II.3. Rising sovereign risk premia and the profile of fiscal consolidation ([35])

Higher sovereign risk premia can have important valuation effects on bank balance sheets. A vulnerable banking sector, already suffering recapitalisation pressures from loan losses, faces additional pressures from declining sovereign bond prices, forcing banks to raise lending costs. This sovereign risk channel constitutes a potentially important transmission from sovereign bond prices to the private sector. For highly indebted countries in the euro area this section shows that the negative output effects of higher sovereign risk premia and expectations of sovereign default can exceed those of fiscal consolidation, implying that the counterfactual of no consolidation could make such countries worse off. This illustrates that the risks to backloading fiscal consolidations, in particular doubts that the necessary consolidation will be implemented at all in the future, could be amplified by the costs of raising expectations of sovereign default, especially if there is no credible long-term consolidation strategy in place.

The increase in debt-to-GDP ratios and rise in sovereign risk premia in some of the euro area's most vulnerable countries have fostered an intensive debate about the best fiscal policy response. Critics of fiscal consolidations claim that fiscal austerity worsens the demand shortfall in an economy which is already hit by negative demand shocks. In addition, they argue that currently monetary policy can do little to accommodate consolidation efforts and that a credit constrained private sector will also be unable to offset negative public demand shocks via an increase in private borrowing. However, these arguments do not take credit constraints of the public sector into account, including risks of losses of market access particularly when part of the debt is held by foreign investors. The recent past has shown that where debt is held by foreigners, the economy may face risks of sudden stops. Countries facing higher risk premia thus need to address the sovereign credit risk by bringing public finances back to sustainable levels. An expectation of sovereign debt restructuring not only increases sovereign borrowing costs but also has detrimental effects on the domestic banking system, which typically holds a sizeable amount of bonds issued by domestic governments.

A similar debate rages about the size of the fiscal multiplier. Those who believe in a small multiplier (e.g. Cogan et al. (2010)) favour consolidation while those who point to estimates of a larger multiplier (as found in e.g. Auerbachand Gorodnichenko (2012)) argue for postponement of consolidation.([36]) While the discussion on multipliers provides information about the short-term income losses of consolidation measures, it is not the only criterion on which one should base fiscal policy decisions, because multiplier calculations usually assume that under the alternative – no consolidation – scenario, the perceived risk of government debt restructuring would remain unchanged. However, countries with high and strongly rising sovereign debt have faced ever higher financing costs (and in some cases even a complete loss of financial market access). This in turn has had repercussions for the private sector.

An important transmission channel to the private sector which has been emphasised in recent discussions is the vulnerability of the domestic banking sector, which already suffers recapitalisation pressures from loan losses and faces additional pressure from declining government bond prices. Corsetti*et al.* (2012) refer to this as the 'sovereign risk channel'.([37]) These authors use a dynamic stochastic general equilibrium (DSGE) model augmented by a simple banking sector and analyse the effects of fiscal retrenchment under alternative debt levels. They find that for debt-to-GDP ratios in excess of 115%, retrenchment packages could actually avoid an initial decline in output, as the sovereign risk channel turns out to dominate the direct effects of spending cuts.

This section analyses the sovereign risk channel using a two-country DSGE model with a banking

([35]) Section prepared by Jan in 't Veld and Werner Roeger.

([36]) Cogan, J. T. Cwik, J. Taylor and V. Wieland (2010), 'New Keynesian versus Old Keynesian government spending multipliers',*Journal of Economic Dynamics and Control*, 34(3), pp 281–95. Auerbach, A. and Y. Gorodnichenko (2012), 'Measuring the output responses to fiscal policy',*American Economic Journal-Economic Policy,* 4, pp. 1–27.

([37]) Corsetti, G., K. Kuester, A. Meier and G. Mueller (2012),'Sovereign risk, fiscal policy and macroeconomic stability',*IMF Working Paper* 12/33.

sector (see Kollmann et al. (2013)).([38]) This is a model for an economy within a monetary union and is particularly suited to an analysis of vulnerable countries in the euro area.

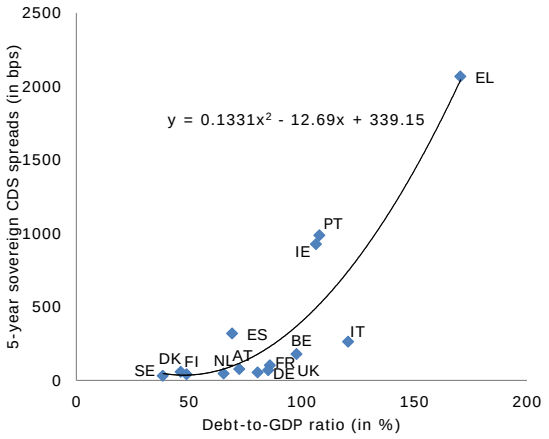
Sovereign default risk and government debt: some empirical evidence

The quantitative results presented in this section depend crucially on the sensitivity of the sovereign default probability to the level of government debt. Theoretical models of government default (see for example Arellano (2008)([39])) typically predict a non-linear and convex relationship. Such a relationship is often found in the empirical literature. Bi (2012) models the interaction between sovereign default risk and fiscal policy using a DSGE model in which, due to the existence of fiscal limits (which measure a government's ability to service its debt), the model produces a non-linear relationship between the default risk premia and the level of government debt.([40]) Default risk premia start to emerge when the debt level reaches a point where sovereign default becomes possible and once risk premia begin to rise, they do so rapidly. Graph II.3.1 shows the relationship between CDS spreads for government bonds (5-year maturity) and the level of government debt (as a share of GDP) for EU countries in 2011.

It can be seen that, for low levels of government debt (below 60% of GDP), CDS spreads are not sensitive to variations in debt levels. Between 60% and 90%, spreads increase more strongly with an increase in government debt. Roughly speaking, a 10 pps. increase of government debt increases the CDS spread by around 10 bps., a number often found in pre-financial crisis empirical estimates (e.g. Ardagna et al., 2007, Laubach, 2009, Poghosyan, 2012).([41]) Non-linearities become more severe for debt levels beyond 90%. There remains a sizeable dispersion, however. Some countries like Belgium manage to retain low CDS spreads despite relatively high levels of government debt, while other countries such as Spain or Portugal face much higher CDS spreads for similar levels of government debt. This suggests that the slope between default risk and government debt is likely to be country-specific. Nevertheless, the average relationship depicted suggests that beyond debt levels of 120%, a 10 pps. increase of government debt can be associated with an increase in the CDS spread of around 200 bps. These empirical relationships are used in this section to analyse the importance of the sovereign risk channel.

Graph II.3.1: **Sovereign CDS spreads vs debt-to-GDP ratios, EU countries (1)**

(July 2011)



(1) The figure shows average 5-year sovereign CDS spreads (bps.) for July 2011, against end-2011 general government debt (as % of GDP) with fitted 2nd-order polynomial.
Source: Bloomberg.

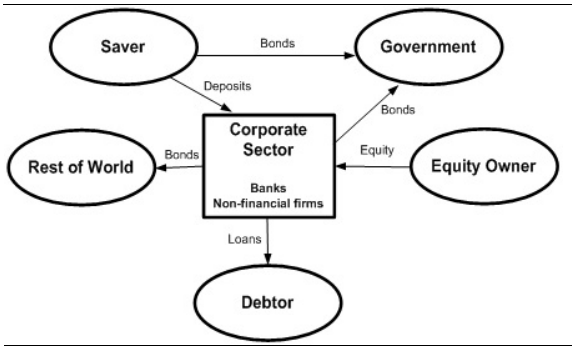
The model

The simulations presented below are based on a two-country DSGE model, where the euro area is divided up into vulnerable (EL, IE, PT, IT, ES) and non-vulnerable countries. The model differs from a standard DSGE model in two respects. First, there is a banking sector and, second, private households are divided up into (risk-averse) savers, (less risk-averse) equity owners and debtor households. The distinction between savers with different risk attitudes allows a distinction to be made between deposits (of risk-averse households) and bank capital (of equity owners). This distinction introduces limited risk sharing within the aggregate household sector and allows for

([38]) Kollmann, R., M. Ratto, W. Roeger and J. in 't Veld (2013), 'Fiscal policy, banks and the financial crisis',*Journal of Economics Dynamics and Control,* 37(2), pp.387-403. .
([39]) Arellano, C. (2008), 'Default risk and income fluctuations in emerging economies', *American Economic Review*, 98. pp. 690-712.
([40]) Bi, H. (2012), 'Sovereign default risk premia, fiscal limits, and fiscal policy', *European Economic Review*, 56, pp. 389-410.
([41]) Ardagna, S., Caselli, F. and T. Lane (2007), 'Fiscal discipline and the cost of public debt service: Some estimates for OECD countries', *The B.E. Journal of Macroeconomics*: Vol. 7(1); Laubach, T, (2009), 'New evidence on the interest rate effects of budget deficits and debt', *Journal of the European Economic Association*, 7(4): 858-85; Poghosyan T. (2012), 'Long run and short run determinants of sovereign bond yields in advanced economies', *IMF Working Paper* 12/271. .

larger fluctuations in borrowing costs. Graph II.3.2 shows the structure of financial relationships between different types of households and the corporate sector (for a more detailed description of the model and simulation experiments, see Roeger and in 't Veld (2013)([42])).

Graph II.3.2: **The structure of the QUEST model with banking**



Source: DG ECFIN.

In the analysis, the sovereign risk channel becomes important because of the vulnerability of the banking sector, which is exposed to sovereign wealth effects from variations in government bond prices. The banking sector is briefly described hereunder so that the transmission mechanism from expected sovereign losses to the real economy can be better understood.

Banks issue shares to equity owners, who receive dividends from bank lending activities. Banks engage in mortgage lending and they hold government bonds. While government bonds are probably important for banks as collateral in refinancing operations, their demand is not modelled explicitly but taken as exogenous. This is sufficient for the purpose of analysing the effects of declining bond prices on banks' balance sheets. Banks are assumed to hold government perpetuities which pay a coupon each period. Expected sovereign restructuring is modelled as a change of expectation about future coupon payments, which results in variations of current sovereign bond prices. Given the limited types of activities of banks, the aggregate banking sector has a simple balance sheet. On the asset side it consists of loans and government bonds. Deposits and bank capital constitute the liability side.

Bank activities are restricted by a capital requirement constraint which penalises the bank if its capital falls below a certain threshold. The bank has various options for responding to loan losses or the loss of value of sovereign bonds, which both erode the current value of its capital. It can reduce lending or recapitalise in order to re-establish an optimal bank capital to asset ratio. In general, banks will act in both directions. Initially, the penalty on excess leverage determines how the bank finances loan supply in order to minimise financing costs. Thus, with a high penalty, banks are forced to recapitalise (reduce dividends, issue new shares) via the equity market and compete for investment funding with non-financial firms. This increases the rate of return on equity and thereby spreads the loss of the banking sector to corporate investment. Thus, introducing bank holdings of sovereign bonds allows modelling of spillover effects from the sovereign to the private sector. In a standard macro model without a banking sector, higher sovereign default expectations would not have significant macroeconomic effects since households would weigh sovereign asset losses against lower future tax payments, i.e. in present value terms households would not be strongly affected.

Merler and Pisani-Ferry (2012)([43]) calculated sovereign bond holdings of domestic banks for euro area countries and found that these asset holdings had increased between 2007 and 2011. Especially domestic banks in countries in southern Europe tend to hold relatively large shares of domestic sovereign debt as a percentage of GDP (EL: 16.1%, IE: 9.6%, PT: 20.8%, IT: 16.9%, ES: 15.9%). In 2007 these holdings were below 10% of GDP. The increase partly reflects foreign investors' reluctance to roll over debt. For the simulations it is assumed that domestic banks' holdings of sovereign debt amount to 12% of GDP. The curvature parameter of the bank´s cost of deviating from target bank capital implies that a 1 pp rise in the bank capital ratio lowers the spread between the bank lending rate and the deposit rate by 40 bps. This is a critical parameter in the model that depends crucially on the degree of risk aversion of depositors. This parameter, as well as all other behavioural and technological parameters, is taken from the estimated model for the euro area in Kollmann et al. (2013).

([42]) Roeger W. and J. in 't Veld (2013), 'Effects of consolidation with rising sovereign debt', *European Economy Economic Paper*, (forthcoming).

([43]) Merler, S and J. Pisani-Ferry (2012), 'Who's afraid of sovereign bonds?', *Bruegel Policy Contribution*, 2012/02.

Policy experiment

The remainder of this section assesses the effects of fiscal consolidation in an environment with rising sovereign debt. It deviates from the standard practice of calculating multipliers, which assumes that without consolidation the economy would move along a pre-existing steady-state path. The analysis hereunder takes an intermediate step and assesses explicitly various 'no fiscal consolidation' scenarios. These scenarios are generated by adverse shocks to the euro area periphery, and their size is calibrated in such a way that the debt-to-GDP ratio rises by 10 pps. permanently in the absence of consolidation. The 10 pps. increase is chosen because a persistent reduction in government spending of 1% of GDP (over 10 years) roughly stabilises the initial debt-to-GDP ratio. The scenario is generated by two adverse shocks: mortgage losses, which build up to 2.5% of (one year's) GDP after five years, and a permanent drop in house prices of 6%. These shocks are roughly representative of the types of shocks that have been hitting euro area periphery countries and which, through the workings of automatic stabilisers, have led to an increase in debt ratios. However the size of the adverse financial shocks is restricted so as to generate only a 10% increase in public debt.

The alternative 'no fiscal consolidation' scenarios differ by the imposed elasticity of the sovereign risk premium to the increase in the debt-to-GDP ratio. Scenario 1 is the (standard) no-fiscal-consolidation scenario and shows the evolution of the economy under the adverse shock and the assumption that financial markets do not expect the resulting increase in government debt to have an impact on the probability of government default. However, the no-consolidation scenario should be interpreted with caution insofar as the problem of high public debt would have to be addressed at a later stage in any case. The output effect of the necessary consolidation would thus occur at a later stage. Scenarios 2a and 2b are no-fiscal-consolidation scenarios under alternative assumptions about default expectations of financial markets. Scenario 2a shows the response of the economy under benign revision of sovereign default expectations (in normal times and for low levels of government debt (below 60%)). In this case an increase in the debt-to-GDP ratio of 10 pps. raises 5-year CDS spreads by 20bps, implying a cumulative probability of sovereign default over five years of 1%. Scenario 2b shows the response of the economy without fiscal consolidation for a more rigorous revision of default expectations. This scenario corresponds to what can be inferred from sovereign CDS spreads for euro area countries with a debt level above 120% in 2011, i.e. in a situation of significant financial market uncertainty (see Graph II.3.1). In this case a 10 pps. increase in the debt ratio raises CDS spreads by 200 bps, implying a cumulative probability of sovereign default over five years of 10%. Scenario 3 shows a fully credible consolidation scenario that reduces the debt-to-GDP ratio by 10 pps. It is a permanent reduction in government consumption of 1% of GDP, which offsets the increase in public debt due to bank losses and deleveraging.

The difference between Scenarios 3 and 1 shows the impact of an expenditure-based fiscal consolidation, everything else being equal. The baseline scenario does not take into account that consolidation would only be delayed. This is not shown in scenarios 1, 2a and 2b in Graph II.3.3. GDP falls by 1% following the spending cuts, i.e. the first year fiscal multiplier is equal to one (see Graph II.3.3). The consolidation also has a negative impact on private consumption and investment, as in a monetary union nominal interest rates are unchanged and the real interest rate increases. The contractionary effects of the consolidation lead to a larger increase in the debt-to-GDP ratio than in the baseline shock scenario in the first year (see Table II.3.1, panels 1 and 3). Only in later years does the debt-to-GDP ratio decline. In the benign no-consolidation scenario 2a, the expected 10 pps. increase in the debt-to-GDP ratio would only affect default probability by 0.2% p. a. and GDP would be 0.2% lower. The higher default probability raises financing costs for firms and households and private demand declines further (see also Table II.3.1, panels 2.a and 2.b).

If instead the situation is such that financial investors revise their default expectations more strongly – in line with assumptions underlying Scenario 2b – the short-run cost of allowing for a permanent increase in government debt is 1.6%. The risk premium on 5-year government bonds increases by about 200 bps, while the risk premium on 5-year corporate bonds increases by a similar amount in the first year, but falls back in following

Table II.3.1: **Impact of bank losses and deleveraging shocks**

(in percent difference from baseline)

1: Bank losses and deleveraging

year	1	2	3
GDP	-1.56	-1.73	-1.30
Consumption	-1.20	-1.19	-0.74
Corporate investment	-4.77	-3.26	-0.28
Residential investment	-8.85	-13.91	-14.24
Rate of return equity (5yr)	60.78	20.93	-7.66
Debt-to-GDP ratio	1.73	2.85	3.30
Price sov. bond (5yr)	2.31	2.23	2.05

2.a: Bank losses and deleveraging + default expectation 0.2%

year	1	2	3
GDP	-1.76	-1.78	-1.30
Consumption	-1.47	-1.24	-0.74
Corporate investment	-5.50	-3.50	-0.28
Residential investment	-8.93	-13.86	-14.23
Rate of return equity (5yr)	79.66	22.29	-8.09
Debt-to-GDP ratio	1.74	2.83	3.24
Price sov. bond (5yr)	-0.83	-0.95	-1.13

2.b: Bank losses and deleveraging + default expectation 2%

year	1	2	3
GDP	-3.14	-2.13	-1.31
Consumption	-3.28	-1.63	-0.75
Corporate investment	-10.62	-5.29	-0.35
Residential investment	-9.53	-13.54	-14.12
Rate of return equity (5yr)	213.73	32.59	-10.82
Debt-to-GDP ratio	1.78	2.62	2.82
Price sov. bond (5yr)	-10.26	-10.5	-10.68

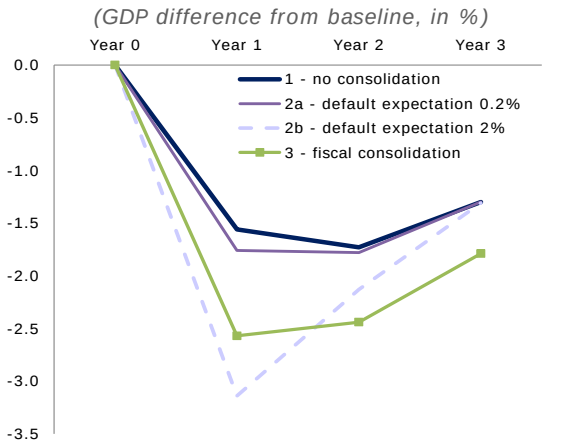
3: Bank losses and deleveraging + reduction government expenditure

year	1	2	3
GDP	-2.57	-2.44	-1.79
Consumption	-1.35	-0.85	-0.09
Corporate investment	-6.55	-5.14	-1.74
Residential investment	-7.59	-11.57	-12.04
Rate of return equity (5yr)	78.89	28.49	-5.63
Debt-to-GDP ratio	2.12	2.49	2.03
Price sov. bond (5yr)	2.92	2.94	2.78

Source: DG ECFIN.

years. The increase of capital costs lowers corporate investment in the first two years.

Graph II.3.3: **GDP impact of bank losses and deleveraging shocks**



Source: DG ECFIN.

In these sovereign risk channel scenarios the increase of capital costs for firms is short-lived. This is due to the fact that the financing needs for banks arise mainly in the first year in case a sovereign default is only expected and does not materialise (as assumed here). This happens because sovereign bond prices drop immediately once the probability of debt restructuring increases. This only requires temporary recapitalisation efforts (e.g. lower bank dividends), and therefore funding costs will only rise temporarily. Residential investment also declines, though by less than corporate investment since the loan rate increases by less than the rate of return on equity (the loan rate is a weighted average of the return on equity and the deposit rate, with weights equal to the capital and deposit share).

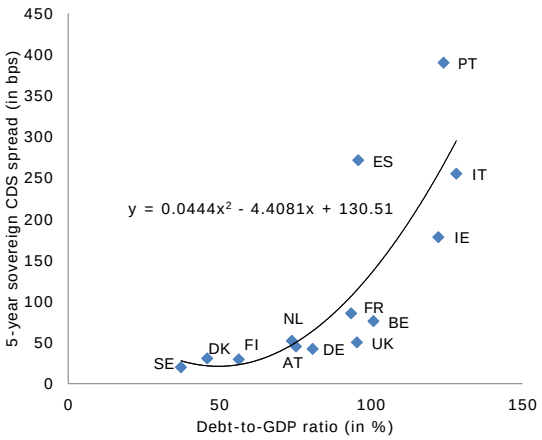
Concluding remarks

These scenarios show the potential costs of higher sovereign risk premia and expectations of sovereign default. This has important implications

for fiscal consolidation needs in highly indebted countries. While at the current juncture the costs of fiscal consolidation in terms of GDP growth are greater because of higher than normal fiscal multipliers, a counterfactual of no fiscal consolidation could for the countries concerned have more detrimental effects if it leads to expectations of sovereign default which put further pressure on the banking system when banks need to maintain high levels of capital. Based on a highly non-linear convex relationship between debt levels and CDS spreads, this section shows that a further increase in debt-to-GDP ratios in highly indebted countries can sovereign spreads spill over into higher private sector borrowing costs. While this does not change the fact that multipliers — as defined relative to the initial state — are larger now, it indicates that in case of sovereign stress there is no alternative to determined consolidation; as otherwise the consequences would be much worse.

Graph II.3.4: **Sovereign CDS spreads vs debt-to-GDP ratios, EU countries (1)**

(February 2013)



(1) Same as Graph II.3.1, but average CDS spreads for February 2013, against forecast for 2013 general government debt (as % of GDP). No CDS spreads available for Greece.

Source: Bloomberg, European Commission Winter Forecast 2013.

This also has possible implications for the consolidation path for highly indebted countries. Those arguing in favour of backloading fiscal consolidations assume that conditions would return to normal even in the absence of consolidation, so that multipliers would be smaller then (a quite strong assumption) and hence the short-term costs of consolidating would be lower. In addition, they argue that nominal rigidities in wages and prices generally favour slower, more gradual adjustment to fast frontloaded ones. But if a slower consolidation path risks raising fears in financial markets due to implementation risks and doubts about the determination to reforms, backloading consolidation would cause immediate costs from raising expectations of sovereign default. Finally, delaying fiscal consolidation would not help to address the nominal rigidities and may even perpetuate them, unless these are tackled by structural reforms.

It should also be acknowledged that there is wide dispersion in CDS spreads across countries, with some being able to attain low CDS spreads despite large debt ratios. Moreover, since the announcement of Outright Monetary Transactions (OMT) by the ECB in the second half of 2012, sovereign risk premia have fallen significantly and the relationship between debt levels and CDS spreads has weakened (see Graph II.3.4).([44]) But while the announcement of OMT has helped to lower perceived default risks, it is not unconditional support but is subject to clear conditionality. The consequences of no consolidation remain an important consideration when judging the appropriate stance of fiscal policy. In the scenarios shown here the costs of expected defaults are heavily frontloaded to the first year, while they could be more spread out over a longer horizon for more realistic scenarios. Further analysis is required to quantify these effects in a more general context.

([44]) While for a country with a debt level of 120% a further 10 pps. increase was, in July 2011, associated with an increase in the CDS spread of 200 bps., in February 2013 this was 60 bps.