Private and public risk-sharing in the euro area

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First Annual Workshop of ESCB Research Cluster 2
"Medium- and long-run challenges for Europe"

16 November 2017

Outline

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Motivation

- **Five President Report / COM reflection paper**: EA countries have to take steps, both individually and collectively, to compensate for the national adjustment tools they gave up on entry in the EMU.

- When a **country-specific economic shock** occur:
  1. Each country should to be able to respond effectively **at the domestic level**.
  2. Member states may also smooth the impact of shocks through **risk-sharing within the EMU**

Consumption risk-sharing: definition

- **Consumption risk-sharing**: notion that agents insure their *consumption* streams against *idiosyncratic income* fluctuations (Canova and Ravn, 1996)
  - **Inter-temporal risk-sharing:** consumption smoothing via national instruments, e.g., private savings, welfare programmes, intergenerational transfers etc.
  - **Intra-temporal risk-sharing:** consumption smoothing via, e.g., cross-country transfers

International (intra-temporal) cons. risk-sharing

- **Complete markets:** with internationally-traded state-contingent bonds $\Rightarrow$ consumption growth in a country is not affected by idiosyncratic income shocks but only by global, i.e., uninsurable, shocks (Backus et al., 1992; Lewis, 1996)
- **Incomplete markets:** consumption insurance could be complemented by *institutions* implementing optimal allocations, e.g., by means of transfer schemes or lending agreements (Fahri and Werning, 2017).

Risk-sharing: empirical tests

- Empirically, tests of the risk-sharing hypothesis generally based the following model (e.g, Sørensen et al., 1997):

$$(\Delta LogC_{i,t} - \Delta LogC_t) = \beta(\Delta LogY_{i,t} - \Delta LogY_t)$$

$$\hat{\beta} = \frac{Cov(\Delta LogC^{idio}_{i,t}, \Delta LogY^{idio}_{i,t})}{Var(\Delta LogY^{idio}_{i,t})}$$

if $\hat{\beta} = 0$, $\Rightarrow$ full risk sharing
if $\hat{\beta} = 1$, $\Rightarrow$ no risk sharing
$1 - \hat{\beta} \Rightarrow$ degree of "shock absorption"

- Contrary to the prediction of the model with complete markets, the hypothesis of full international risk sharing has been largely **rejected in the empirical literature**.

Literature

- **Asdrubali et al. (1996)**: risk sharing among states in the United States (1963-1990). Smoothing via capital markets: 39%, via credit market: 23%, via federal government: 13% (unsmoothed: 25%).
- **European Commission (2016)**: in the EA12 (except LU, AT, GR), about 40% shocks smoothed, 60% unsmoothed, over the period 2000-2015.

- **Sørensen et al., 2007; Fratzscher and Imbs, 2009**: greater financial globalization tends to lead to increased risk-sharing
  - **Beine et al., 2010, Tasca and Battiston, 2011**: Interconnections in financial markets may generate shock amplification

Risk-sharing: main channels in the euro area

- **Private risk-sharing:** it can be achieved through integrated financial and capital markets in the monetary union
  - Income from foreign assets is high when domestic output growth is low
  - International banks unaffected by the domestic shocks can provide the necessary credit in the host economy.

  $\Rightarrow$ may be insufficient to insure against idiosyncratic shocks (Kenen, 1969; Fahri-Werning, 2017)
- **Public risk sharing:** risk-sharing could be enhanced through a mechanism of fiscal stabilisation for the euro area as a whole, e.g., a centralised **fiscal capacity**
  $\Rightarrow$ would strengthen existing (ex-post) cross-country risk sharing mechanisms within the EMU: **EFSF/ESM loans** channeling financial assistance to EMU countries under stress
- Risk-sharing via TARGET balances (not covered here)

This analysis

- **Degree of consumption risk sharing (shock absorption)** in the EMU over the period 1999-2015, *time-variation* in shock absorption
- **Private risk-sharing channels**: cross-border bilateral bank loans and holdings of portfolio investment securities (debt and equity) $\Rightarrow$ financial integration
- **Public risk-sharing channels**: international financial assistance via the EFSF/ESM (see also Delrio et al., 2017; Milano, 2017)
  - Loans to distressed countries could have helped governments to maintain a certain level of public expenditure (e.g., public salaries and pensions)

Data

- **Sample**: 11 euro area countries for the period 1999-2015
  - Austria, Belgium, Germany, Finland, France, the Netherlands, Italy, Greece, Portugal, Ireland, Spain
- Bilateral bank loans: International Locational Banking Statistics (BIS)
- Bilateral equity and debt holdings: IMF's Coordinated Portfolio Investment Survey (CPIS)
- Household consumption, GDP: Eurostat

Methodology: simple risk-sharing regression

$$(\Delta LogC_{i,t} - \Delta LogC_{j,t}) =$$
$$\alpha + \beta(\Delta LogY_{i,t} - \Delta LogY_{j,t}) + \gamma Z_{ij,t-1} + \eta_t + \mu_{ij} + \varepsilon_{ij,t}$$

- $C_{i,t}$: household consumption in country i and year t
- $Y_{i,t}$: output in country in i and year t

Vector of controls Z_{ij} includes:

- $\Delta VAT_{ij,t}$: difference in the growth rate of statutory value added taxes (Epstein et al. 2016)
- $\Delta PIT_{ij,t}$: difference in statutory personal income taxes (Epstein et al. 2016)
- $\Delta INFL_{ij,t}$: inflation differential
- $\Delta YIELD_{ij,t}$: 10-year sovereign bond yield differential
- $\Delta DCREDIT_{ij,t}$: difference in growth of local credit by domestic banks

Results: simple risk-sharing regression

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
$\Delta \log Y_{i,t} - \Delta \log Y_{j,t}$	0.521***	0.537***	0.500***	0.515***	0.476***	0.469***	0.445***	0.452***
	(0.114)	(0.118)	(0.128)	(0.127)	(0.130)	(0.0796)	(0.102)	(0.0703)
$\Delta VAT_{ij,t-1}$					-0.240*			-0.0670
					(0.138)			(0.160)
$\Delta PIT_{ij,t-1}$					-0.0919*			-0.0204
					(0.0534)			(0.0367)
$\Delta DCREDIT_{ij,t-1}$						0.143***		0.134***
						(0.0281)		(0.0309)
$\Delta INFL_{ij,t-1}$							0.131	-0.00501
							(0.243)	(0.167)
$\Delta YIELD_{ij,t-1}$							-0.225***	-0.0573
							(0.0371)	(0.0534)
Constant	-0.150	-0.174***	0.587**	0.538*	0.681**	-0.343	0.0665	0.450
	(0.139)	(0.0098)	(0.266)	(0.309)	(0.341)	(0.355)	(0.274)	(0.282)
# of observations	870	870	870	870	760	815	815	760
# of country pairs	55	55	55	55	55	55	55	55
# of countries	11	11	11	11	11	11	11	11
Country pair FE	NO	NO	YES	YES	YES	YES	YES	YES
Year FE	NO	NO	YES	YES	YES	YES	YES	YES

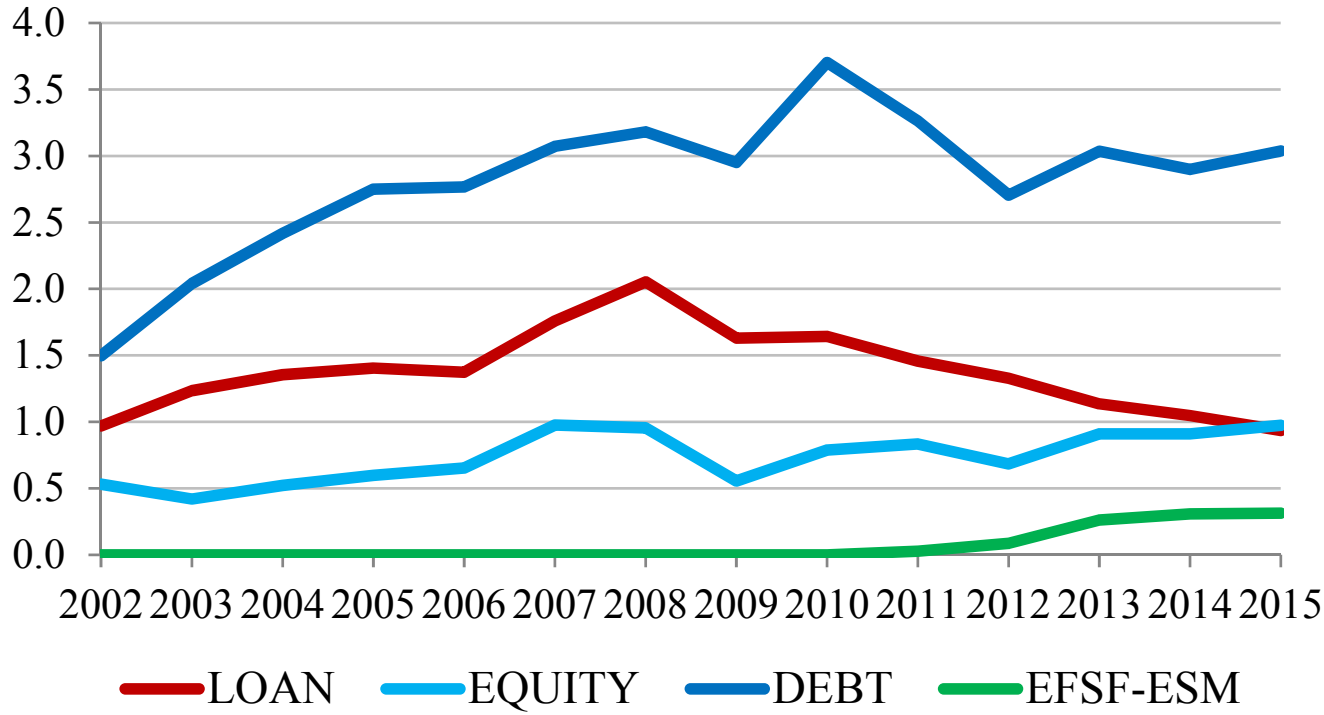
Notes: OLS estimation with clustered standard errors for dyadic data (in parenthesis) of equation (1). ***, ** and * refer to the 1%, 5% and 10% statistical significance.

Financial integration and EFSF-ESM assistance

$$INT_{ij,t} = \frac{A_{i \to j,t} + A_{j \to i,t}}{Y_{i,t} + Y_{j,t}}$$

- $A_{i \to j,t}$: claims of country i over country j
- A: $LOANS$, $DEBT$, $EQUITY$, $EFSF/ESM$

Financial integration and EFSF-ESM assistance[1]



[1]Annual euro area country-pair averages in percent of GDP. "Loans", "Equity", "Debt" and "EFSF-ESM" are defined as the sum of the relevant bilateral exposure of country *i* in country *j* and the bilateral exposure of country *j* in country *i* over the sum of the GDP of countries *i* and *j*

Extended model[2]

$$
\begin{aligned}
&(\Delta LogC_{i,t} - \Delta LogC_{j,t}) = \\
&\alpha + \beta_0(\Delta LogY_{i,t} - \Delta LogY_{j,t}) + \beta_1(\Delta LogY_{i,t} - \Delta LogY_{j,t})LOAN_{ij,t-1} \\
&+ \beta_2(\Delta LogY_{i,t} - \Delta LogY_{j,t})EQUITY_{ij,t-1} + \beta_3(\Delta LogY_{i,t} - \Delta LogY_{j,t})DEBT_{ij,t-1} \\
&+ \beta_4(\Delta LogY_{i,t} - \Delta LogY_{j,t})EFSF_{ij,t-1} + \gamma Z_{ij,t-1} + \eta_t + \mu_{ij} + \varepsilon_{ij,t}
\end{aligned}
$$

[2] Estimation: OLS with dyadic robust standard errors (Cameron and Miller, 2014). To avoid endogeneity problems, we use lagged values of integration proxies.

Synthetic measure of risk-sharing

$$\hat{\beta}_t = \hat{\beta}_0 + \sum_{k=1}^{4} \hat{\beta}_k INT^k_{ij,t-1}$$

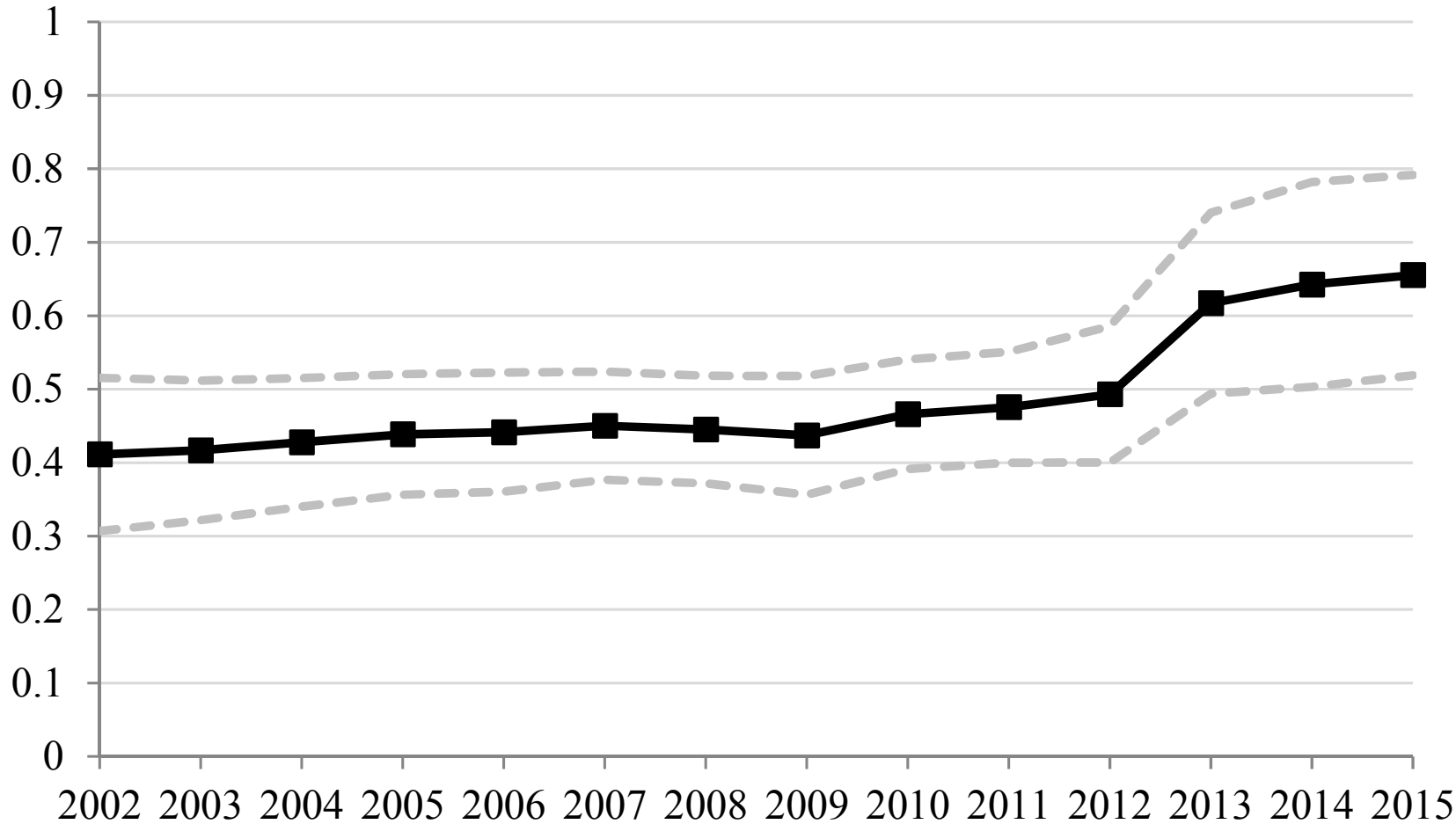
- Coefficient capturing risk-sharing between country i and j equal to the sum of the income growth differential coefficient (β_0) and the coefficients related to fiscal/financial integration measures ($\hat{\beta}_1$,$\hat{\beta}_2$,$\hat{\beta}_3$,$\hat{\beta}_4$):
- Degree of shock absorption: $1 - \hat{\beta}_t$

Results

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
$\Delta\log Y_{i,t} - \Delta\log Y_{j,t}$	0.491***	0.557***	0.581***	0.478***	0.641***	0.635***	0.623***
	(0.0540)	(0.119)	(0.0948)	(0.0740)	(0.0752)	(0.0844)	(0.0873)
$(\Delta\log Y_{i,t} - \Delta\log Y_{j,t})EFSF_{ij,t-1}$	-0.575***		-0.577***	-0.607***	-0.489**	-0.508***	-0.587***
	(0.192)		(0.220)	(0.192)	(0.203)	(0.180)	(0.211)
$(\Delta\log Y_{i,t} - \Delta\log Y_{j,t})FIN_{ij,t-1}$		-0.0138	-0.0120				
		(0.0107)	(0.00937)				
$(\Delta\log Y_{i,t} - \Delta\log Y_{j,t})LOAN_{ij,t-1}$				0.00273		0.0264**	0.0262**
				(0.0166)		(0.0104)	(0.0108)
$(\Delta\log Y_{i,t} - \Delta\log Y_{j,t})PORT_{ij,t-1}$					-0.0251**	-0.0317***	
					(0.0111)	(0.0122)	
$(\Delta\log Y_{i,t} - \Delta\log Y_{j,t})DEBT_{ij,t-1}$							-0.0292
							(0.0218)
$(\Delta\log Y_{i,t} - \Delta\log Y_{j,t})EQUITY_{ij,t-1}$							-0.0310**
							(0.0137)
$\Delta VAT_{ij,t-1}$	-0.0437	-0.0697	-0.0566	-0.0603	-0.0410	-0.0550	-0.0219
	(0.168)	(0.159)	(0.165)	(0.169)	(0.162)	(0.163)	(0.156)
$\Delta PIT_{ij,t-1}$	-0.0158	-0.0235	-0.0188	-0.0178	-0.0180	-0.0165	-0.0118
	(0.0314)	(0.0335)	(0.0291)	(0.0310)	(0.0292)	(0.0280)	(0.0246)
$\Delta INFL_{ij,t-1}$	0.00900	0.0468	0.0563	0.0434	0.0357	0.0648	0.0672
	(0.158)	(0.127)	(0.120)	(0.135)	(0.138)	(0.121)	(0.118)
$\Delta YIELD_{ij,t-1}$	-0.212***	-0.00384	-0.164***	-0.210***	-0.129**	-0.134**	-0.179***
	(0.0575)	(0.0589)	(0.0561)	(0.0492)	(0.0638)	(0.0585)	(0.0448)
$\Delta DCREDIT_{ij,t-1}$	0.120***	0.118***	0.105***	0.111***	0.106***	0.0976***	0.0964***
	(0.0295)	(0.0321)	(0.0298)	(0.0289)	(0.0287)	(0.0279)	(0.0253)
Constant	0.369	0.366*	0.276	0.337	0.261	0.215	0.202
	(0.314)	(0.214)	(0.242)	(0.235)	(0.296)	(0.247)	(0.254)
# of observations	760	731	731	733	758	731	715
# of unique country pairs	55	55	55	55	55	55	55
# countries	11	11	11	11	11	11	11

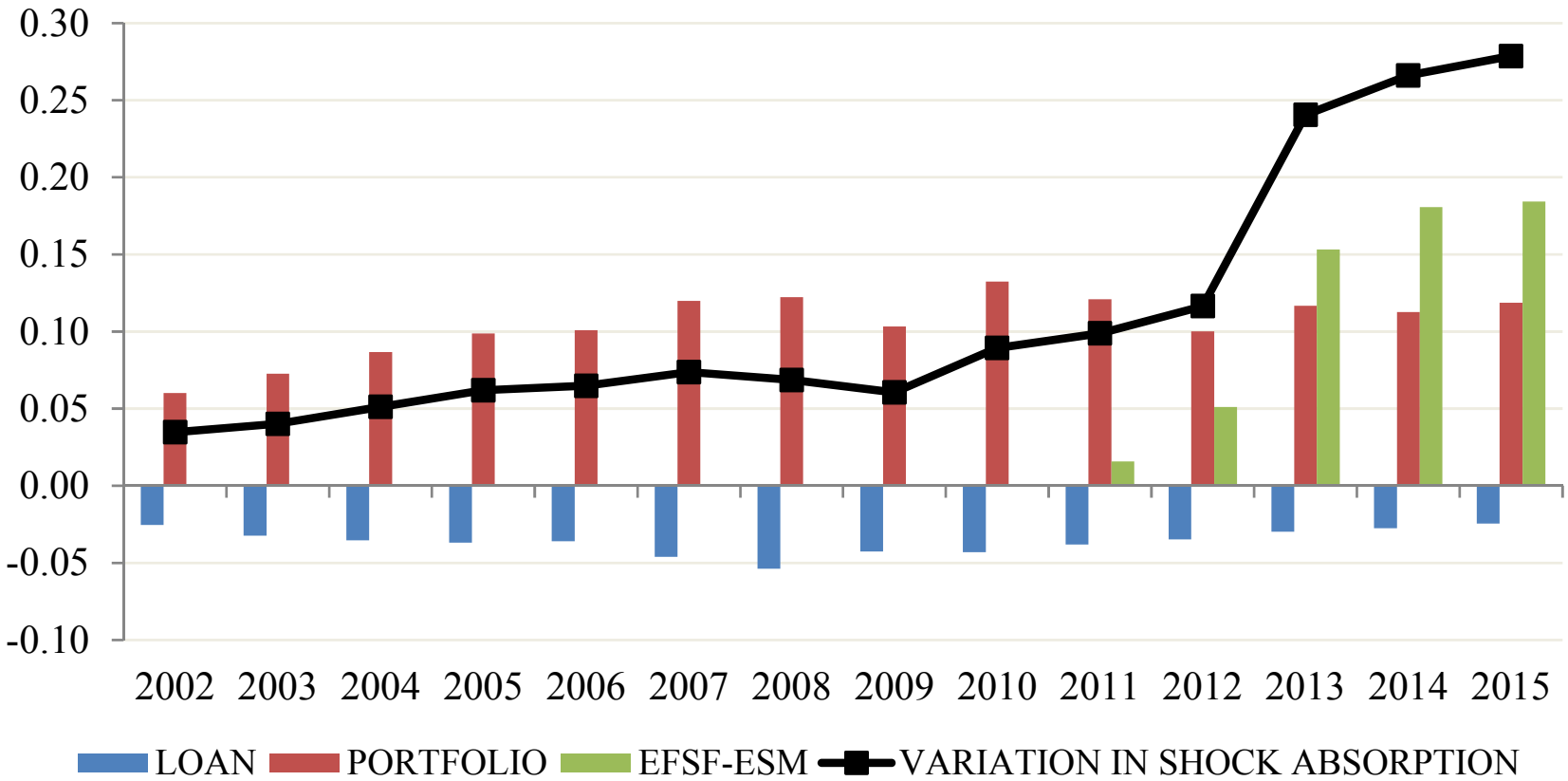
Notes: OLS estimation with robust standard errors for dyadic data (in parenthesis) of equation (3). ***, ** and * refer to the 1%, 5% and 10% statistical significance. All regressions include country–pair and year fixed effects.

Evolution of shock absorption $(1 - \hat{\beta})$ in the EA[3]



[3] The figure plots the degree of shock absorption defined as $(1 - \beta_t)$, where β_t is the overall risk-sharing coefficient defined in equation (4) and based on the estimates in column (7) of Table 2. A value of one corresponds to full-risk sharing (full shock absorption of idiosyncratic output shocks), a value of zero indicates no shock absorption. The interaction terms are evaluated at their annual country-pair means (see Figure 1). Confidence bands correspond to the 90% level of statistical significance and are constructed using cluster-robust standard errors accounting for dyadic data..

Contribution of fin. integration and EFSF-ESM



Main findings

- Over the full 1999-2015 sample: about **50%** of output shocks absorbed (compares with 40% found in EC, 2016)
- At the start of the EMU about **40%** while in the aftermath of the euro zone's sovereign debt crisis about **65%** of output shocks were absorbed thus **reducing consumption growth differentials** across countries.
- Due to two main factors:
  1. **Financial integration**: in particular cross-border holdings of debt and equity
  2. **EFSF-ESM assistance** played a very important role since 2010.

Robustness

- Adding levels of financial integration and EFSF/ESM terms.
- Alternative estimation methods: (1) standard OLS with FE (2) feasible GLS with AR(1) and (3) OLS with Driscoll-Kraay standard errors.
- Sample: excluding one country at the time (e.g., Greece).
- Blocks of countries: EA Core versus Periphery.

Conclusions

- A novel approach to gauge the extent of consumption risk sharing, and its main drivers, since the start of the EMU
- Role of private channels (i.e., cross-border loans and holdings of financial assets), versus public channels (i.e., official financial assistance to distressed euro zone countries)
- The shock absorption capacity generated by international (private and public) channels has increased since the start of the EMU, from about 40% to about 65%
- International official assistance, but also financial integration, played an important role in explaining this improvement.
- These results do not allow to conclude that the severity of the crisis would have not been attenuated by a fully-fledged centralised fiscal capacity at the EA level

Thank you

Risk-sharing links between "Core" and "Periphery"

- Zoom in into the risk-sharing links between "Periphery" and "Core" countries within the EMU
  - Periphery: Greece, Portugal, Ireland, Spain, (Italy).
  - Core: Austria, Belgium, Germany, Finland, France, the Netherlands, (Italy).
- Financial assistance has been mainly directed from core countries to vulnerable ones, therefore exploring the links between these two groups of countries is in our view interesting
- Methodology: run the baseline regression focussing on country-pairs (Core-Periphery, e.g. Germany-Greece) and excluding Core-Core and Periphery-periphery pairs.

Risk-sharing links between "Core" and "Periphery"

	(1) All	(2) Core-Periphery	(3) Core-Periphery (IT in Core)
$\Delta\log Y_{i,t} - \Delta\log Y_{j,t}$	0.623***	0.687***	0.696***
	(0.0873)	(0.0833)	(0.0798)
$(\Delta\log Y_{i,t} - \Delta\log Y_{j,t})EFSF_{ij,t-1}$	-0.587***	-0.383***	-0.376***
	(0.211)	(0.123)	(0.122)
$(\Delta\log Y_{i,t} - \Delta\log Y_{j,t})LOAN_{ij,t-1}$	0.0262**	0.0364**	0.0324**
	(0.0108)	(0.0156)	(0.0151)
$(\Delta\log Y_{i,t} - \Delta\log Y_{j,t})DEBT_{ij,t-1}$	-0.0292	-0.0479***	-0.0389*
	(0.0218)	(0.0172)	(0.0220)
$(\Delta\log Y_{i,t} - \Delta\log Y_{j,t})EQUITY_{ij,t-1}$	-0.0310**	-0.0434***	-0.0516***
	(0.0137)	(0.0122)	(0.0160)
$\Delta VAT_{ij,t-1}$	-0.0219	-0.0320	-0.0316
	(0.156)	(0.138)	(0.135)
$\Delta PIT_{ij,t-1}$	-0.0118	-0.0183	-0.0173
	(0.0246)	(0.0292)	(0.0342)
$\Delta INFL_{ij,t-1}$	0.0672	0.0481	0.0945
	(0.118)	(0.116)	(0.120)
$\Delta YIELD_{ij,t-1}$	-0.179***	-0.114*	-0.0759
	(0.0448)	(0.0621)	(0.0802)
$\Delta DCREDIT_{ij,t-1}$	0.0964***	0.101***	0.105***
	(0.0253)	(0.0314)	(0.0330)
# of observations	715	394	361
# of unique country pairs	55	30	28
# countries	11	11	11

Risk-sharing links between "Core" and "Periphery"