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# Sovereign and Banking Sector Debt: Interconnections Through Guarantees

**Presentation prepared for "Symposium on Crisis Management and the Use of Government Guarantees", OECD, Paris 3 to 4 October 2011**

Arturo Estrella (RPI) and Sebastian Schich (OECD)

# Outline of the presentation

- Background and motivation
- Theoretical model
- Empirical findings
- Conclusions and policy implications

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## Related previous work on the use of government supported guarantees

- OECD has intensified work on financial sector guarantees since 2008, as the policy response to the financial crisis consisted largely of extension of existing and introduction of new guarantees.
- OECD's Committee on Financial Markets: This policy response was helpful, <u>but not without costs</u> (e.g. contingent liabilities, competitive distortions, moral hazard)

## The pricing of bank bond guarantees

- Fee structures of the government-supported bank bond guarantees introduced in OECD countries in 2008/09 have focused on issue or borrower characteristics (only).
- OECD/CMF (Levy and Schich, 2010): When fees abstract from the quality of the guarantor, competitive distortions can arise.
- Recently, renewed calls for sovereign bank bond guarantees have been made (including for joint and several guarantees).
- => Focus of our work is on pricing sovereign bank debt guarantees (related work include e.g. BIS Paper no. 48, July 2009; Levy and Zaghini, 2010; CGFS Paper no. 43, 2011).

## Theoretical model

- Based on Merton (1974) classic debt model
- Extended to two agents (2 sources of risk)
- Some earlier examples
  - Johnson and Stulz (1985, 1987), Lai (1992)
- Our extension
  - Is fully consistent with the original framework
  - Explicitly considers sovereign liabilities

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## Model and valuation summary

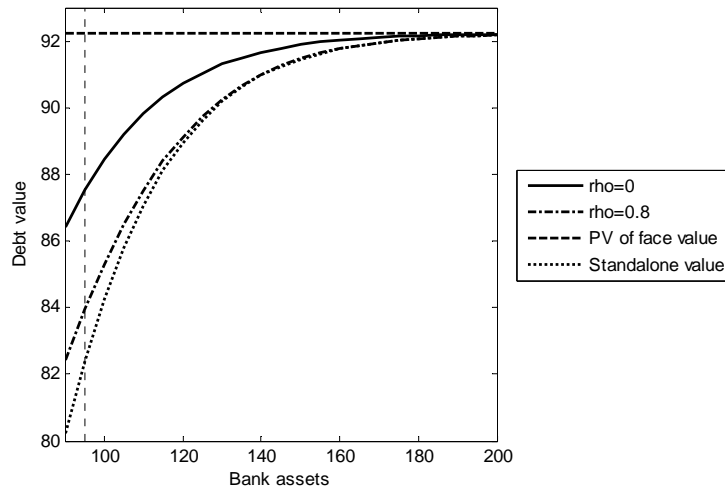**Table 1. Conditional payoffs for bank debt guaranteed by the sovereign**

| Case | Payoff $R_G$ is | If |
|---|---|---|
| 1 | $L_B$ | $A_B \geq L_B$ |
| 2 | $L_B$ | $A_B < L_B$ and $A_S \geq L_S + L_B - A_B$ |
| 3 | $A_B + A_S - L_S$ | $A_B < L_B$ and $L_S \leq A_S < L_S + L_B - A_B$ |
| 4 | $A_B$ | $A_B < L_B$ and $A_S < L_S$ |

$$V_B = e^{-r}\left[ \int_{L_B}^{\infty} L_B f_B(x)\,dx + \int_0^{L_B} x f_B(x)\,dx \right]$$

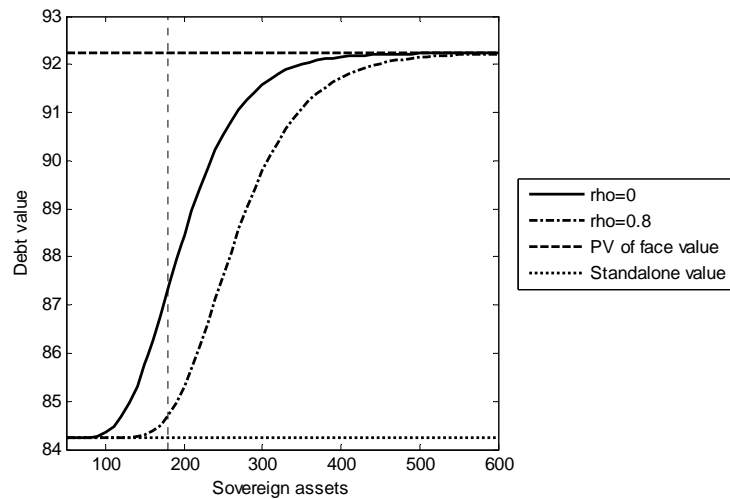$$V_G = e^{-r}\left[ \int_0^{\infty}\int_{L_B}^{\infty} L_B f(x,y)\,dxdy + \int_{L_B+L_S-x}^{\infty}\int_0^{L_B} L_B f(x,y)\,dxdy \right.$$

$$\left. + \int_{L_S}^{L_B+L_S-x}\int_0^{L_B} (x+y-L_S) f(x,y)\,dxdy + \int_0^{L_S}\int_0^{L_B} x f(x,y)\,dxdy \right]$$
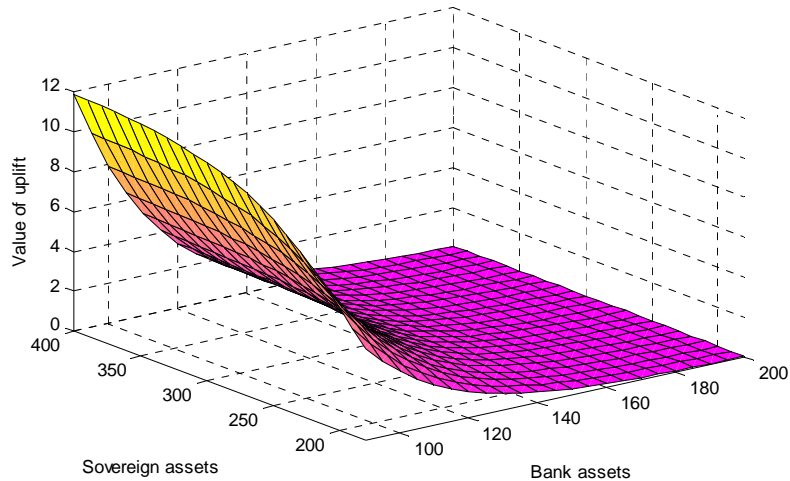
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# Sensitivity to bank risk



# Sensitivity to sovereign risk

## Value of uplift from guarantee



## Data for empirical estimates

- Our data:
  - Definition: *Stand-alone credit profile* (SACP) + *credit rating uplift* (UPLIFT) = *issuer credit rating* (ICR).
  - Estimates of the *standalone credit profile* and the *issuer credit rating,* incorporating assumed external support, for each of the 100 largest European banks rated by S&P (Standard & Poor's, 2011a)
  - Country-specific estimates from Fitch and Moody's of *credit rating uplifts* for 2007 and 2011 from Packer and Tarashev (2011).
  - UPLIFT reflects the value of assumed external support for each bank, mainly but not exclusively due to its sovereign's capacity and willingness to provide such support (it is our dependent variable).
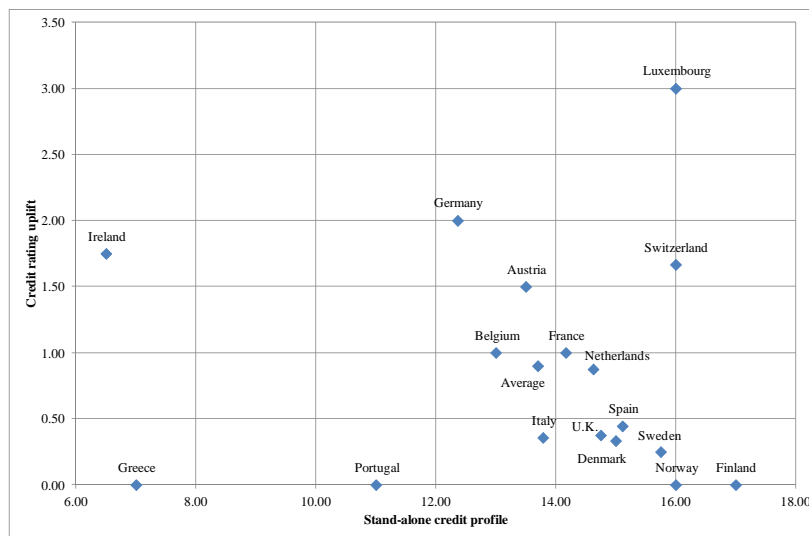
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# Stand-alone and all-in ratings
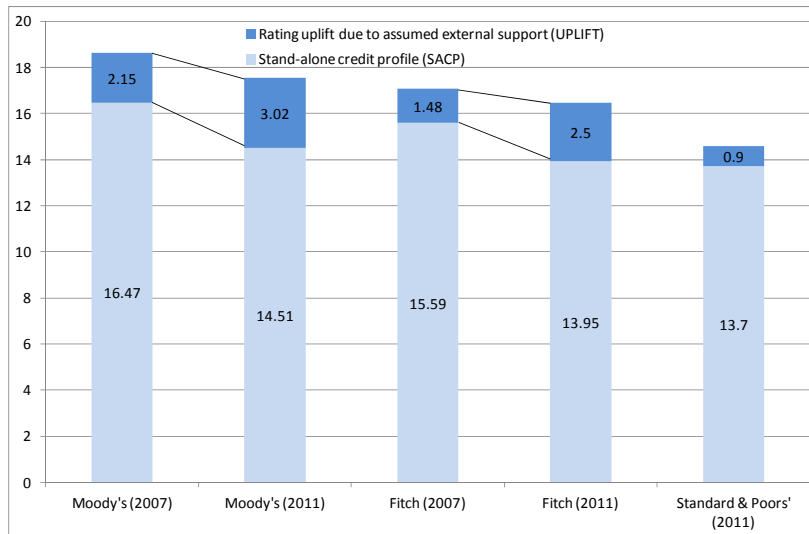


Notes: The Figure provides numerical approximations of stand-alone credit profiles and credit rating uplifts due to assumed external support, according to estimates by credit rating agencies. Credit ratings are translated into numbers, with AAA or Aaa equal to 20, AA+ or Aa1 equal to 19, and so forth.

# Country profile and uplift



Notes: Sample of 100 large European banks in April 2011. Averages of stand-alone credit profile (SACP) and credit rating uplift (UPLIFT) per country.

# Uplift, stand-alone, and country

| Variable | Coefficient | Std. Error | t-Statistic | Prob. |
|---|---|---|---|---|
| Constant | 4.04*** | 0.88 | 4.58 | 0.00 |
| Issuer stand-alone credit rating (SACP) | -0.24*** | 0.05 | -4.40 | 0.00 |
| *Country dummies:* | | | | |
| Austria | 0.67 | 0.78 | 0.86 | 0.39 |
| Belgium | 0.05 | 0.78 | 0.07 | 0.95 |
| Denmark | -0.14 | 0.66 | -0.21 | 0.84 |
| Finland | 0.01 | 1.05 | 0.00 | 1.00 |
| France | 0.33 | 0.44 | 0.75 | 0.45 |
| Germany | 0.90* | 0.47 | 1.92 | 0.06 |
| Greece | -2.37*** | 0.74 | -3.21 | 0.00 |
| Ireland | -0.74 | 0.76 | -0.98 | 0.33 |
| Italy | -0.40 | 0.43 | -0.94 | 0.35 |
| Luxembourg | 2.77*** | 1.05 | 2.65 | 0.01 |
| Netherlands | 0.31 | 0.48 | 0.65 | 0.52 |
| Norway | -0.23 | 1.05 | -0.22 | 0.82 |
| Portugal | -1.42** | 0.64 | -2.24 | 0.03 |
| Sweden | -0.04 | 0.60 | -0.07 | 0.94 |
| Switzerland | 1.43*** | 0.44 | 3.26 | 0.00 |
| United Kingdom | -0.16 | 0.48 | -0.32 | 0.75 |
| R-squared | 0.45 | Mean dependent var | | 0.90 |
| Adjusted R-squared | 0.34 | S.D. dependent var | | 1.22 |
| S.E. of regression | 0.99 | Log likelihood | | -131.07 |

Notes: Dependent variable is the credit rating uplift (UPLIFT) for 100 large European banks. The country with the median coefficient estimate (Spain) was eliminated. ***,**, and * denote significance at the 1, 5, and 10 per cent level, respectively.

# Uplift, stand-alone, and sovereign rating

| Variable | Coefficient | Std. Error | t-Statistic | Prob. |
|---|---|---|---|---|
| Constant | 0.01 | 0.62 | 0.01 | 0.99 |
| Issuer stand-alone credit rating (SACP) | -0.24*** | 0.04 | -5.52 | 0.00 |
| Sovereign credit rating (SCR) | 0.23*** | 0.04 | 5.55 | 0.00 |
| R-squared | 0.28 | Mean dependent var | | 0.90 |
| Adjusted R-squared | 0.27 | S.D. dependent var | | 1.22 |
| S.E. of regression | 1.04 | Log likelihood | | -144.67 |

Notes: Dependent variable is the credit rating uplift (UPLIFT) for 100 large European banks. ***,**, and * denote significance at the 1, 5, and 10 per cent level, respectively. The data for SCR are from Standard&Poors (2011b) and the ratings categories are transformed into numerical values in the same way as the data on stand-alone credit profiles and issuer credit ratings of banks.

## Conclusions from research

- Contingent claims analysis suggests that, for a given bank, the value of a sovereign guarantee decreases with the bank's own creditworthiness and increases with the sovereign's creditworthiness.
- These implications are consistent with our empirical findings: For a sample of 100 large European banks, a measure of implicit support is shown to be higher, the lower the bank's stand-alone creditworthiness and the higher the sovereign's creditworthiness.

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## Policy implications

- Where individual sovereign debt guarantees are provided, to avoid creating competitive distortions between banks, the premium charges need to reflect each sovereigns' own creditworthiness.
- Where joint sovereign guarantees are extended, the relative contribution to the value of the guarantee is higher in the case of stronger sovereigns, who should be compensated by higher allotments of premium incomes.

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