Risk sharing mechanisms for the EMU: Are banking and equity market integration complementary?

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Background

European Monetary Union was a major boost to financial integration in the Eurozone. But it remained uneven:

– Equity market integration not higher than seen elsewhere among industrialized countries. Home bias stayed high

– High levels of bond market integration for sovereign and big corporates.

– But most firms in Europe rely on banks. This calls for a special focus on banking integration:

  – EMU amounted to the creation of an integrated interbank market.

  – But direct cross-border integration between banks and real sector remained limited.

Cross-border bank lending in the Eurozone
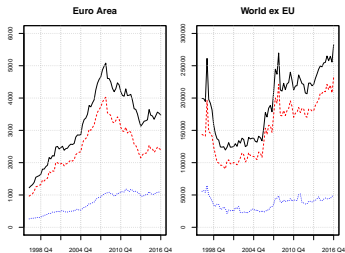
During the crisis, cross-border bank lending to banks (**red** dashed lines) decreased a lot more than to the non-financial sector (**blue** dotted lines).

This retrenchment is not apparent for other parts of the world.

Our contribution: banking integration and macroeconomic risk sharing

- How does banking integration affect the way in which consumption reacts to macroeconomic shocks?
- Very little evidence on this link at the international level but important intra-national evidence from the United States
    - Situation in the U.S. prior to state-level banking deregulation in the 1980s similar to the one in Europe today: highly integrated interbank market. But virtually no direct cross-(state-)border lending.
- We first document that the way in which banking integration in the eurozone has affected the patterns of risk sharing in the eurozone is indeed similar to the U.S.
- We then provide a stylized two-country DSGE model in which we can explain these patterns.

Our empirical findings

– (Direct) Banking integration associated with more risk sharing through cross-border (capital) income flows prior to 2008.

– During the GFC / European sovereign debt crisis, we see that risk sharing drops significantly and almost dried up.

– This freeze in risk sharing is mainly associated with a drop in cross-border interbank lending.

– Direct cross-border lending stayed relatively stable and remains associated with better income risk sharing.

  – Patterns of risk sharing changed in the same way pre/post state-level banking deregulation (BD) in the 1980s: before deregulation, inter-state consumption smoothing decreased in U.S. wide recessions and increased in booms. This cyclicality was removed by BD and the U.S. also saw more income risk sharing after BD. (Sorensen et al. (JF 2007), Hoffmann and Sherbakova-Stewen (REStat 2011))

Our theoretical explanation: model mechanism

– (Direct) banking integration improves firm's access to external
  finance but comes with longer-maturity bank lending.

– For a given idiosyncratic shock, this 'de-couples' current
  investment spending and wage payments from current cash
  flows, making firm profits more volatile and more pro-cyclical.

– Hence, any given international equity portfolio diversification,
  contribution of income smoothing to risk sharing will be higher.

– In dealing with 'normal' idiosyncratic shocks, interbank and
  direct cross-border integration are pretty similar.

– However, interbank lending more sensitive to global banking
  shocks. Retrenchment in interbank lending leads to dry-up of
  household credit and a collapse in consumption smoothing by
  households.

Channels of Risk Sharing

Focus on three broad channels of risk sharing following the
decomposition of Asdrubali, Sørensen and Yosha (QJE, 1996)

- – Cross-border ownership of assets: GDP/GNI
- – Depreciations (and prod. taxes): GNI/NNI
- – Net fiscal transfers: NNI/DI
- – Intertemporal consumption smoothing: DI/C

We abstract from valuation changes (VA). Most VA coming from
nominal exchange rate variability, which does not matter in EMU.

Measuring the importance of channels

General idea: look at the exposure ("β") of the various channels to (idiosyncratic) GDP shocks.

$$\beta_I = \frac{cov\{[\Delta \log GDP_i - \Delta \log GNI_i], \Delta \log GDP\}}{var(\Delta \log GDP)}$$ Income smoothing

$$\beta_D = \frac{cov\{[\Delta \log GNI_i - \Delta \log NNI_i], \Delta \log GDP\}}{var(\Delta \log GDP)}$$ Depreciation & prod. taxes

$$\beta_F = \frac{cov\{[\Delta \log NNI_i - \Delta \log DI_i], \Delta \log GDP\}}{var(\Delta \log GDP)}$$ Fiscal smoothing

$$\beta_C = \frac{cov\{[\Delta \log DI_i - \Delta \log C_i], \Delta \log GDP\}}{var(\Delta \log GDP)}$$ Consumption smoothing

$$\beta_U = \frac{cov\{\Delta \log C_i, \Delta \log GDP\}}{var(\Delta \log GDP)}$$ Unsmoothed component

Note that

$$1 - \beta_U = \beta_I + \beta_D + \beta_F + \beta_C$$

Estimation

Estimate the βs from the following basic regressions:

$$\Delta gdp_t^i - \Delta gnp_t^i = \tau_{K,t} + \beta_I \Delta gdp_t^i + \varepsilon_{I,t}^i$$

$$\Delta gni_t^i - \Delta nni_t^i = \tau_{D,t} + \beta_D \Delta gdp_t^i + \varepsilon_{D,t}^i$$

$$\Delta gnp_t^i - \Delta di_t^i = \tau_{F,t} + \beta_F \Delta gdp_t^i + \varepsilon_{F,t}^i$$

$$\Delta di_t^i - \Delta c_t^i = \tau_{C,t} + \beta_C \Delta gdp_t^i + \varepsilon_{C,t}^i$$

$$\Delta c_t^i = \tau_{U,t} + \beta_U \Delta gdp_t^i + \varepsilon_{U,t}^i$$

- as panel (adding country-fixed effects)
- cross-sectional regression for each t. That gives us time-varying $\beta_X(t)$.
- As panel in which $\beta_x^k(t)$ varies by time and country as a function of banking and equity market integration of a country.

Table: Risk Sharing Channels in EMU and non-EMU EU countries

Time span		β_I	β_D	β_F	β_C	β_U	β_I	β_D	β_F	β_C	β_U
				EMU10					non-EMU		
1998-2013	$\Delta\widetilde{gdp}_t^k$	0.074	-0.118	0.012	0.232	0.800	-0.007	-0.025	0.018	0.024	0.973
		(2.627)	(-1.69)	(1.854)	(4.764)	(7.465)	(-0.447)	(-1.086)	(1.429)	(0.592)	(34.270)
1998-2008	$\Delta\widetilde{gdp}_t^k$	0.098	0.034	-0.008	0.479	0.396	-0.03	-0.012	0.016	0.042	0.976
		(1.386)	(0.460)	(-0.434)	(4.862)	(3.890)	(-1.341)	(-0.665)	(0.771)	(1.087)	(47.007)
2009-2013	$\Delta\widetilde{gdp}_t^k$	0.018	-0.151	0.000	0.317	0.816	0.011	-0.014	0.053	0.13	0.93
		(0.204)	(-6.571)	(-0.016)	(4.102)	(5.588)	(0.241)	(-0.436)	(1.520)	(0.916)	(9.609)

The table reports the results of the panel OLS regressions $\Delta x_t^k = \beta_X \Delta\widetilde{gdp}_t^k + d_{Xt}^{U}\mathbf{1} + \varepsilon_{Xt}^k$ with $x = \widetilde{gdp} - \widetilde{gni}$, $\widetilde{gni} - \widetilde{nni}$, $\widetilde{nni} - \widetilde{ndi}$, $\widetilde{nni} - \widetilde{c}$, $\widetilde{c}$ for I, D, F, C and U respectively. The lower-case letters with a tilde denote logarithmic deviations from the sample-wide aggregate, $\Delta x = \Delta\log\left[X_t^k/X_t^*\right]$. d_{Xt}^k contains time and state fixed effects. Standard errors are in parenthesis and clustered by state.
EMU10: Belgium, Germany, Finland, Italy, Greece, Spain, France, Netherlands, Austria, Portugal.
Non-EMU: Bulgaria, Croatia, Czech Republic, Hungary, Poland, Romania, Sweden, UK.

Figure: Income and Consumption Smoothing in EMU countries, 1996-2013
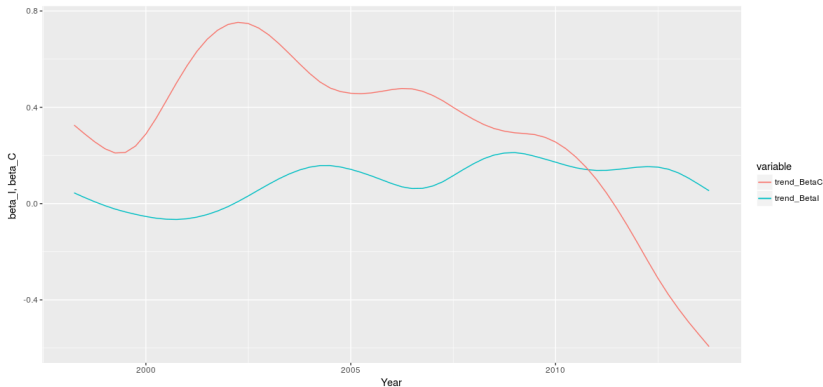
NOTES: The figure plots the (smoothed) degree of income smoothing ($\beta_I(t)$, red line) and consumption smoothing ($\beta_C(t)$, blue line) for each quarter from $t = 1996Q1 \ldots 2013Q4$.

Not all cross-border lending is equal...

Table: RS-impact of direct and interbank cross-border bank lending

interactions $z_t^k \times \widetilde{\Delta gdp}_t$	β_I	β_c	β_U	β_I	β_c	β_U	β_I	β_c	β_U	β_I	β_c	β_U
$1 \times \widetilde{\Delta gdp}_t^k$	0.10 (1.56)	**0.48** (4.66)	**0.39** (4.36)	0.11 (1.56)	**0.46** (4.52)	**0.39** (4.82)	0.05 (1.11)	**0.49** (4.83)	**0.42** (4.14)	0.05 (1.13)	**0.43** (3.61)	**0.48** (7.26)
$\frac{TB_{t-1}^k}{GDP_{t-1}^k} \times \widetilde{\Delta gdp}_t^k$	**0.13** (1.83)	-0.12 (-1.15)	0.06 (0.66)									
$\frac{B2B_{t-1}^k}{GDP_{t-1}^k} \times \widetilde{\Delta gdp}_t^k$				0.13 (1.44)	-0.16 (-1.53)	0.11 (0.94)				0.00 (0.01)	-0.21 (-1.52)	0.28 (1.75)
$\frac{B2N_{t-1}^k}{GDP_{t-1}^k} \times \widetilde{\Delta gdp}_t^k$							**0.75** (3.01)	-0.30 (-0.53)	-0.29 (-0.82)	**0.75** (2.57)	0.13 (0.64)	**-0.84** (-2.46)

panel regressions with interactions of total (TB), bank-to-nonbank (B2) and interbank (B2B) integration with $\widetilde{\Delta gdp}_t^k$

1. **Direct (B2N) lending —> significant positive effect on RS**
2. **Effect much less clear-cut for interbank (B2B) lending.**
3. **B2N affects the income-smoothing channel, like equity!**

Banking vs. equity market integration

Table: Risk Sharing, cross-border bank lending and equity holdings

panel regressions with interactions of equity and banking integration with $\widetilde{\Delta gdp_t^k}$

interactions $z_{t-1}^k \times \widetilde{\Delta gdp_t}$	β_I	β_C	β_U	β_I	β_C	β_U	β_I	β_C	β_U	β_I	β_C	β_U
$1 \times \widetilde{\Delta gdp_t^k}$	0.13	0.47	0.38	0.14	0.47	0.37	0.09	0.48	0.42	0.09	0.43	0.45
	(1.86)	(4.00)	(3.55)	(1.85)	(3.82)	(4.53)	(1.50)	(4.62)	(3.70)	(2.42)	(4.42)	(7.80)
$\dfrac{\widetilde{E_{t-1}^k}}{GDP_{t-1}^k} \times \widetilde{\Delta gdp_t^k}$	0.66	-0.44	-0.14	0.54	0.05	-0.72	0.29	-0.37	0.12			
	(2.07)	(-0.99)	(-0.35)	(1.00)	(0.11)	(-1.53)	(0.60)	(-0.91)	(0.23)			
$\dfrac{\widetilde{B2B_{t-1}^k}}{GDP_{t-1}^k} \times \widetilde{\Delta gdp_t}$				0.04	-0.17	0.22				-0.04	-0.21	0.33
				(0.31)	(-1.79)	(1.75)				(-0.40)	(-1.76)	(2.70)
$\dfrac{\widetilde{B2N_{t-1}^k}}{GDP_{t-1}^k} \times \widetilde{\Delta gdp_t}$							0.54	-0.15	-0.31			
							(1.72)	(-0.38)	(-0.81)			
$\left(\dfrac{\widetilde{E_{t-1}^k}}{GDP_{t-1}^k} + \dfrac{B2N_{t-1}^k}{GDP_{t-1}^k}\right) \times \widetilde{\Delta gdp_t^k}$										0.55	0.10	-0.66
										(2.61)	(-0.25)	(-2.31)

B2N and equity integration seem to be very collinear in their effect on RS-channels. B2B again much less clear-cut effect.

Sketch of the stylized DSGE model

2-country DSGE with the following 'ingredients':

Financial Sector:

- One global (northern European) bank. 2 local banks, one in each country.
- Global bank refinances itself in a global interbank market. The local banks refinance from local deposits and wholesale from the European interbank market.

Frictions

- Partial international diversification of firm-ownership (exogenous)
- Firms have to pre-finance wages and investment from bank loans or from internal funds.
- Global and bank loans are imperfect substitutes in firm borrowing.
- Local banks face short-run adjustment costs in substituting wholesale (European interbank) funds.
- Interbank loans carry lower risk weight in global banks' VaR-constraint than cross-border firm loans.

Testing the model

We run the same regressions as before on model-simulated data:

Panel B: Cross-border bank lending and equity holdings

	β_I	β_C	β_U	β_I	β_C	β_U	β_I	β_C	β_U	β_I	β_C	β_U
$1 \times \widetilde{\Delta gdp_t^k}$	0.10***	0.42***	0.42***	0.11***	0.36***	0.42***	0.10***	0.40***	0.42***	0.11***	0.37***	0.42***
	(9.45)	(7.49)	(146.51)	(9.30)	(5.71)	(148.03)	(10.88)	(7.46)	(172.02)	(9.24)	(5.72)	(140.63)
$\frac{\widetilde{E_{t-1}^k}}{GDP_{t-1}^k} \times \widetilde{\Delta gdp_t^k}$	0.48**	−0.95	0.06	0.47**	−0.87	0.07	0.32	−0.65	0.11*			
	(2.24)	(−1.02)	(0.99)	(2.11)	(−0.87)	(0.93)	(1.58)	(−0.57)	(1.66)			
$\frac{B2N_{t-1}^k}{GDP_{t-1}^k} \times \widetilde{\Delta gdp_t^k}$				0.02	−0.13	−0.00				0.02	−0.13	−0.00
				(0.42)	(−0.45)	(−0.18)				(0.40)	(−0.46)	(−0.17)
$\frac{B2N_{t-1}^k}{GDP_{t-1}^k} \times \widetilde{\Delta gdp_t^k}$							0.46	−0.78	−0.13			
							(1.19)	(−0.36)	(−1.14)			
$\left(\frac{E_{t-1}^k}{GDP_{t-1}^k} + \frac{B2N_{t-1}^k}{GDP_{t-1}^k}\right) \times \widetilde{\Delta gdp_t^k}$										0.36**	−0.64	0.04
										(2.02)	(−0.86)	(0.69)

Model predictions: out of sample

We run the model calibrated to m

Table 8: Risk-sharing in model simulations under different scenarios

	β_I	β_C	β_U
Low equity integration Low banking integration	0.03***	0.54***	0.47***
	(35.30)	(73.01)	(497.78)
Low equity integration High banking integration	0.04***	0.56***	0.43***
	(31.31)	(70.69)	(496.08)
High equity integration Low banking integration	0.10***	0.47***	0.45***
	(50.76)	(52.01)	(502.04)
High equity integration High banking integration	0.14***	0.45***	0.41***
	(47.79)	(44.47)	(505.25)

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– Model predicts a complementarity between equity market and (direct)
  banking integration: the higher banking (equity) market integration,
  the stronger the effect of increasing equity (banking) market
  integration on income smoothing and thus on risk sharing.

Conclusions and policy implications

- (Direct) Banking integration has an equity-like impact on EMU risk sharing.
- There is an integrated interbank market in Europe today but very little 'deep' (i.e. direct) cross-border integration in banking. This makes risk sharing among EMU members vulnerable to global liquidity crises.
- Situation in EMU (and the observed risk sharing patterns) similar to the experience of U.S. states prior to state-level banking deregulation. In the U.S., state level banking deregulation lead to genuine cross-border integration of banks. In Europe, banking union still has to achieve this objective.
- Findings and model document complementarity between equity market and banking integration: banking integration improves firms' access to finance but at the cost sof increased volatility in profits. This increasesthe need for (and benefits from) equity market integration.