) treatment as private or other creditors with respect to bonds […], in accordance with the terms of such bonds."	ECB press statement, September 6th 2012.
	"With regard to seniority, the statement on outright monetary purchases does not apply to the SMP holdings."	ECB press conference, September 6th 2012.

The International Monetary Fund

The best example of the lack of clear de-jure seniority is the IMF. Although we document below that the IMF is *de facto* the most clearly senior lender among all multinational lenders, its institutional setting does not provide a basis for this (see Martha (1990) and Roubini & Setser (2004)). The seniority is widely accepted, but it is not written in the contracts of IMF emergency lending. Nevertheless, in the course of the financial crisis, this senior role of the IMF has never been challenged by any of the commentators. It was re-affirmed for instance by Jean-Claude Trichet on May 6th of 2010, during a press conference when he said that "the IMF has a general privilege of seniority which is part of the overall global institutional framework"[8]. Also later in the year, when the seniority debate of the official rescue packages, has become more intense, the Eurogroup stated that the "ESM loans will enjoy preferred creditor status, junior only to the IMF loan"[9]

The first Greek loan facility and the EFSM

In the first Greek loan facility lenders are considered to be treated "at least" pari-passu. Later, however, the text adds that "the Borrower undertakes not to grant to any other creditor or holder of its sovereign debt any priority to the Lenders". This leaves room for interpretation, as at a time the IMF had already committed €30 billion under a stand-by arrangement. A similar wording was also used in the agreement on bilateral loans to Ireland from the UK.

When the EFSM was activated for the first time in the case of Ireland, it contained an even stronger clause "The support from the EFSM needs to be supplied on terms and conditions similar to those of the IMF". Again, a vague statement, but the IMF reference clearly signals that the loans might be considered senior at the time of repayments.

The temporary rescue fund, EFSF

A similar wording was used when the EFSF was introduced as a société anonyme incorporated in Luxembourg. Referring to the definition of "pari-passu" above, it states that "Financial support shall be provided by the EFSF in conjunction with the IMF and shall be on comparable terms to the stability support loans advanced by euro-area Member States to the Hellenic Republic on 8 May 2010". The ambiguity in the bilateral loans thus translated into an ambiguity in the EFSF lending that was strengthened by the uncertainty about the concrete terms of the transition of this loan facility to the ESM three years later.

In public statements, however, the EFSF and other policy makers made clear that it did not claim a senior role for its lending. On July 13th, 2010, Klaus Regling, the chief executive officer of the EFSF stated in an interview with a Wall Street Journal that "Unlike the IMF, the EFSF will not be a preferred creditor."[10]

[8] European Central Bank Press Conference, 06.05.2010.
[9] Statement by the Eurogroup, 28.11.2010.
[10] Wall Street Journal, 13.07.2010.

The permanent rescue fund, ESM

When on November 28th, 2010, the Eurogroup agreed on the ESM, as an intergovernmental organization under public international law, they expressed the ESM's status very clearly: "an ESM loan will enjoy preferred creditor status, junior only to the IMF loan." Later on, this was renewed and justified by the ESM's debtor-in-possession financing. A first version of the treaty containing the above statement was signed on July 11th, 2011.

In a later version of the treaty, March 25th 2012, an important clarification was added. While both versions claimed seniority for the ESM itself and envisaged the transfer of EFSF credits into the ESM, only the second version made clear how the transferred EFSF credits stand in terms of creditor seniority. They were intended to gain the same seniority status as the ESM.

As the financial crisis developed, there were also some downgrades of its strong initial seniority stance. In the final version of the ESM treaty the seniority statement was weakened. While the first draft read "the ESM will enjoy preferred creditor status", the final version said "The ESM *loans* will enjoy preferred creditor status" (emphasis by the authors). Other instruments, such as the Secondary Market Support Facility (SMSF*)* are thus excluded from the seniority clause. It is furthermore interesting to note that the seniority status of the ESM is only governed in its preamble - as a mutual understanding.[11] Also the extension of maturities of EFSF and ESM loans can be interpreted as a withdrawal from its strong seniority position.[12]

SMP and OMT

The Eurosystem of Central Banks also became an important creditor of countries in crisis via its Securities Markets Programme (SMP), collateralized lending to financial institutions and, later, the Outright Monetary Transactions (OMT), a component not yet used at the time of writing. Despite a controversial public debate on the seniority status of the Euro-system, there is de jure little justification for claiming such a preferred status. All government bonds in the open (secondary) market contain the same legal clauses[13] – whether bought by the ECB or by private investors. In the case of OMT, the ECB explicitly acknowledged this fact in stating: "that it accepts the same (pari passu) treatment as private or other creditors with respect to bonds […], in accordance with the terms of such bonds." However, accepting pari-passu treatment does not mean that the Euro-system is allowed to participate in voluntary debt restructurings, such as the Greek PSI in February/March 2012. Both, SMP and OMT are monetary policy instruments. Voluntarily writing down claims on these bonds would constitute forbidden monetary financing (Article 123 EU Treaty, Article 21 ECB statute), a fact highlighted repeatedly by members of the ECB.[14]

[11] According to ESM chief, Klaus Regling, this is however, legally binding as any "repeal or amendment of their earlier statement would therefore also require a decision by the Heads of State or Government. In several Member States it would require support by the national parliament." (Transcript of a conference call from August 09th,2012, via the EFSF webpage. Later, this statement was also published in the official EFSF FAQ).

[12] On July 21st, 2011, the heads of state for the first time extended the maximum maturity for Greece, Ireland and Portugal from 7.5 years to a minimum of 15 years and up to 30 years with a grace period of 10 years. The maximum EFSF maturity for Spain has been increased 15 year in July 2012, with an average maturity of 12.5 year. All these maturities are substantially longer than typical senior IMF-loans. Furthermore, in December 2012, the Eurogroup decided to reduce the interest rate of the Greek Loan Facility and the EFSF loans, at the same time deferring interest payments on the later by 10 years.

[13] Generally, government bonds come with a pari-passu clause. In the context of sovereign lending it is, however, unclear what pari-passu really means (See Weidemaier et al. (2013)).

[14] For example Bundesbank president Weidmann stated in an interview published on the Bundesbank webpage: „Auf jeden Fall gilt: Die Notenbanken dürfen Griechenland die Schulden nicht erlassen, das wäre ein direkter Transfer und käme damit einer verbotenen monetären Staatsfinanzierung gleich." (10.11.2012). Also, ECB board member Jörg Asmussen: "The ECB would not be able to take part in any such restructuring because this would constitute state financing, which is forbidden" (Die Welt, 25.09.2012)

Target2 balances

Also Target2-balances are de jure not senior, although they constitute multilateral claims of an institution – the Eurosystem of Central Banks – that is widely accepted as a preferred creditor, and that has already enforced its senior status in the case of the Greek private sector involvement 2012.

In principle, the entire lending operations of national central banks (NCBs) – which are part of the Eurosystem - could be seen as senior to private markets. In practice, however, it is unclear whether NCB's can enforce this position with respect to their own banks and – indirectly – governments. The Target2-balance, however, measures only the share of NCBs credit that is used for international transactions. Thus it turns a domestic credit of an NCB given to a private bank into a multilateral liability of the country (as owner of the NCB) with respect to the Eurosystem (see Garber (1999)). If these loans are not repaid, or at least serviced, the remaining Eurosystem countries will realize losses.[15]

Sinn and Wollmershäuser (2012) and Whelan (2013), despite other differences, also both state that Target2-balances are best characterized as "loans" with respect to the Eurosystem. Even in the case of an exit from the euro, Whelan (2013) argues that Target2-liabilities (and interest rates) are likely to continue to be serviced, in order to maintain access to the international payments system. Whelan also points out that Target2-balances are de jure not collateralized. However, as the survey results show, there are nevertheless expectations in the market, that the Target2-claims will have senior status in case of default.

De facto seniority – a survey among experts

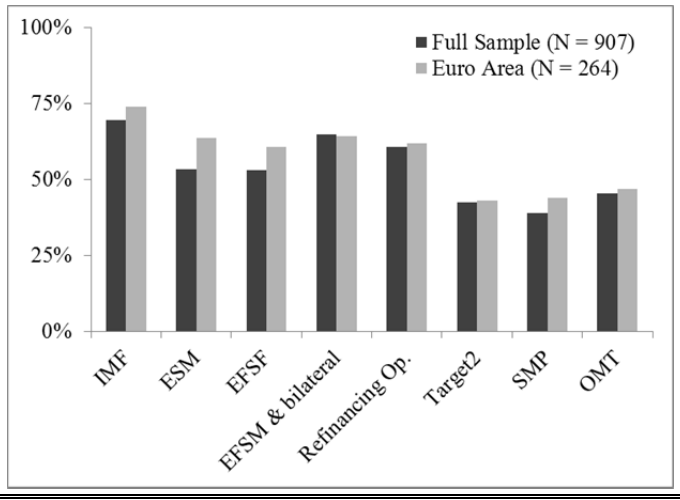
Whether this ambiguity in legal contracts, as well as the public debate on the seniority question has actually had an impact on market expectations can be evaluated when looking at survey data. In the *World Economic Survey*, of April 2013, the ifo Institute has asked experts worldwide about their expectations regarding the seniority status of different components of the rescue umbrella. The experts were asked to answer the following question, with either *Yes* or *No*:

> *"In a case of default (or debt restructuring) of a member country of the European monetary union, do you expect the following public creditors to get preferred treatment (i.e. have senior status), compared to private sector creditors?"*[16]

[15] An additional argument is that government bonds are often used as collateral in refinancing operations. This strengthens the case that large Target2-liabilities can drive up interest rates. Note however that this is not the case in all countries (See also Drechsler et al. (2013) on the composition of collateral in the Eurosystem). In Italy the share of government bonds is on average about 50%. At the margin, however, the share is likely to be higher as government securities make up 88% of all freely available assets of Italy's banking system (See Banca D'Italia's Financial Stability Report, April 2012). On the other hand, sovereign debt is not the main source of collateral in Ireland. Irish banks used substantially haircut "own" bonds, backed by real estate. Also they used NAMA-bonds, which are not sovereign debt, but are viewed as carrying a government guarantee.

[16] The exact wording can be found in Appendix A1. The ifo Institute's WES survey is conducted on a quarterly basis since 1981 and includes a wide range of more than 1000 experts who are very well informed about the economic development in their countries. All respondents work in leading positions or are conducting economic research within their institution. About 65% of the panelists work for international corporations, 10% work each in economic research institutes and chambers of commerce, 5% in consulates and embassies and the last 5% in multilateral organizations (such as OECD and IMF), foundations, media or small scale enterprises.

Figure 1: Market expectations on de facto senior status



Notes: Figure shows the percentage of respondents expecting the respective component of rescue packages to be senior to private market participants. Data source: World Economic Survey, April 2013, ifo Institute.

Overall, expectations regarding the seniority of multilateral loans can be said to be very high: 88% of the respondents see at least one component of the rescue umbrella as senior to private creditors. There are, however, some differences in the details. As illustrated in Figure 1, 70% of respondents see the IMF as a preferred creditor. This is the highest share among all components of the rescue package. 65% of the respondents expect that bilateral loans (as part of the EFSM agreement), will have a preferred creditor status. Expectations regarding the EFSF and the ESM are substantially lower, scoring only 53% each. It is interesting that the latter, despite their differences in "de Jure" seniority, are judged almost identically by survey participants.

Part of the WES-question also covered the ECB and the national central banks of the Eurosystem. Overall, the expectation about seniority was somewhat lower in this case. The highest expectations were expressed with respect to the refinancing credit of the national central banks, which are partly collateralized with the government debt of their respective countries. 61% of respondents expect that the central banks will be able to enforce their status as a senior lender in case of insolvency. The share is somewhat smaller in case of Target2-claims, which are not explicitly collateralized. Here, 42% of the respondents expect that the claims will have a preferred creditor status.

As far as bond purchases by th e ECB are concerned, 39% of the respondents state that the bonds purchased in the SMP program will have preferred creditor status, while 45% expect such a status for the new OMT program. This comparison again reflects the discrepancy between *de jure* and *de facto* seniority.

Differences also exist between the regions covered in the WES survey. Among the participants from euro area countries considered on their own, 91% of all respondents see at least one component of the rescue package as senior. The largest difference among the subcomponents exists regarding the seniority of the ESM, where 65% (rather than 53%) of respondents see a preferred creditor status.

Rating Agencies

The rating agencies reacted quite sensitively to the ups and downs in the debate on creditor seniority of rescue funds. In several cases, the downgrading of individual countries was explicitly motivated by the concerns about subordination of private markets. In the context of our subsequent empirical analysis, this is an important aspect, as it shows in a non-technical way that a causal impact that runs from the seniority status to the level of interest rate spreads is plausible.

Prior to the crisis, there have been occasional statements that S&P would generally take multilateral lenders as preferred creditors with a triple-A rating (see statements from 1998, 2005, 2011). [17] In January 2011, S&P for the first time publicly linked the European public rescue funds to future borrowing costs of the countries in crisis. In the S&P economic outlook, it argued that "Unlike the current vehicle, the new vehicle will be senior to commercial debt, in other words, to bond debt […] the ranking of this official European lending vehicle is a change in the rules of the game and that's having an impact on government's refinancing costs."[18] About one month later, the Financial Times referred to the case of Portugal when it said: "S&P warned it would downgrade Portugal's sovereign debt rating by one or two notches if European leaders decided later this month to require borrowers from the European Stability Mechanism – due to replace the EFSF in 2013 – to restructure their government bonds and make the ESM a preferred creditor."[19] Again, only three weeks later, S&P actually did downgrade Greece and Portugal for exactly this reason, arguing that "[Subordination by ESM is] detrimental to commercial creditors", on the 29th of March 2011. A full list of rating decisions by the two biggest rating agencies that were explicitly motivated by the seniority issue are given in Box 2, below.

In later statements, the ESM was also clearly seen as a senior lender by the rating agencies. S&P for instance, in January 2012, expressed the expectation that "the ESM, [is] a privileged creditor that is expected to be senior to bondholders in any future restructuring".[20]

The rating agencies also reacted to the ECB's decision to not participate in haircuts during the Greek debt-restructuring in early 2012. Moody's for instance argued as follows: "The agreement and a bond swap that took place over the previous weekend confirm the European Central Bank's (ECB) and national central banks' (NCBs) status as 'senior creditors'. […] the subordination of private sector creditors may make it more difficult to re-access the markets once their existing support programmes run out in 2013. This is a credit negative factor that we have already reflected in recent sovereign rating actions, including those announced on 13 February"[21].

The list of rating decisions based on creditor seniority considerations, reported in Box 2, illustrates the awareness of markets and the careful monitoring of the decision making process that took place in this regard in Frankfurt and Brussels.

[17] Standard & Poor's, 18.09.1998: "Multilateral lenders, such as the triple-'A'-rated World Bank, enjoy preferred creditor status that, while fundamentally a political expression, reflects the incentives of a borrowing/guaranteeing government to place priority on loan repayment to the multilateral lending institutions." Standard & Poor's, 2005: "Buttressed by the long record of favorable treatment of loans from multilateral institutions by sovereigns under severe financial distress, these incentives have led Standard & Poor's to expect that in most cases obligations to these institutions will receive similarly preferential treatment in the future." Standard & Poor's, 26.11.2011: "Preferred creditor treatment on the exposures to sovereigns is a cornerstone of the Multilateral lending institution sector that historically has enabled it to operate with low losses."
[18] Standard & Poor's, John Chamber, 03.01.2011
[19] Financial Times, 02.03.2011.
[20] Standard & Poor's, 13.01.2012.
[21] Moody's, 27.02.2012.

Box 2: Rating decisions by Standard & Poor's and Moody's influenced by problems of creditor seniority

S&P	Downgrade of Greece to BB-and Portugal to BBB-	29.03.2011	"[Subordination by ESM is] detrimental to commercial creditors" and "Nevertheless, any ESM borrowings would be senior to Portugal's government bonds. The seniority of ESM borrowings (and the consequent subordination of government bonds) in our view reduces the prospect of timely repayment to government bondholders, and likely also results in lower recovery values."
S&P	Lowered sovereign credit ratings on the Republic of Ireland to 'BBB+/A-2'.	01.04.2011	"The downgrade reflects our view of the concluding statement of the European Council (EC) meeting of March 24-25, 2011, that confirms our previously published expectations that (i) sovereign debt restructuring is a possible pre-condition to borrowing from the European Stability Mechanism (ESM), and (ii) senior unsecured government debt will be subordinated to ESM loans. Both features are, in our view, detrimental to the commercial creditors of EU sovereign ESM borrowers."
S&P	Downgrades for nine eurozone sovereigns and affirmations of the ratings on seven others.	13.01.2012	"Decision based results of on EU summit Dec. 9, 2011" "As we noted previously, we expect eurozone policymakers will accord ESM de-facto preferred creditor status in the event of a eurozone sovereign default. We believe that the prospect of subordination to a large creditor, which would have a key role in any future debt rescheduling, would make a lasting contribution to the rise in long-term government bond yields of lower-rated eurozone sovereigns and may reduce their future market access"
Moody's	Key Drivers of Decision to Downgrade Spain's Rating to Baa3 and Review for Further Possible Downgrade	26.06.2012	"[…] there are several factors that differentiate Spain's anticipated programme from the support packages extended to Ireland, Portugal and Greece. In addition to being sector specific, its size is significantly smaller than it is in those cases. We therefore consider the issue of subordination of bondholders to the senior creditor EFSF/ESM to be less of a negative factor."
S&P	Long-Term Rating of Cyprus Lowered To 'BB'; Placed On Watch Negative As Bailout Talks Continue"	01.08.2012	"The CreditWatch placement reflects our view of the increasing short-term financing pressures on the Cypriot government. We see at least a one-in-two chance that we could lower the rating in the third quarter of 2012 if official assistance is not forthcoming and/or it carries an explicit preferred creditor status."
S&P	Ireland Ratings Affirmed At 'BBB+/A-2'; Outlook Remains Negative	02.08.2012	"Regarding the status of a possible ESM loan to Ireland and its impact on commercial creditors, we note that the ESM has indicated that they would not seek preferred creditor status should the prospective European Financial Stability Facility loan to recapitalize Spanish banks be transferred to the ESM at a later date. Preferred creditor treatment may therefore only be applied on a case-by-case basis. We will assess the implications of ESM financial assistance for Ireland in the event that it is required"
Moody's	Assigns Aaa/Prime-1 rating to European Stability Mechanism (ESM); negative outlook"	08.10.2012	"The fourth key rating factor is the ESM's preferred creditor status that is junior only to that of the IMF. This status differentiates the ESM from its predecessor entity, the EFSF, which ranks pari-passu with senior unsecured bondholders."
S&P	Cuts long-term rating for Cyprus to 'B'	17.10.2012	"Cyprus' commercial banks – or the government itself – could be forced to reschedule their debt in order to meet the terms of an official lending program. Potential loans from the ESM could be senior to holders of Cypriot debt, and we understand it is somewhat uncertain whether this could trigger the acceleration of debt repayment issued under the government's medium term notes (EMTN) program according to the provisions of the EMTN transaction documents. This could significantly weaken confidence in Cyprus' financial system"
Moody's	Downgrades ESM to Aa1 from Aaa and EFSF to (P) Aa1 from (P) Aaa, maintains negative outlook on ratings	30.11.2012	"[…] the ESM benefits from credit features that differentiate it from the EFSF, including the preferred creditor status and the paid-in capital of EUR80 billion. However, […] these credit features do not enhance the ESM's credit profile to the extent that it would warrant a rating differentiation between the two entities.
S&P	Ratings On European Investment Bank Affirmed At 'AAA/A-1+' Following Criteria Revision: Outlook Negative	05.12.2012	"The EIB benefited from preferred creditor treatment (PCT) during the Greek debt private-sector involvement earlier in 2012: it did not incur any losses. While there is no guarantee that PCT will always apply to the EIB, we believe that the bank's past experience is relevant for future debt restructurings if and when they occur."
Moody's	Assigns (P)Aa1/(P)P-1 ratings to ESM debt issuance programme, negative outlook	06.12.2012	"The fourth key rating factor is the ESM's preferred creditor status that is junior only to that of the IMF. This status differentiates the ESM from its predecessor entity, the EFSF, which ranks pari-passu with senior unsecured bondholders."

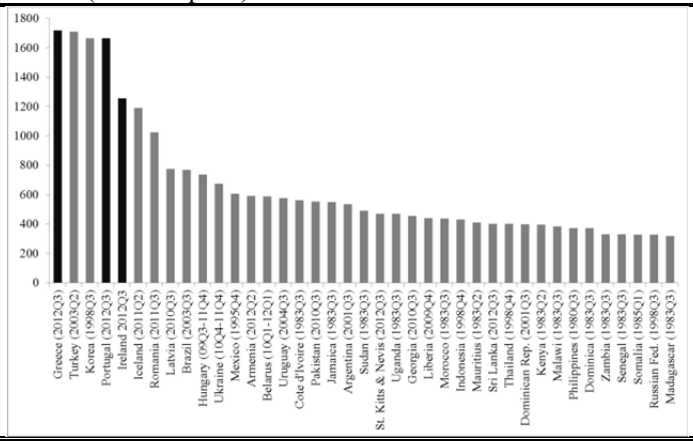
3 Co-movement with interest rate spreads

In this section we start our empirical analysis by illustrating that the senior tranche relative to total public debt is large in magnitude and also large by historical standards. Furthermore, there is a striking correlation between the share of senior tranche debt and the interest rate spread in the countries currently experiencing a financial crisis.

The magnitude of the senior tranche

Rescue operations since the beginning of the financial crisis have been large in comparison to other countries. Even when focusing on the IMF alone, the most clearly senior lender, the European countries are among the largest recipients of IMF emergency lending. Figure 3 shows that Greece, Portugal and Ireland, are among the top-five largest IMF programs, when compared to its quota share in the IMF. The first 400% of the quota are available to participating countries without a special decision on emergency assistance. Greece, Portugal and Ireland have exceeded this quota by a factor of four, and three, respectively. Figure 4 further shows that the average size of IMF programs has substantially increased during the European sovereign debt crisis. It is clearly larger in magnitude than the Latin-American debt crises in the 1980ies and mid-1990ies or the Asian financial crisis in 1997/98. [22]

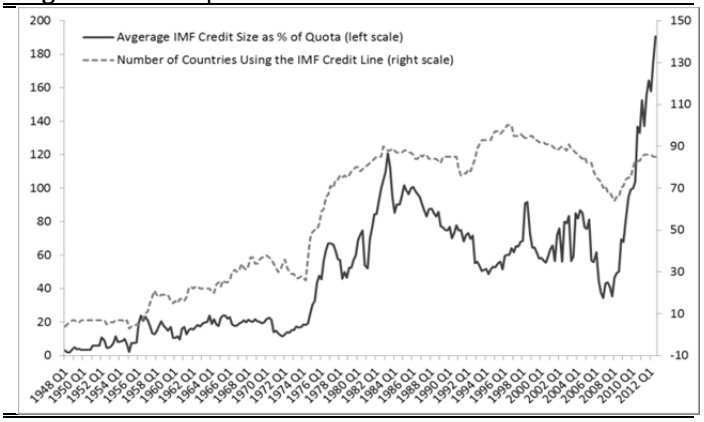
Figure 2: Countries' Maximum Use of IMF Credit between 1948 and 2012 (as % of quota)



Notes: Figure shows the biggest IMF credits (as % of quota) in the respective country's history. Data source: International Financial Statistics (IMF).

[22] See also Barkbu et al. (2012) for an analysis of the size of multilateral responses to different episodes of financial crisis.

Figure 3: Development of Size and Number of IMF Credits



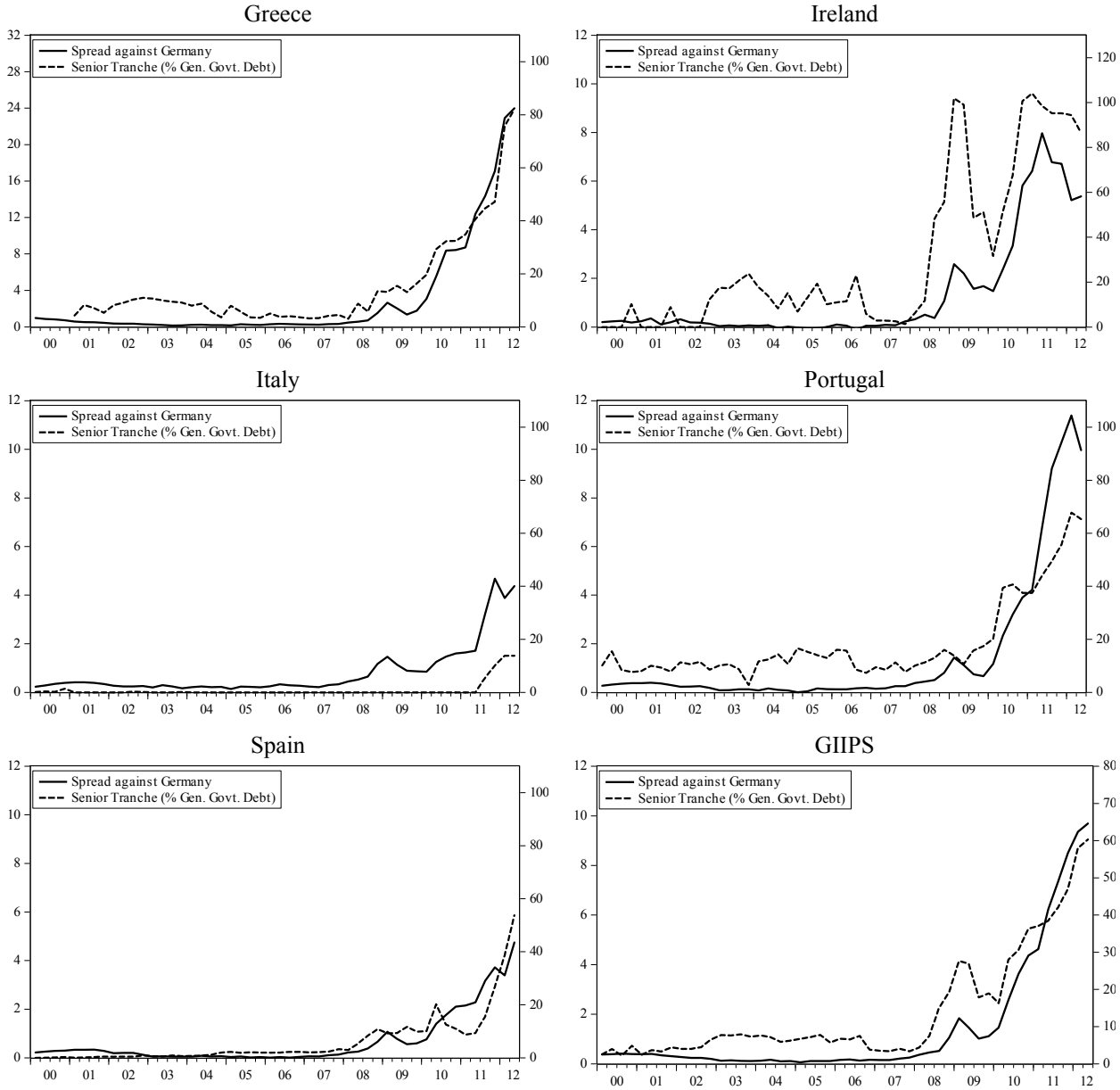
Notes: Figure shows the development of the average size of IMF credits (dark line) and the number of IMF members being a net creditor to the IMF (light-grey line). Data source: International Financial Statistics (IMF).

Despite this quite large IMF involvement, the contribution of the IMF to the total rescue packages in the euro area has been relatively small. Bilateral loans of the EU member countries as well as the multilateral agreements within Europe, as discussed above, constitute a much larger share of total rescue-efforts. Furthermore, either type of institution is relatively small, when considering the Eurosystem of central banks as senior lender, as for instance the rating agencies did, as shown in the previous section.

Our benchmark-proxy for senior tranche lending in the subsequent empirical analysis consists of all multilateral claims. There are two different parts: The first component, official loans, comprise all loans provided by the IMF, the EU and euro area (through ESM, EFSF and EFSM) and individual countries. The second component includes all government bonds purchased under the SMP and Target2-liabilities of national central banks (NCB's). In sum, the total senior tranche lending in the end of our sample period ranges in between 13.8% (Italy) and more than 86.5% (Ireland) of total public debt. The average senior tranche share of the five countries in crisis is 60.3%.

Figure 4 provides an initial visual impression of the data and displays the dynamics over time. It compares the senior tranche share with spreads on the sovereign bonds of the crisis countries. One can clearly see a high contemporaneous correlation for the individual countries as well as in their aggregate. This impression is confirmed in a first correlation analysis in Table A2 of the appendix. The correlation between senior tranche lending and government bond spreads is 0.80.

Figure 4: Development of the Senior Tranche and the Crisis Countries Government Bond Spreads



Notes: Figure shows the spread between the interest rate of countries' government bonds and the German Bund, both with a maturity of 10 years (left scale). The senior tranche proxy is calculated as described in in this Section (right scale). The last graph in the figure compares GIIPS countries' means of both variables since the year 2000. Data source: See data appendix A5.

Preliminary analysis and benchmark regression

In this section, we establish our first empirical finding: a robust partial correlation of the senior tranche share in total public debt and the interest rate spreads of 10-year government bonds. We start our analysis by providing an overview of the descriptive statistics and the stationarity and cointegration properties of the variables that enter the regression analysis, reported in Appendices A3 and A4. In the subsequent regression analysis, we analyze whether the bivariate correlation, visible in the graphs of the previous section, is statistically significant and robust in a multivariate framework.

Table 1 contains a first set of results that we use as our benchmark regression for the latter analysis and robustness tests. In this benchmark regression, we use standard sets of control variables that were also chosen in other articles (see for instance De Grauwe & Ji (2013) and Beirne & Fratzscher (2013)). These include the debt to GDP ratio, the current account, the real effective exchange rate and the real GDP growth rates.

Our analysis focuses on the member countries of the euro area which joined the common currency before the onset of the global financial crisis. The panel dataset consists of quarterly observations from the beginning of 2000 until mid-2012, when the ECB announced its OMT program. The main data sources are Eurostat of the European Commission, International Financial Statistics of the IMF, Thomson Reuters' Datastream and the Target2-database "Euro Crisis Monitor", collected at the Institute of Empirical Economic Research at Osnabrück University. The sources and construction of the variables are described in the Appendix A4 and A5.

Table 1: Benchmark Regression

Dependent Variable: 10y Government Bond Spread Against Germany						
Variables	(1)	(2)	(3)	(4)	(5)	(6)
Senior Tranche			0.115**	0.102**	0.047**	0.043**
			(3.10)	(2.58)	(2.31)	(2.57)
Debt/GDP	0.085***	0.077***			0.052***	0.042***
	(6.66)	(6.40)			(7.43)	(6.81)
Current Account/GDP	0.011	0.034			-0.011	0.013
	(0.36)	(0.97)			(0.51)	(0.51)
REER	0.017	0.116*			0.012	0.107**
	(1.16)	(2.11)			(1.06)	(2.80)
Real GDP Growth	-0.149**	-0.074			-0.085*	-0.055
	(2.22)	(1.34)			(2.09)	(1.63)
Country Fixed Effects	yes	yes	yes	yes	yes	yes
Time Fixed Effects	no	yes	no	yes	no	yes
R^2 (within)	0.64	0.71	0.72	0.76	0.73	0.78
Obs.	574	574	563	563	542	542

*Notes: Robust t-statistics in parentheses; *, **, *** indicate variables significant at 10%, 5%, and 1% level respectively. Results are from a panel fixed effects model estimated using OLS. Reported R^2 is calculated "within", i.e. from the mean-deviated regression. Data source: See data appendix A5.*

All regressions in Table 1 are estimated using Ordinary Least Squares with robust standard errors.[23] Columns (1) and (2) replicate earlier specifications in the literature. In these regressions, we explain the interest rate spread by fundamentals.[24] Following De Grauwe and Ji (2013), we also add country fixed effects (Column 1) and time fixed effects (Column 2). The first is included to control for unobserved time-invariant heterogeneity between countries.[25] The later is included to control for unobserved default risk that is not explicitly captured by our

[23] The higher standard deviations in the post-crisis sample reported in the descriptive statistics in Appendix A3 raised the issue of heteroscedasticity in our data set. A modified Wald-test rejected the null hypothesis of homoscedasticity at the 1% level. We therefore report robust standard errors in all regressions.

[24] In Table A7a of the appendix we also analyze other dependent variables, such as sovereign bond prices, or real versus nominal government bond yields as a robustness test.

[25] Alternatively, we could have chosen a random effects model. A Hausman-test, however, rejected the appropriateness of this approach at the 1% level in favor of fixed effects, with a $\chi^2(5) = 52.2$.

fundamental variables.[26] Columns (3) and (4) show that the bivariate correlation between senior tranche and interest rate spreads is indeed statistically significant and columns (5) and (6) document that it remains significant in a multiple regression setup that includes the standard explanatory variables. A one percentage point increase in the senior tranche share is associated with a higher interest rate spread of about 0.04 percentage points.

Applying this coefficient to the data – over the full sample period – , would imply that a country with a senior tranche share of 60%, as the average senior tranche share of the crisis countries is in the end the sample period, would ceteris paribus be charged an additional interest rate of about 2.58% above the German interest rate.[27]

Interaction with the level of public debt

The magnitude of this coefficient, however, might vary, depending on the current level of public debt. Suppose a country did not have any public debt to start with, than it would not matter whether the bonds are sold to junior or senior lenders – in any case, both could be expected to be repaid. On the other hand, when countries have exceeded a certain threshold, say the critical 90% value of Rogoff & Reinhart (2010), the seniority status of public debt clearly begins to matter. In Table 2, we address this issue, by adding various interaction terms to our benchmark regression.

In the first two columns, we interact the senior tranche variable with the level of public debt. The dummy variable takes a value of one, if the general government debt of the country has passed the 80%, 100% and 120% debt-to-GDP threshold, respectively, and is equal to zero otherwise. In this table, the interpretation of the senior tranche variable becomes that of senior lending in "good-times", when the level of public debt is below the thresholds defined above.

The effect of the senior tranche share in times with high debt levels can be seen in the second row of Table 2, labeled "Senior Tranche X Dummy". This variable is our senior tranche variable interacted with the dummy variable defined above. In all cases, the high-debt coefficient is larger and statistically significant at the 1% level. Also, the larger the public debt, the larger is the magnitude of this coefficient. Similar results can also be shown, when constructing a zero-one dummy variable for different Debt-to-GDP one year forecasts of the European Commission or for different periods of crisis. Furthermore, there is a larger coefficient in the post-2007 period, when debt levels increased substantially, as well as after the Deauville meeting in autumn 2010, when private sector involvement (PSI) became more likely.

[26] Furthermore, as discussed in Section 4, it helps capture influences of herding behavior/unobserved contagion (see also De Grauwe & Ji (2013) who follow the same approach).
[27] The magnitude of the senior tranche varies considerably across countries. In Table A7b of the appendix, we eliminate each country from the benchmark regression to show that the results do not depend on any individual country, or are driven by outliers.

Table 2: Interaction Effect

Dependent Variable: Government Bond (10y) Secondary Market Spreads

	ACTUAL DEBT TO GDP			DEBT TO GDP FORECAST			TIME	
Variables	>80%	>100%	>120%	EC >80	EC >100	EC >120	2007 or later	After Deauville Meeting
Senior Tranche	0.019**	0.028***	0.041**	0.018***	0.027***	0.043**	0.036**	0.021*
	(2.72)	(4.09)	(2.79)	(3.81)	(3.74)	(2.62)	(2.45)	(2.18)
Senior Tranche X Dummy	0.059***	0.070**	0.103***	0.065***	0.073***	0.106***	0.043**	0.061***
	(3.50)	(3.06)	(10.85)	(4.34)	(3.41)	(15.14)	(2.44)	(3.47)
Debt/GDP (Forecast)	0.023**	0.018***	0.037***	0.006	0.004	0.026***	0.040***	0.027***
	(2.85)	(3.46)	(4.29)	(0.42)	(0.56)	(4.48)	(6.04)	(3.69)
Current Account/GDP	0.020	0.012	0.014	0.032	0.023	0.023	0.014	0.011
	(0.85)	(0.68)	(0.57)	(1.00)	(0.91)	(0.71)	(0.52)	(0.58)
REER	0.125***	0.105***	0.068*	0.134**	0.121***	0.087**	0.104**	0.114***
	(3.38)	(3.88)	(1.83)	(3.05)	(3.81)	(2.31)	(2.87)	(3.18)
Real GDP Growth	-0.052*	-0.066***	-0.013	-0.050	-0.054**	-0.011	-0.056	-0.060
	(1.90)	(3.45)	(0.50)	(1.25)	(2.72)	(0.38)	(1.58)	(1.64)
Country Fixed Effects	yes	yes	yes	yes	yes	yes	yes	yes
Time Fixed Effects	yes	yes	yes	yes	yes	yes	yes	yes
R^2 (within)	0.82	0.83	0.81	0.82	0.83	0.81	0.82	0.82
Obs.	542	542	542	500	500	500	542	542

*Notes: Robust t-statistics in parentheses; *, **, *** indicate variables significant at 10%, 5%, and 1% level respectively. Reported R^2 is calculated "within", i.e. from the mean-deviated regression. The coefficient of the interaction term "Senior Tranche X Dummy" is the sum of the senior tranche coefficient plus the additional senior tranche effect, when the dummy variable is equal to one. In the first six columns the dummy variable is one if the country exceeds certain debt-to-gdp ratios, or the respective European Commission forecasts. In the last two columns the dummy is coded 1 after the onset of the financial crisis (2007Q1) or after the Deauville Meeting (2010Q4). Data source: See data appendix A5.*

In Table 3, we use these coefficients of the total effect, conditional on the current debt level, to evaluate the quantitative effect of senior lending on interest rate spreads, at the time when each country received its first official rescue package. In Greece, it explains the largest share, with a value of 40.20% of the actual increase in interest rate spreads. In Ireland it explains 37.33% and in Portugal 17.64%.

Table 3: Predicted Senior Tranche Effect at the Time of First Official Rescue Payments

Country	Time	ΔSenior Tranche	Debt to GDP [%]	Predicted Effect on Spreads			Actual ΔSpread	Explained [%]
				95% Confidence Interval		Point Estimate		
Greece	2010/Q2	+9.6	>120%	+0.79	+1.19	+0.99	+2.46	40.20%
Ireland	2011/Q1	+3.2	>100%	+0.06	+0.38	+0.22	+0.60	37.33%
Portugal	2011/Q2	+6.5	>100%	+0.13	+0.78	+0.46	+2.58	17.64%

Notes: Table 3 compares the predicted effect of changes in senior tranche lending on government bond spreads, for a given level of public debt, with the actual change. All changes in percentage points.

4 Identification and the direction of causality

The analysis above raises the question whether we are picking up a causal impact of the senior tranche on interest rates. The decisions of rating agencies, reported in Box 2 of Section 2, suggest in a non-econometrically way that a causal channel exists that runs from the senior tranche to the interest rate spread. Rating agencies have repeatedly pointed to the senior tranche when downgrading countries in crisis.[28] The ordering of creditor claims and the expected recovery values are a recurring theme in their rating actions.

From a political economy perspective, however, one could argue the other way around. Public rescue efforts have been motivated by increases in the spread and the partial correlation above may be capturing the response of the rescue packages to the crisis, rather than the response of interested rates to the senior tranche. In this section we further explore this hypothesis in our panel regressions.

Components of the senior tranche and survey data

As a first step to address the identification question, we take advantage of the ifo survey data set discussed above, which showed that not all components of the rescue packages are viewed as equally senior by the markets. While nearly 70% of the respondents view the IMF to be senior in case of default, only 42% share this expectation in the case of Target2-claims in the Eurosystem.

In Table 4, we decompose the senior tranche into its subcomponents, and add them one by one in a nested regression setup. Column (1) of Table 4 reports the impact of IMF lending only. The coefficient is statistically significant at the 5% level, but substantially larger in magnitude that the senior tranche definition in our benchmark regression. This result confirms previous findings of Dooley and Stone (1993), who report related evidence on the IMF's role in the Latin American sovereign debt crisis in the 1980ies. As shown in Figure 2 and 3, the IMF's involvement in Europe is even larger than in previous crisis.

[28] Empirically ratings are also found to be significantly related to CDS spreads (see Aizenman et al. (2013b)). Our identifying restrictions show, however, that there is no remaining explanatory power for sovereign bond spreads, after fitting a regression that includes the senior tranche.

When adding the second most senior item, the bilateral loans and loans under the EFSM agreements (Column 2), the magnitude of the coefficient declines, but is still considerably larger than in our benchmark. Adding one by one the different elements of the senior tranche, the coefficient continues to decline, but remains statistically significant in all cases.

The lowest coefficient is found when using the complete senior tranche as in our benchmark. This seems plausible, as the Target2-balances are the least clearly senior component of the rescue package, but also constitute the largest share in the total senior tranche in most countries.[29]

Table 4: Nested Senior Tranche Definitions

Dependent Variable: Government Bond (10y) secondary market spreads					
Variables	(1)	(2)	(3)	(4)	(5)
Debt Ratio	0.037***	0.037***	0.035***	0.042***	0.042***
	(4.86)	(7.33)	(6.20)	(7.82)	(6.81)
Current Account/GDP	0.013	0.015	0.011	0.013	0.013
	(0.90)	(0.91)	(0.76)	(0.54)	(0.51)
REER	0.101**	0.079**	0.080**	0.107**	0.107**
	(2.59)	(2.92)	(2.92)	(2.79)	(2.80)
Real GDP Growth	-0.078*	-0.047***	-0.048**	-0.055	-0.055
	(2.02)	(3.32)	(2.99)	(1.62)	(1.63)
NESTED DEFINITIONS					
IMF	0.338**				
	(2.36)				
+ EFSM / Bilateral		0.189***			
		(3.86)			
+ EFSF / ESM			0.175***		
			(3.92)		
+ TARGET2				0.044**	
				(2.46)	
+ SMP					0.043**
					(2.57)
Country Fixed Effects	yes	yes	yes	yes	yes
Time Fixed Effects	yes	yes	yes	yes	yes
R^2 (within)	0.80	0.83	0.84	0.78	0.78
Obs.	574	574	574	542	542

*Notes: Robust t-statistics in parentheses; *, **, *** indicate variables significant at 10%, 5%, and 1% level respectively. Results are from a panel fixed effects model estimated using OLS. Reported R^2 is calculated "within", i.e. from the mean-deviated regression. In this table we start with a narrow definition of the senior tranche and, step-by-step, add several additional components to our proxy. Data source: See data appendix A5.*

As all components of the rescue packages share the same goal of preventing a deeper financial crisis, it is remarkable that they have different strength of impact on the interest rate spread variable that is in line with the seniority expectations of market participants. We take this as a first indicator that the direction of causality may be at least two-sided, i.e. going in both directions. In the following section, we address the issue of endogeneity more formally in a two-stage regression setup with instrumental variables.

[29] In Table 8 – which addresses the issue of fragmentation, we show that Target2-liabilities are also significant when being included separately in the same regression with the remaining senior tranche (excluding Target2-liabilities). Interestingly, it is only significant when looking at Target2-*liabilites* as a percentage of the *total public debt*, not the Target2-*balance* as a percentage of *GDP*. The later variable could be taken as a proxy for fragmentation, rather than for creditor seniority.

Instrumental Variable Regressions

In Table 5 we report the results of several two-step Instrumental Variable (IV) regressions to account for possible endogeneity of our senior tranche variable. We use three different sources of instrumental variables: Based on (i) an external instrument, (ii) lagged values and (iii) generated instruments justified by the specific properties of our variables. In all cases, the senior tranche variable remains statistically significant and is of roughly equal size, compared to our benchmark regression.

In the first two columns, we choose S&P sovereigns credit rating and its lagged changes (Set A and Set B) as external instruments. While the rescue packages might increase as a political reaction to the increase in the interest rate spread, the rating agencies have no such political motivation to stabilize interest rates in the respective countries. There is, however (as Box 2 of the paper shows), a clear influence of the senior tranche share on the decisions of rating agencies. It thus fulfills the two criteria for a good instruments of being correlated with the independent variable, but under null not being impacted by the dependent variable. Columns (1) and (2) show that the senior tranche proxy stays significant, and that the instrument passes standard tests regarding the validity of the instrument (reported in the lower part of Table 5). The Hansen-J statistic indicates that for Column (1) the null hypothesis of no overidentification has not to be rejected at a reasonable level of significance.[30] Furthermore, the null that the equation is underidentified can be rejected at the 1% level for both IV regressions. Thus, our instruments seem to be valid, i.e. uncorrelated with the error term and correlated with the (potentially) endogenous regressor. The common rule-of-thumb of an F-Statistic > 10 also holds in both cases. Thus, weak identification does not seem to be a problem either.

In columns (3) - (5), we proceed by following the common IV approach of using lagged values as instruments. The instruments are chosen from the lagged values of our senior tranche variable (Set C), the benchmark control variables (Set D), or both (Set E). Again, standard tests generally confirm the validity of these instruments.[31] The coefficient of our senior tranche variable remains of roughly the same size and is still significant at the 1% level in Columns (3) and (5), but only at the 10% level in Column (4).

In the final two regressions, we use the identification approach suggested by Lewbel (2012) that exploits the heteroscedasticity in the first stage of the regression. This IV technique yields consistent estimates by imposing higher moment restrictions even when valid external instruments are unavailable or weak – as in Set D. As identifying instrument $(Z - \bar{Z})\hat{\varepsilon}_1$ is used, where Z is the vector of our exogenous variables excluding the senior tranche, $\bar{Z}$ the vector of means of the Z variables, and $\hat{\varepsilon}_1$ the residual of the first stage regression explaining the senior tranche variable with the Z variables. A Breusch-Pagan test rejects homoscedasticity of the first stage regression at the 1% level, indicating that this approach is indeed valid for our data set. In Column (6) we solely use the Lewbel instruments, whereas in column (7) we complement our lagged value IV regressions with the Lewbel instruments to increase estimation efficiency. As above, size and statistically significance of the senior tranche coefficient does not change considerably in these regressions, and our instruments pass all tests of weak-, under-, and overidentification.

[30] In Column (2) it is not possible to test for overidentification. The number of instruments equals the number of (potentially) endogenous explanatory variables, so there are no overidentifying restrictions to test.
[31] With one exception for Set D, where the first stage F-Statistic is lower than 10. The results of this regression should be interpreted with caution as we cannot rule out the problem of weak identification.

The partial correlation of the senior tranche share and the government bond spreads remains remarkably robust in all of our IV regressions. The coefficient is statistically significant at the 1% level in all IV regressions except for column (4), where the instruments seem to be rather weak. The effect size does not change considerably, too. Only when using the external instrument, our coefficient increases.

Based on the difference of two Sargan-Hansen statistics, we formally test whether the senior tranche can actually be treated as exogenous. The test provides mixed evidence on this question. The majority of the tests suggest that this is the case, but in three out of seven regressions we reject the null of the senior tranche being exogenous.

Table 5: Instrumental Variable Regressions
Dependent Variable: Government Bond (10y) secondary market spreads

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
	External Instrument		Lagged Values			Lewbel Approach	Combined
Variables	Set A	Set B	Set C	Set D	Set E (C+D)	Set F	Set G (F+E)
Senior Tranche	0.092***	0.146***	0.047***	0.036*	0.045***	0.033***	0.042***
	(5.45)	(6.91)	(7.12)	(1.92)	(7.08)	(5.20)	(7.39)
Debt/GDP	-0.007	-0.045***	0.042***	0.049***	0.044***	0.047***	0.044***
	(0.51)	(2.73)	(7.19)	(2.90)	(7.98)	(6.25)	(8.41)
Current Account/GDP	-0.016	-0.037*	0.012	0.019	0.011	0.012	0.006
	(1.11)	(1.90)	(0.87)	(1.23)	(0.87)	(1.19)	(0.62)
REER	0.072***	0.024	0.139***	0.124***	0.140***	0.124***	0.146***
	(2.79)	(0.56)	(5.74)	(4.90)	(6.04)	(6.42)	(6.80)
Real GDP Growth	0.004	-0.031	-0.049	-0.065	-0.045	-0.082**	-0.053
	(0.07)	(0.27)	(1.15)	(1.55)	(1.10)	(2.46)	(1.51)
Country Fixed Effects	yes	yes	yes	yes	yes	yes	yes
Time Fixed Effects	yes	yes	yes	yes	yes	yes	yes
R^2	0.67	0.34	0.79	0.78	0.79	0.77	0.79
Obs.	455	480	492	513	491	542	491
First Stage F-Statistic	10.55	51.52	85.69	6.51	52.71	72.20	83.02
H_0: Underidentified	0.000	0.000	0.000	0.000	0.000	0.000	0.000
H_0: Not Overidentified	0.101	Exactly. Ident.	0.199	0.285	0.985	0.238	0.450
H_0: Senior Tranche Exogenous	0.003	0.000	0.361	0.120	0.476	0.007	0.241

*Notes: Robust t-statistics in parentheses; *, **, *** indicate variables significant at 10%, 5%, and 1% level respectively. The Table shows two-step GMM regressions using different sets of instrumental variables for senior tranche lending. Columns (1) and (2) make use of the rating agencies assessment of the countries default risk as an external instrument. To be more specific, Column (1) uses lagged changes in S&P sovereign credit rating scores as external instruments, whereas Column (2) uses the most recent credit rating. Columns (3)-(5) use lagged values as instrumental variables. Set C includes only lagged values of the senior tranche variable up to the fourth order. Set D consists of a subset of lagged exogenous variables (i.e. first lagged values of the debt ratio and the current account ratio and the debt ratio of the previous year). Set D makes use of the combined set of instrumental variables from sets C and D. Lastly, Column (6) makes use of the Lewbel (2012) identification approach, while Column (7) follows a combined approach using lagged values of Set E as well as the Lewbel instruments. In the Lewbel approach, $(Z - \bar{Z})\hat{\varepsilon}_1$ is used as an identifying instrument, where Z is the vector of our exogenous variables, $\bar{Z}$ the vector of means of the Z variables, and $\hat{\varepsilon}_1$ the residual of the first stage regression. In the lower part of the table, we report p-values of several specification tests as well as the F-Statistic of excluded instruments from the first stage regression. As an underidentification test, we apply the Kleibergen-Paap rk LM statistic. As a test of overidentification, we used Hansen's J-Statistic. Based on the difference of two Sargan-Hansen statistics, we additionally test whether the senior tranche can actually be treated as exogenous. Since our senior tranche variable is the only variable instrumented, this test essentially becomes equivalent to a simple Hausman test comparing the consistent simple estimate with the potentially more precise two-step estimate. Data source: See data appendix A5.*

Omitted variables: The unobserved probability of private sector involvement

In our benchmark regression we have included time fixed effect to capture the possibility of unobserved default risk as a potential omitted variable. Here we pursue this idea further by adding various control variables that might address this issue more directly.

Table 6 starts by adding two indices of economic sentiment as further control variables to our benchmark regression, the Economic Sentiment Index (ESI) of the European Commission (Column 1) and the World Economic Climate index of the ifo Institute (Column 2). The Economic Sentiment Indicator (ESI) is a large composite indicator made up of five sectoral confidence indicators each covering several questions on present economic situation and economic outlook. The ifo World Economic Climate Index is the arithmetic mean of the assessments of the general economic situation and the expectations for the economic situation in the next six months. In both cases, the senior tranche variable stays significant and the coefficient remains of similar size.

Next we add the number of Google searches for "private sector involvement" (PSI), dummy variables for the post-Deauville meeting period and the first time the discussion started on private sector involvement in Greece, June 2011. Both periods fostered nervousness in the sovereign debt market (see Lane (2012)). In all regressions (in columns 3-5) the coefficient of the senior tranche again remains significant and of similar size.

We furthermore try to decompose the interest rate spread into a default and non-default component, following the approach of Favero and Missale (2012). They subtract the CDS spreads from the interest rate spreads and interpret the remainder as the non-default component in interest rate spreads. Column (6) illustrates that our senior tranche variable also remains significant when explaining this non-default component, rather than the total interest rate spread. Alternatively, we also include the CDS spread explicitly as a proxy for the default probability in our benchmark regression, reported in column (7). Although the size of the coefficient declines, the senior tranche still remains statistically significant at the 5% level.

We choose not to use the specification of these regressions as our benchmark, however, as the CDS spread not only captures the unobserved default risk. It also captures the expected recovery values in case of default. The latter is exactly what we aim to capture by our senior tranche variable.

Table 6: Unobserved Default Probability

Variables	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Dependent Variable:	Interest Rate Spread	Interest Rate Spread	Interest Rate Spread	Interest Rate Spread	Interest Rate Spread	Non Default Component	Interest Rate Spread
Senior Tranche	0.043**	0.043**	0.038**	0.043**	0.043**	0.015***	0.014**
	(2.57)	(2.57)	(2.53)	(2.57)	(2.57)	(3.38)	(2.90)
Debt/GDP	0.042***	0.042***	0.051***	0.042***	0.042***	0.014	0.009*
	(6.81)	(6.81)	(5.57)	(6.81)	(6.81)	(1.39)	(2.16)
Current Account/GDP	0.013	0.013	0.045	0.013	0.013	0.024	0.023
	(0.51)	(0.51)	(1.04)	(0.51)	(0.51)	(1.33)	(1.24)
REER	0.107**	0.107**	0.176**	0.107**	0.107**	0.079**	0.055***
	(2.80)	(2.80)	(2.64)	(2.80)	(2.80)	(2.32)	(3.42)
Real GDP Growth	-0.055	-0.055	-0.048	-0.055	-0.055	0.040	0.036
	(1.63)	(1.63)	(1.38)	(1.63)	(1.63)	(1.00)	(0.92)
EC Economic Sentiment	0.021						
	(1.70)						
Ifo Economic Sentiment		-0.009**					
		(2.40)					
Google Searches PSI			0.022*				
			(2.18)				
Deauville Meeting (10/2010)				-0.347			
				(0.58)			
Greece PSI Talk (06/2011)					0.163		
					(0.34)		
CDS Spreads							0.011***
							(10.00)
Country Fixed Effects	yes	yes	yes	yes	yes	yes	yes
Time Fixed Effects	yes	yes	yes	yes	yes	yes	yes
R^2 (within)	0.78	0.78	0.79	0.78	0.78	0.68	0.96
Obs.	542	542	394	542	542	262	280

*Notes: Robust t-statistics in parentheses; *, **, *** indicate variables significant at 10%, 5%, and 1% level respectively. Results are from a panel fixed effects model estimated using OLS. Reported R^2 is calculated "within", i.e. from the mean-deviated regression. The first two columns control for market sentiment based on survey sentiment indices (by the European Commission and the ifo Institute). Columns (3)-(5) add variables reflecting changes in the expected probability of private sector involvement. More specifically, we control for the relative number of Google searches on the keyword "private sector involvement". Furthermore, we add dummy variables taking the value 1 after the Deauville meeting or after the first talk about the possibility of PSI in Greece. Column (6) replicates our benchmark specification, albeit with the difference between sovereign bond spreads and the respective CDS spreads as dependent variable. Column (7) uses the CDS spread as a control variable. Data source: See data appendix A5.*

Contagion and Fragmentation

As a last step in the panel-regression analysis, we ask whether our coefficient has been influenced by contagion during the euro crisis, as well as the process of fragmentation that took place in Europe over the last 5 years. Tables 7 and 8 address this point, by adding further control variables to our benchmark specification.

In Table 7, we start with the issue of contagion, as several authors suggested that contagion has been a main driver of interest rate spreads during the euro crisis.[32] In regressions (1-3), we add three regional contagion proxies, the average interest rates spread of the countries in crisis, a trade weighted index of the interest rate spread of all euro area countries (except the respective country itself) and the VStoxx index that measures market expectations of near-term volatility of the biggest European stocks. Among these variables, only the VStoxx index is statistically significant at the 10% level. Our Senior tranche variables remains of similar size and stays statistically significant at least at the 10% level (regression 2) or 5% level (regressions 1 and 3). We also add the VIX index, which is the US equivalent of the VStoxx, as a measure of global contagion. Again this proxy is insignificant and does not change the results on the senior tranche. This absence of regional and global contagion effects is in line with the earlier literature. For instance Beirne and Fratscher (2013), who analyze this question more extensively, find little evidence on the role of regional contagion in determining interest rate spreads.

However, we did find evidence for time fixed effects, which is sometimes interpreted as unobserved herding contagion. Without time fixed effects we reject the null of cross-sectional independent residuals at the 1% level, whereas we did not find evidence for herding contagion when including them. Consequently, we added time fixed effects also to our benchmark regression. Similar results regarding herding contagion have been obtained in other recent papers (e.g. De Grauwe & Ji (2013)) and again Beirne and Fratzscher (2013)).

In Table 8, we also include several proxies for fragmentation. First, with a common monetary policy one would expect lending rates and real sector loans to commove across countries. In Column (1) we include the lending rate of each country relative to the rest of the EMU and in Column (2) the real sector loans relative to GDP as a first control variable for fragmentation. Furthermore, we also add the total foreign claims (Column 3), the euro area cross-border claims (Column 4) and the exposure to the GIIPS countries only (Column 5) as alternative proxies. In all regressions, the senior tranche variable stays roughly unchanged. The fragmentation variables are statistically not significant.

Some authors also argued that Target2 balances reflect euro area fragmentation (e.g. Cour-Thimann (2013)). In the last two columns of Table 8, we therefore dropped Target2 from our senior tranche definition and instead included the Target2 variable separately to the regression. It is interesting that the Target2-balance, as percentage of GDP (Column 6), is not a significant determinant of government bond spreads. When including Target2-*liabilities* as percentage of public debt, however, this variable is statistically significant. The latter can be interpreted as senior-tranche proxy, while the former could be taken as a proxy of fragmentation. In any case, the senior tranche variable – without Target2 – remains significant at the 5% level, in both regressions.

[32] De Grauwe & Ji (2013) as well as Beirne & Fratzscher (2013) both find evidence for unobserved herding contagion based on an analysis of cross-sectional correlation in a panel analysis similar to ours. Beirne & Fratzscher (2013) additionally look at the possibility of regional contagion but find only little evidence in favor of this. Favero & Misalle (2012) use a global VAR framework, where the dynamics of each spread is determined by its distance between their fiscal fundamentals and the exposure of each country's spread to the other countries' spreads. They find evidence for contagion, which is again correlated across the euro area countries.

Table 7: Contagion

Dependent Variable: 10y Government Bond Spread Against Germany						
	Regional Contagion			Global Contagion	Unobserved Contagion / Herding Behavior	
	(1)	(2)	(3)	(4)	(5)	(6)
Senior Tranche	0.043**	0.034*	0.042**	0.043**	0.047**	0.043**
	(2.50)	(2.19)	(2.45)	(2.57)	(2.31)	(2.57)
Debt/GDP	0.040***	0.041***	0.043***	0.042***	0.052***	0.042***
	(6.90)	(6.36)	(7.39)	(6.81)	(7.43)	(6.81)
Current Account/GDP	0.016	0.010	0.010	0.013	-0.011	0.013
	(0.59)	(0.44)	(0.43)	(0.51)	(0.51)	(0.51)
REER	0.106**	0.087**	0.099**	0.107**	0.012	0.107**
	(3.01)	(2.27)	(2.56)	(2.80)	(1.06)	(2.80)
Real GDP Growth	-0.046*	-0.077	-0.049	-0.055	-0.085*	-0.055
	(1.86)	(1.66)	(1.41)	(1.63)	(2.09)	(1.63)
GIIPS Spread	-0.739					
	(0.81)					
Trade weighted EA Spread		-0.093				
		(0.98)				
VStoxx			-0.009*			
			(1.96)			
VIX				-0.039		
				(1.70)		
Country Fixed Effects	yes	yes	yes	yes	yes	yes
Time Fixed Effects	yes	yes	yes	yes	no	yes
H_0: No cross-sectional dependence						
Pesaran test	-3.66	-2.48	-2.71	-2.63	3.27***	-2.62
R-Squared (within)	0.79	0.80	0.77	0.78	0.73	0.78
Observations	542	480	531	542	542	542

*Notes: Robust t-statistics in parentheses; *, **, *** indicate variables significant at 10%, 5%, and 1% level respectively. Results are from a panel fixed effects model estimated using OLS. Reported R^2 is calculated "within", i.e. from the mean-deviated regression. Column 1 includes the average spread of the (other) euro area crisis countries (Greece, Ireland, Italy, Portugal and Spain) as a control variable. Column (2) analyzes the trade channel of contagion by adding the trade-weighted spread of all other euro are countries as explanatory variable. Columns (4) and (5) control for stock market volatility expectations, based on European stocks (VStoxx) and US stocks (VIX). The last two columns compare our benchmark regression (Column (6)) with the same regression, albeit without time fixed effects. In the second part of the table we report the results of a Pesaran (2004) test with the H_0 of no cross-sectional dependence. Data source: See data appendix A5.*

Table 8: Fragmentation

Dependent Variable: 10y Government Bond Spread Against Germany							
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Senior Tranche	0.042**	0.039**	0.043**	0.040**	0.035**		
	(2.76)	(2.66)	(2.51)	(2.63)	(2.97)		
Debt/GDP	0.046***	0.048***	0.042***	0.053***	0.056***	0.032***	0.023***
	(5.51)	(5.93)	(7.47)	(5.40)	(5.23)	(4.64)	(5.13)
Current Account/GDP	0.029	0.036	0.012	0.051	0.002	0.003	0.001
	(0.86)	(0.94)	(0.50)	(1.07)	(0.05)	(0.21)	(0.07)
REER	0.116*	0.142**	0.108**	0.215**	0.211**	0.118***	0.073*
	(1.92)	(2.66)	(2.84)	(2.64)	(2.45)	(4.28)	(2.19)
Real GDP Growth	-0.052	-0.046	-0.057	-0.024	-0.035	-0.062*	-0.069*
	(1.51)	(1.51)	(1.57)	(0.75)	(0.48)	(2.02)	(2.14)
MFI Lending Rate	0.435						
	(1.17)						
MFI Real Sector Loans/GDP		0.130					
		(0.37)					
MFI Foreign Claims/GDP			-0.006				
			(0.18)				
MFI EA cross-border claims				0.000			
				(0.31)			
MFI GIIPS Exposure					0.004		
					(1.11)		
TARGET2 Balance/GDP						-0.138	
						(1.77)	
TARGET2 Liabilities/Debt							0.019***
							(4.28)
Senior Tranche (w/o TARGET2)						0.161**	0.170**
						(2.30)	(2.60)
Country Fixed Effects	yes	yes	yes	yes	yes	yes	yes
Time Fixed Effects	yes	yes	yes	yes	yes	yes	yes
R-Squared (within)	0.79	0.79	0.78	0.79	0.84	0.83	0.82
Observations	439	439	542	349	251	542	574

*Notes: Robust t-statistics in parentheses; *, **, *** indicate variables significant at 10%, 5%, and 1% level respectively. Results are from a panel fixed effects model estimated using OLS. Reported R^2 is calculated "within", i.e. from the mean-deviated regression. In order of appearance, we control for: The average lending rate of monetary financial institutions (MFI) to the real sector (as deviation from the euro area mean), MFI loans to the domestic real sector (as % of GDP), MFI's foreign claims (2007=100), the total size of MFI cross-border claims within the euro area (2007=100) and MFI's cross-border claims against the (other) countries in crisis (2007=100). In the last two columns, we compare the Target2-balance (as % GDP) with the Target2-liabilities (as % of public debt). Data source: See data appendix A5.*

5 Evidence from Survey Data

In this section, we evaluate the survey data set from the ifo Institute on de facto seniority of different items of the rescue packages. As part of the World Economic Survey, participants have also been asked about their expectations regarding the path of interest rates in the following 6 month. An advantage compared to a macro data analysis, is that it is plausible to assume that there exists no causal channel running from the expectation about interest rates development to the expectation about the preferred creditor status of different rescue components.

Figure 5 gives a first visual impression of the differences between respondents that consider the rescue packages senior and those who view them as pari-passu with private markets.

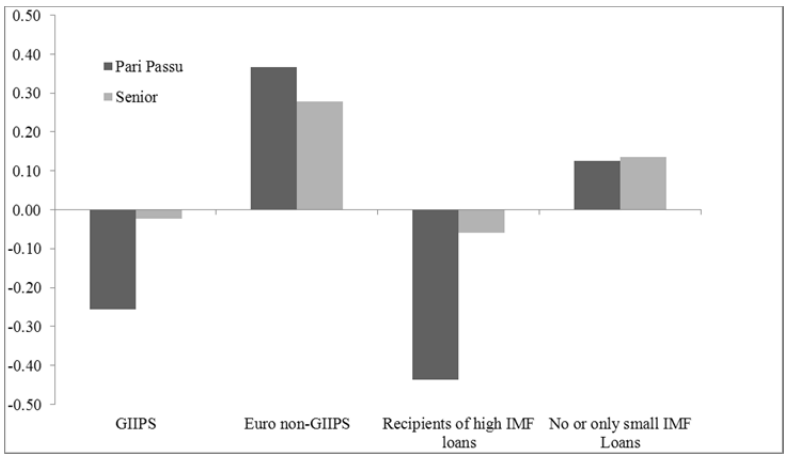
Differences in subgroups

Among the set of countries in crisis, which currently have high interest rates, both groups of respondents have on average the expectation of falling interest rates. It is remarkable however, that the expectation of falling interest rates is much stronger in the subset of respondents that view the rescue packages to rank pari-passu with private markets. On the other hand, the set of respondents who view the rescue packages as senior to private markets have a nearly constant interest rate expectation, and expect only a very minor decline.

The opposite relationship - although less pronounced - is present in the set of countries in the euro area that are currently not in crisis. On average, they expect rising interest rates. However in the set of respondents that have pari-passu expectations, the expectation of a future increase in interest rates is stronger. In both groups of countries in this graph, the set "senior" refers to respondents who view at least half of the components of rescue packages as senior to private markets.

As a control group we also consider the world-wide response of survey participants to the question whether the IMF is senior to private markets. The ifo survey is conducted in 120 countries, many of which have used IMF loans substantially during the crisis. The third pair of bars in Figure 5 displays the average interest rate expectations of respondents in countries that have used more than 500% of their IMF quota in special drawing rights at least once in the last five years. Again, we see that both groups have falling interest rate expectations. Among respondents who expect the IMF to be senior to private markets, however, these expectations are much less pronounced than in the other group. The fourth pair of bars in Figure 5 shows that respondents from countries without strong use of IMF loans expect rising interest rates on average. There is not a large difference between those respondents that have the expectation that the IMF is senior and those who do not.

Figure 5: Average Interest Rate Expectation in Different Samples



Notes: Light-grey bars show the average response of survey participants that expect the rescue packages to have senior status. Dark bars show the average response of participants with pari-passu expectations. Answers are scaled [-1, 0, 1], indicating expectations of falling, constant or rising interest rates, respectively. Data source: World Economic Survey, April 2013, ifo Institute.

Ordered Probit Regressions

In Table 9 below, we analyze the impact of the seniority status on interest rate expectations more formally in an ordered probit regression. In the survey, interest rate expectations are scaled [-1, 0, 1], indicating expectations of falling, constant and rising interest rates. We explain this variation by the seniority expectations on rescue packages of the respective respondents, as well as different sets of control variables. The first set of control variables is quite similar to those that were used in the panel regressions above. We control for the expectations about public debt, the expected trade balance, the expected GDP growth rates and the expected change in the exchange rate relative to US Dollar. We find that most of these control variables are statistically significant and have the expected signs. For robustness, we also consider an extended set of control variables, making use of the full ifo-survey data set.

The main variable of interest in the regression is a dummy variable that is equal to one, if the survey participants expect the rescue packages to be senior to private markets. Making no further distinction, this variable, however is insignificant in all specifications. When adding another dummy variable that indicates whether the respondent comes from country that received large loans from senior creditors (according to various definitions) and interact this variable with the seniority expectation, we find a significant and sizable effect of seniority expectations on interest rate expectations among those countries who are large debtors.

In the first four columns of the table, the debtor indicator is equal to one, if the respondents come from one of the crisis countries of the euro area, i.e. Greece, Ireland, Italy, Portugal and Spain. We find that respondents from these countries have on average significantly lower interest rate expectations, as indicated by the negative sign on the debtor variable. For respondents, who expect rescue packages to be senior, this expectation of falling interest rates is significantly less pronounced, however, as indicated by the interaction term between the seniority-dummy and the debtor-dummy, which is positive. They have a statistically significant higher probability of being in a category of rising or stalling interest rate expectations compared to being in the falling interest rate expectations category.

The magnitude of these effects is also substantial. When using the coefficients from the ordered probit regression to compute the difference in predicted probabilities for a discrete change in seniority expectations from zero to one, we find that respondents from the European countries in crisis, are 21.2% more likely to have rising interest rate expectations when they view the rescue packages as senior, and 9.3% less likely to have falling interest rate expectation.[33]

In columns (B3) and (B4), we repeat the exercise focusing on countries that used IMF loans intensively. The dummy variable "debtor" is here equal to one if the respondents come from a country that used 500% or more of its IMF quota at least once during the last five years.[34] The seniority variable is equal to one, if the respondents expect the IMF to be senior to private markets. Interestingly, we find a similar effect, compared to the findings for Europe. Survey participants from highly indebted countries expect on average falling interest rates. But significantly less participants share this expectation, when they also expect the IMF to be senior. The same finding also prevails in our columns (C3) and (C4), where we exclude the euro area countries in crisis from the regression analysis. Again, differences in predicted probabilities are of substantial size. Respondents from countries that are large IMF debtors, are 31.7% more likely to have rising interest rate expectations if they believe that IMF will be senior, and 10.6% less likely to have falling interest rate expectations.[35]

Overall, our survey data analysis is reminiscent of as a triple difference strategy to illustrate the impact of senior-status in rescue loans on interest rate expectations. There is a difference between debtor countries and other countries, and there is a difference between those respondents that have seniority expectations and those how do not. There is however no such difference between countries from the Euro Area, and other countries that intensively make use of IMF loans outside the Euro Area.

[33] Using regression results (A4) from Table 9 as a basis for the computation.
[34] Note that this dummy variable capturing whether a respondent comes from a country with high IMF credit is negative and statistically significant at the 1% level in most regressions. This result can be interpreted as evidence for the expectation of IMF's catalytic finance and complements earlier findings of the literature (see e.g. Corsetti et al. (2006), Morris & Shin (2006), Mody & Saravia (2006) and Eichengreen et al. (2006)).
[35] Using regression results (C4) from Table 9 as a basis for the computation.

Table 9: WES Survey Ordered Probit Regressions

Dependent Variable: Expectation about the development of 10 year government bond interest rates												
	Set A: GIIPS				Set B: Countries with high IMF credit				Set C: Countries with high IMF credit - excluding GIIPS countries			
Variables	(A1)	(A2)	(A3)	(A4)	(B1)	(B2)	(B3)	(B4)	(C1)	(C2)	(C3)	(C4)
Seniority	0.08	0.06	0.02	-0.02	0.09	0.11	0.04	0.05	0.03	0.04	0.00	0.01
	(1.03)	(0.66)	(0.24)	(-0.21)	(1.10)	(1.27)	(0.43)	(0.59)	(0.33)	(0.48)	(0.00)	(0.15)
Debtor (Set A, B, C)	-0.39**	-0.32*	-0.73***	-0.68***	-0.43***	-0.33***	-1.04***	-1.01***	-0.52**	-0.38*	-1.19***	-1.05***
	(-2.16)	(-1.71)	(-3.04)	(-2.64)	(-3.07)	(-2.28)	(-4.72)	(-3.31)	(-2.52)	(-1.70)	(-7.35)	(-5.68)
Seniority X Debtor			0.60**	0.64**			0.80***	0.88**			0.85***	0.84***
			(2.37)	(2.29)			(3.18)	(2.53)			(4.41)	(4.17)
Debt Problem	0.15*	0.26**	0.16**	0.28***	0.16**	0.23*	0.16**	0.23***	0.15**	0.23**	0.14*	0.23**
	(1.86)	(2.54)	(1.98)	(2.65)	(2.45)	(2.75)	(2.46)	(2.76)	(1.91)	(2.52)	(1.87)	(2.48)
Trade Deficit	0.17***	0.18***	0.17***	0.18***	0.14**	0.14**	0.14**	0.14**	0.11**	0.11*	0.11*	0.11*
	(2.99)	(2.77)	(2.94)	(2.72)	(2.56)	(2.39)	(2.49)	(2.38)	(1.82)	(1.82)	(1.78)	(1.81)
Real GDP [%]	-0.05**	-0.05**	-0.05***	-0.05**	-0.04**	-0.04**	-0.04**	-0.04**	-0.06**	-0.05**	-0.06**	-0.05***
	(-2.28)	(-2.20)	(-2.28)	(-2.17)	(-2.25)	(-2.17)	(-2.26)	(-2.19)	(-2.55)	(-2.31)	(-2.58)	(-2.35)
Exchange Rate	0.07	0.06	0.06	0.06	0.05	0.04	0.04	0.04	0.07	0.06	0.06	0.06
	(0.83)	(0.78)	(0.86)	(0.82)	(0.74)	(0.63)	(0.69)	(0.58)	(0.93)	(0.80)	(0.86)	(0.73)
Further controls	no	yes	no	yes	no	yes	no	yes	no	yes	no	yes
(Pseudo) R^2	0.02	0.03	0.03	0.04	0.02	0.03	0.02	0.03	0.02	0.02	0.02	0.03
Obs.	632	604	632	604	741	702	741	702	668	631	668	631

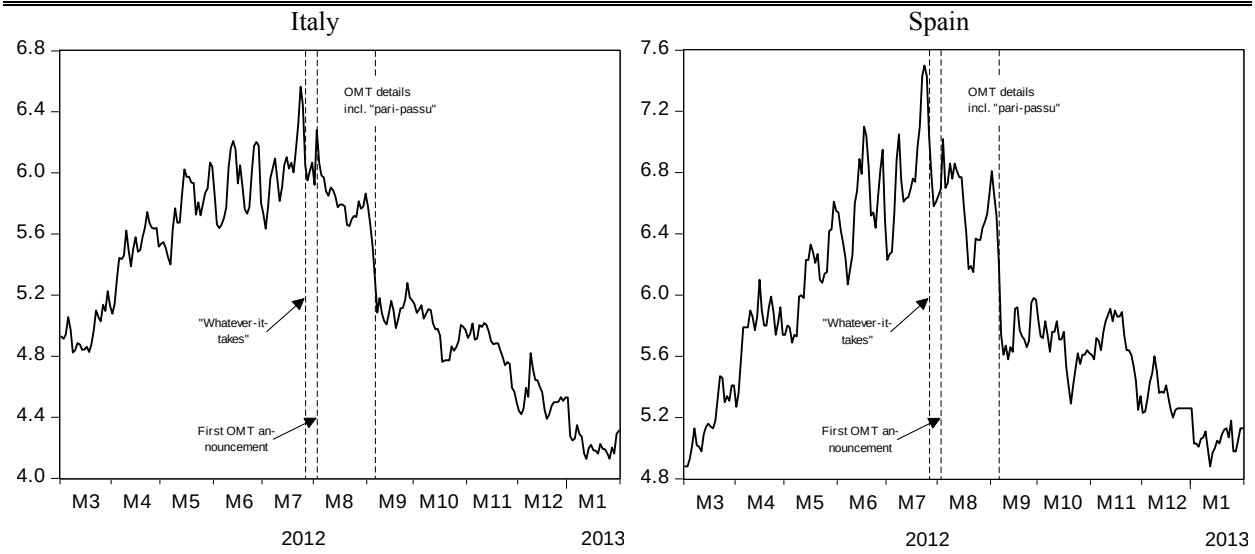
*Notes: *, **, *** indicate variables significant at a 10%, 5%, and 1% level respectively. z-values in parentheses. Standard errors clustered at the country level, resulting in 120 clusters. The dependent variable is coded [1, 2, 3] if respondents expect falling, stalling or rising interest rates, respectively. The seniority dummy is 1 if respondents expect at least half of the official creditors to be senior, zero otherwise. We also control for the participants assessment of how much of a problem they see in the countries debt level (coded [0, 1, 2] for "not important", "very important" and "most important", respectively), their expectation about the development of the trade balance [%], the real GDP growth [%] and the direction of change in the exchange rate compared to the US dollar. Survey participants have also been asked about their assessment on how much of a problem they see in the issues like government policy, inflation, competitiveness, trade openness, public deficits, capital shortage or unemployment. These variables make up our "further controls" set. Data source: World Economic Survey, April 2013, ifo Institute.*

6 Securities Markets Programme vs. Outright Monetary Transactions

Another perspective on the role of creditor seniority can be taken by comparing two different programs of the ECB that are very similar to each other, but differ with regard to the seniority stance. In the first bond-purchase program of the ECB, the Stability Markets Program (SMP), the ECB had communicated to the markets, that it would be senior to private lenders when these government bonds mature. Markets calculated their recovery values accordingly, and the interest rates spread did not decline. Instead, it increased the months following the announcement, as well as the implementation of the bond purchases. The program was eventually phased out, as it was considered ineffective. In the Greek bond-restructuring, the ECB actually enforced its senior position and did not participate in the haircut.[36] Also in August 2012 when the first Greek bond matured, the ECB got paid in full.

In the Outright Monetary Transactions (OMT) program, on the other hand, the ECB was announced to be treated "pari-passu" with private markets in case of insolvency. Interestingly the interest rates fell, and the program is widely considered a very successful component of the rescue efforts in Europe's sovereign bond crisis. Clearly it was more successful in bringing down interest rates than its predecessor, the SMP.

Figure 6: Development of 10-year Government Bond Yields



Notes: Figure shows the 10-year government bond yields of Spain and Italy around the ECBs announcement of the OMT. Dashed vertical lines mark (1) Mario Draghi's speech at the Global Investment Conference, July 26th, 2012, (2) the first announcement of Open Market Operations at the ECB press conference on August 2nd, 2012 and (3) the ECB press release outlining the technical details of the OMT on September 6th, 2012. Data source: See data appendix A5.

A more detailed look at the timing of the OMT announcement is helpful to illustrate the role of the pari-passu announcement in the OMT-package that contains other elements, such as conditionality comparable to the ESM and the fact that unlike the SMP, it contains no ex ante limits. Figure 6 documents the time paths of interest rate spreads in Italy and Spain, where the impact on interest rates was the most pronounced.

Several different steps were taken in the summer of 2012, where interest rate spread reached record levels in Europe, before the OMT programme was fully announced. First, on July 26th, the ECB President Mario Draghi announced that the ECB will do "what ever it takes" to preserve the euro. This statement was most widely

[36] Instead, it extended the list of eligible collateral to so-called T-bills, which enabled Greece to repay its debt.

discussed in the international press, however it had comparably little effect on the interest rate spreads of either country, Italy or Spain. Only one week later, both countries again had interest rate spreads with respect to Germany that exceeded 5.5%. When on August 2012 2nd, the ECB clarified how it intended to implement its "whatever it takes" statement, it announced that it would conduct "outright open market operations" to an extent necessary to achieve its objective. However, again, there was no sustained decline of interest rates. By the end of the month, Spain was again characterized by spreads above 5.5% and Italy above 5% with respect to Germany.

A major trend change, as well as the largest single drop during this period occurred on September 6th, when the ECB announced the details of the plan to conduct outright open markets operations, announced on August 2nd. Among these details the two most important items were (i) there would be no ex ante limits and (ii) the ECB would be treated pari-passu with respect to private markets.[37]

When analyzing the exact wording of the announcements, one can argue that (ii) was the most important incremental news component on this day. On August 2nd, president Draghi had already stated that the ECB will conduct "outright open market operations of a size adequate to reach its objective" and later added: "we will do everything that is required to reach the objectives". When concretely being asked about what the previous "whatever it takes"-statement meant, he said: " 'Whatever-it-takes' means two things: it means the list of measures, all the measures that are required, and it means that their size ought to be adequate to reach their objectives." This wording appears to be not substantially different from the September 6th announcement: "there are no ex-ante limits on the amount of Outright Monetary Transactions. And the size – as I think it said in the first press release or the introductory statement – is going to be adequate to meet our objectives". It is therefore unclear whether there had really been a new decision on the possible size of intervention.

It was certainly news, however, that the ECB made a clear statement that it would not again enforce its position as a senior lender. The pari-passu announcement marked a major turning point in the ECB policy.

7 Evidence from legal terms of debt contracts

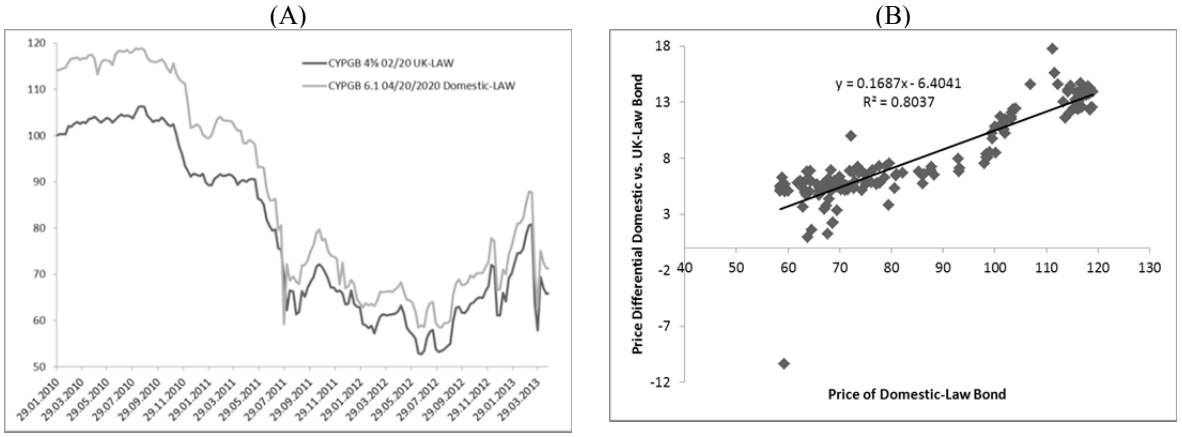
A final perspective to take on the role of creditor seniority is to look at the legal terms of debt contracts. In a detailed analysis of the Greek debt restructuring, Zettelmeyer et al. (2013) have shown that local-law bonds have been more easily to restructure than foreign-law bonds. During the private sector involvement (PSI) Greece retroactively applied collective action clause to its domestic-law bonds – unilaterally through an act of parliament. Contract terms of UK-law bonds, however, remained the same. Thus, UK-Law bondholders effectively became senior creditors, with a greater ability to hold out. Greece addressed this issue, by offering an exchange of local-law to UK-law bonds in its debt restructuring. Zettelmeyer et al. (2013) argue that this seniority-upgrade may have acted as a PSI-sweetener to reach the targeted participation threshold.

If holding bonds falling in a foreign jurisdiction indeed effectively increases the seniority status of investors, this should translate to a lower risk premium of these bonds. Such an effect on sovereign bond prices can be illustrated by making use of a natural experiment offered by recent developments in Cyprus. Figure 7A plots the

[37] An additional news element was that countries needed to be under an ESM program to be eligible for OMT purchases. This third news element, however, would not lead to a decline in interest rates, and this thus not considered in the discussion on why interest rates fell after the September 6th press conference of the ECB.

prices of two comparable sovereign bonds of Cyprus. The dark line shows the development of a bond issued under UK-jurisdiction and the light-grey line of a domestic-law bond, both with a maturity date in spring 2020 (February 2020 vs. April 2020). The bonds, however, differ within their coupon. The light-grey bond pays an semi-annual interest of 6.1%, while the dark grey one only offers an 4.65% annually.

Figure 7: Cyprus' Risk-premium of Domestic-law Bonds



Notes: Panel (A) plots the price of two government bonds of Cyprus. The dark line shows a bond issued under UK-governing law, paying a coupon of 4.65%. The light-grey line shows a bond issued under domestic (Cypriot) law, paying a coupon of 6.1%. Both bonds mature in spring 2020, with the UK-law being due about two month earlier. The scatter plot in Panel (B) shows differential between the two bonds on the y-axis and the level of the domestic law government bond on the x-axis. Data Source: Bloomberg. ISIN: CY0049570811 and XS0483954144.

Accordingly, at the beginning of 2010, the domestic-law bond is traded about 15% above the UK-law bond, reflecting its higher coupon. However, the price differential between the two bonds is non-constant. When in mid-2011 bond prices plummeted by 40%, their difference decreased considerably. We further investigate this relationship in the scatter plot of Figure 7B. There is indeed a strong correlation between default probability (as measured by the price level of the domestic bond) and the risk premium differential. The lower the price level, the less favorable investors perceive the domestic-law compared to the UK-law bond.

Furthermore, in the last week of June 2011 the higher-coupon domestic-law bond even traded a lower price than its UK-law cousin. During the European stress tests it became clear that Cypriots banking system was heavily exposed to Greek Government Debt. Furthermore, the Cyprus cabinet resigned. This led to a sharp downgrade of the S&P creditor ratings for Cyprus and several of its private banks including the biggest one, the Bank of Cyprus. Apparently, investors valued UK-law bonds status considerably higher (around 14% price differential) during this time, than the promise of an extra 1.45% in coupon payments.[38] This revealing outlier can also be seen in the lower-left corner of Figure 6B.

The results of these simple graphical analyses indicate that investors indeed fear a sovereign selective default on their debt obligations and the importance of the seniority status in case of debt restructuring.[39]

[38] This is consistent with some anecdotal evidence in the market for unsecured bank bonds. For example, ECB president, Mario Draghi remarked at a press conference on 2nd may, 2013: "[…] the same bank issued a bond in Munich and issued a bond in Milan […], and there was a spread of, I think, roughly 150, 200 basis points difference between the two, so it's the same bank issuing in two different sovereign jurisdictions."

[39] Choi et al. (2011) perform a similar exercise, albeit with Greek government bonds in the period from mid-2009 to mid-2010. Their results are consistent with ours: UK-law bonds are traded more favorably compared to domestic-law bonds when default probability is high. However, as the authors note, the Greek government bonds at times seem to be traded at very low volumes.

8 Conclusions and policy implications

The main objective of this paper was to empirically document that rescue policies can have unintended side effects. We show that these side effects on interest rates become quantitatively important when the share of the senior tranche gets large.

In the European sovereign debt crisis, the size of the senior tranche has grown substantially over the last five years. In the set of countries we have focused on in this paper, there is quite a wide range. On average, however, it has reached a share of 60% towards the end of our sample period. Note that this corresponds to the threshold of senior government debt relative to GDP has been suggested in the Eurobond proposal of the European Parliament (2010/2242(INI)).

Several researchers have argued that the introduction of Eurobonds would help to resolve the euro crisis, providing the theoretical background of the European Parliament's proposal (see for instance the red/blue bond proposal of Delpla and Von Weizsäcker (2010), which is the closest analogy. Similar proposals, but without joint liability for the senior tranche, include the European Safe Bonds (ESB) proposal of Brunnermeier et al. (2011), or the Euro-standard bill proposal of the EEAG (2012)). The idea in these proposals is to explicitly partition the debt into a senior and a junior tranche. As a result, the average interest burden would decline due to the seniority of the first 60% of the debt. On the other hand, incentives for fiscal discipline would remain intact because of the high marginal interest rate of the resulting junior tranche, the debt above the 60% level.

Based on the results of our paper, some countries in the euro area might already be quite close to the scenario sketched out in these proposals. Even without explicit Euro-bonds, countries in crisis are largely borrowing from official sources at low interest rates, while simultaneously facing a higher marginal interest rate in the markets. Also after the OMT announcement, this continues to play a role, as spreads have still not converged to their pre-crisis level.

With respect to the red/blue bond proposal, a gradual separation into junior and senior tranche of the type we observed in the past years might not be desirable, however. In the proposal of Delpla and Von Weizsäcker (2010), it was envisioned that the blue bonds would predominantly be held by domestic lenders and red bonds by international lenders. In such a setting, it would be credible that the red bonds would not carry implicit bailout guarantees. In practice, however, it appears to have happened the other way around. This makes it harder to disentangle sovereigns and banks, annother main goal of post-crisis reforms. [40]

With respect to the proposal of European Safe Bonds the current situation also misses key elements. It is not the case that there is a single institution to manage the portfolio and enforce seniority. As we show, the de jure classifications are vague, and de facto, the seniority has been weakened by the extension of maturities. Furthermore, the senior tranche does not include government bonds of all countries in GDP-weighted proportion.

A policy conclusion can thus be reached regarding the timing of a possible Eurobond/ESB introduction. If the ECB or ESM are forced to intervene in the absence of Eurobonds, it makes the Eurobond proposal harder to implement at a later stage.

[40] See also Dooley and Stone (1993) for empirical evidence on endogenous creditor seniority of domestic banks.

In the paper we highlight further trade-offs that policy makers are facing. From the perspective of multilateral lenders, we argue costs and benefits of a downgrade of seniority should be made visible and explicit. While on the one hand downgrading the seniority status is effective in reducing interest rates, taxpayers of other countries are assuming a share of the default risk. If the reduction of interest rates does not ultimately lead to higher growth, the multilateral institutions will share losses with the private sector.

Also from the financial markets perspective, it is important to reduce uncertainty about seniority and to establish clear rules. An abundance of different legal clauses by a range of senior lenders, and a lack of enforceability, makes it more difficult to correctly price sovereign risk. It also may make it very difficult to restructure sovereign debt if needed (see Bolton and Jeanne (2009) for a theoretical discussion).

From the perspective of the countries receiving the loans, our analysis may raise the question whether they are willing to accept such loans that are strictly senior. Hungary for instance has recently decided on an early IMF-loan repayment. Also Ireland has been discussing an early exit by the end of 2013, when first rescue loans will mature. If strictly senior loans are the only outside help, the countries may consider to instead issue senior debt – possibly collateralized with future tax incomes or real estate – without multilateral support.[41]

Finally, there is an important distinction between the SMP/OMT component in the senior tranche and other components. From an investors perspective they are the same, as both are public debt in the hands of senior creditors. But from a perspective of the governments, this clearly matters. When they receive loans from the ESM, for instance, this will reduce their average interest burden. When multilateral lenders purchase debt on secondary markets, however, their average interest burden remains unchanged. A way the central bank can avoid this puzzle is to be willing to buy all government bonds in the markets, or accept pari-passu treatment. Note however, that if it should do so, it could be missing another important component of the Eurobond idea – the incentive effect of high marginal interest rates.

[41] See the related proposal for "Euro-standard bills" by the European Economic Advisory Group (2012).

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Appendix A1: World Economic Survey Question

"In a case of default (or debt restructuring) of a member country of the European monetary union, do you expect the following public creditors to get preferred treatment (i.e. have senior status), compared to private sector creditors?

	YES	*NO*
International Monetary Fund, IMF	□	□
Permanent rescue facility, ESM	□	□
Temporary rescue facility, EFSF	□	□
European Union (EFSM and bilateral)	□	□
European System of Central Banks (incl. ECB)		
A) Collateralized Refinancing Operations	□	□
B) Target2 claims	□	□
C) Old bond purchase program, SMP	□	□
D) New bond purchases program, OMT	□	□ *"*

Appendix A2: Contemporaneous Correlations Matrix

LEVELS	Gov. Bond Spreads	Debt to GDP	Senior Tranche Share	Current Account	REER	Real GDP Growth
Gov. Bond Spreads	1.00					
Debt/GDP	0.44***	1.00				
Senior Tranche Share	0.80***	0.28***	1.00			
Current Account/GDP	-0.23***	-0.43***	-0.22***	1.00		
REER	0.21***	0.05	0.25***	-0.10**	1.00	
Real GDP Growth	-0.25***	-0.15***	-0.17***	0.12***	-0.24***	1.00

*Notes: Table shows pairwise correlations of government bond spreads, our senior tranche variable and the main control variables. *, **, *** indicate variables significant at a 10%, 5%, and 1% level respectively.*

Appendix A3: Summary Statistics

		Gov. Bond Spreads			Debt to GDP			Real GDP Growth		
	SAMPLE	00 - 08	08 - 12	full	00 - 08	08 - 12	full	00 - 08	08 - 12	full
COUNTRIES	Greece	0.4 (0.2)	8.4 (7.7)	3.6 (6.4)	103.5 (3.8)	139.0 (17.9)	116.4 (20.5)	0.9 (0.9)	-0.9 (1.0)	0.5 (1.2)
	Ireland	0.1 (0.1)	3.8 (2.5)	1.4 (2.2)	31.6 (5.1)	80.6 (24.3)	48.6 (28.5)	1.1 (1.9)	-0.3 (1.3)	0.7 (1.8)
	Italy	0.3 (0.1)	1.9 (1.3)	0.9 (1.2)	108.0 (2.4)	117.5 (5.8)	111.4 (6.2)	0.3 (0.4)	-0.4 (1.1)	0.1 (0.8)
	Portugal	0.2 (0.1)	4.2 (4.0)	1.7 (3.1)	60.5 (6.7)	91.5 (15.4)	71.4 (19.0)	0.3 (0.8)	-0.4 (0.9)	0.05 (0.9)
	Spain	0.1 (0.1)	1.8 (1.3)	0.8 (1.3)	48.2 (7.8)	57.7 (11.7)	51.8 (10.7)	0.8 (0.3)	-0.3 (0.5)	0.4 (0.7)
AGGREGATES	Euro Area	0.1 (0.3)	2.0 (3.5)	0.8 (2.4)	61.8 (29.3)	77.8 (32.8)	67.4 (31.6)	0.6 (0.9)	-0.2 (1.2)	0.3 (1.0)
	Non-GIIPS	0.04 (0.3)	0.5 (0.4)	0.2 (0.4)	56.2 (26.9)	63.9 (25.0)	58.9 (26.5)	0.6 (0.8)	-0.04 (1.4)	0.4 (1.0)
	GIIPS	0.2 (0.2)	4.0 (4.7)	1.7 (3.5)	69.8 (30.9)	97.2 (32.6)	79.5 (34.2)	0.7 (1.1)	-0.4 (1.0)	0.3 (1.2)
		Senior Tranche Share			Current Account			REER		
	SAMPLE	00 - 08	08 - 12	full	00 - 08	08 - 12	full	00 - 08	08 - 12	full
COUNTRIES	Greece	6.4 (2.7)	32.2 (22.1)	15.4 (17.9)	-8.8 (3.3)	-10.3 (3.1)	-9.1 (3.5)	96.8 (5.8)	106.5 (1.1)	100.0 (6.6)
	Ireland	11.7 (6.4)	76.4 (24.9)	37.0 (35.8)	-2.1 (2.3)	-0.2 (3.5)	-1.4 (3.0)	96.2 (9.9)	103.0 (5.2)	98.3 (9.1)
	Italy	0.08 (0.2)	2.7 (5.1)	0.9 (3.1)	-0.8 (0.8)	-2.7 (1.0)	-1.4 (1.3)	97.3 (4.4)	100.4 (2.0)	98.3 (4.1)
	Portugal	10.7 (3.0)	34.0 (19.2)	18.2 (15.5)	-9.5 (1.7)	-9.1 (3.5)	-9.2 (2.7)	97.7 (4.2)	101.0 (1.1)	98.8 (3.8)
	Spain	1.3 (1.2)	16.6 (12.8)	6.2 (10.2)	-6.1 (2.7)	-4.7 (1.9)	-5.5 (2.6)	97.1 (5.5)	104.5 (1.6)	99.5 (5.7)
AGGREGATES	Euro Area	4.5 (5.6)	18.2 (24.9)	8.9 (16.2)	0.2 (6.4)	-0.6 (6.0)	-0.03 (6.2)	97.7 (4.9)	101.4 (3.3)	98.8 (4.7)
	Non-GIIPS	3.5 (5.3)	6.6 (7.9)	4.5 (6.4)	4.4 (4.2)	2.8 (4.2)	3.8 (4.2)	98.1 (3.5)	100.2 (2.7)	98.7 (3.4)
	GIIPS	5.7 (5.7)	32.4 (30.6)	14.7 (22.3)	-5.5 (4.2)	-5.4 (4.7)	-5.3 (4.4)	97.0 (6.3)	103.1 (3.5)	99.0 (6.1)

Notes: Table shows arithmetic means and standard deviations (in parentheses) of government bond spreads, our senior tranche proxy and the main control variables used in the regression analysis. Data sources: See Appendix A4.

Appendix A4: Unit Root and Cointegration Properties

In order to correctly specify the regressions in the subsequent analysis, we conduct tests for stationarity and cointegration. Table A4a reports the panel unit root tests according to several definitions. We find that the variables are integrated of order one, i.e. they have a unit root in levels and are stationary in first differences. In Table A4b we proceed by reporting the results of the Engle-Granger based cointegration tests. In all cases, we can reject the null of non-stationary residuals.

Table A4a: Panel Unit Root Properties

TEST	H_0	TEST STATISTICS			
		Spread	ΔSpread	Senior Tranche	ΔSenior Tranche
Fisher type ADF (z-stat.)	All panels contain (individual) unit roots	4.49 (1.000)	-4.42 (0.000)	2.97 (0.998)	-5.54 (0.000)
Fisher type Phillips-Perron (z-stat.)	All panels contain (individual) unit roots	2.08 (0.981)	-11.77 (0.000)	-0.33 (0.370)	-11.76 (0.000)
Hadri LM (z-stat.)	All panels are stationary	8.75 (0.000)	0.13 (0.450)	8.18 (0.000)	1.25 (0.106)

Notes: Probability values in parentheses. Fisher-type tests allow for lags up to fourth order. In a panel context the rejection of the unit root hypothesis should be interpreted as evidence that a statistically significant proportion of the units are stationary. For Hadri LM test we report the heteroscedastic consistent version of the z-statistic.

Table A4b: Panel Cointegration Properties

VARIABLES / TREND ASSUMPTION	PEDRONI RESIDUAL BASED TEST WITH H_0: NO COINTEGRATION	
	Panel statistics / Common AR Coefficient	Group statistics / Individual AR Coefficient
Benchmark Regression		
Intercept	-3.74 (0.000)	-3.29 (0.000)
Intercept & Trend	-4.43 (0.000)	-1.87 (0.002)

Notes: Philips-Perron statistics reported with probability values in parentheses. Lags and leads have been selected using AIC. Additionally to the reported tests above, we also performed a simple Kao type cointegration test. An ADF test t-statistic of -2.39 and a respective p-value of 0.008 reject the null of a unit root, thus confirming that the residuals of our benchmark are indeed stationary.

Appendix A5: Data Descriptions and Sources

Variable	Description	Time Period	Sources	Units	Notes
Government Bonds					
Spreads	Interest rate spread between Government Bond secondary market yield and the German Bund (both with a 10 year maturity)	2000Q1–2012Q2	OECD - Monthly Monetary and Financial Statistics (Series: "Long-term interest rates, Per cent per annum"), For gaps in series of Luxembourg: Thomson Reuters Datastream (Series: "Luxembourg Benchmark Bond 10 Yr (DS) Red. Yield")	Per cent per annum	
Prices	Government Bond secondary market price (10 year maturity)	2000Q1–2012Q2	Thomson Reuters Datastream (Series: "Benchmark 10 year DS Govt. Index – Clean Price Index"	Index (2000Q1 = 100)	No data for Luxembourg available
Senior Tranche	Sum of Target2-liabilities, SMP purchases and official sector loans	2000Q1–2012Q2	See below	% of General Government Debt	For further details see Section 2
Intra-Eurosystem Liabilities ("Target")	Liabilities of the individual countries central banks to the Eurosystem	2000Q1–2012Q1	See Appendix A6		
SMP	ECB Government Bond purchases during its "Securities Markets Programme". See decision ECB/2010/5.	2000Q2–2012Q2	Thomson Reuters Datastream (Series: "Sec. Markets Prog. Amount"; Code: S244FC)		The ECB does not report the composition of bond purchases. We therefore assume the ECB bought the bonds in the same relative amounts as it reported to hold in the end of 2012 (ECB press release February 21st, 2013)
Official Loans					
EFSM/bilateral	EU loan packages for Ireland and Portugal	2000Q1-2012Q2	Websites of the European Commission (http://ec.europa.eu/economy_finance/eu_borrower/efsm/) , Ministerial statements of HM Treasury.		Excludes loans of about 1 bn. € from Sweden and Denmark to Ireland since the exact disbursement dates are unknown.
EFSF/ESM	ESFS/ESM loans to Ireland, Portugal, Greece, Spain	2000Q1-2012Q2	Websites of the European Financial Stability Facility (http://www.efsf.europa.eu) and of the European Stability Mechanism (http://www.esm.europa.eu)		
IMF	Credit granted by the IMF	2000Q1–2012Q2	International Financial Statistics (Series: "Other Investment, Liabilities, Loans, Monetary Authorities, Use of Fund Credit and Loans, Net"; Code: 4766..1)		
Main Macroeconomic Controls					
Debt Ratio	General Government Debt to GDP ratio	2000Q1–2012Q2	Eurostat (Series: "Gross Government Debt"; Code: gov_q_ggdebt)	% of GDP	
Current Account Ratio	Net Current Account to GDP ratio	2000Q1–2012Q2	Eurostat (Series: "Current Account"; Code: bop_q_c)	% of GDP .	For Belgium, time series are only from 2002Q1 onwards
REER	Real effective exchange rate (based on CPI)	2000Q1–2012Q2	International Financial Statistics (Series: "Real Effective Exchange Rate, Consumer Price Index"; Code: ..RECZF)	Index (2005=100)	
Real GDP Growth	Percentage change of real Gross domestic product	2000Q1–2012Q2	Eurostat (Series: GDP and main components – volumes; Code: namq_gdp_k)	% of GDP	No data for Greece from 2011Q2 onwards.
Other Controls					
Debt Forecasts	Average of the current and next year European Commission forecast	2000Q1–2012Q2	Favero (2013)	% of GDP	
Rating	Standard & Poor's Rating	2000Q1–2011Q4	Favero (2013)	Scaled from 0 to 76.	
CDS Spreads	Credit Default Swap spread against Germany	2006Q1-2012Q2	Thomson Reuters Datastream (Series: "SEN 10Y CDS - CDS PREM. MID")	Basis points	For Spain from 2007Q2 onwards, for Finland from 2008Q2, for Ireland and Netherlands from 2007Q1 onwards.
EC Economic Sentiment	Economic Sentiment Indicator (ESI) for the euro area of the European Commission	2000Q1–2012Q2	Eurostat (Series: "Economic sentiment indicator"; Code: teibs010)	calculated as an index with mean value of 100.	
Ifo Economic Sentiment	World Economic Climate index for the Euro Area of the ifo Institute	2000Q1–2012Q2	Ifo Institute's webpage (www.ifo.de/de/w/3TAL6okDN)	Index (2005=100)	
Google Searches PSI	Relative volume of search queries on "private sector involvement" conducted through Google.	2005Q1–2012Q2	Application Google Trends	Index (maximum number of searches = 100)	
VStoxx and CBOE VIX	Implied Volatility Indices based on Eurostoxx 50 and S&P 500, respectively	2000Q1–2012Q1	Datastream (WKN A0C3QF) and Federal reserve Bank of St. Louis	Percent per annum	
MFI Lending Rate	Average MFI interest rate to non-financial corporations (as spread to euro area average)	2003Q1-2012Q2	ECB Statistical Data Warehouse (MIR.M….B.A20.K.R.A.2240.EUR.O)	Percent per annum	
MFI Real sector Loans	MFI outstanding loans to non-financial corporations	2003Q1-2012Q2	ECB Statistical Data Warehouse (BSI.M….N.A.A20.A.1.U2.2240.Z01.E)	% of GDP	
MFI Foreign Claims	MFIs Total foreign claims on a contractual basis	2000Q1–2012Q2	Bank for International Settlements, Consolidated Banking Statistics, Table 9A:S	% of GDP	
MFI EA cross-border claims	Sum of cross-borders claims within the euro area	2005Q1-2012Q2	Bank for International Settlements, Consolidated Banking Statistics, Table 9C:T	Index (2005=100)	
MFI GIIPS exposure	MFIs foreign claims against counterparties in Greece, Ireland, Italy, Portugal and Spain	2005Q1-2012Q2	Bank for International Settlements, Consolidated Banking Statistics, Table 9C:T	Index (2005=100)	
Others used for calculations					
Nom. GDP	Gross domestic product at current prices	2000Q1–2012Q2	Eurostat (Series: „Gross domestic product at market prices" ; Code: namq_gdp_c)	Mio. €	
Exchange rate	National Currency per U.S. Dollar	2000Q1–2012Q2	International Financial Statistics (Series: "National Currency per U.S. Dollar, period average"; Code: ..RF.ZF)	€/$	
Trade Weights	share of country one in the trade (exports plus imports) of another country	2000Q1–2011Q4	Favero (2013)		

Notes: Our sample consists of quarterly data from 2000 until the ECBs announcement in the 2nd quarter of 2012. We include all EA-12 countries, namely Belgium, Spain, Ireland, Italy, Luxembourg, Netherlands, Germany, Finland, France, Austria, Portugal and Greece. If the original data source did not provide the series seasonally adjusted – and we suspected a seasonal pattern in it – we accounted for this using the U.S. Census method (X12-ARIMA). For a complete description of the variables used in the analysis of the World Economic Survey data of the ifo Institute (Section 5) see http://www.cesifo-group.de (doi: 10.7805/ebdc-wes-2012).

Appendix A6: TARGET2 data sources

The organization of the Target statistics varies widely across the 17 central banks and sometimes over time for individual central banks. Most of the central banks publish them as a part of their annual, quarterly, or in many cases monthly financial statements. The relevant positions are mostly called "Intra-Eurosystem Claims/Liabilities", "Other Liabilites/claims of euro area residents" or "Deposits/Liabilities of/to other euro area MFI's". In the data set, we try to construct the narrowest definition of Target2 balances available for the individual countries. The following table describes the adjustments made for each country. An alternative although less precise proxy can be constructed from Central Bank Survey data of the IMF and is discussed in Sinn and Wollmershäuser (2012).

		Central Bank	Source/Publication	Position	Notes
SAMPLE COUNTRIES	GIIPS	Bank of Greece	Website of the Bank of Greece (http://www.bankofgreece.gr) 1. Balance sheet of the Bank of Greece 2. Bank of Greece Monthly Financial Statement	1. "Claims on MFIs, Other euro area countries" / "Liabilities to MFIs, Other euro area countries" 2. "9.4 Net claims related to transactions with the ESCB (TARGET2)" / "9.3 Net liabilities related to transactions with the ESCB (TARGET2)"	
		Central Bank and Financial Services Authority of Ireland	Website of Central Bank and Financial Services Authority of Ireland (http://www.centralbank.ie), Money and Banking Statistics, Table A.2 Financial Statement of the Central Bank of Ireland.	"Other liabilities"	We adjust this item for "Liabilities related to the allocation of euro banknotes within the Eurosystem", using the latest data available in the IFS database. After correction, this position still contains some smaller other liabilities which amount to roughly 2.3 bn. € in December 2011 (see note 30 of the annual report 2011).
		Bank of Italy	Bank of Italy Balance Sheet Aggregates and Official Reserves, Bank of Italy Balance Sheet Aggregates	"Other claims within the Eurosystem (net)" / "Other liabilities within the Eurosystem (net)"	
		Bank of Portugal	Statistical Bulletin, Table B.2.4, Assets and liabilities of the Banco de Portugal Vis-à-vis non-residents	Column 8: "Liabilities - Monetary financial institutions - Euro area countries"	
		Bank of Spain	Sistema de búsqueda de información estadística 1. Table 7.09 Economic Bulletin 2. 8.1.b Balance sheet of the Banco de Espana. Net Lending to credit institutions and its counterparts (monthly average of daily data)	Sistema de búsqueda de información estadística 1. Column 4: "Deposits of other Euro Area MFI's" Economic Bulletin 2. Column 21: "Counterparts, Intra ESCB, Target"	For the period 01/99 to 11/07 only monthly averages of daily data are available.

CORE	Austrian National Bank	Website of the Austrian National Bank (http://www.oenb.at), Report 1.1.31	"Net liabilities related to TARGET and correspondent accounts" / "Net claims related to TARGET and correspondent accounts	
	National Bank of Belgium	Statistical Bulletin / Belgostat online	"Other liabilities within the Eurosystem (net)" / "Other claims within the Eurosystem (net)"	These items comprise also some other, but minor, positions.
	Federal Bank of Germany	Website of the Federal Bank of Germany (http://www.bundesbank.de)	"Time series BBK01.EU8148B: MEMO ITEM: External position of the Bundesbank since the beginning of EMU / Claims within the Eurosystem / TARGET 2 (net)"	Before the Deutsche Bundesbank explicitly published the Target balance, one could find the series EU8148. This one diverges from EU8148B in two aspects: Firstly, the accrual principle is applied. Secondly, Target balances with central banks of countries not member of the Euro area are not included.
	Bank of France	Balance sheet of the Banque de France	Liabilities, other euro area countries – Deposits, MFIs	
	Bank of Finland	Website of the Bank of Finland (http://www.suomenpankki.fi) 1. Balance sheet of the Bank of Finland Bank of Finland Bulletin 2. Balance sheet of the Bank of Finland	1. "9.4 Claims related to Target and correspondent accounts (net)", "9.2 Liabilities related to Target and correspondent accounts (net)" 2. "Other claims within the Eurosystem (net)" / "Other liabilities within the Eurosystem (net)"	Monthly data does not match annual data since the first ones are as of the last Friday of the month while the figures in the annual report are as of the last day of the year.
	Central Bank of Luxembourg	Website of the Central Bank of Luxembourg (http://www.bcl.lu), Tab. 1.2 Financial statement of the Banque centrale du Luxembourg	"Cl. 18 Claim on the Eurosystem" / "Cl. 16 Liabilities to the Euroystem"	
	Netherlands Bank	Website of the Netherlands Bank (http://www.statistics.dnb.nl), T5.1 Balance sheet of the Nederlandsche Bank (monetary presentation)	"Loans to euro area residents, MFI, of which: target2 balance", "Deposits of euro area residents, MFI, of which: target2 balance"	
OTHER EURO AREA COUNTRIES NOT IN THE SAMPLE	Central Bank of Cyprus	Website of the Bank of Cyprus (http://www.centralbank.gov.cy), Monthly Balance Sheets	„Intra-Eurosystem liabilities" / „Intra-Eurosystem claims"	
	Bank of Estonia	Website of the Bank of Estonia (http:// http://www.eestipank.info), Statistical Indicators, Quarterly Balance sheet of the Eesti Pank	"9.4 Other claims within the Eurosystem (net)" / "10.3 Other liabilities within the Eurosystem (net)"	
	Central Bank of Malta	Website of the Central Bank of Malta (http://www.centralbankmalta.org), Balance Sheet of the Central Bank of Malta based on Statistical Principles	"Intra-Eurosystem claims" / "Intra-Eurosystem liabilities"	In the case of net liabilities to the Eurosystem, we adjust this item for "Liabilities related to the allocation of euro banknotes within the Eurosystem", using the latest IFS data available.
	Bank of Slovenia	Website of the Bank of Slovenia (http://www.bsi.si/), Table 1.7., Balance Sheet of the Banke of Slovenia – by Instruments – Liabilities	„Intra-Eurosystem liabilities" / „Intra-Eurosystem claims«	
	National Bank of Slovakia	Annual Report	Note 18 to "Intra-Eurosystem liabilities"	Data published only on a yearly basis

Notes: In the past, sources of Target2-data often changed in some countries. We therefore maintain a regularly updated list of these sources on our website, as well as the dataset itself (both also available upon request).

Appendix A7: Further Robustness Analysis

Table A7a: Varying Dependent Variables

	(1)	(2)	(3)	(4)	(5)
Variables	(Spread)	(1st Difference)	(Nom. Yield)	(Real Yield)	(Price)
Senior Tranche	0.043**	0.024***	0.043**	0.058***	-0.334**
	(2.57)	(7.65)	(2.57)	(5.72)	(2.79)
Debt/GDP	0.042***	0.021	0.042***	0.060***	-0.293***
	(6.81)	(1.77)	(6.81)	(4.75)	(6.59)
Current Account/GDP	0.013	0.005	0.013	0.014	-0.048
	(0.51)	(1.35)	(0.51)	(0.45)	(0.20)
REER	0.107**	0.100*	0.107**	0.98**	-0.769**
	(2.80)	(2.08)	(2.80)	(2.95)	(2.36)
Real GDP Growth	-0.055	-0.014	-0.055	-0.015	0.636
	(1.63)	(0.92)	(1.63)	(-0.24)	(1.74)
Country Fixed Effects	yes	yes	yes	yes	yes
Time Fixed Effects	yes	yes	yes	yes	yes
R^2	0.76	0.33	0.69	0.74	0.76
Obs.	542	529	542	542	500

*Notes: Robust t-statistics in parentheses; *, **, *** indicate variables significant at 10%, 5%, and 1% level respectively. Results are from a panel fixed effects model estimated using OLS. Reported R^2 is calculated "within", i.e. from the mean-deviated regression. This table compares different dependent variables: The 10-year government bond spread against Germany (Column 1), the first (logged) differences of the spread (Column 2), the nominal and real government bond yield (Columns 3 and 4) and the government bond price. Data source: See data appendix A5.*

Table A7b: Outlier Analysis

Variables	(GRC)	(ESP)	(ITA)	(PRT)	(IRL)
Senior Tranche	0.039**	0.043**	0.043**	0.037***	0.085***
	(2.75)	(2.27)	(2.56)	(3.50)	(4.30)
Debt/GDP	0.040***	0.041***	0.043***	0.037***	0.048***
	(5.11)	(5.98)	(7.33)	(6.19)	(6.27)
Current Account/GDP	0.010	0.017	0.014	-0.009	-0.001
	(0.37)	(0.56)	(0.54)	(0.83)	(0.03)
REER	0.079*	0.111*	0.107**	0.091*	0.087*
	(1.98)	(2.20)	(2.68)	(2.13)	(2.17)
Real GDP Growth	-0.020	-0.059	-0.053	-0.049	-0.049*
	(0.69)	(1.74)	(1.54)	(1.10)	(2.20)
Country Fixed Effects	yes	yes	yes	yes	yes
Time Fixed Effects	yes	yes	yes	yes	yes
R^2	0.74	0.74	0.75	0.77	0.83
Obs.	501	493	493	493	501

*Notes: In the reported regressions individual countries are dropped from the sample. Robust t-statistics in parentheses; *, **, *** indicate variables significant at 10%, 5%, and 1% level respectively. Results are from a panel fixed effects model estimated using OLS. Reported R^2 is calculated "within", i.e. from the mean-deviated regression. Data source: See data appendix A5.*