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Abstract
An active role of fiscal policy has been rediscovered as a crisis remedy at the beginning of the financial crisis all over Europe. More recently, the Euro Crisis with its mounting governments' funding costs for a number of Southern EU member states and Ireland has called this strategy into question. As opposed to this view, the main point of this contribution is to elaborate a link between rising sovereign risk premia in the Eurozone and a major feature of the financial crisis – which culminated in elevated uncertainty after the Lehman collapse. Theoretically, this link is developed with a reference to Keynes' liquidity preference theory. Empirically, a high explanatory power of rising uncertainty in financial markets and detrimental effects of fiscal austerity for the evolution of sovereign risk spreads are demonstrated by means of panel regressions and supplementary correlation analyses.
JEL: E12, E62, G12

Introduction: a Renaissance of Fiscal Policy during the Financial Crisis

It is well-known that governments' receipts from taxes and social benefits are unstable sources of finance in the business cycle. At the expenditure side, there are a number of items which fluctuate as well. The most prominent example is social spending on unemployment benefits which is often subsidized from the central government budget during downturns. In such times of economic strain rising government outlays and falling receipts result in fiscal deficits. Cyclical deficits (and surpluses) since the Keynesian revolution have been regarded as unproblematic by the majority of economists because they represent a counterbalance to highly cyclical parts of private spending. As the practical conduct of fiscal policy is concerned, so-called *Automatic Stabilizers* can be found in the institutional frameworks of fiscal policy in many countries. For example, even in the constitutional debt brakes of Switzerland and Germany cyclical deficits shall be accounted for in the calculation of the maximum amount of the current deficit.

Next to the working of automatic stabilizers one of the immediate crisis responses following the Lehman collapse was a resurgence of fiscal stimulus in a number of countries around the world. Increased public spending on infrastructure as well as subsidies granted by governments (in order to encourage private consumption or labor hoarding by employers) were part of these efforts. Examples in Europe comprise large fiscal stimulus programs, such as Germany's *Konjunkturpakete I* and *II*, and subsidy schemes for the private purchase of new cars, which were set up temporarily in Italy, France and Germany (similar to the *Cash for Clunkers* program in the U.S.). These developments seemingly went along with a gradual upgrading of fiscal policy as an economic policy tool.[1] However, a reappraisal of fiscal policy has suffered a severe blow by the sharp worsening of funding conditions for a number of European Monetary Union (EMU) member states since mid 2011. Speculation against selected countries from Southern Europe and Ireland took the form of rising sovereign risk premia.[2]

The proponents of fiscal austerity argue that the massive debt load of these countries (and their weak price competitiveness) is the reason of speculative attacks which are only rational following this argument. This view is upheld most strongly in the European economic

[1] This is reflected in two recent JEL contributions on this issue; see Parker (2011) and Ramey (2011).

[2] The much-debated governments' funding costs are measured as a difference of the rate of return on long term government bonds (10 year maturity, so-called *Benchmark Bonds*) vis-à-vis the rate of German long term government bonds (*Bunds*).

heartland, Germany, and some countries in its neighborhood.[3] Moreover, it is shared by many European politicians as is demonstrated by the vast majority for the fiscal compact – the philosophy of which is far away from a real fiscal union or any kind of burden sharing. Also the European Commission and some leading European economists back the view that fiscal austerity is needed now in order to reverse "spending excesses" of the past.[4]

As opposed to this view, the main point of this contribution is to show a link between rising sovereign risk premia in the Eurozone and an important feature of the financial crisis – which culminated in elevated uncertainty after the Lehman collapse. I argue that a major source of risk premia is a flight of European and international investors into very liquid benchmark bonds such as the German Bund, which are regarded as safe in times of high uncertainty in financial markets. Moreover, following Keynes famous paradox of thrift, fiscal austerity might not yield the expected results of calming financial markets. Rather, GDP drops induced by spending cuts can further deteriorate not just public finances but also financial stability – measured by sovereign risk premia.

The article is structured as follows. In section 1 a short overview of the recent development of sovereign risk premia in the EMU is given. Theoretically, the link between sovereign risk premia and high levels of uncertainty on financial markets is developed with a reference to Keynes' theory of interest in section 2. In the empirical section 3, a high explanatory power of rising uncertainty in financial markets and detrimental effects of fiscal austerity for the evolution of sovereign risk premia can be shown by means of panel regressions and supplementary correlation analyses. Lastly, section 4 summarizes and draws conclusions.

1. A short glance on the evolution of sovereign risk premia in Europe

The most visible characteristic of the European Debt Crisis are rising sovereign risk premia of the so-called *Euro periphery* Greece, Portugal and Ireland. These were the countries under financial market attack from the very beginning of the Euro crisis in 2009. Meanwhile, Spain and Italy have been added to the list although those countries can hardly be regarded as periphery when their economic weight is considered. Sovereign risk premia are measured as a difference of the rate of return on long-term government bonds (benchmark bonds) vis-à-vis the rate of return on a long-term benchmark bond with a relatively stable development (the latter can be chosen for a number of reasons, some of which are listed in the next section). In the EMU the rate of German long-term bonds – the Bund rate is most widely used for this calculation. The development of these sovereign risk premia for a selection of crisis countries is depicted in Figure 1, where the development of risk premia in Greece sets out the upper margin (solid line).

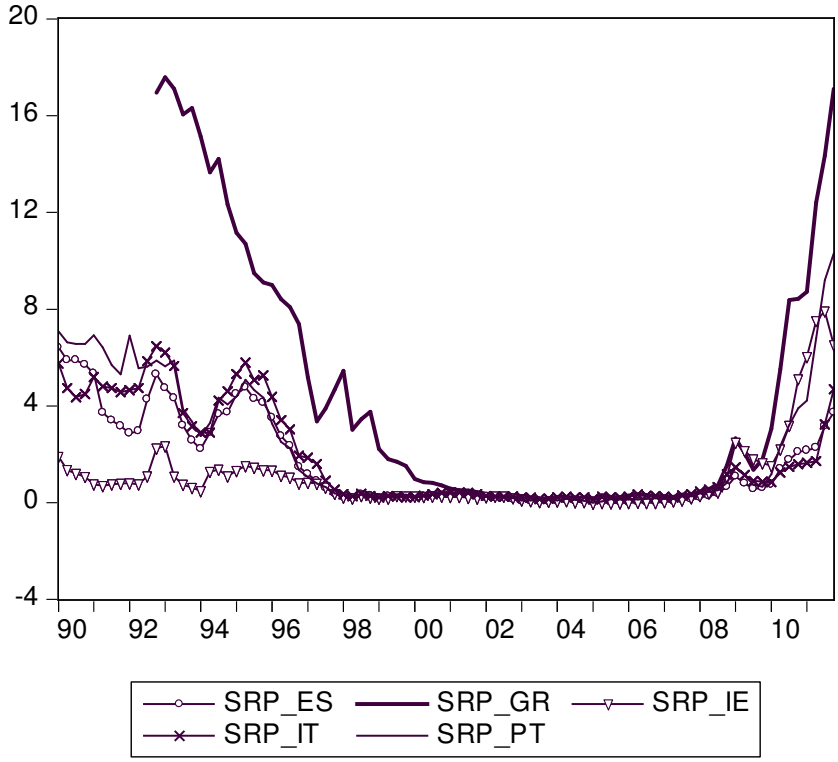
For Greece the risk premium started to rise already in the year 2008 and a first peak (2.7%) was reached in the first quarter of 2009. The general public only started noticing this when risk premia started skyrocketing in the second quarter of 2010. Already before that incident it had become generally known that Greek governments had been hiding information about the true extent of the debt level. The ensuing devaluation of public debt affected other member states as well – most notably Portugal and Ireland, which nevertheless had their own problems

[3] Most prominent and fierce defenders of this line of argument are German central bankers such as Bundesbank president Jens Weidmann or the former ECB chief economist Jürgen Stark. Another important proponent is ifo Institute head Hans-Werner Sinn.

[4] DG ECFIN commissioner Olli Rehn might serve as an example: "Rehn tells Spain: Stick to deficit targets", Financial Times, 24th March. Another example is CEPS director Daniel Gros, who regards fiscal austerity as rather unproblematic because he does not assume long-run negative repercussions; see Gros (2011).

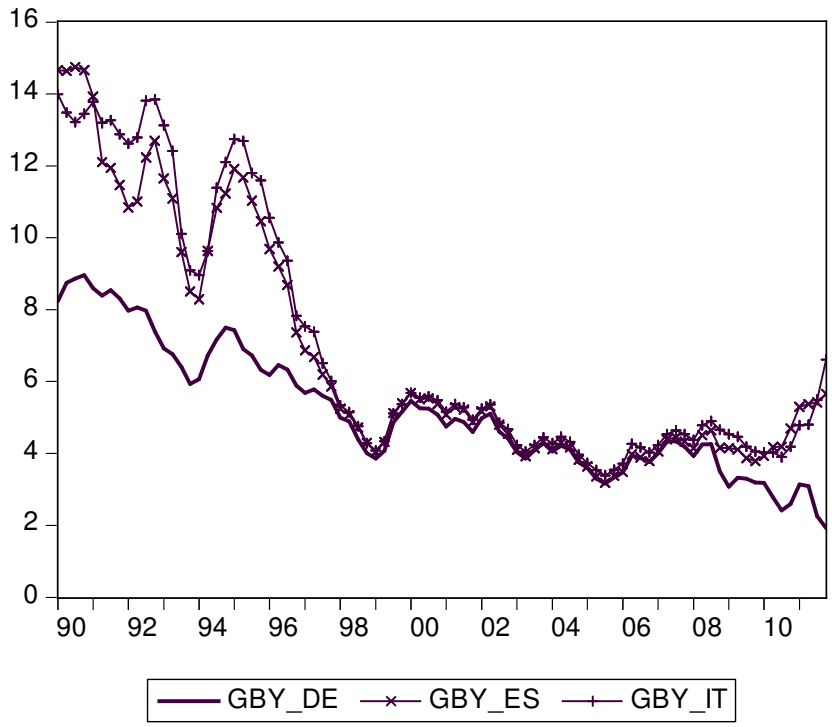
– as can be seen from Figure 1. At last, also Spain and Italy became to feel the grip of financial markets. In the fourth quarter of 2011 their risk premia reached 3% and 4% on average. While this looks like a large scale investors' flight from these bonds, there was one major bond issuer that was not subject to this. On the contrary, German bonds seemed to profit from the flight which can be seen from nominal rates of return in Figure 2 where they set out the lower margin in a comparison with two other large EMU member states (Italy and Spain).

Figure 1: Evolution of sovereign risk premia (SRP) in 5 crisis countries of the Eurozone (GR: Greece, PT: Portugal, IE: Ireland, ES: Spain, IT: Italy)



Data source: IMF IFS and own calculations

Figure 2: Nominal government bond yields (GBY) on long-term German (GBY_DE), Spanish (GBY_ES) and Italian Bonds (GBY_IT)



Data source: IMF IFS

As can be seen from Figure 2, the trend of German long-term bond (Bund) yields has been declining on average since the beginning of the observation period. At the start of EMU this trend flattened somewhat and started accelerating again at the beginning of the Euro Crisis. What is more, already in the run-up to EMU a convergence of bond yields (sometimes called *compression*) set in which, however disappeared quite abruptly in 2008 – just before the onset of the Euro Crisis. Since then, the evolution of German yields has been decoupled from the average movement of yields in the Eurozone while yields of Southern EMU member states and Ireland were moving upwards – leading to higher risk premia on these bonds.

2. A Keynesian Theory of Sovereign Risk Premia

According to the mainstream view of European policy makers, as it is reflected in the large majority for the Fiscal Compact, the Euro Crisis has been caused by lax conduct of fiscal policy in the crisis countries. Much of the current debate concentrates on the elevated debt ratios or the ongoing dynamic of government indebtedness. The underlying assumption is that high levels of government debt raise private investors' expectations of the default probability which is then reflected in rising sovereign risk premia. This analysis offers a straightforward remedy for the Euro Crisis which can only be stopped when a credible trend reversal in the debt level is reached.

One might assume that this view is firmly anchored in economic theory. However, a look at existing studies on sovereign risk reveals that large parts of this literature have a predominantly empirical focus and do not develop a deep theory of sovereign risk premia.

Maybe it is symptomatic that even Rogoff and Reinhard (2010), who aim at giving a comprehensive overview of financial crises in their bestselling book "This time is different", dedicate only one page to the study of sovereign risk. Only recently, the theory debate has picked up some pace in the finance literature. Examples include Vayanos (2004) and Acharya and Pedersen (2005), who used CAPM models for modeling liquidity effects which they deem to be an important characteristic of asset pricing (the latter contribution being more general and not concerned with sovereign risk, in particular). Those models can be linked to a general equilibrium view of sovereign risk premia.

The conventional notion of *risk* in these contributions is something that can be assessed using actuarial mathematics calculus. A risk assessment of sovereign bonds implies that financial investors continuously monitor default probabilities of assets (which they own or regard as interesting for their portfolio) and other sources of valuation risk (e.g. risks related to changing exchange rates and interest rates). To this end, they use macroeconomic information which is made available by agencies such as Eurostat or the IMF. These data sets are often called *fundamentals* as they enable financial market actors to do a risk assessment based on fundamental facts of the affected economies. Most empirical studies on sovereign risk premia use some sort of fiscal variable such as the fiscal deficit or the debt ratio (in % of GDP)[5] or expected values of these variables (Canzoneri et al., 2002). Fundamental variables can also comprise private sector data of the considered economies. Examples are the studies of Altman and Rijken (2011) as well as Dötz and Fischer (2010) who use bankruptcy probability estimates for private sector companies or – more specifically – the banking sector.

An interesting amendment of such explanations of sovereign risk premia can be found in a number of recent studies. Those argue that risk premia are a financial market phenomenon and as such they are affected by broad-based movements on these markets which are not necessary linked to individual countries' fundamentals. Especially in times of elevated uncertainty investors' *risk appetite* diminishes which can lead to rising sovereign risk premia (Sgherri and Zoli 2009). As opposed to a purely microeconomic modeling of risk aversion, those contributions point out the importance of macroeconomic uncertainty which contributes to large swings on financial markets (Sgherri and Zoli 2009; Beber et al. 2009). In this literature empirical proxies for investors' risk appetite are used such as the *US AAA* [or] *US BBB corporate bond index spread over US treasuries* (yield premium of US corporate bonds of certain rating classes as compared to long-term sovereign US bonds) or the *VIX* (volatility index of the US stock market). Some authors use statistical decompositions (principal components) of such measures (Barbosa and Costa 2010). The prominent role of measures for the US markets can be related to their particular depth and, therefore, their central role for international financial markets.

Generally speaking, the above-mentioned studies find a large explanatory power of proxies for general financial market uncertainty for the evolution of sovereign risk premia. Not surprisingly, the correlation is positive. I.e. rising levels of uncertainty on financial markets coincide with rising sovereign risk premia, as can be expected when there is a flight to a selection of "safe" benchmark bonds. This effect can be even reinforced when there is a conditioning effect of financial market uncertainty on the risk perception associated to fundamentals, such as the debt share. An indication for the latter can be significant interaction terms, which have been found in a study of Codogno et al. (2003).

Despite the good and interesting results of studies incorporating measures of uncertainty, they also have to be judged against the background of a general lack of theoretical foundation. A

[5] Examples for studies which find a positive effect of the debt ratio on sovereign risk premia are Codogno et al. (2003), Haugh et al. (2009); Marratin and Salotti (2010); Bernoth and Erdogan (2012).

theoretical derivation of the risk appetite cannot be found in those studies. The aim of this contribution therefore is to offer some more insight, how uncertainty as a general feature of financial markets enters into the pricing of sovereign bonds (and as a reflection of this, sovereign risk premia). A theoretical derivation of this is made by making reference to Keynes' (1936) theory of interest which was developed in the General Theory. I start with a short description of this theory. Four motives for the holding of money as most liquid of all assets are listed in chapter 15:

1. Income motive (funds for individual household payments up to the next income flow)
2. Business motive (equivalent to motive 1 for the business sector, where income is replaced by sales revenue)
3. Precautionary motive (precaution for contingent outlays)
4. Speculation motive

All these motives together represent reasons for holding money (demand for money). Thus, if money shall be given out of the hands of individual owners (be it households, enterprises or banks) and the underlying act is not a goods purchase, it has to be compensated by an interest rate. The resulting interest rate is the equilibrium condition for the money market (Keynes regarded the money supply as exogenous in his exposition, for reasons of simplification). Motives 1 to 3 can be regarded as rather stable sources of money demand. For motive 4 it is reasonable to assume a larger influence of uncertainty following Keynes' argument on the vagueness of knowledge (regarding the investment decision). Considering the behavior of speculators he coined the term *beauty contest* for the financial market participants' activity of outguessing the mass taste – which points to the assumption of a rather unstable speculative motive. Therefore, expectations – and related uncertainty – about the broad economic development path and (more specifically) the development of financial markets exert a considerable influence on the extent of speculative money demand in Keynes' view.

For my consideration of sovereign risk premia it is useful to assume investors with an international orientation. This assumption is straightforward – financial markets these days are very much internationally integrated. Moreover, by way of their construction sovereign risk premia have an international dimension since only selected benchmark bonds are used for their calculation. Few benchmark bonds are used in practice[6] and their sovereigns are well integrated into international financial markets (US, UK) and/or into the international division of labor (Germany, Japan). Those assets as well as assets with more narrow markets can be expected to be subject to valuation changes if bouts of elevated uncertainty (in the Post Keynesian sense) make investors' conventional valuation considerations obsolete.

High levels of uncertainty can be expected to cause an increasing demand for speculative cash holdings because liquidity enables financial market investors to react fast to further unforeseen developments with major impacts on financial earning positions. In Keynes (1936) only two assets were considered for the liquidity motive: money (with the highest liquidity) and securities (less liquid) – the former not bearing interests, while the latter does. A high demand for liquidity can in principle be met by selling parts of existing asset positions (as long as there are enough counterparties for those trades, which is the case when not all market participants share the same opinion (Keynes 1936, ch. 12).

However, the argument can be made more general in assuming that uncertainty-induced sales are not equally distributed over all asset classes but affect notes which cannot be traded that easily. This is a corollary of the demand for liquid asset holdings in times of elevated uncertainty. Among investors' existing assets there are interest-bearing securities which have

[6] As an example, Bloomberg.com displays rates of UK gilts, US treasuries and Japanese 10 year notes at the top.

this interesting property of being close substitutes to money regarding their degree of liquidity (reflecting investors' ability to transform them into other assets – which usually involves selling them). Being close substitutes to money from an investor's perspective, it is not surprising that their yields can drop to zero (reflecting their safe haven status). Thus, following the speculative motive, sales affect highly liquid benchmark bonds to a lesser extent. Those benchmark bonds' high degree of liquidity can be derived from deep financial markets of the issuing country (or currency area, in the case of Germany), contract currencies with a relatively stable track record and good institutional frameworks (these elements can also condition each other). Where these conditions are not met – in countries not issuing highly liquid benchmark bonds – rising sovereign risk premia further limit governments' flexibility to cushion sudden shortfalls of aggregate demand. Paradoxically, this might be considered as a further risk for the stability of output and debt levels (see the estimation results in the next section) and push up risk premia even further.

Considering all of this, money liquidity cannot be raised by sales. Rather those result in a redistribution of liquidity (Keynes 1936, ch. 12). However, some speculators might regard higher sovereign risk premia as the necessary monetary compensation and step into the market (as long as higher returns are not outweighed by a conventional risk assessment). This effect can accommodate other speculators' demand for higher liquidity. Moreover, other sources of higher liquidity can be imagined. As an example, times of high uncertainty on financial markets often coincide with economic crises. In these situations governments and central banks try their best to resurrect private activity and resulting profits (an overview of these activities and their relative success in the US in historical situations was given by Minsky 1986). After a certain time lag this can accommodate the speculative demand for money. This can even be the case without any time lag when central banks use their open market policy to purchase securities – an option which was used intensely by the Bank of England and the Federal Reserve in the recent financial crisis.

So far, I have only regarded selling pressure on less liquid benchmark bonds as a source of rising sovereign risk premia. This is only part of the picture as could be seen on the right hand side of Figure 2, where German benchmark bond yields were not only *not rising* but *falling* in the financial crisis (despite rising debt levels also in Germany). Referring to the above-mentioned speculative motive it is possible to understand this development. Falling benchmark bond yields can have private and public sources in a situation of high financial market uncertainty. Private actors with a relatively constant demand for speculative cash-holdings (as for example insurance companies with a large stock of financial assets) may restructure their portfolio when uncertainty hits financial markets in order to limit losses in riskier (non-benchmark) parts of their portfolio. This trend may be reinforced by speculators who bet their cash on such movements in order to profit from the market swing. The open market policy of large central banks was already mentioned – it has a potential yield-compressing effect especially for highly liquid benchmark bonds (not the least due to regulations concerning acceptable collateral or even the explicit wish to lower long-term benchmark bond interest rates). Moreover, Basle II and Basle III can be mentioned as important regulations which exert pressure on large asset management organizations and banks to restructure their portfolio proactively in order to meet the equity criteria. Again, in times of financial market distress this has an advantageous effect for highly liquid benchmark bonds (thus, it is lowering their yields). This is not to mention financial market supervision and other regulations which work in the same direction.

Hence, the Keynesian view on the link between uncertainty and asset pricing offers an explanation for both sides of the observed large swings on financial markets. It includes investors' *flights from* less liquid benchmark bonds *into* more liquid benchmark bonds, thus

pushing up the sovereign risk premia. The central role of uncertainty for asset pricing also appears in recent works such as Brunnermeier and Pedersen (2009) who denote this result as a *flight to quality*. Uncertainty, therefore, is a potential driving force for a broad-based flight from comparatively illiquid benchmark bonds into more liquid benchmark bonds as we have witnessed it during the Euro Crisis.

3. An Empirical Investigation of the Drivers of Sovereign Risk Premia in the Euro Crisis

As mentioned in the last section, large parts of the empirical sovereign risk literature are dedicated to finding the weight of *national fundamental factors* in the pricing of sovereign bonds. The resulting risk spreads are considered as the outcome of rational pricing decisions, reflecting considerations about the default risk of the respective sovereigns. To mention the most important fundamental, the majority of studies use at least one fiscal variable (deficit or debt ratio).[7] Next to this, variables measuring the ease of trading bonds (transaction cost measures such as the bid-ask spread) are present in some studies[8] and sometimes also private sector variables with a potential for spillover effects to public budgets are considered. Increasingly, the literature is also incorporating measures for financial market uncertainty as has been mentioned above.

The empirical examination of this section is strongly inspired by the usual set-up of above-mentioned empirical studies. This means that a selection of fundamentals is combined with a number of measures for uncertainty in the estimation. As method panel estimations have been chosen which also follows the majority of studies and is especially suitable for having a broad look at the Euro Crisis.[9] Some other fundamentals have been found contributory in the Sovereign Rating literature (see Afonso et al. 2007). This includes the level of foreign indebtedness and GDP growth.[10] For the inclusion of uncertainty two measures are used. Both stem from the international interbank markets. This is appropriate because these markets are central for bank liquidity and therefore represent major branch points of international financial markets. Not least, banks are important holders of sovereign bonds which they use as collateral in their refinancing operations.

The first uncertainty variable is the so-called *US TED spread* which measures the difference of 3 months interest rates on Eurodollar[11] contracts on the London interbank market (3M US Libor) and interest rates on low-risk 3 months US T-bills (short-term government securities). Due to the central role of the US Dollar for world financial markets the US TED spread is a truly international risk measure (Orlowski 2008).[12] Similar to this global variable another

[7] Next to many other examples: Codogno et al. (2003), Haugh et al. (2009); Marratin and Salotti (2010); Bernoth and Erdogan (2012).

[8] E.g. in the studies of Barbosa and Costa (2010), Bernoth and Erdogan (2012); for a partial model see Favero et al. (2010).

[9] This has been done by others before, but with a different purpose; see von Hagen et al. (2011).

[10] Some more variables were found by these authors which are however not necessary in this examination as they presumably display a low degree of volatility which makes them dispensable for this examination with its very short time horizon.

[11] Eurodollar contracts are money market contracts in US Dollar which are concluded outside the US.

[12] Recently, there has been a discussion about US Libor manipulation. However, collusion is something that can be expected in oligopolistic markets. At the same time, collusive arrangements can be seen outcome of a non-cooperative game and cannot be enforced. Therefore, forces are at play which can make collusive arrangements quite unstable as is exemplified by the recent disclosures. It can be expected that collusion has a scope which is rather limited in time.

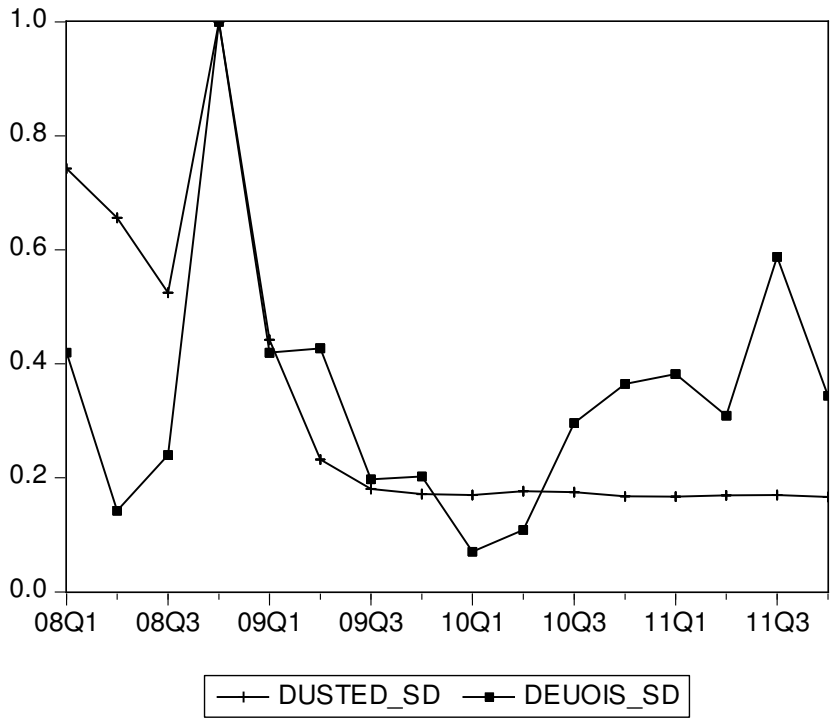
variable is used with a more regional scope. The *EU OIS spread* measures the difference between 3 months Euribor and 3 months OIS. The Euribor is the Euro equivalent to the US Libor and thus a measure of funding stress in the European interbank market. As the European T-bill markets are generally less liquid than the US T-Bill market the OIS is used as a European substitute. Low-risk swap interest rates such as the OIS are often regarded as central measures for a judgment of the funding conditions in the international banking sector (see BIS 2012, p. 2-6).

Funding stress in the banking sector can be considered as a result of fundamental factors and true uncertainty. In principle, from one bank's perspective a conceived deterioration of other banks' assets such as benchmark bonds can contribute to less willingness to lend to them and, thus, drive up the Libor or the Euribor. However, a general mistrust among big international banks can also be the result of fundamental uncertainty over where the true risk is situated. In any case, news about fundamentals can be expected to work rather smoothly through the financial system while fundamental uncertainty could be displayed in sudden bouts of market volatility. Therefore, not only the US TED spread and the EU OIS spread shall be used in the subsequent estimations but also two measures for their volatility. In order to construct these time-variant series, ARCH-GARCH models with lagged endogenous variables were used to filter out possible fundamental effects which might be measured by the influence of lagged endogenous variables in trading day data.[13] (see Appendix).

The extracted time-variant standard deviations were then averaged to calculate quarterly data for subsequent panel estimations. Because the underlying daily standard deviations are quite small, these time series were then divided by their largest value (still close to zero and thus raising the values) in order to normalize them to a level which is closer to that of the other variables. Both time series are depicted in Figure 3 for illustrative purpose. This Figure displays the phases of the financial crisis: the high level of uncertainty after the Lehman collapse (culminating in the last quarter of 2008 in both interbank markets) as well as the increasing intensity of the Euro Crisis – showed by uncertainty on European interbank markets getting ahead of its more international counterpart after the second quarter of 2010.

[13] This was done assuming that fundamentals need up to three trading days to be fully reflected in rates. Incorporating more lags did not yield better results.

Figure 3: time variant standard deviations (SD) of US TED and EU OIS (averaged data from the ARCH-GARCH estimations, divided by highest value in Q4 2008)



Data sources: own calculations based on IMF IFS, BBA, EBF/Euribor

Next to the sources of sovereign risk premia discussed above, Keynesian authors often argue that austerity during slumps most probably leads to a further deterioration of the economy and – as a result – public finances (Jayadev and Konczal 2010). This argument can be traced back to the famous paradox of thrift of Keynes (1936, chapter 7). If austerity is indeed self-defeating in a crisis time, the widely-shared view, that timely deficit reductions are key when it comes to reducing sovereign risk premia, should be approached with great caution. The opposite hypothesis is well-known in the literature under the heading of non-Keynesian effects of budget consolidation (Alesina and Ardagna 2009). The link of this argument – which originally focused on the level of economic activity and public debt – to financial stability is made by Corsetti et al. (2011). According to these scholars an expected worsening of the public debt situation is causing an immediate drop in private activity due to expected higher taxes. This, in turn, causes the sovereign risk premium to rise.

While a thorough test of the above-mentioned hypotheses related to crisis-exacerbating or – opposed to this – crisis-abating role of fiscal austerity is not an easy undertaking, the question in subsequent panel estimations is rather to what extent movements of sovereign risk premia can be explained by the fiscal variables and other national fundamentals or if a major source of rising sovereign risk premia can be found on international financial markets (and uncertainty on those). To give a balanced overview, the following fiscal variables are used:

1. Lagged changes of the primary surplus (in % of GDP).
2. Lagged changes of the debt share (in % of GDP).
3. Lagged changes of the deficit (in % of GDP).
4. Lagged changes of government consumption (in % of GDP).

To avoid endogeneity in the measurement of the influence of uncertainty on sovereign risk premia (which would lead to biased estimates of the link), first a possible influence of sovereign risk premia on uncertainty was checked. Granger causality tests using trading day data for the time from 2009 till 2011 revealed that there was no problem with reverse causation in this time span.[14] Moreover, all variables were checked for unit roots and, if necessary, they were differenced. The estimations were then run separately for the fiscal variables introduced above.

Table 1: Panel estimations of determinants of sovereign risk premia without financial market uncertainty data; estimation method: fixed effects; EMU14 (all but Germany, Luxemburg and Estonia); time: 2008Q1-2011Q4; n*T=224

	Fiscal variables			
Dependent variable: Δ(srp)	Δ Primary surplus	Δ Debt share	Δ Deficit	Δ Government consumption
constant	0.27***	0.19***	0.27***	0.33***
	(.04)	(.05)	(.04)	(.04)
Δ GDP(t)	-0.07**	-0.08**	-0.07**	-0.07**
	(.03)	(.03)	(.03)	(.03)
Δ GDP(t-1)	0.02	0.04	0.02	0.05*
	(.03)	(.03)	(.03)	(.03)
Δ GDP(t-2)	0.02	0.05	0.02	0.03
	(.03)	(.03)	(.03)	(.03)
Δ Fiscal variable(t-1)	0.03***	0.01	0.03***	-0.04***
	(.01)	(.01)	(.01)	(.01)
Δ Fiscal variable(t-2)	0.02	0.02	0.01	-0.03***
	(.01)	(.01)	(.01)	(.01)
Δ Fiscal variable(t-3)	0.00	0.03**	-0.01	-0.01
	(.01)	(.01)	(.01)	(.01)
Δ USD(t-1)	-1.29**	-1.35**	-1.26**	-1.21**
	(.54)	(.55)	(.54)	(.54)
McFadden R^2	0.22	0.21	0.23	0.25
Fixed effects Likelihood ratio prob.	0.00	0.00	0.00	0.00

*/**/*** significant on the 1% / 5% / 10% level; Data sources: Eurostat (GDP growth, debt shares, deficits, government consumption, USD exchange rate), IMF IFS (bond yields, primary surplus, T-Bill rate, GDP growth for Greece), EBF/Euribor (Euribor, OIS), BBA (US Libor)

[14] In line with the reasoning of section 2, a number of influences could be detected running from uncertainty to sovereign risk premia. For the opposite direction only the Portuguese data revealed Granger causality towards the EU OIS standard deviation on the 5% error level. However, the estimated parameter was small (-0.002) and had the wrong sign. It can therefore be regarded as a spurious correlation.

The first round of estimations in Table 1 was done without the financial market variables but with fundamentals.[15] The fit of these equations is not very good as is displayed by the low McFadden R^2. Lagged changes of the USD over Euro exchange rate are used as a proxy for expected exchange rate risk and seem to work in the right direction (falling USD/Euro indicating higher SRP). Moreover, some lags of the fiscal variables show significant effects. Only the estimate for the debt share has the correct sign and seems to support the argument that fiscal austerity has a cushioning effect on sovereign risk at least after 3 quarters. The signs for the primary balance and the deficit are not as expected (improvements of the fiscal balance lead to higher SRP). Lastly, increases of government consumption seem to have a cushioning effect on sovereign risk. A possible reason for this might be expectations about the multiplier effects of fiscal expansions. This view is supported by the finding that GDP growth matters for sovereign risk, as is shown by the significant contemporaneous effect.

Next, the estimations were repeated including the variables for financial market uncertainty (shaded area of Table 2). To sum up, results in Table 2 indicate that changes in the uncertainty measures are important driving forces of sovereign risk premia in the Eurozone.[16] After including the financial market uncertainty variables based on the EU OIS and the US TED spread the explanatory power of the models roughly doubled as compared to earlier results of Table 1 which is shown by the high values of McFadden R^2. A strong and positive impact of financial market uncertainty on SRP is in line with the extraordinary importance of uncertainty in Keynes' speculative motive. Another result is that sovereign risk premia are influenced by lagged changes of the exchange rate – which can be connected to expectations on further devaluations (depicting a currency risk premium). However, this effect is lower in the results of Table 2 as compared to Table 1 and not always significant.

[15] The lag order was optimized using the Akaike information criterion for the more complex estimations of Table 2 in order to make results comparable (some more lags in the case of simple estimations of Table 1 only make estimation results a bit less efficient). Lag order 2 was optimal for GDP growth and lag order 3 for the fiscal variables. Estimations were done using fixed effects which are significant in all specifications (see Likelihood ratio test prob. values in the bottom line of Table 1).

[16] For the extraordinary event of the Lehman collapse two dummies (Lehman 1 for the sharp rise of uncertainty in Q4 2008 and Lehman 2 for its subsequent fall in Q1 2009) were included in order to allow for a special influence of this idiosyncratic event on sovereign risk. Estimated values for these dummies indicate that only a part of elevated uncertainty after the Lehman collapse was finally reflected in higher SRP.

Table 2: Panel estimations of determinants of sovereign risk premia with financial market uncertainty data; estimation method: fixed effects; EMU14 (all but Germany, Luxemburg and Estonia); time: 2008Q1-2011Q4; n*T=224

	Fiscal variable			
	Δ Primary surplus	Δ Debt share	Δ Deficit	Δ Government consumption
constant	0.38***	0.30***	0.38***	0.39***
	(.04)	(.05)	(.04)	(.04)
Δ GDP(t)	-0.10***	-0.09***	-0.10***	-0.09***
	(.03)	(.03)	(.03)	(.03)
Δ GDP(t-1)	-0.09***	-0.07**	-0.09***	-0.07**
	(.03)	(.03)	(.03)	(.03)
Δ GDP(t-2)	-0.07***	-0.06**	-0.07***	-0.08***
	(.03)	(.03)	(.02)	(.03)
Δ Fiscal variable(t-1)	0.00	0.02*	0.00	-0.02**
	(.01)	(.01)	(.01)	(.01)
Δ Fiscal variable(t-2)	-0.02	0.01	-0.02**	-0.01
	(.01)	(.01)	(.01)	(.01)
Δ Fiscal variable(t-3)	-0.04***	0.02*	-0.05***	0.01
	(.01)	(.01)	(.01)	(.01)
Δ USD(t-1)	-1.00*	-0.87	-1.07*	-0.87
	(.57)	(.6)	(.56)	(.6)
Uncertainty variables:				
Δ $EUOIS_{sd}$	0.84***	0.82***	0.85***	0.75***
	(.22)	(.23)	(.22)	(.23)
Δ $USTED_{sd}$	2.33***	2.15***	2.39***	2.04***
	(.51)	(.53)	(.5)	(.54)
Δ EUOIS	1.08***	0.98***	1.10***	0.96***
	(.24)	(.24)	(.23)	(.24)
Δ USTED	0.94***	0.84***	0.95***	0.82***
	(.26)	(.26)	(.25)	(.26)
Dummy Lehman 1	-3.97***	-3.54***	-4.05***	-3.38***
	(.45)	(.44)	(.44)	(.5)
Dummy Lehman 2	3.16***	2.98***	3.20***	2.78***
	(.48)	(.48)	(.47)	(.49)
McFadden R^2	0.40	0.44	0.49	0.44
Fixed effects				
Likelihood ratio prob.	0.00	0.00	0.00	0.00

*/**/*** significant on the 1% / 5% / 10% level; data sources: see Table 1

Moreover, the influence of fundamentals on sovereign risk is more visible in the estimation results of Table 2. The fiscal variables have the correct signs, indicating that ceteris paribus – if a changed fiscal stance does not hurt growth – higher primary balances as well as lower deficits and debt shares lead to improved SRP after 3 quarters, the latest. As in the earlier estimations, a cushioning effect of higher government consumption on SRP can be found after

1 quarter (this effect is somewhat lower as compared to the result of Table 1). Lastly, the influence of GDP growth on SRP seems to be substantial and enduring in all the estimations. Changes in GDP growth have a strong influence on the evolution of SRP for 3 quarters. It is interesting to note that this effect is much stronger than that of the fiscal variables, considering that the underlying variables have the same reference magnitude (they are measured as changes in percent of GDP). As a stability check, estimations were repeated for a selection of Southern EMU member states. Results did not differ qualitatively (interestingly, GDP growth did have an even stronger effect in these estimations).

Table 3: Correlation coefficients of the fiscal stance (cumulated changes over last 4 quarters) with GDP growth in the budget consolidation period 2010-2011; EMU14

Lags of the fiscal stance	Δ Primary surplus	Δ Debt share	Δ Deficit	Δ Government consumption
contemporeneous	-0.09	-0.26***	-0.10	0.44***
1 lag	0.11	-0.28***	0.12	0.35***
2 lags	-0.25**	-0.17	-0.24**	0.35***
3 lags	-0.07	-0.20*	-0.06	0.33***

*/**/*** significant on the 1% / 5% / 10% level; data sources: see Table 1

Lastly, possible effects of budget consolidation on sovereign risk shall be examined. To this end, supplementary correlation analyses for lagged changes of the fiscal variables and GDP growth where conducted for the time span from 2010 to 2011, when budget consolidation went high on the political agenda of the EU (discussions an ECOFIN summits were focusing on fiscal "Exit Strategies"). Calculation results of Table 3 reveal some significant and negative correlation coefficients of GDP growth and lagged changes of the primary deficit, the debt share and the deficit. Even though these values are not large, truly non-Keynesian effects of budget consolidation would suggest a positive correlation or at least (in the case of Ricardian equivalence) a zero correlation; meaning that fiscal consolidation does not hurt growth (or even spurs growth). Thus, following the non-Keynesian hypothesis on budget consolidation one should expect insignificant or positive parameter values but not an agglomeration of significant negative correlation coefficients of deficit/debt variables and GDP growth. Furthermore, the working of the fiscal multiplier is suggested by the medium-sized positive correlation coefficients of (lagged) government consumption changes and growth in the last column of Table 3. Thus, it seems like that fiscal consolidation has indeed hurt growth in the EMU in the course of the Euro crisis. Considering the rather high influence of lagged GDP growth on SRP (Table 2) a crisis-aggravating role of fiscal consolidation in the Euro crisis is conceivable.

4. Summary and conclusions

The aim of this contribution is to develop an alternative interpretation of the much-debated Euro Crisis. To this end, it is crucial to give an interpretation of the elevated rates of return on sovereign bonds in many EMU member states. Theoretically, an explanation is possible with recourse to Keynes' theory of interest where liquidity considerations are key in understanding investors' speculative demand for liquidity. A high demand for liquidity results especially in times of uncertainty about the future development of financial markets and the economy as a whole. This, in turn, can lead to asymmetric regroupings of financial investors' portfolios,

favoring highly liquid benchmark bonds for a number of reasons (thus, pushing up the sovereign risk premium). The Euro Crisis is the ideal test case for an examination of this hypothesis because it coincided with waves of uncertainty on the financial markets. In line with the hypothesis, in the empirical section of this contribution it turns out that uncertainty in global and regional financial markets roughly doubles the explanatory power of the estimated models of sovereign risk premia in the Eurozone.

Another aim of the study is an inquiry into possible effects of austerity policy on financial stability. Panel estimations and supplementary correlation calculations suggest that the recent shift to a tight fiscal stance in a number of EMU member states came too early and did not play the crisis-abating role that was so much hoped for by Eurozone officials. The calculated correlation coefficients for fiscal variables and GDP growth suggest that the fiscal consolidation efforts have come at the cost of significantly subdued growth and this, in turn, has lead to higher sovereign funding costs. For sure, it is not easy to develop constructive solutions for overcoming the Euro Crisis. The results of this study, however, suggest that a narrow focus on budget consolidation is likely to fail. Instead, more attention should be paid to resolve problems in the financial sector (with the aim of calming uncertainty/reviving confidence) and to assure that there are sufficient financial resources not to force weaker EMU member states into a vicious circle of further hasty budget consolidations, subsequent GDP drops and deteriorating financial stability.

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Appendix

Table: ARCH-GARCH model calculations which were used for the calculation of financial market volatility as uncertainty variables (extracted time-variant standard deviations)

Method:	ML - ARCH (Marquardt) Generalized error distribution (GED)		ML - ARCH (Marquardt) Generalized error distribution (GED)	
GARCH = C(12) + C(13)*RESID(-1)^2 + C(14)*GARCH(-1) Sample (adjusted): 5 … 1673 (mid 2005 till end 201				
Dependent Variable:	D(EUOIS)		D(USTED)	
Variable	Coefficient	Std. Error	Coefficient	Std. Error
LOG(GARCH)	-0.0003***	(.)	0.002***	(.)
C	-0.004***	(.001)	0.02***	(.)
endogenous(-1)	0.09***	(.016)	0.01***	(.)
endogenous(-2)	0.04***	(.015)	0.01***	(.)
endogenous(-3)	0.04***	(.014)	-0.003***	(.)
endogenous(-4)	0.07***	(.014)	-0.002**	(.001)
endogenous(-5)	0.08***	(.014)	0.24***	(.002)
endogenous(-6)	0.03**	(.013)	0.003***	(.001)
endogenous(-7)	0.01	(.012)	0.002**	(.001)
endogenous(-8)	0.03***	(.012)	0.01***	(.)
endogenous(-9)	-0.01	(.012)	0.01***	(.)
endogenous(-10)	0.03***	(.011)	0.05***	(.002)
Variance Equation				
GED Parameter	0.79		0.34	
C	10^{-6}	(.)	$8.3*10^{-6}$	(.)
RESID(-1)^2	0.31***	(.04)	0.01***	(.001)
GARCH(-1)	0.79***	(.018)	0.96***	(.001)
Adjusted R-squared	0.04		0.001	