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Abstract

In a globalized world, countries are exposed to policy shocks from abroad. This paper investigates the cross-border effect of fiscal consolidations taking place in two safe assets countries (Germany and the USA). Cross-border spillovers are defined as the results of fiscal consolidation shocks in Germany or USA which are transmitted to peripheral countries. We consider two levels of analysis: the external effect of US fiscal consolidations on other OECD countries and the external effect of German fiscal consolidations on other Eurozone countries. The "beggar-thy-neighbor" effect in this context means that a reduction of the public debt in a safe asset country as a consequence of a fiscal consolidation plan may generate an increase in the public debt abroad. We suggest a financial market mechanism composed by two steps. First, a fiscal consolidation by reducing government bond issuance in the safe asset countries may generate an excess of demand in the financial market which may then reduce the borrowing cost faced by the peripheral countries. Second, this reduction in the borrowing cost leads to an increase in government bond issuance of the peripheral countries. Our empirical analysis in a sample of 27 OECD countries over the period 1980 - 2007 shows an evidence of a "beggar-thy-neighbor" effect in public debts. We find empirical supports for the mechanism both at the OECD and the Eurozone levels.

Key Words: Fiscal consolidation, Spillover effects, Bond yields, Bond issuance, OECD, Eurozone.
JEL Codes: E44; E62; F36; F42; H63.

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Introduction

The deterioration of the fiscal stance in many countries following the financial crisis leads to massive fiscal consolidation plans. The OECD (2012) projected for 2013-2014 a need for fiscal consolidations of at least 1% point of the OECD's GDP. In a globalized world, countries are vulnerable to foreign economic shocks. This situation raises concerns about the cross-border effects of fiscal consolidations. For instance in 2010, Krugman in the New York Times expressed his concerns about the potential spillover effects of German fiscal consolidations on the US economy:

> "And it is also important to send a message to the Germans: We are not going to let them export the consequences of their obsession with austerity."

This paper investigates cross-border spillovers of fiscal consolidations taking place in Germany and in the US on other OECD countries. Unlinke previous works we focus on the external effects of fiscal consolidations on other countries' indebtedness. We ask a novel question: Do the reduction in public debt (as a result of a fiscal consolidation) taking place in a safe asset country increases the level of debt in peripheral countries? In other words is there any "beggar-thy-neighbor" effect in public debts? To answer this question we consider two levels of analysis: the OECD and then the Eurozone. The US is the source country at the OECD level while Germany is the source country at the Eurozone level. We emphasize a financial prices channel as the mechanism of the "beggar-thy-neighbor" effect in public debts. The mechanism is composed by two steps. First, when a safe asset country consolidates, it reduces his supply of safe assets on the financial market creating an excess of demand. This excess of demand may then induce a reduction in the borrowing cost on the market. Second, the peripheral countries now facing a low borrowing cost may take advantage of this shock and issue more debt securities. We propose an empirical test of this mechanism by estimating the impact of the size of a fiscal consolidation taking place in the key countries on the long term interest rates and on the central government bond issuance in the peripheral countries. Previous studies find evidence of the external effects of fiscal policy on long term interest rates (Faini, 2006; Paesani et al., 2006; Caporale and Girardi, 2013).

Our empirical strategy relies on the exogeneity of fiscal consolidations identified by the narrative approach (Romer and Romer, 2010 ; Cloyne, 2013).[1] Fiscal consolidations based on the intention to reduce budget deficit are induced by past decisions and therefore are unlikely to be correlated with prospective economic conditions (Romer and Romer, 2010). Furthermore, we are interested in the external effect of such fiscal consolidations on foreign economies and therefore they can be interpreted as exogenous shocks. Using a sample of 27 OECD countries over the period 1980-2007, We find supports for the "beggar-thy-neighbor" effect in public debts. More specifically, our baseline results suggest that a 1% point of GDP

[1] Romer and Romer (2010) and Cloyne (2013) study the effects of discretionary tax chnages in the US and in the United Kingdom respectively.

increase in the size of US fiscal consolidations reduces on average the borrowing cost by 0.5% point and increases the net bond issuance by 0.88 % point of GDP in other OECD countries the following years. A 1% point increase in the size of German fiscal consolidations generates a reduction of the borrowing cost by 0.147% point and an increase in net bond issuance by 0.64% point of GDP on average in the other Eurozone countries. The empirical analysis shows that the speed of transmission of the spillovers effects and their impact on bond issuance are higher at the Eurozone level than at the OECD level owing to the high financial integration of the Eurozone.

The remainder of the paper is organized as follows. The first section presents a brief overview of the related literature. Section II describes the data and Section III provides a suggestive evidence based on descriptive analysis. Section IV outlines the empirical methodology, Section V discusses the baseline empirical results and Section VI presents robustness checks. Finally, section VII concludes.

I- Related literature

There is a flourishing literature on the spillover effects of fiscal policy. The main focus of this literature is the effects of a source country's fiscal policy on foreign output. A smaller strand of the literature focuses on the external effects of a given country's fiscal policy on long term interest rates, trade balance or current account in foreign countries.

The literature can also be classified according to the mechanism through which domestic fiscal consolidations may generate spillovers.The first channel is focused on trade linkages (Beetsma et al., 2006; Auerbach and Gorodnichenko, 2013; Goujard, 2013; Hebous and Zimmerman, 2013). The main intuition for the trade channel is the following. Fiscal consolidations in trading partners countries may have negative spillovers on domestic growth by inducing a reduction in bilateral exports and an increase in bilateral imports. Beetsma et al. (2006) combine a gravity model of bilateral trade with a VAR for an analysis in european countries to show that a 1% of GDP increase in German public spending implies a foreign exports gain of 2.2% over the first two years equivalent to an output gain of 0.15% of annual GDP. Their results also show that the maximal spillover effects originate in Germany. Auerbach and Gorodnichenko (2013) estimate the effects of governments spending shocks from one country on the output of another country. They find that fiscal stimulus may have positive external effects on the output of other countries especially in recessions. Goujard (2013) shows in a sample of 17 OECD countries that fiscal consolidations in trading partners countries have a negative spillover effect on domestic growth. He also finds that the spillover effects are particularly strong within Monetary Unions. Finally his results show that spending cuts have larger spillover effects than tax hikes. Hebous and Zimmerman (2013) show that the euro-area wide fiscal shock has a higher impact on output than a similar size domestic

shock.

The second important channel is centered on the current acount mechanisms (Feyrer and Shambaugh, 2012; Roeger et al., 2010). The intuition here is centered on the twin deficits hypothesis that is the simultaneity of the budget and the current account deficits. Fiscal consolidations by increasing the current account of the source country generates a current account deficit abroad. Feyrer and Shambaugh (2012) employ the data based on the narrative approach from Romer and Romer (2010) and find that tax policy changes in the US have an impact on investment in other countries. They emphasize that the changes in the current account is the main channel of this effect. The exogenous tax increases in the US increase the US current account which appears in a current account deficit abroad. Roeger et al. (2010) employ the european commision's macroeconomic model to simulate the effects of the German fiscal consolidation plan annonced on 7 June 2010 on the rest of the Euro area. They find that this unilateral fiscal consolidation aimed at reducing the federal deficit by 1.3% of GDP has negative spillovers effects on the trade balance and the current account of the rest of the Eurozone. They also find a positive spillover to real output due to the lower interest rates that increase domestic consumption.

Finally, a strand of the literature focuses on the spillover effects of fiscal policy on foreign borrowing cost (Faini, 2006; Paesani et al., 2006 ; Caporale and Girardi, 2013). Faini (2006) finds that fiscal policy in a given EMU country has a strong external effect on other EMU countries. More specifically, a 1% fall in the primary surplus of a EMU country increases the interest rate of another country by 41 basis points. Paesani et al. (2006) focuse on 3 countries (Germany, Italy and the US) and they show that an increase in the US long term interest rates as a consequence of the deterioration of its fiscal stance increases the long term interest rates in Germany and Italy (with a stronger effect on Italy). Caporale and Girardi (2013) estimate the effect of fiscal imbalances in a given EMU country on the borrowing cost of other members countries using a global VAR approach with quarterly data over the period 1998-2010. They find that there is a strong link between long term bond yields dynamics for euro-denominated government securities (except for Greece). Their results also suggest that there is a high degree of substitution between different Eurone members government bonds before the financial crisis (2007-2008).

II- Data

To assess the empirical relevance of the spillovers effects of fiscal consolidations, We employ a cross-countries panel dataset over the period 1980-2007. The sample is focused on 27 OECD countries and contains 11 Eurozone countries.[2] The sample selection is based only on data availability. The panel data is unbalanced. The period of analysis is choosed in order to explore the determinants of governments' indebtedness before the financial crisis of 2008. We will present the summary statistics at the OECD level and then at the Eurozone Level. Detailed informations about the variables used in the empirical work follow.

The size of fiscal consolidations

We use the data on the size of fiscal consolidations as the main indicator of fiscal shocks. The data come from the "action-based" fiscal consolidations of Devries et al.(2011). The authors construct the dataset using different historical sources like Budget Reports, Budget Speeches, Central Bank Reports, Convergence and Stability Programs, IMF reports and OECD economic surveys. An important feature of the dataset is that it includes only fiscal consolidations primarily motivated by the desire to reduce the budget deficit. Therefore it allows us to identify discretionary policy change motivated only by policy nakers' intentions to reduce the budget deficit and separate them from policy changes motivated by cyclical fluctuations. The conventional approach to identify episodes of fiscal consolidations consists in using large changes in the cyclically adjusted primary balance to identify these episodes (Alesina and Perotti, 1995). However, the conventional approach even if it identifies a discretionary policy change, it fails to inform about the motivation for this policy change. Indeed it does not distinguish between a discretionary policy change motivated by cyclical fluctuations and those motivated by the policy maker's intention to reduce the budget deficit. The fiscal consolidations based on the intention to reduce budget deficit are induced by past decisions and therefore are unlikely to be correlated with prospective economic conditions (Romer and Romer, 2010). In other words, this approach allow us to separate "exogenous" fiscal consolidations from the "endogenous" ones. Guajardo et al. (2011) compare the size of fiscal consolidations identified by the conventional approach and the narrative approach by Devries et al. (2011). They show that the conventional approach is inaccurate because of potential measurement errors stemming from non policy changes. The dataset includes announced measures of fiscal consolidations only if they are confirmed as implemented by historical records. In addition, Devries et al. (2011) also record a fiscal consolidation preceding an adverse shock that leads to the adoption of a countercyclical policy that completely offsets the fiscal consolidation in the dataset. The inclusion of such consolidations ensures to not omit fiscal consolidations that are correlated with adverse shocks. The dataset covers 17 OECD countries and records 173 fiscal consolidation episodes over the period 1978-2009. The size of fiscal consolidations is defined as the budgetary impact in % of GDP. We recode the

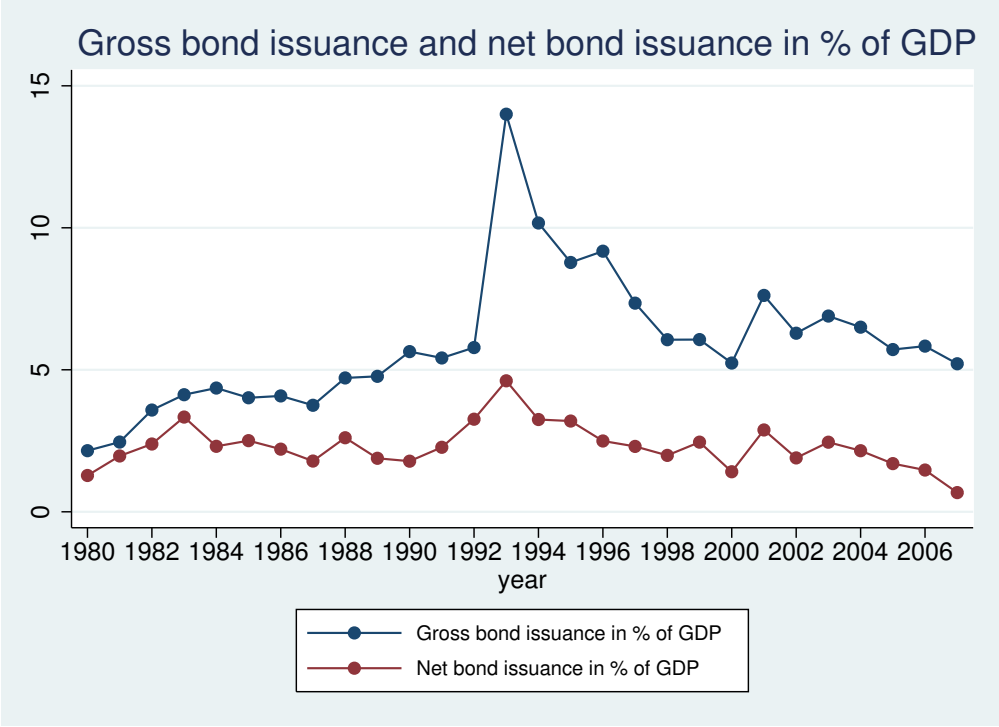
[2]The 11 Eurozone countries are the members of the Euro area since the January 1st 1999.

size of fiscal consolidations as equal to 0 for the years not recorded in the Devries et al.(2011) dataset and therefore without a fiscal consolidation in place.

Government bond issuance

The data on the flow of central government bond issuance are from OECD Statistics. The raw data is in millions USD and are converted into shares of GDP in other to facilitate a cross-country analysis. We use gross bond issuance and net bond issuance as shares of GDP. The difference between the two series is that the latter takes into account government buybacks and the maturity. Figure 1 below plots the average of gross bond issuance and net bond issuance as shares of GDP in the sample over the period 1980-2007. Since we are interested in the spillover effect of US fiscal consolidations on bond issuance behavior in other OECD countries, the data described in Figure 1 excludes US central government bond issuance. The spike in 1993 is explained by the sharp increase in Irish bond issuance following a short term increase in aggregate demand (Fortin, 2003). Figure 1 shows that the unweighted mean of the two series are quite similar.

Figure 1
Gross and Net bond issuances accross OECD



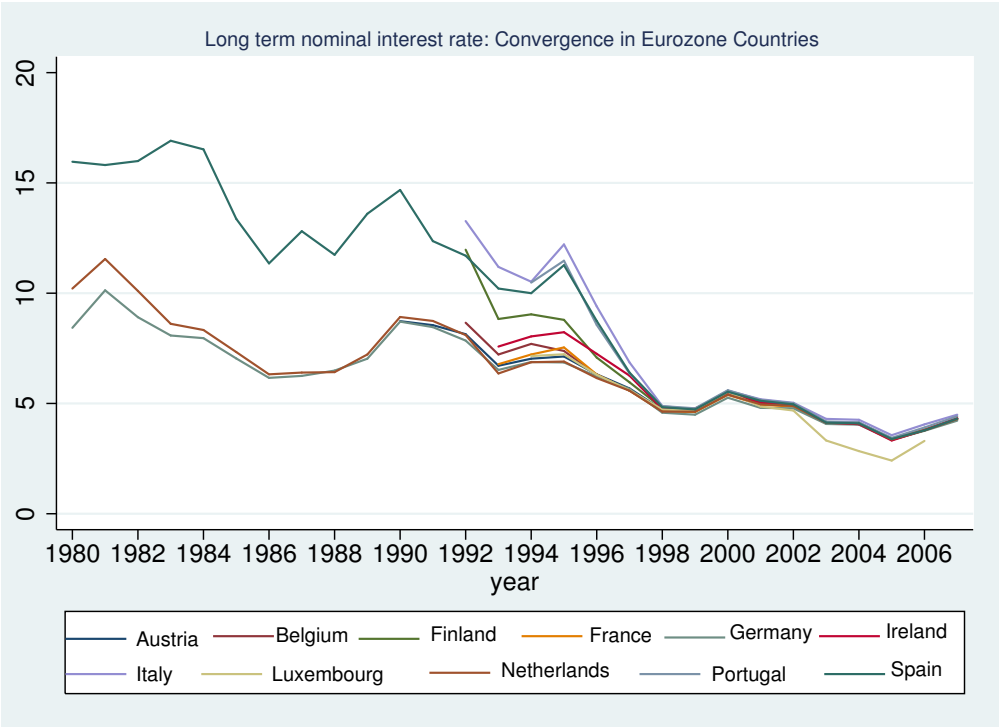
Government bond yields

We measure government bond yields by long term interest rates from OECD Statistics. The long term interest rates represent secondary market yield of long term (usually 10 years)

bonds. They capture governments' borrowing cost. In our empirical analysis we use the long term real interest rates and the long term nominal interest rates. We compute the real interest rates following the Fisher equation as follows: $r = \frac{i-\pi}{1+\pi}$ where r, i and π are the real interest rate, the nominal interest rate and the inflation rate respectively. Since the Eurozone is central in our analysis, Figure 2 shows the long term nominal interest rates for the 11 Eurozone countries in our sample over the period 1980-2007. We can learn different informations from Figure 2 for the empirical analysis. First there is a general downward trend in nominal interest rates accross Eurozone countries.

Second, There is a convergence in the nominal interest rates in Eurozone countries and it indicates that the Eurozone is financially well integrated. In addition, we can note that this convergence and therefore financial integration started before the introduction of the Euro in 1999. These features of the data are consistent with the previous study by Faini (2006). Regarding the downward trend in nominal interest rates we must control for this trend in the data in order to be able to interpret correctly our estimates. We will discuss further this issue in the empirical methodology. Regarding the convergence in nominal interest rates before the Economic and Monetary Union (EMU) in 1999 suggests that there may not be a structural break due to the adoption of Euro in 1999. We will investigate this issue in the empirical session. Finally, Figure 2 makes the case for the potential importance of the spillover effects of fiscal consolidations on bond yields. Indeed, fiscal consolidations may lead to a drop in interest rates at home and in neighbor countries.

Figure 2
Long term nominal interest rates in Eurozone countries



Other variables

In our empirical analysis we will focus on two main dependent variables (Government bond issuance and bond yields). Therefore, the control variables are selected based on the determinants of each of the two dependent variables. Some of the control variables are present both when estimating equations of bond issuance and equations of bond yields while some are specific to each of them.

In order to estimate the external effects of fiscal consolidations in a key country (US at OECD level and Germany at Eurozone level) on the governement bond issuance in other countries, we follow Guscina and Broeck (2011) for the selection of the control variables. To the best of our knowledge Guscina and Broeck (2011) are the only ones to estimate in a cross country set up the determinants of government bond issuance. They investigate the impact of the financial crisis on debt securities' issuances practices in 16 Eurozone countries and Denmark over the period 2007-2009 using monthly data. We control for the central government debt stock as a share of the GDP, the level of GDP per capita, inflation rate , fiscal deficit in % of GDP and the exchange rate between the local currency and USD.
Central government debt stock in % of GDP from OECD Statistics captures the needs to issue new bonds in order to pay for the redemption of maturing bonds or rollovers. The real GDP per capita from World Development Indicators (WDI) allows us to control for the changes in bond issuance that may stem from the business cycle fluctuation and this is particularly relevant because we use the dependent variable as a share of the GDP. High inflation may be positively correlated with high deficit and therefore both may increase government borrowing. Data on inflation rate (Consumer Price Index) come from OECD Statistics. The general government deficit as a share of GDP comes from the IMF World Econonic Outlook Database. We use the overall deficit instead of the primary deficit because of missing data on interest payment in order to compute the latter for many countries. The deficit data is therefore available for a long period of time and a large number of countries. Finally, the exchange rate between the local currency and USD comes from OECD Statistics. It measures national currency units per USD.

We follow Ardagna et al. (2007) and Faini (2006) in selecting other determinants of bond yields. The two papers are close to our study in term of the sample under analysis. Ardagna et al. (2007) analyse the effects of public debt and deficit on long term interest rates for a sample of 16 OECD countries. Faini (2006) investigates the link between fiscal policy and interest rates in 9 EMU countries. We use standard determinants of bond yields as control variables. The short term interest rates are from OECD Statistics and capture the influence of the monetary policy. Short term rates are either the three month interbank offer rate attaching to loans given and taken amongst banks for any excess or shortage of liquidity over several months or the rate associated with Treasury bills, Certificates of Deposit or comparable instruments, each of three month maturity. They are expected to be positively correlated

with long term interest rates. We use the short term interest rates both in nominal and real terms. We also control for the central government debt stock as % of GDP, the inflation rate and the deficit in % of GDP previouly described. In addition we control for the growth rate. The data on annual real GDP growth rate are from WDI. The growth rate of the economy is expected to reduce the borrowing cost of the government and therefore we expect a negative effect on long term interest rates.

Finally, we also include in our empirical analysis a set of political variables that may have an influence on the government bond issuance. We control for the government fractionalisation, elections and the orientation of the party in power (right wing). The political variables are from the World Bank Database on Political Institutions (DPI). Government fractionalisation is the probability that two deputies picked at random from the legislature will be of different parties. It captures the so-called "common pool " pressures that are an important source of the defict bias. We use a dummy variable to capture elections years during which a government may experience extraordinary pressures on public finance because of the political budget cycles (Rogoff, 1990). Right wing is a dummy variable taking the value 1 if the party in power's orientation with respect to economic policy is defined as conservative, christian democratic or right-wing. Except for the party orientation, all the political variables are expected to have a positive effect on government bond issuance and on bond yields. We expect an opposite effect for the party orientation.

Table 1 and Table 2 present the summary statistics for the variables used in the empirical work at the OECD and the Eurozone level respectively. Again, the empirical analysis at the OECD level is focused on the effect of US fiscal consolidations on the other OECD countries and therefore, otherwise specified, the statistics to do not include the US. The same approach applies to the Eurozone and Germany.

Table 1 below, shows a maximum size of fiscal consolidations in the US of 0.9 % of GDP. As mentioned earlier, we consider the size of fiscal consolidations to be 0 in the years without fiscal consolidations. In the other 16 OECD countries for which we have data on fiscal consolidations, the size ranges between -0.75 and 4.49 % of GDP. Note that negative values arise in the data when a temporary consolidation measure expires. For instance a one year increase in tax of $1 has a budgetary impact of $1 in the first year and -$1 in the next year followed by no impact (Devries et al., 2011 ; Guajardo et al., 2011). The minimal value of -0.75% of GDP corresponds to the end (in 2003) of a "one-off tax amnesty" in Portugal (Devries et al., 2011). Finally, the maximal size of fiscal consolidations of 4.49% corresponds to Italy in 1993 with spending cuts of 2,49% an tax hikes of 2% of GDP.

Table 1
Summary statistics (OECD Level)

Variable	Obs	Mean	Std. Dev.	Min	Max
USA consolidation size (% GDP)	367	0.14	0.236	0	0.9
Country consolidation size (% GDP)	270	0.335	0.677	-0.75	4.49
Gross bond issuance (% GDP)	350	5.928	5.114	0	52.26
Net bond issuance (% GDP)	348	2.045	2.868	-5.501	13.574
Deficit (% GDP)	352	1.439	4.267	-18.483	11.173
Inflation rate (CPI)	367	2.743	1.969	-0.9	11.3
CG debt stock (% GDP)	367	45.343	28.615	0.8	164.5
Deficit (% GDP)	352	1.439	4.267	-18.483	11.173
Real GDP per capita (Log)	367	10.294	0.508	8.848	11.316
Growth	367	2.446	1.969	-3.443	10.649
Right wing	342	0.444	0.498	0	1
Government fractionalisation	367	0.319	0.263	0	0.828
Election year	367	0.294	0.456	0	1
Long term real interest rate	367	1.306	1.987	-0.865	23.667
Short term Real interest rate	345	0.865	1.334	-0.367	20.2
Long term nominal interest rate	367	5.953	2.652	0	16.52
Short term nominal interest rate	345	5.409	3.403	0.09	17.61

At the Eurozone level, Table 2 shows that German fiscal consolidations are between -0.1 and 1.6% of GDP. The maximal size of consolidation in 1997 was composed of 1.1% of GDP in spending cuts and O.5% of GDP in tax hikes. Devries et al. (2011) report that the end of the spending freeze introduced in 1997 induced a budgetary impact of -0.1% of GDP in 1998. It is worth also noting again that the highest gross debt issuance of almost 150% of GDP stems from Ireland in 1993. Again, this sharp increase in bond issuance is probably explained by the short-term increase in aggregate demand experienced by Ireland in 1993 (Fortin, 2000).

Table 2
Summary statistics (Eurozone Level)

Variable	Obs	Mean	Std. Dev.	Min	Max
Germany consolidation size (% GDP)	216	0.423	0.478	-0.1	1.6
Country consolidation size (% GDP)	201	0.436	0.86	-0.75	4.49
Gross bond issuance (% GDP)	196	9.115	14.389	0	149.688
Net bond issuance (% GDP)	194	2.768	2.811	-3.103	13.574
Deficit (% GDP)	206	3.603	4.886	-6.843	20.126
Inflation rate (CPI)	216	4.135	4.457	-0.7	28.4
CG debt stock (% GDP)	216	54.216	27.21	0.8	118.3
Real GDP per capita (Log)	216	10.267	0.412	9.259	11.364
growth	216	2.356	2.044	-3.866	9.673
Right wing	214	0.388	0.488	0	1
Government fractionalisation	216	0.343	0.27	0	0.828
Election year	216	0.245	0.431	0	1
Long term real interest rate	179	1.25	1.888	-0.097	23.667
Short term Real interest rate	188	0.824	1.595	-0.277	20.2
Long term nominal interest rate	179	6.478	3.03	2.41	16.91
Short term nominal interest rate	188	6.381	4.628	2.11	20.05

III- Data Exploration: Descriptive evidence

Before an econometric analysis, we propose a suggestive evidence regarding the external effects of fiscal consolidations by exploring the data at hand. Here we focus on fiscal consolidations in the US (at the OECD level) and Germany (at the Eurozone level) of the 90s and latter to illustrate the "beggar-thy-neighbor" effect. The other countries are denoted peripheral countries. We explore the changes in the issuance of government bonds in the peripheral countries following a reduction in bond issuance induced by fiscal consolidations in the key countries (USA and Germany). We will focus on the changes in bond issuance over the periods of fiscal consolidations and on the immediate period following them.

Figure 3 below shows the changes in government bond issuance over the periods of fiscal consolidations in the key countries. The US have a long period of fiscal consolidations over the period 1990-1998. Germany on the other hand has four periods of fiscal consolidations. The first one span on 1991-1995 (C1), the second one on 1997-2000 (C2), the third one on 2003-2004 (C3) and the last one over 2006-2007 (C4). We focus the descriptive evidence on the effects of fiscal consolidations that induce reductions in bond issuance in the key countries, on the issuance of the peripheral countries. We consider the spillover effects of fiscal consolidations that induce a sustained reduction in both gross and net bond issuances in the key countrties. As shown in Figure 3, sustained reductions in government bonds issuance in the US are over the immediate years following the fiscal consolidation. Over the three years following the fiscal consolidation in the US, there is an average change of -0.881 % point of GDP in gross issuance and of -0.512% point of GDP in net issuance. The average change in gross issuance was postive (0.06% point of GDP) over the period of fiscal consolidation. In the German case, we focus on the first fiscal consolidation over (1991-1995) that was long enough and which induces a reduction in bond issuance. Over this period of fiscal consolidation, the average change in gross and net issuances is -0.199 % point of GDP and -0.493% point of GDP repectively.

The next step of the analysis is to show how the peripheral countries respond to the reduction in the US bond issuance over the three years following the fiscal consolidation at the OECD level. For the analysis at the Eurozone level, we will show how the other Eurozone members respond to the reduction in the German bond issuance over the fiscal consolidation of 1991-1995. Again, We consider only the Eurozone members of the EMU since the January 1st 1999 for our analysis.

Figure 3
Annual change in central government bond issuance and fiscal consolidations

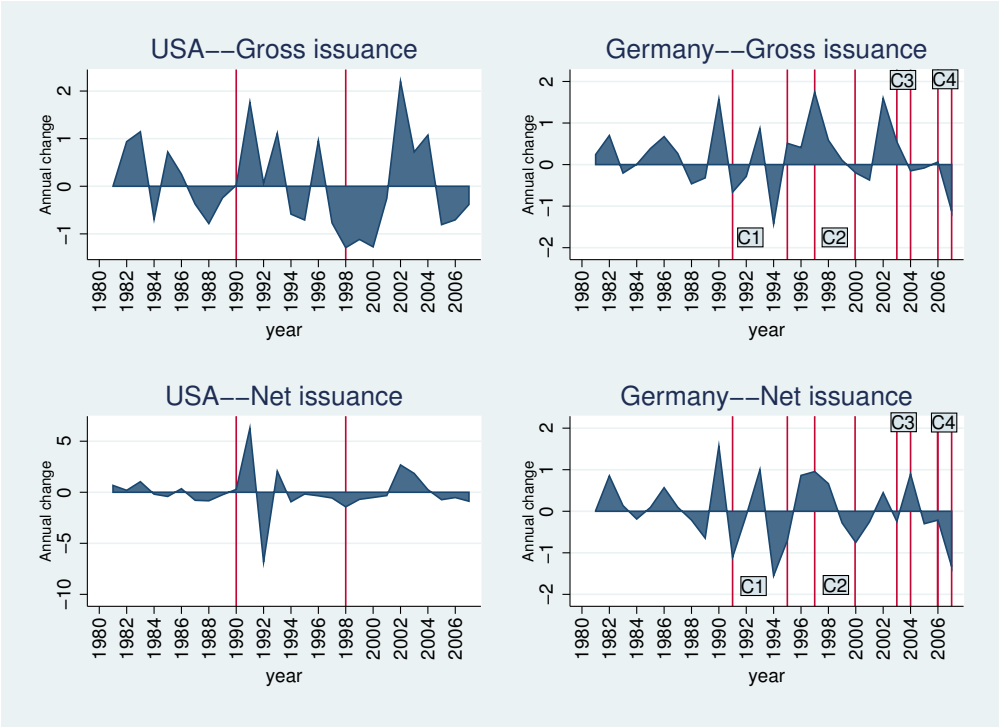


Figure 4 below shows the average change in bond issuance over the three years following the fiscal consolidation in the US at the OECD level. Considering gross issuances, while there is a reduction in USA over the three years following the consolidation, 13 countries have an increase in their issuances. The countries are: Switzerland, Chile, Czech Republic, Estonia, United Kingdom, Hungary, Iceland, Japan, Korea, Mexico, Poland, Slovak Republic and Turkey. Turkey has the largest increase of 20.54 % point of GDP (not shown in the graph to avoid distortion due to scale effects and therefore to ease comparison). Except Denmark and Finland, the countries that experience a reduction in their gross issuance of bonds were either on a consolidation period or a post consolidation period. More specifically, Australia, Austria, Belgium, Canada, Finland, Italy, Spain and Sweden were under a fiscal consolidation. Germany and France were on an immediate post consolidation period. The Japanese case is interesting because although on an immediate post consolidation period, Japan has the largest increase in gross issuance just behind Turkey. Considering net issuance, the result is quite similar to the one for gross issuance. However, some countries that showed a reduction in the gross issuance of government bonds have an increase in net issuances (Australia and Norway). Also, some countries showing an increase in gross issuance now show a reduction (Hungary, Korea and Mexico). Again, Turkey has the largest increase in net issuance of 9.66 % point of GDP (not shown in the graph for the same reason as before).

Figure 4
Average change in bonds issuance over the 3 years following the US fiscal consolidation

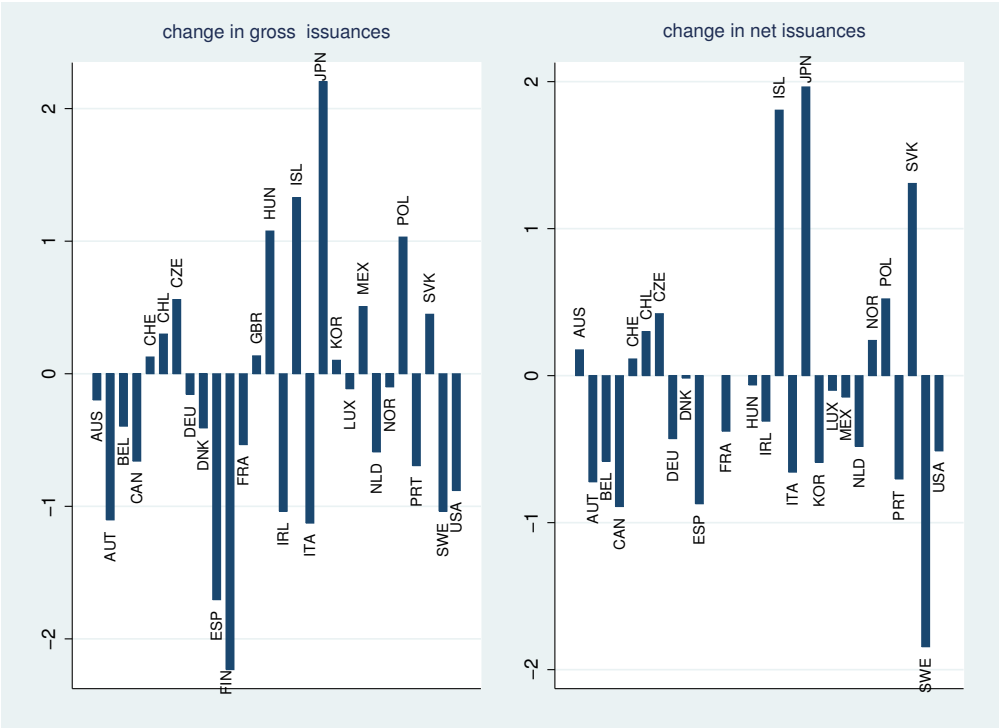
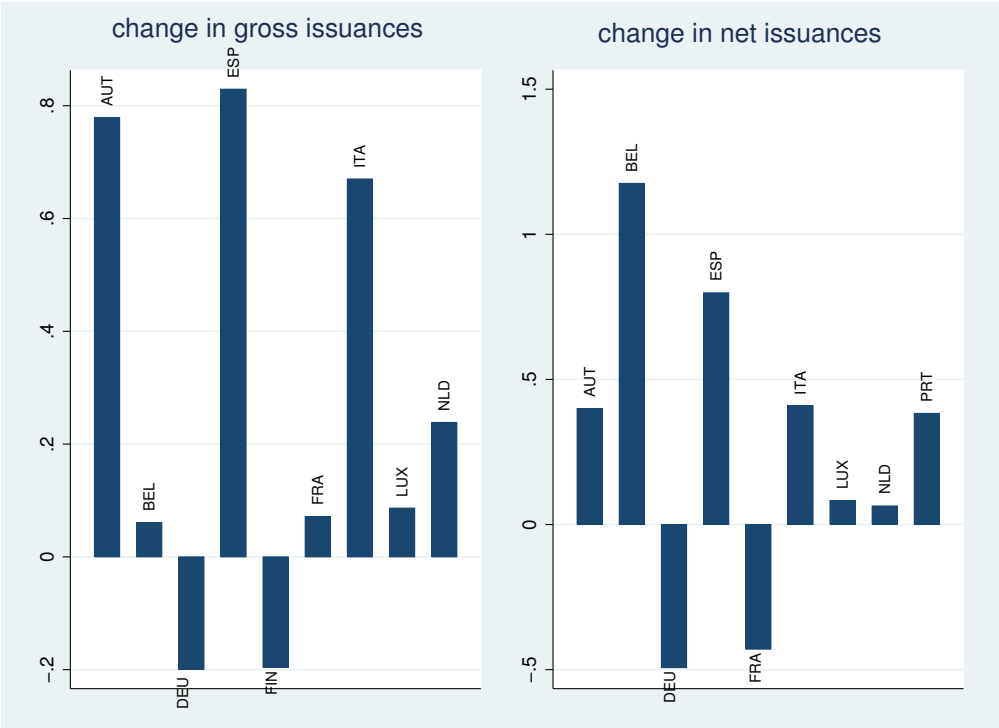


Figure 5 below shows the average change in bond issuance over the German fiscal consolidation (1991-1995). As shown in Figure 5, while Germany reduces his gross issuance of bonds, the other Eurozone countries show an increase in their issuances except for Finland and Ireland (Ireland showed a huge reduction of 42.71 percentage point of GDP). Given the size of the reduction in bonds issuances, Ireland is not shown on the grah in order to avoid scale effect in the graph and facilate comparison. Finland was under a fiscal consolidation over the period. It is interesting to note that Belgium, France, Italy and Spain although (mostly or entirely) under a fiscal consolidation have an increase in their gross issuance. The result considering net issuance is quite similar. The exception is that France shows a reduction in net issuance probably due to its ongoing fiscal consolidation.

Figure 5
Average change in bond issuance over the German fiscal consolidation (1991-1995)



Overall, Figure 4 and Figure 5 tend to confirm that peripheral countries may increase their issuance of government bonds when there is a reduction in the issuance that is induced by fiscal consolidation in the key countries. Most of the peripheral countries may use this negative supply shock of government bonds as a window of opportunity to issue more government bonds in order to compensate for the asset shortage on the market. The result for the Eurozone seems more striking than the one at OECD level. As shown in the previous section, the Eurozone is financially well integrated and therefore this feature may explain the evidence.

The suggestive evidence from Figure 4 and Figure 5 illustrates the "beggar-thy-neighbor" effect in public debts. The intuition is that fiscal consolidations in key (leading safe asset supply) countries that induce a reduction in their public debt may increase the public debt in peripheral countries (suppliers of less safe assets). We postulate the following mechanisms: domestic fiscal consolidations in the key countries induce a reduction in the supply of safe government bonds. This supply shock then creates an excess of demand for government bonds and pushes interest rates down allowing the peripheral countries to use this window of opportunity to fulfill the demand. In the context of the Eurozone, a fiscal consolidation in Germany may generate a positive external effect for the other members of the region in term of the borrowing cost. Figure 2 shows a strong convergence in long term nominal interest rates in the Eurozone. This finding is consistent with the quarterly report on the euro area (2014) which underlines that in the Eurozone the prices of any asset market usually transmit

quickly into asset prices in other countries. Also Caporale and Girardi (2013) emphasize the high degree of substitution between different Eurozone members government bonds.

Finally, the suggestive evidence also points toward some considerations for the econometric analysis. First at the OECD level, the fact that the fiscal consolidation in the US induce a reduction in government bond issuance only in a post consolidation period suggests that the spillover effect may take time to manifest itself. Second, at the Eurozone level, given the financial integration and the fact that the reduction in German bond issuance occurs over the period of consolidation the external effect may spread quickly. Also, because the negative correlation suggested in the data could be explained by other determinants of bond issuance, we will investigate it further in an econometric analysis.

IV- Empirical Methodology

Our empirical strategy relies on the plausible exogeneity of the fiscal consolidations based on the narrative approach. We estimate equations of government bond yields and equations of government bond issuance. The specifications at the OECD level are slightly different from the specifications for the Eurozone. Indeed as mentioned in the data analysis section, at the OECD level the spillovers effects may take much longer to manisfest themselves than at the Eurozone level. We estimate reduced forms of the effect of fiscal consolidations in key countries (USA and Germany) on the bond yields and on the government bond issuance in peripheral countries.

Specifications at the OECD level

Let $bond\ yield_{it}$ be the long term interest rate (in nominal or real term) where i and t denote country and year repectively. We first test the effects of the US fiscal consolidations on the long term interest rates in the peripheral countries. Consider the following equation:[3]

$$\text{bond yield}_{it} = \alpha_0 + \alpha_1 \text{Consol_USA}_{t-4} + \alpha_2 \text{X}_{it} + \text{D}_i + \text{trend}_i + \epsilon_{it} \tag{1}$$

Consol_USA is the size of the fiscal consolidation in the US and it is our measure of consolidation shock; X is a set of control variables, D_i is a country fixed effect, trend_i is a country-specific trend and ϵ_{it} is the error term. This specification allows us to test the average effect of a fiscal consolidation in the US on the other OECD countries. We do not include time fixed effects because we are estimating the impact of a well-identified common fiscal consolidation shock. However we include country-specific trends that control for all time-varying unobserved heterogeneity. In addition, as underlined in the data analysis, there is downward trend in the long term interest rates. α_1 is the coefficient of interest. The test of

[3]Panel unit root tests (Augmented Dickey Fuller , Philippe and Perron) allow us to reject the null of the presence of unit root in all panels.

one important piece of the "beggar-thy-neighbor" effect implies testing for $\alpha_1 < 0$. It means that fiscal consolidations in the US reduce the long term interest rates faced by other OECD countries. The inclusion of the country-specific trends allows us to interpret α_1 as a shock and also allows us to factor in the downward trend showed in Figure 2. Indeed it allows us to be able to interpret the negative correlation as the external effect of a fiscal consolidation and not a mirror of the downward trend.

Now consider the following equation for the central government bonds issuance:

$$\text{bond issuance}_{it} = \beta_0 + \beta_1 \text{Consol_USA}_{t-5} + \beta_2 \text{X}_{it} + \text{D}_i + \text{trend}_i + \epsilon_{it} \tag{2}$$

where bond issuance$_{it}$ is the central government bond issuance in % of GDP (in gross or net term). The other variables were described earlier. One difference is the lag specification of the consolidation shock. Again as shown by the data analysis, US fiscal consolidations are likely to take time to manifest themselves as the reductions in bond issuances happen on the post period of the fiscal consolidation. In addition the mechanism that we suggest may imply a delay between the response of the bond yields to the external shock and the response in terms of bond issuance at OECD level. The coefficient of interest is β_1 and the test for the second part of the "beggar-thy-neighbor " effect implies testing for $\beta_1 > 0$. It means that the fiscal consolidations in the US induce an increase in the issuance of government bonds in other OECD countries. The intuition is that, following the reduction in US bond issuance that induce a reduction in the borrowing cost faced by the peripheral countries, the latter issue more bonds. Again, Equation 2 is a reduced-form. We include also country-specific trends in this specification because it is plausible that the aforementioned downward trend in bond yields may be correlated to an upward trend in bond issuance. It is likely if we assume a negative correlation between bond yields and bond issuance.

We also estimate an equation including interaction terms between the Eurozone countries in the sample and the US fiscal consolidation shocks. The specifications take the following general form:

$$\text{Y}_{it} = \alpha_0^* + \alpha_1^* \text{Lagged (Consol_USA)} \times \text{Eurozone} + \alpha_2^* \text{X}_{it} + \text{D}_i + \text{trend}_i + \epsilon_{it} \tag{3}$$

Where Y_{it} is either bond issuance or bond yields and Eurozone is dummy variable taking the value of 1 for the Eurozone countries (EMU members since 1999) in the sample. We do not separately include the dummy in the equation because it is colinear with the country-fixed effects.

Specifications at the Eurozone Level

The specifications at the Eurozone level are quite similar to the ones at the OECD level. One important feature is the difference in the lag structure. Again, as shown in the data section,

the Eurozone exhibits a convergence in long term interest rates meaning that the region is financially well integrated. In addition, the reduction in German bond issuance take place over the period of fiscal consolidation. These two features together suggest that the fiscal consolidation shocks may propagate at a higher speed than at the OECD level.[4]

We estimate the following equation for the government bond yields:

$$\text{bond yield}_{it} = \theta_0 + \theta_1 \text{Consol_Germ}_{t-1} + \theta_2 \text{X}_{it} + \text{D}_i + \text{trend}_i + \epsilon_{it} \tag{4}$$

Where Consol_Germ is the size of the fiscal consolidation in Germany. The other variables were previously described. The main difference is the one year lag used at Eurozone level explained by the plausible high speed of propagation of a fiscal consolidation shock from Germany in other Eurozone countries. The coefficient of interest is θ_1 and consistently with equation (1) we test $\theta_1 < 0$. At the Eurozone level we can add that the other countries may benefit from a the reduction in bond yields that may follow the fiscal consolidation in Germany.

Now consider the equation for bond issuance:

$$\text{bond issuance}_{it} = \gamma_0 + \gamma_1 \text{Consol_Germ}_{t-1} + \gamma_2 \text{X}_{it} + \text{D}_i + \text{trend}_i + \epsilon_{it} \tag{5}$$

The coefficient of interest is γ_1 and consistenly with equation (2) we test for $\gamma_1 > 0$. The intuition is the same as before. The other eurozone countries may take advantage of the reduction in the borrowing cost induced by the fiscal consolidation in Germany to issue more bonds.

The distribution of the fiscal consolidations in Germany allow us to explore another specification of the form:

$$\text{Y}^*_{it} = \theta^*_0 + \theta^*_1 \text{Post_Germ} + \theta^*_2 \text{X}_{it} + \text{D}_i + \text{trend}_i + \epsilon_{it} \tag{6}$$

Where Y^*_{it} is the long term interest rates and Post_Germ is a dummy variable taking the value of 1 for the immediate period following a German fiscal consolidation. This allows us to test for the behaviour of bond yields the years following a fiscal consolidation in Germany. The coefficient of interest is θ^*_1 and the test is consistent with equation (4).

We consider one last specification that allows us to test for a structural break in the external effects of German fiscal consolidations on the other Eurozone countries. As mentioned before, the data analysis showed a convergence in nominal interest rates starting before the adoption of the euro suggesting no structural break at the creation of the EMU. However, it is interesting to test whether, controlling for other determinants the relation between govern-

[4]The quarterly report on the euro area (2014) underlines the well-known fact that in the Eurozone asset prices transmit quickly from a country to other countries.

ment bond yields and German fiscal consolidations has changed since the introduction of the euro in 1999.
We may expect the relation to be stronger since the introduction of the Euro. The equation is the following:

$$\mathrm{Y}_{it}^{'} = \theta_0^{'} + \theta_1^{'}\mathrm{Consol_Germ}_{t-1} + \theta_2^{'}\mathrm{Consol_Germ}_{t-1} \times \mathrm{EMU} + \theta_3^{'}\mathrm{EMU} + \theta_4^{'}\mathrm{X}_{it} + \mathrm{D}_i + \mathrm{trend}_i + \epsilon_{it} \tag{7}$$

Where $\mathrm{Y}_{it}^{'}$ is the bond yield and EMU is a dummy variable taking the value of 1 over the period 1999-2007 an zero on the previous period. If the effect of German consolidations on bond yield is stronger after the introduction of the euro then $|\theta_2^{'}| > |\theta_1^{'}|$.

We estimate the previous equations by the within estimator with clustered standard errors at country level.

V- Baseline Results

OECD Level

Table 3 below shows the estimation of equation (1) with different control variables. The results show that US fiscal consolidations have a negative and statistically significant effect on the bond yields of other OECD countries. More specifically, increasing the fiscal consolidation size in the US by 1% point of GDP induces an average reduction of the nominal interest rates faced by other OECD countries by roughly 0.5 % point (colum (7)) in the following years. Considering the average long term interest rate in the sample, this effect is equivalent to a 8.4% reduction. In column (7) the specification includes the square of the debt stock to account for a potential nonlinear effect on the long term interest rates (Ardagna et al., 2007). Table 3 is then consistent with the first step of the "beggar-thy-neighbor" effect in public debts. The results are consistent with Paesani et al. (2006) who show (in a three countries'context) that US fiscal policy's effects on long term interest rates have a spillover effect on Germany and Italy.

Table 3
OECD level: Nominal Bond yields and US fiscal consolidations

Dependent variable: Nominal long term interest rate	(1)	(2)	(3)	(4)	(5)	(6)	(7)
USA consolidation size ($t-4$)	-0.826***	-0.480**	-0.582**	-0.501**	-0.502**	-0.508**	-0.495**
	(0.262)	(0.221)	(0.245)	(0.229)	(0.229)	(0.229)	(0.233)
Short term nominal interest rate		0.373***	0.386***	0.350***	0.334***	0.329***	0.326***
		(0.059)	(0.061)	(0.065)	(0.071)	(0.072)	(0.073)
CG debt stock (% GDP)			0.014	0.019*	0.011	0.009	0.0001
			(0.010)	(0.010)	(0.011)	(0.011)	(0.023)
Inflation rate (CPI)				0.095**	0.107**	0.131**	0.131**
				(0.045)	(0.044)	(0.053)	(0.052)
Deficit (% GDP)					0.062**	0.081***	0.082***
					(0.026)	(0.028)	(0.029)
Growth						0.062*	0.062*
						(0.037)	(0.037)
CG debt stock (% GDP)^2							0.0002
							(0.0002)
Observations	366	344	344	344	329	329	329
Countries	27	27	27	27	27	27	27
R^2	0.037	0.409	0.414	0.421	0.403	0.409	0.410

Notes: All specifications include country fixed effects and country-specific trends. Clustered Standard errors at country level in parentheses.
* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Table 4 presents the results for equation (2).[5] All the estimations show a positive and statistically significant effect of US fiscal consolidations on the net bond issuance in other OECD countries except in colum (2). As shown in column (6), on average a 1% point of GDP increase in US fiscal consolidation induces an increase of 0.88% point of GDP in net bond issuance for the other OECD countries the following years. Considering the sample mean, this effect is equivalent to an increase in net bond issuance of 14.78%. The results are consistent with the second part of the "beggar-thy-neighbor" effect. Together Table 3 and Table 4 suggest that a fiscal consolidation in the US, through its external effect on the reduction of the borrowing cost faced by the OECD peripheral countries generate an increase in government bond issuance in these countries. The results illustrate how a fiscal consolidation motivated by an intention to reduce public deficit (and therefore public debt) in a key country like the US may lead to the increase in public debt in other countries.

[5]The number of countries used for the estimations is 25 because UK and Finland do not have data on net bond issuance.

Table 4
OECD level: Net bonds issuance and US fiscal consolidations

Dependent variable: Net bond issuance in % of GDP	(1)	(2)	(3)	(4)	(5)	(6)
USA consolidation size ($t-5$)	1.162*	0.280	0.814*	0.951**	0.810**	0.880**
	(0.680)	(0.769)	(0.449)	(0.430)	(0.409)	(0.397)
CG debt stock (% GDP)		0.146***	0.098***	0.108***	0.118***	0.103***
		(0.029)	(0.017)	(0.018)	(0.017)	(0.021)
Deficit (% GDP)			0.468***	0.487***	0.465***	0.434***
			(0.143)	(0.147)	(0.146)	(0.148)
Inflation rate (CPI)				0.153	0.157	0.167
				(0.146)	(0.141)	(0.134)
Exchange rate (LCU-USD)					0.149***	0.148***
					(0.055)	(0.054)
Real GDP per capita (Log)						-7.084
						(6.469)
Observations	335	335	321	321	321	321
Countries	25	25	25	25	25	25
R^2	0.018	0.166	0.353	0.359	0.382	0.385

Notes: All specifications include country fixed effects and country-specific trends. Clustered Standard errors at country level in parentheses * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Eurozone Level

Table 5 presents the results for the impact of German fiscal consolidations on the nominal bond yields faced by the Eurozone OECD countries. The estimates correspond to equation (4). The results show that once we control for the short term interest rates, fiscal consolidations in Germany have a negative effect on the long term interest rates faced by the peripheral Eurozone countries. As shown in column (4), a 1% point of GDP increase in the German fiscal consolidation reduces the borrowing cost faced by other Eurozone countries by 0.147 % point. On average, this effect is equivavent of a 2.27 % reduction in the borrowing cost. Given the high sample average of long term interest rates (6.478%), this reduction could change government behaviour regarding their bond issuance.

Table 5
Eurozone level: Nominal Bond yields and German fiscal consolidations

Dependent variable: Nominal long term interest rate	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Germany Consolidation size ($t-1$)	0.010	-0.076	-0.116*	-0.147***	-0.135***	-0.138***	-0.144**
	(0.083)	(0.062)	(0.062)	(0.046)	(0.052)	(0.052)	(0.057)
Short term nominal interest rate		0.533***	0.549***	0.505***	0.512***	0.509***	0.509***
		(0.052)	(0.050)	(0.053)	(0.052)	(0.054)	(0.053)
CG debt stock (% GDP)			0.022*	0.042***	0.043***	0.041***	0.059**
			(0.013)	(0.008)	(0.009)	(0.009)	(0.029)
Inflation rate (CPI)				0.220***	0.229***	0.244***	0.254***
				(0.051)	(0.047)	(0.050)	(0.063)
Deficit (% GDP)					0.086*	0.097*	0.098**
					(0.044)	(0.050)	(0.050)
Growth						0.039	0.039
						(0.033)	(0.033)
CG debt stock (% GDP)^2							-0.0002
							(0.0002)
Observations	173	163	163	163	158	158	158
Countries	10	10	10	10	10	10	10
R^2	0.000	0.609	0.620	0.660	0.675	0.678	0.679

Notes: All specifications include country fixed effects and country-specific trends. Clustered Standard errors at country level in parentheses * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Table 6 shows the estimates of equation (5).[6] The results show that once we control for the fiscal deficit, the German fiscal consolidations have a positive and statistically significant efefct on goverment bond issuance. For instance, column (3) shows that an increase in the size of German fiscal consolidations of 1 % point of GDP generates on average an increase in net government bond issuance by 0.64% point of GDP in peripheral Eurozone countries. This effect corresponds to an increase of 23.12 % in net bond issuance considering the sample average. The degree of financial integration in Eurozone countries may explain the response of the peripheral countries to the reduction in the borrowing cost following a fiscal consolidation in Germany. Also, there is high degree of subtitution between euro denominated government bonds before the crisis (Caporale and Girardi, 2013). The results are consistent with the fact that peripheral countries may exploit periods of fiscal consolidations in Germany as a window of opportunity to issue more bonds than usual.

Overall, either at OECD level or at the Eurozone level, the evidence supports the existence of a "beggar-thy-neigbor" effect in public debts. The fiscal consolidations in key countries that can be plausibly considered as net safe asset suppliers on the market have external effects on the indebtedness of other countries (less safe asset suppliers). When a country enters a period of fiscal consolidation in order to reduce its deficit and therefore to reduce its indebtedness, it does not internalize the potential external effects on other countries. The results suggest that the reduction in borrowing cost as an external effect of fiscal consolidations abroad, generates a stronger response at the Eurozone level as compared to the OECD level

[6] Again, Finland is missing from the sample because of no data available for net bond issuance.

in terms of bond issuance.

This finding is particularly relevant for Eurozone (Monetary Unions in general) and may contribute to the debate on the coordination of fiscal policy.

Table 6
Eurozone level: Net bonds issuance and German fiscal consoliddations

Dependent variable: Net bond issuance in % of GDP	(1)	(2)	(3)	(4)	(5)	(6)
Germany Consolidation size ($t-1$)	0.511	0.420	0.639*	0.640*	0.616*	0.591*
	(0.363)	(0.371)	(0.358)	(0.334)	(0.354)	(0.353)
CG debt stock (% GDP)		0.045	0.079***	0.078***	0.079***	0.074***
		(0.037)	(0.021)	(0.029)	(0.026)	(0.025)
Deficit (% GDP)			0.317***	0.317***	0.326***	0.301***
			(0.115)	(0.108)	(0.103)	(0.104)
Inflation rate (CPI)				-0.002	0.084***	0.039
				(0.049)	(0.029)	(0.043)
Exchange rate (LCU-USD)					4.319	3.763
					(2.770)	(3.011)
Real GDP per capita (Log)						-1.493
						(1.463)
Observations	187	187	178	178	178	178
Countries	9	9	9	9	9	9
R^2	0.011	0.038	0.243	0.243	0.251	0.254

Notes: All specifications include country fixed effects and country-specific trends. Clustered Standard errors at country level in parentheses * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

VI- Robustness checks

We carry out various robustness checks. First, because the central mechanism of the "beggar-thy-neigbor" effect rests on the reduction in the borrowing cost as a result of the fiscal consolidation in the key country, we take into account whether the peripheral countries are going through a fiscal consolidation themselves. If a peripheral country have an ongoing fiscal consolidation while the external shock from the key country takes place we may confound the country's own fiscal shock's effect with the external one. Therefore we control for a contemporaneous fiscal consolidations in the peripheral countries. We add political variables that may have an influence on government bond issuance as well in the list of control variables. We test also other specifications mentioned in the empirical strategy. Given the small sample size for the anlysis at the Eurozone level, we extend the sample of analysis to all European countries.[7] By extending the sample size we expect the econometric tests to have a higher power. In addition, at the OECD level we show estimates relative to the lag structure to illustrate that US fiscal consolidation shocks take time to manifest themselves. Finally, We explore a potential difference between spending cuts and tax hikes. Goujard (2013) shows in a sample of OECD countries that spending-based fiscal consolidations tend to have a stronger spillover effect than tax-based fiscal consolidations. We provide additional robustness estimates in the appendix.[8]

Table 7 shows the results once we take into account the contemporaneous fiscal consolidations in the peripheral countries. The data on the size of fiscal consolidations are available for 17 countries including the US and Germany. The results show that as we suspect, country-specific consolidations reduce also the borrowing cost. For instance, column (3) shows that an increase of 1% in the size of fiscal consolidation reduces the borrowing cost by 0.257 % point in the following years. Moreover, not only the fiscal consolidations from the US still have a negative and statistically significant effect but the effect is always bigger than the effect of the country-specific consolidation. In column (3), a 1% point increase in the US fiscal consolidation generates an average reduction in the borrowing cost faced by the peripheral countries by 0.459% point. This effect is similar to the baseline results.

[7] The countries added to the sample are: Czech Rep., Denmark, Hungary, Poland, Slovak Rep. and Sweden.

[8] We show estimates using gross bond issuance and real interest rates. We estimate also the bond yields and the bond issuance equations simulateneously using a SUR methodology. We find that the estimates are close to the baseline results. In addition, the Breush-Pagan's test of independence of the error terms has p values of 0.6596 and 0.8422 at OECD and Eurozone levels respectively. The correlation between the error terms at the OECD level is -0.0254 and at the Eurozone level it is 0.0169. The p values of the Breush-Pagan's test imply that we cannot reject the null of independent error terms at all conventional levels of significance. The results are not shown but available upon request.

Table 7
OECD level: Nominal Bond yields and country-specific consolidations

Dependent variable: Nominal Long term interest rate	(1)	(2)	(3)	(4)	(5)	(6)	(7)
USA consolidation size($t-4$)	-0.757***	-0.292*	-0.459**	-0.394**	-0.391**	-0.392**	-0.358*
	(0.289)	(0.158)	(0.215)	(0.190)	(0.199)	(0.195)	(0.204)
Country Consolidation size($t-4$)	-0.334***	-0.233***	-0.257***	-0.241***	-0.230***	-0.230***	-0.240***
	(0.093)	(0.065)	(0.070)	(0.064)	(0.076)	(0.078)	(0.077)
Short term nominal interest rate		0.435***	0.454***	0.418***	0.411***	0.406***	0.401***
		(0.037)	(0.038)	(0.037)	(0.044)	(0.046)	(0.047)
CG debt stock (%GDP)			0.022**	0.028**	0.025**	0.023*	0.003
			(0.010)	(0.011)	(0.013)	(0.013)	(0.023)
Inflation rate (CPI)				0.098**	0.121**	0.137**	0.136**
				(0.045)	(0.052)	(0.067)	(0.065)
Deficit (% GDP)					0.041	0.056*	0.056*
					(0.032)	(0.031)	(0.031)
Growth						0.046	0.045
						(0.047)	(0.047)
CG debt stock (%GDP)^2							0.0002
							(0.00014)
Observations	270	254	254	254	239	239	239
Countries	16	16	16	16	16	16	16
R^2	0.101	0.640	0.653	0.662	0.653	0.656	0.658
widstat							

Notes: All specifications include country fixed effects and country-specific trends. Clustered Standard errors at country level in parentheses
* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Table 8 shows results accounting for potilical economy variables, Eurozone interactions and country-specific consolidations. One interesting result is that for all specifications, country-specific fiscal consolidations lead to a reduction of the issuance of government bonds. In column (5), a 1% point increase in the country-specific fiscal consolidation leads to a reduction of 0.5% point in net bond issuance. Also, the introduction of the interaction term with the Eurozone shows that the Eurozone countries respond more than other OECD countries to a fiscal consolidation shock from the US. The direct effect of US fiscal consolidations is no longer statistically significant. Finally, the political control variables do not have a statistically significant effect but they have the expected signs.

Table 8
OECD level: Net bond issuance and other controls

Dependent variable: Net bonds issuance in % of GDP	(1)	(2)	(3)	(4)	(5)
Country consolidation size ($t-5$)	-0.541***	-0.536***	-0.536***	-0.522***	-0.509***
	(0.148)	(0.152)	(0.148)	(0.159)	(0.165)
USA consolidation size ($t-5$)	-0.444	-0.469	-0.437	-0.492	-0.528
	(0.546)	(0.542)	(0.532)	(0.496)	(0.471)
USA consolidation size ($t-5$) $\times$ Eurozone	2.189**	2.161*	2.178**	2.148**	2.093**
	(1.074)	(1.126)	(1.028)	(1.037)	(1.033)
Deficit (% GDP)	0.484***	0.491***	0.481***	0.459***	0.465***
	(0.141)	(0.140)	(0.143)	(0.133)	(0.133)
Inflation rate (CPI)	-0.056	-0.053	-0.058	-0.043	-0.040
	(0.122)	(0.120)	(0.124)	(0.117)	(0.118)
CG debt stock (% GDP)	0.101***	0.102***	0.101***	0.107***	0.109***
	(0.037)	(0.038)	(0.037)	(0.035)	(0.035)
Exchange rate (LCU-USD)	0.361***	0.359***	0.372***	0.384***	0.393***
	(0.117)	(0.118)	(0.127)	(0.106)	(0.114)
Real GDP per capita (Log)	-5.824	-5.654	-5.848	-6.491	-6.292
	(7.697)	(7.898)	(7.599)	(7.573)	(7.580)
Right wing		-0.148			-0.227
		(0.350)			(0.336)
Election year			0.249		0.223
			(0.262)		(0.250)
Government fractionalisation				1.581	1.674
				(1.089)	(1.104)
Observations	229	229	229	229	229
Countries	14	14	14	14	14
R^2	0.514	0.514	0.516	0.520	0.523

Notes: All specifications include country fixed effects and country-specific trends. Clustered Standard errors at country level in parentheses * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Table 9 shows that at the Eurozone level, the contemporaneous fiscal consolidation does not have a statistically significant effect on the borrowing cost except for column (4).[9] In column (4), previous country-specific consolidations has a counterintuitive positive and statistically significant effect on the borrowing cost. However, the effect of German fiscal consolidations on the borrowing cost faced by the other Eurozone countries remains negative and statistically significant for most of the regressions. For instance, in column (7) the marginal effect is close to the baseline effect.

Table 9
Eurozone level: Bond yield and country-specific consolidation

Dependent variable: Nominal Long term interest rate	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Germany Consolidation size $(t-1)$	0.015	-0.087	-0.116*	-0.147***	-0.128**	-0.134**	-0.142**
	(0.071)	(0.068)	(0.061)	(0.050)	(0.058)	(0.056)	(0.061)
Country Consolidation size$(t-1)$	0.145	0.216	0.192	0.229*	0.186	0.188	0.192
	(0.215)	(0.138)	(0.148)	(0.126)	(0.132)	(0.129)	(0.125)
Short term nominal interest		0.530***	0.543***	0.496***	0.502***	0.497***	0.497***
		(0.046)	(0.044)	(0.049)	(0.052)	(0.055)	(0.055)
GG debt stock (% GDP)			0.017	0.037***	0.038***	0.036***	0.057*
			(0.018)	(0.010)	(0.011)	(0.011)	(0.032)
Inflation rate (CPI)				0.238***	0.239***	0.258***	0.272***
				(0.038)	(0.043)	(0.048)	(0.063)
Deficit (% of GDP)					0.075	0.089*	0.090*
					(0.047)	(0.054)	(0.053)
Growth						0.050	0.049
						(0.039)	(0.039)
CG debt stock $(\%GDP)^2$							-0.0002
							(0.0003)
Observations	160	155	155	155	150	150	150
Countries	9	9	9	9	9	9	9
R^2	0.009	0.626	0.632	0.678	0.687	0.691	0.692

Notes: All specifications include country fixed effects and country-specific trends. Clustered Standard errors at country level in parentheses * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Table 10 shows the estimates for equation (6). The specifications include post German fiscal consolidations instead of the German fiscal consolidations' size. The results are consistent with the previous estimates using the size of the fiscal consolidation. In column (7) on average, the long tern interest rates are reduced by 0.5% point in the immediate period following a fiscal consolidation in Germany.

[9]The estimates do not include Luxembourg because data on country-specific consolidations are not available.

Table 10
Eurozone level: Nominal Bond yields and Post consolidation dummies

Dependent variable: Nominal long term interest rate	(1) est1	(2) est2	(3) est3	(4) est4	(5) est5	(6) est6	(7) est7
Post Germany consolidation	-0.316***	-0.352***	-0.388***	-0.563***	-0.513***	-0.498***	-0.525***
	(0.035)	(0.035)	(0.048)	(0.077)	(0.091)	(0.076)	(0.079)
Short term Real interest rate		-0.052	-0.059	0.083	0.090	0.091	0.101
		(0.051)	(0.056)	(0.093)	(0.094)	(0.094)	(0.100)
CG debt stock (% GDP)			-0.026	0.020	0.004	0.002	0.059
			(0.024)	(0.035)	(0.032)	(0.031)	(0.055)
Inflation rate (CPI)				0.451**	0.371**	0.377*	0.419**
				(0.193)	(0.185)	(0.196)	(0.189)
Deficit (% GDP)					0.125**	0.131**	0.128**
					(0.057)	(0.065)	(0.062)
Growth						0.019	0.008
						(0.054)	(0.052)
CG debt stock (% GDP)^2							-0.001
							(0.001)
Observations	179	168	168	168	163	163	163
Countries	10	10	10	10	10	10	10
R^2	0.009	0.016	0.036	0.180	0.213	0.214	0.224

Notes: All specifications include country fixed effects and country-specific trends. Robust Clustered Standard errors at country level in parentheses * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Table 11 shows the results for net bond issuance with political economy variables as controls. The table shows a postive and statistically significant effect of German fiscal consolidations (in line with baseline results) except for column (4). Consistently with our expectations, in elections years government net bond issuance tend to increase on average by 1% point of GDP. This result is consitent with the political budget cycle mechanism. Also, consistently with the theory of "common pool", fragmented governments tend to issue large amounts of government bonds.

Table 11
Eurozone level: Net bonds issuance and political controls

Dependent variable: Net bond issuance in % of GDP	(1)	(2)	(3)	(4)	(5)
Germany Consolidation size ($t-1$)	0.591*	0.552*	0.647*	0.529	0.600*
	(0.353)	(0.314)	(0.341)	(0.335)	(0.309)
Deficit (% GDP)	0.301***	0.315***	0.281***	0.247***	0.242***
	(0.104)	(0.099)	(0.101)	(0.055)	(0.048)
Inflation rate (CPI)	0.039	0.059*	-0.000	0.003	-0.026
	(0.043)	(0.034)	(0.052)	(0.049)	(0.052)
CG debt stock (% GDP)	0.074***	0.078***	0.067***	0.072***	0.065***
	(0.025)	(0.026)	(0.023)	(0.023)	(0.019)
Exchange rate (LCU-USD)	3.763	5.203**	2.970	4.471**	4.732**
	(3.011)	(2.295)	(3.283)	(2.134)	(1.997)
Real GDP per capita (Log)	-1.493	-1.564	-1.981	-2.022	-2.257*
	(1.463)	(1.436)	(1.426)	(1.281)	(1.316)
Right wing		-0.666			-0.225
		(0.473)			(0.218)
Election year			1.068***		1.096***
			(0.395)		(0.404)
Government fractionalisation				4.145*	4.058*
				(2.360)	(2.215)
Observations	178	177	178	178	177
Countries	9	9	9	9	9
R^2	0.254	0.265	0.290	0.302	0.343

Notes: All specifications include country fixed effects and country-specific trends. Clustered Standard errors at country level in parentheses * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Table 12 shows the results for equation (7). This table allows us to discuss a plausible structural break in the relation betwen German fiscal consolidations and the borrowing cost faced by the peripheral Eurozone countries after the introduction of the euro in 1999. As the interaction term is not statistically significant, the results are consistent with the idea that the external effect of German fiscal consolidations on the other Eurozone countries is not specifically due do the introduction of the euro. However as the region is financially well integrated , the results suggest a need for the coordination of fiscal policy in the Eurozone as mentioned earlier. However Table A_6 in the Appendix shows that using the real long term interest rates, the relationship becomes stronger after the introduction of the euro in 1999 than before (suggesting the role of country-specific inflation).

Table 12
Eurozone level: Structural break and bond yields

	(1) est1	(2) est2	(3) est3	(4) est4
Germany Consolidation size $(t-1)$	-0.166***	-0.186***	-0.136**	-0.156**
	(0.056)	(0.066)	(0.056)	(0.072)
Germany Consolidation size $(t-1)\times$ EMU	0.036	0.049	0.068	0.081
	(0.083)	(0.078)	(0.078)	(0.073)
EMU	-0.095	-0.143	0.043	-0.003
	(0.268)	(0.285)	(0.243)	(0.268)
Country Consolidation size $(t-1)$			0.192	0.194
			(0.126)	(0.123)
Short term Real interest rate	0.505***	0.503***	0.498***	0.496***
	(0.052)	(0.050)	(0.055)	(0.053)
Inflation rate (CPI)	0.247***	0.262***	0.254***	0.269***
	(0.052)	(0.069)	(0.054)	(0.072)
CG debt stock (%GDP)	0.040***	0.061**	0.037***	0.058*
	(0.009)	(0.029)	(0.011)	(0.033)
Deficit (% GDP)	0.094*	0.093*	0.090	0.089
	(0.056)	(0.055)	(0.059)	(0.058)
Growth	0.037	0.036	0.050	0.049
	(0.034)	(0.034)	(0.040)	(0.039)
CG debt stock $(\%GDP)^2$		-0.0002		-0.0002
		(0.0002)		(0.0003)
Observations	158	158	150	150
Countries	10	10	9	9
R^2	0.678	0.679	0.691	0.692

Notes: All specifications include country fixed effects and country-specific trends. Clustered Standard errors at country level in parentheses * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Table 13 and Table 14 show the estimates for the extended sample at the European level for bond yields and net bond issuance respectively. In column (7) of Table 13, a 1% of GDP increase in the the size of German fiscal consolidations reduces on average the bond yields in other European countries by 0.122 % point. In column (6) of Table 14, an increase in the size of German fiscal consolidations of 1% leads to an increase in ne bond issuance in the peripheral European countries by 0.698%. Overall, the results presented in Table 13 and Table 14 are close to the baseline results. The results are therefore robust to the sample extension. In addition, extending the sample to all Europeans countries generates an efficiency gain (low sdandard errors).

Table13
European countries: Bond yields and German fiscal consolidations

Dependent variable: Nominal Long term interest rate	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Germany Consolidation size $(t-1)$	0.057	-0.077	-0.127*	-0.141***	-0.126**	-0.124**	-0.122**
	(0.082)	(0.062)	(0.073)	(0.053)	(0.057)	(0.056)	(0.056)
Short term nominal interest rate		0.515***	0.535***	0.499***	0.493***	0.488***	0.487***
		(0.042)	(0.041)	(0.043)	(0.046)	(0.047)	(0.049)
CG debt stock(% GDP)			0.017**	0.031***	0.027***	0.023**	0.007
			(0.007)	(0.007)	(0.009)	(0.011)	(0.040)
Inflation rate (CPI)				0.154***	0.167***	0.197***	0.191***
				(0.048)	(0.044)	(0.046)	(0.052)
Deficit(% GDP)					0.062*	0.085**	0.083**
					(0.034)	(0.035)	(0.037)
Growth						0.079*	0.079*
						(0.045)	(0.045)
CG debt stock (% GDP)^2							0.000
							(0.000)
Observations	237	223	223	223	217	217	217
Countries	16	16	16	16	16	16	16
R^2	0.001	0.607	0.616	0.642	0.645	0.655	0.656

Notes: All specifications include country fixed effects and country-specific trends. Clustered Standard errors at country level in parentheses * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Table 15 below, shows the estimates (full specification) for net bond issuance at the OECD level. The estimates show that consistently with the mechanism underlined in the paper, the fifth and the fourth lags have a negative and statistically significant effects suggesting again, that the external effects of US fiscal consolidations at the OECD level take time to manifest themselves. Table A_7 shows similar estimates for bond yields. All together, Table 15 and Table A_7 show that the fith Lag is the only one consistent with the mechanism of the "beggar-thy-neigbor" effect.

Table 14
European countries : Net bond issuance and German fiscal consolidations

Dependent variable: Net bond issuance in % of GDP	(1)	(2)	(3)	(4)	(5)	(6)
Germany Consolidation size $(t-1)$	0.564	0.423	0.665**	0.714***	0.714***	0.698***
	(0.386)	(0.326)	(0.282)	(0.253)	(0.253)	(0.256)
CG debt stock(% GDP)		0.069*	0.088***	0.080***	0.079***	0.075***
		(0.037)	(0.013)	(0.015)	(0.016)	(0.016)
Deficit(% GDP)			0.363***	0.372***	0.374***	0.346***
			(0.088)	(0.089)	(0.090)	(0.099)
Inflation rate (CPI)				-0.042	-0.048	-0.085*
				(0.039)	(0.047)	(0.048)
Exchange rate (LCU-USD)					-0.013	-0.008
					(0.019)	(0.019)
Real GDP per capita (Log)						-1.873
						(1.374)
Observations	282	282	266	266	266	266
Countries	15	15	15	15	15	15
R^2	0.011	0.062	0.315	0.318	0.319	0.322

Notes: All specifications include country fixed effects and country-specific trends. Clustered Standard errors at country level in parentheses * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Table 16 and Table 17 below show the estimates of the external effect of US spending cuts and tax hikes on bond yields at the OECD level. In Table 16 all the coefficients for the US spending cut are negative and statiscally significant. In column (7) a 1% point of GDP increase in US spending cuts leads to a reduction of the borrowing cost faced by other OECD countries by 1.047% point. In Table 17, all the coefficients for the US tax hikes are negative but only the univariate specification shows a statistically significant coefficient. The two tables suggest that spending cuts are more likely to generate spillover effects on borrowing costs. This result is consistent with Goujard (2013). In the Appendix, Tables A_8 and A_9 show the results for net bond issuance using spending cuts and tax hikes repectively. The results indicate that the external effects of tax hikes and spending cuts on government bond issuance at the OECD level are quite similar.

Table 15
OECD level: Net bond issuance and the Lag structure

Dependent variable: Net bond issuance in % of GDP	(1)	(2)	(3)	(4)	(5)
USA consolidation size ($t-5$)	0.880**				
	(0.397)				
USA consolidation size ($t-4$)		0.083			
		(0.419)			
USA consolidation size ($t-3$)			0.461		
			(0.351)		
USA consolidation size ($t-2$)				0.224	
				(0.325)	
USA consolidation size ($t-1$)					-0.094
					(0.762)
Deficit(% GDP)	0.434***	0.405***	0.412***	0.406***	0.406***
	(0.148)	(0.154)	(0.153)	(0.153)	(0.146)
Inflation rate (CPI)	0.167	0.095	0.103	0.096	0.090
	(0.134)	(0.156)	(0.143)	(0.146)	(0.147)
CG debt stock(% GDP)	0.103***	0.109***	0.105***	0.108***	0.110***
	(0.021)	(0.025)	(0.023)	(0.025)	(0.025)
Exchange rate (LCU-USD)	0.148***	0.159**	0.155**	0.157**	0.159**
	(0.054)	(0.065)	(0.061)	(0.065)	(0.066)
Real GDP per capita (Log)	-7.084	-4.888	-4.357	-4.536	-4.896
	(6.469)	(6.793)	(6.844)	(6.749)	(6.913)
Observations	321	332	332	332	332
Countries	25	25	25	25	25
R^2	0.385	0.360	0.362	0.360	0.360

Notes: All specifications include country fixed effects and country-specific trends. Clustered Standard errors at country level in parentheses * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Table 16
OECD level: Nominal Bond yields and US spending Cuts

Dependent variable: Nominal Long term interest rate	(1)	(2)	(3)	(4)	(5)	(6)	(7)
USA spending cut size ($t-4$)	-1.788***	-1.096***	-1.284***	-1.168***	-1.102**	-1.063**	-1.047**
	(0.511)	(0.425)	(0.464)	(0.440)	(0.454)	(0.441)	(0.451)
Short term nominal interest rate		0.368***	0.382***	0.348***	0.332***	0.327***	0.326***
		(0.058)	(0.060)	(0.065)	(0.071)	(0.072)	(0.073)
CG debt stock(% GDP)			0.016*	0.021**	0.014	0.011	0.006
			(0.009)	(0.010)	(0.011)	(0.011)	(0.024)
Inflation rate (CPI)				0.091**	0.103**	0.125**	0.125**
				(0.046)	(0.044)	(0.053)	(0.053)
Deficit(% GDP)					0.053**	0.071**	0.071**
					(0.026)	(0.029)	(0.029)
Growth						0.055	0.055
						(0.035)	(0.036)
CG debt stock (% GDP)^2							0.000
							(0.000)
Observations	366	344	344	344	329	329	329
Countries	27	27	27	27	27	27	27
R^2	0.059	0.418	0.424	0.431	0.409	0.414	0.414

Notes: All specifications include country fixed effects and country-specific trends. Clustered Standard errors at country level in parentheses * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Table 17
OECD level: Nominal Bond yields and US tax hikes

Dependent variable: Nominal Long term interest rate	(1)	(2)	(3)	(4)	(5)	(6)	(7)
USA tax hike size ($t-4$)	-0.989**	-0.500	-0.638	-0.439	-0.561	-0.657	-0.629
	(0.440)	(0.375)	(0.411)	(0.379)	(0.391)	(0.420)	(0.429)
Short term nominal interest rate		0.378***	0.387***	0.346***	0.331***	0.327***	0.323***
		(0.059)	(0.061)	(0.066)	(0.072)	(0.072)	(0.074)
CG debt stock(% GDP)			0.009	0.016	0.007	0.005	-0.008
			(0.010)	(0.010)	(0.011)	(0.011)	(0.023)
Inflation rate (CPI)				0.107**	0.119***	0.142***	0.142***
				(0.044)	(0.043)	(0.053)	(0.052)
Deficit(% GDP)					0.070***	0.091***	0.091***
					(0.026)	(0.029)	(0.029)
Growth						0.067*	0.065*
						(0.038)	(0.038)
CG debt stock (% GDP)^2							0.000
							(0.000)
Observations	366	344	344	344	329	329	329
Countries	27	27	27	27	27	27	27
R^2	0.012	0.400	0.402	0.412	0.396	0.403	0.404

Notes: All specifications include country fixed effects and country-specific trends. Clustered Standard errors at country level in parentheses * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Table 18 and Table 19 below show the estimates of the external effect of German spending cuts and tax hikes on bond yields at the Eurozone level. In Table 18 column (7) a 1% point of GDP increase in German spending cuts leads to a reduction of the borrowing cost faced by other Eurozone countries by 0.288% point. In Table 19, all the coefficients are statistically non significant. The two tables suggest that spending cuts are more likely to generate spillover effects on borrowing costs at the Eurozone level. Again, this result is consistent with Goujard (2013). In the Appendix, Tables A_{10} and A_{11} show the results for net bond issuance for spending cuts and tax hikes repectively. The results indicate that as at the OECD level that the external effects of tax hikes and spending cuts on government bond issuance are quite similar.

Table 18
Eurozone level: Nominal Bond yields and German spending cuts

Dependent variable: Nominal Long term interest rate	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Germany apending cut size $(t-1)$	-0.094	-0.149*	-0.180**	-0.227***	-0.286***	-0.289***	-0.288***
	(0.078)	(0.076)	(0.088)	(0.059)	(0.070)	(0.070)	(0.070)
Short term Real interest rate		0.533***	0.548***	0.503***	0.513***	0.510***	0.510***
		(0.052)	(0.050)	(0.052)	(0.049)	(0.051)	(0.051)
CG debt stock (% GDP)			0.022	0.042***	0.044***	0.042***	0.053**
			(0.013)	(0.009)	(0.010)	(0.010)	(0.027)
Inflation rate (CPI)				0.224***	0.237***	0.252***	0.258***
				(0.053)	(0.048)	(0.052)	(0.063)
Deficit (% GDP)					0.091**	0.102**	0.103**
					(0.045)	(0.050)	(0.050)
Growth						0.039	0.039
						(0.032)	(0.032)
CG debt stock (% GDP)^2							-0.000
							(0.000)
Observations	173	163	163	163	158	158	158
Countries	10	10	10	10	10	10	10
R^2	0.001	0.612	0.623	0.664	0.685	0.687	0.688

Notes: All specifications include country fixed effects and country-specific trends. Clustered Standard errors at country level in parentheses * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Table 19
Eurozone level: Nominal Bond yields and German tax hikes

Dependent variable: Nominal Long term interest rate	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Germany tax hike size ($t-1$)	0.132	0.054	0.029	0.036	0.129	0.128	0.121
	(0.102)	(0.058)	(0.052)	(0.050)	(0.089)	(0.084)	(0.090)
Short term nominal interest rate		0.530***	0.544***	0.500***	0.506***	0.503***	0.503***
		(0.051)	(0.049)	(0.051)	(0.049)	(0.051)	(0.050)
CG debt stock(% GDP)			0.020	0.039***	0.039***	0.037***	0.047
			(0.012)	(0.008)	(0.009)	(0.009)	(0.029)
Inflation rate (CPI)				0.215***	0.224***	0.238***	0.243***
				(0.051)	(0.046)	(0.049)	(0.061)
Deficit(% GDP)					0.089**	0.099**	0.099**
					(0.044)	(0.049)	(0.048)
Growth						0.037	0.036
						(0.031)	(0.032)
CG debt stock (% GDP)^2							-0.000
							(0.000)
Observations	173	163	163	163	158	158	158
Countries	10	10	10	10	10	10	10
R^2	0.002	0.609	0.618	0.656	0.674	0.676	0.676

Notes: All specifications include country fixed effects and country-specific trends. Clustered Standard errors at country level in parentheses * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Overall, the results in Table 16-19 tend to show that consistently with previous studies (Goujard,2013) the external effects of spending cuts are stronger than the external effects of ta hikes. This result can also be explained by the fact that spending-based fiscal consolidations are more likely to be effective in leading to a reduction of government bond issuance in the core countries. Indeed, this result is consitent with previous finding (Alesina and Perotti, 1997 ; Alesina and Ardagna, 2010) on the effectiveness of spending-based fiscal consolidations in reducing the budget deficit and the public debt.[10]

[10] Alesina and Perotti (1997) show that fiscal consolidations that rely on spending cuts in transfers and the government wage tend to be more successfull than the fiscal consolidations relying on cuts in public investment.

VII- Conclusion

Countries initiate fiscal consolidation plans in order to reduce their fiscal deficit and therefore their public debt. However these domestic unilateral policies may have spillover effects abroad especially when they take place in major countries. These spillover effects are more likely in a well integrated economic environment.

We empirically investivage in this paper the cross-border effects of fiscal consolidations taking place in the USA on one hand and in Germany on the other hand. Unlike previous research, we emphasize a financial market mechanism and we focus on the consequences for public debt in foreign countries following a fiscal consolidation in the two key countries. The empirical findings are consistent with a "beggar-thy-neigbor" effect in public debts. That is reducing public debt in safe assets countries tend to lead to increased indebtedness in peripheral countries. We suggest the following mechanism for the "beggar-thy-neigbor" effect. The safe assets countries reduce their bond issuance when they undertake fiscal consolidations. This situation generates an excess of demand in the financial market and consequently reduces the borrowing cost faced by the peripheral countries. Finally this reduction in the borrowing cost induce an increase of governemnt bond issuance in the peripheral countries.

In our empirical assessment of the "beggar-thy-neigbor" effect in public debts, we explicitly test the two channels of its mechanism. We employ a macroeconomic panel dataset of 27 OECD countries over the period 1980-2007. Our empirical strategy relies on the exogeneity of fiscal consolidations based on the narrative approach. First we test the effect of fiscal consolidations in the key countries on the government bond yields in the peripheral countries. Second, we estimate a reduced form of the effect of these fiscal consolidations on government bond issuance in the peripheral countries. We carry out the analysis first at the OECD level and second at the Eurozone level. The US is the source country at the OECD level while Germany is the source country at the Eurozone level. Our baseline results suggest that a 1% point of GDP increase in the size of US fiscal consolidations reduces on average the borrowing cost by 0.5% point and increases the net bond issuance by 0.88 % point of GDP in other OECD countries over the following years. A 1% point increase in the size of German fiscal consolidations generates a reduction of the borrowing cost by 0.147% point and an increase in net bond issuance by 0.64% point of GDP on average in the other Eurozone countries. We find that the speed of transmission of the spillover effects is higher at the Eurozone level than at the OECD level. Also, the response in terms of bond issuance is higher at the Eurozone level owing to high degree of financial integration in the Eurozone. In addition, spending-based fiscal consolidations generate stronger external effects than tax-based fiscal consolidations on the bond yields.

While there is an increasing interest in the spillover effects of fiscal consolidations, this paper is the first to the best of our knowledge to show how a reduction in the public debt in

some core countries may lead to the increase of the public debt in other countries.

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Appendix

Countries in the sample

Countries in the sample at OECD Level

Australia* (AUS), Austria* (AUT), Belgium* (BEL), Canada* (CAN), Chile (CHL, Czech Republic (CZE), Denmark* (DNK), Finland* (FIN), France* (FRA), Germany* (DEU), Hungary (HUN), Iceland (ISL), Ireland* (IRL), Italy* (ITA), Japan* (JPN), Korea (KOR), Luxembourg (LUX) Mexico (MEX), Netherlands* (NLD), Norway (NOR), Poland (POL), Portugal* (PRT), Slovak Republic (SVK), Spain* (ESP), Sweden* (SWE), Switzerland (CHE), United Kingdom* (GBR).

Eurozone Countries (except Germany)

Austria* (AUS), Belgium* (BEL), Finland* (FIN), France* (FRA), Ireland* (IRL), Italy* (ITA), Luxembourg (LUX), Netherlands* (NLD), Portugal* (PRT), Spain* (ESP).

(*) Countries with data on Fiscal consolidation.

Table A_1
OECD level: Real bond yields and US fiscal consolidations

Dependent variable: Real long term interest rate	(1)	(2)	(3)	(4)	(5)	(6)	(7)
USA consolidation size ($t-4$)	0.688	-0.029	-0.241*	-0.337***	-0.336**	-0.333**	-0.357**
	(0.608)	(0.128)	(0.138)	(0.124)	(0.155)	(0.158)	(0.163)
Short term Real interest rate		1.170***	1.157***	1.093***	1.077***	1.076***	1.079***
		(0.019)	(0.023)	(0.043)	(0.048)	(0.047)	(0.045)
CG debt stock (% GDP)			0.027***	0.015***	0.018***	0.018***	0.036**
			(0.006)	(0.006)	(0.006)	(0.005)	(0.018)
Inflation rate (CPI)				-0.144***	-0.126***	-0.131***	-0.126***
				(0.037)	(0.038)	(0.037)	(0.036)
Deficit (% GDP)					0.006	0.001	0.001
					(0.023)	(0.022)	(0.022)
Growth						-0.014	-0.012
						(0.017)	(0.017)
CG debt stock (% GDP)^2							-0.00007
							(0.00006)
Observations	366	344	344	344	329	329	329
Countries	27	27	27	27	27	27	27
R^2	0.008	0.919	0.928	0.938	0.933	0.933	0.933

Notes: All specifications include country fixed effects and country-specific trends. Clustered Standard errors at country level in parentheses * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

TableA$_2$
OECD level: Gross bond issuance and controls

Dependent variable: Gross bond issuance in % of GDP	(1)	(2)	(3)	(4)	(5)
Country consolidation size ($t-5$)	-0.057	-0.055	-0.053	-0.078	-0.075
	(0.145)	(0.144)	(0.150)	(0.130)	(0.134)
USA consolidation size ($t-5$)	-1.311***	-1.321***	-1.335***	-1.254**	-1.279**
	(0.467)	(0.466)	(0.437)	(0.553)	(0.529)
USA consolidation size ($t-5$) $\times$ Eurozone	2.425***	2.409***	2.429***	2.398**	2.398***
	(0.892)	(0.888)	(0.875)	(0.943)	(0.921)
Deficit (% GDP)	0.209***	0.210***	0.200***	0.216***	0.207***
	(0.071)	(0.073)	(0.069)	(0.072)	(0.072)
Inflation rate (CPI)	-0.238***	-0.238***	-0.235***	-0.255***	-0.252***
	(0.084)	(0.084)	(0.085)	(0.087)	(0.089)
CG debt stock (% GDP)	0.222***	0.223***	0.222***	0.220***	0.221***
	(0.032)	(0.032)	(0.032)	(0.030)	(0.030)
Exchange rate (LCU-USD)	0.092	0.092	0.111	0.084	0.104
	(0.100)	(0.101)	(0.097)	(0.098)	(0.097)
Real GDP per capita (Log)	14.388**	14.566**	13.949**	15.635**	15.256**
	(7.233)	(7.087)	(7.046)	(7.359)	(7.272)
Right wing		-0.069			-0.014
		(0.201)			(0.196)
Election year			0.309		0.316
			(0.248)		(0.245)
Government fractionalisation				-1.255	-1.288
				(1.105)	(1.082)
Observations	228	228	228	228	228
Countries	16	16	16	16	16
R^2	0.401	0.401	0.406	0.405	0.410

Notes: All specifications include country fixed effects and country-specific trends. Clustered Standard errors at country level in parentheses * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Table A_3
Eurozone level: Real Bond yields and German fiscal consolidations

Dependent variable: Real long term interest rate	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Germany Consolidation size ($t-1$)	-0.184	-0.049	-0.074***	-0.066**	-0.064**	-0.064**	-0.061**
	(0.233)	(0.034)	(0.026)	(0.029)	(0.030)	(0.031)	(0.031)
Short term Real interest rate		1.151***	1.155***	1.142***	1.123***	1.123***	1.122***
		(0.019)	(0.025)	(0.025)	(0.033)	(0.032)	(0.033)
CG debt stock (% GDP)			0.016*	0.011*	0.014*	0.014*	0.007
			(0.009)	(0.006)	(0.008)	(0.009)	(0.020)
Inflation rate (CPI)				-0.043	-0.026	-0.028	-0.033
				(0.069)	(0.069)	(0.068)	(0.065)
Deficit (% GDP)					0.025	0.024	0.023
					(0.016)	(0.018)	(0.018)
Growth						-0.004	-0.004
						(0.018)	(0.018)
CG debt stock (% GDP)^2							0.00007
							(0.0002)
Observations	173	163	163	163	158	158	158
Countries	10	10	10	10	10	10	10
R^2	0.003	0.957	0.959	0.960	0.958	0.958	0.958

Notes: All specifications include country fixed effects and country-specific trends. Clustered Standard errors at country level in parentheses * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Table A_4
Eurozone level: Real Bond yields and Post consolidation dummies

Dependent variable: Real long term interest rate	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Post Germany consolidation	-0.429***	-0.111***	-0.083***	-0.074**	-0.090***	-0.059	-0.058*
	(0.062)	(0.030)	(0.024)	(0.030)	(0.030)	(0.040)	(0.035)
Short term Real interest rate		1.137***	1.142***	1.135***	1.117***	1.121***	1.120***
		(0.032)	(0.040)	(0.040)	(0.047)	(0.045)	(0.046)
CG debt stock (% GDP)			0.020	0.018	0.022**	0.020**	0.016
			(0.013)	(0.011)	(0.011)	(0.009)	(0.023)
Inflation rate (CPI)				-0.024	0.002	0.014	0.011
				(0.073)	(0.073)	(0.072)	(0.066)
Deficit (% GDP)					0.007	0.020	0.020
					(0.021)	(0.024)	(0.024)
Growth						0.041*	0.042*
						(0.024)	(0.025)
CG debt stock (% GDP)^2							0.00003
							(0.0002)
Observations	179	168	168	168	163	163	163
Countries	10	10	10	10	10	10	10
R^2	0.006	0.942	0.947	0.947	0.944	0.946	0.946

Notes: All specifications include country fixed effects and country-specific trends. Clustered Standard errors at country level in parentheses * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Table A_5
Eurozone level : Net bonds issuance and country-specific consolidations

Dependent variable: Net bond issuance in % of GDP	(1)	(2)	(3)	(4)	(5)	(6)
Country Consolidation size $(t-1)$	0.771**	0.677	0.640*	0.666*	0.632	0.629
	(0.324)	(0.459)	(0.376)	(0.376)	(0.470)	(0.471)
Germany Consolidation size $(t-1)$	0.312	0.281	0.547*	0.566**	0.560*	0.558*
	(0.283)	(0.301)	(0.297)	(0.282)	(0.297)	(0.297)
CG debt stock (% GDP)		0.025	0.058**	0.049*	0.050*	0.050*
		(0.054)	(0.024)	(0.029)	(0.030)	(0.030)
Deficit (% GDP)			0.313***	0.320***	0.324***	0.320***
			(0.099)	(0.097)	(0.089)	(0.095)
Inflation rate (CPI)				-0.038	-0.002	-0.008
				(0.035)	(0.091)	(0.103)
Exchange rate (LCU-USD)					1.704	1.633
					(4.446)	(4.494)
Real GDP per capita (Log)						-0.209
						(1.734)
Observations	173	173	165	165	165	165
Countries	8	8	8	8	8	8
R^2	0.071	0.079	0.287	0.289	0.290	0.290

Notes: All specifications include country fixed effects and country-specific trends. Clustered Standard errors at country level in parentheses * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Table A_6
Eurozone level: Structural break and real bond yields

Dependent variable: Real long term interest rate	(1)	(2)	(3)	(4)
Germany Consolidation size $(t-1)$	0.076**	0.094***	0.083**	0.101***
	(0.031)	(0.031)	(0.034)	(0.035)
Germany Consolidation size $(t-1)\times$ EMU	-0.200***	-0.209***	-0.185***	-0.194***
	(0.071)	(0.068)	(0.071)	(0.067)
EMU	0.448***	0.488***	0.488***	0.529***
	(0.112)	(0.124)	(0.122)	(0.143)
Country Consolidation size $(t-1)$			0.069	0.069
			(0.059)	(0.060)
Short term Real interest rate	1.125***	1.122***	1.119***	1.116***
	(0.028)	(0.029)	(0.030)	(0.033)
Inflation rate (CPI)	-0.037	-0.052	-0.036	-0.051
	(0.063)	(0.060)	(0.064)	(0.062)
CG debt stock (%GDP)	0.018**	-0.002	0.018*	-0.002
	(0.008)	(0.023)	(0.009)	(0.026)
Deficit (% GDP)	0.040*	0.040*	0.034	0.035
	(0.021)	(0.022)	(0.021)	(0.022)
Growth	0.004	0.005	0.004	0.005
	(0.019)	(0.019)	(0.021)	(0.021)
CG debt stock $(\%GDP)^2$		0.0002		0.0002
		(0.0002)		(0.0002)
Observations	158	158	150	150
Countries	10	10	9	9
R^2	0.961	0.962	0.962	0.962

Notes: All specifications include country fixed effects and country-specific trends. Clustered Standard errors at country level in parentheses * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Table A_7
OECD level: Bond yields and the Lag structure

Dependent variable: Nominal Long term interest rate	(1)	(2)	(3)	(4)	(5)
USA consolidation size $(t-5)$	-0.391*				
	(0.223)				
USA consolidation size $(t-4)$		-0.495**			
		(0.233)			
USA consolidation size $(t-3)$			-0.125		
			(0.254)		
USA consolidation size $(t-2)$				0.653***	
				(0.162)	
USA consolidation size $(t-1)$					0.687***
					(0.168)
Short term nominal interest rate	0.327***	0.326***	0.314***	0.327***	0.311***
	(0.087)	(0.073)	(0.075)	(0.071)	(0.070)
Inflation rate (CPI)	0.145**	0.131**	0.141***	0.130***	0.132***
	(0.060)	(0.052)	(0.050)	(0.044)	(0.047)
CG debt stock(% GDP)	0.010	0.000	-0.026	-0.037	-0.034
	(0.022)	(0.023)	(0.022)	(0.023)	(0.021)
CG debt stock (% GDP)^2	0.000	0.000	0.000	0.000	0.000
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Deficit(% GDP)	0.080***	0.082***	0.090***	0.090***	0.060**
	(0.031)	(0.029)	(0.029)	(0.030)	(0.030)
Growth	0.058*	0.062*	0.064*	0.054	0.049
	(0.035)	(0.037)	(0.039)	(0.038)	(0.033)
Observations	317	329	342	354	365
Countries	27	27	28	28	28
R^2	0.420	0.410	0.399	0.416	0.417

Notes: All specifications include country fixed effects and country-specific trends. Clustered Standard errors at country level in parentheses * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Table A_8
OECD level: Net bond issuance and US spending Cuts

Dependent variable: Net bond issuance in % of GDP	(1)	(2)	(3)	(4)	(5)	(6)
USA spending cut size ($t-5$)	1.753	0.278	1.222	1.526*	1.270*	1.443**
	(1.172)	(1.530)	(0.893)	(0.859)	(0.768)	(0.729)
CG debt stock(% GDP)		0.148***	0.099***	0.109***	0.119***	0.104***
		(0.031)	(0.017)	(0.019)	(0.017)	(0.020)
Deficit(% GDP)			0.466***	0.486***	0.464***	0.432***
			(0.142)	(0.147)	(0.145)	(0.147)
Inflation rate (CPI)				0.158	0.161	0.173
				(0.146)	(0.141)	(0.134)
Exchange rate (LCU-USD)					0.149***	0.148***
					(0.055)	(0.054)
Real GDP per capita (Log)						-7.487
						(6.313)
Observations	335	335	321	321	321	321
Countries	25	25	25	25	25	25
R^2	0.014	0.165	0.351	0.358	0.381	0.384

Notes: All specifications include country fixed effects and country-specific trends. Clustered Standard errors at country level in parentheses * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Table A_9
OECD level: Net bond issuance and US tax hikes

Dependent variable: Net bond issuance in % of GDP	(1)	(2)	(3)	(4)	(5)	(6)
USA tax hike size ($t-5$)	2.552*	0.819	1.752**	1.903**	1.657**	1.719**
	(1.427)	(1.215)	(0.861)	(0.812)	(0.842)	(0.832)
CG debt stock(% GDP)		0.145***	0.098***	0.108***	0.118***	0.106***
		(0.026)	(0.018)	(0.019)	(0.019)	(0.023)
Deficit(% GDP)			0.466***	0.483***	0.461***	0.433***
			(0.145)	(0.150)	(0.148)	(0.150)
Inflation rate (CPI)				0.137	0.145	0.152
				(0.147)	(0.141)	(0.136)
Exchange rate (LCU-USD)					0.150***	0.150***
					(0.057)	(0.057)
Real GDP per capita (Log)						-6.226
						(6.766)
Observations	335	335	321	321	321	321
Countries	25	25	25	25	25	25
R^2	0.020	0.167	0.354	0.359	0.382	0.384

Notes: All specifications include country fixed effects and country-specific trends. Clustered Standard errors at country level in parentheses * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Table A_{10}
Eurozone level: Net bond issuance and German spending cuts

Dependent variable: Net bond issuance in % of GDP	(1)	(2)	(3)	(4)	(5)	(6)
Germany apending cut size ($t-1$)	0.252	0.206	0.355	0.353	0.337	0.341
	(0.258)	(0.263)	(0.300)	(0.293)	(0.286)	(0.293)
CG debt stock (% GDP)		0.047	0.081***	0.083***	0.083***	0.077***
		(0.037)	(0.022)	(0.031)	(0.028)	(0.027)
Deficit (% GDP)			0.311***	0.310***	0.320***	0.289***
			(0.118)	(0.110)	(0.105)	(0.103)
Inflation rate (CPI)				0.006	0.097***	0.039
				(0.056)	(0.029)	(0.045)
Exchange rate (LCU-USD)					4.570*	3.844
					(2.718)	(3.043)
Real GDP per capita (Log)						-1.900
						(1.609)
Observations	187	187	178	178	178	178
Countries	9	9	9	9	9	9
R^2	0.002	0.032	0.230	0.230	0.239	0.243

Notes: All specifications include country fixed effects and country-specific trends. Clustered Standard errors at country level in parentheses * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Table A_{11}
Eurozone level: Net bond issuance and German tax hikes

Dependent variable: Net bond issuance in % of GDP	(1)	(2)	(3)	(4)	(5)	(6)
Germany tax hike size ($t-1$)	0.607	0.496	0.707	0.705	0.681	0.635
	(0.599)	(0.582)	(0.498)	(0.476)	(0.495)	(0.511)
CG debt stock(% GDP)		0.046	0.080***	0.081***	0.081***	0.077***
		(0.037)	(0.021)	(0.029)	(0.025)	(0.025)
Deficit(% GDP)			0.316***	0.316***	0.326***	0.302***
			(0.118)	(0.112)	(0.106)	(0.109)
Inflation rate (CPI)				0.002	0.091***	0.047
				(0.050)	(0.030)	(0.042)
Exchange rate (LCU-USD)					4.438	3.905
					(2.766)	(2.961)
Real GDP per capita (Log)						-1.432
						(1.594)
Observations	187	187	178	178	178	178
Countries	9	9	9	9	9	9
R^2	0.009	0.036	0.238	0.238	0.247	0.249

Notes: All specifications include country fixed effects and country-specific trends. Clustered Standard errors at country level in parentheses * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.