

Wealth shocks, credit-supply shocks, and asset allocation: Evidence from household and firm portfolios

Thomas Kick (*Deutsche Bundesbank*)

Enrico Onali (*Bangor University*)

Benedikt Ruprecht (*Deutsche Bundesbank*)

Klaus Schaeck (*Bangor University*)



NOTE THAT THIS DISCUSSION PAPER REPRESENTS THE AUTHORS' PERSONAL OPINIONS AND DOES NOT NECESSARILY REFLECT THE VIEWS OF THE DEUTSCHE BUNDESBANK OR ITS STAFF.

Motivation

- Much of the literature on household finance documents **cross-country variation for asset allocation**, and **demographic determinants** of stock market **participation and rebalancing** of portfolios.
- We take a different perspective and investigate the **role of macroeconomic shocks** in portfolio choice.
- We compare asset of allocation of households and firms using a **unique bank-level data set** from the Deutsche Bundesbank which provides information about bank clients' security holdings for all German banks for the period 2005 to 2012 .
- We address two research questions:
 - Did the sovereign debt crisis in the Eurozone motivate households and non-financial firms to better diversify their portfolios?
 - How do household and non-financial firms' portfolios respond to credit-supply shocks triggered by bank distress?

Motivation (2)

- Our research is important for the following reasons:
 1. **Households and non-financial firms** control large proportions of the investable savings in a society.
 2. The literature on the impact of macroeconomic shocks on portfolio diversification is sparse, especially with regard to consequences of **wealth shocks** arising from declines in the value of a certain class of securities.
 3. While borrowing constraints have received considerable attention in the literature (Paxson (1990); Guiso, Jappelli, and Terlizzese (1996); Haliassos and Hassapis (1998)), the **nexus between the credit supply of a financial institution and the portfolio choice of its customers** has not yet been investigated.
 4. The literature has so far focused almost exclusively on the role of households for investment decisions. While non-financial firms tend to hold sizeable securities portfolios **comparisons between the portfolio allocation preferences of households and those of firms** are virtually nonexistent.

Advantages of our data set

1. The data represent the **entire population of all German households' and non-financial firms' securities portfolios held with German banks** and our study considers **assets with an overall value of more than half of the German GDP**.
2. We can compute **several** different **measures of diversification**. We compute HHIs for **asset classes** (bonds, shares, and mutual funds) and **issuers** in terms of countries, and in terms of sectors.
3. Info on both the **nominal and the market value** of all the securities. By focusing on the NV of the securities we can rule out by construction changes in diversification due to passive rebalancing.
4. Info on both **household and non-financial firm portfolios** – direct **comparison** of diversification preferences of the two groups.
5. Aggregation at the **bank level** allows ruling out **heterogeneities** that arise from different **advisory practices** and **cultural traits** of banks. It also allows **merging** data on security holdings with data on bank distress → impact of a credit-supply shock on portfolio choice.

Preview of main findings - Eurozone crisis

1. Bank clients respond strongly to the **Eurozone's** sovereign debt **crisis** by **actively rebalancing** their portfolios.
2. The crisis leads to a **lower HHI in terms of asset classes and issuers**, for customers with high shares of PIIGS securities than for customers with low shares of PIIGS securities.
3. However, the **decrease in HHI is found only for households**, but not for firms.
4. The decreases in **HHI** in terms of **asset classes** are driven by decreases in the overall share of bond securities and an increase in the share of stocks.
5. The decrease in **HHI** in terms of **issuer** is driven by a decrease in the overall share of securities issued by foreign and domestic financial institutions, and an increase in the share of securities issued by nonfinancial corporations.

Preview of main findings - Credit-supply shock

1. Positive associations between a credit-supply shock, represented by declines in customer loans, and bank clients' portfolio diversification, in terms of asset classes and in terms of issuers.
2. **Drops in credit-supply displays consistently positive and significant effects on the diversification measures, for both households and firms.**
3. A drop in retail loans does not have any effect on diversification of either households or firms, while a **drop in corporate loans leads to higher diversification** in terms of asset class for both the households' and firms portfolios.
4. The results for households suggest that what drives the increase in portfolio diversification is *not* a decrease in their own borrowing abilities, but rather an increase in background and income risk.

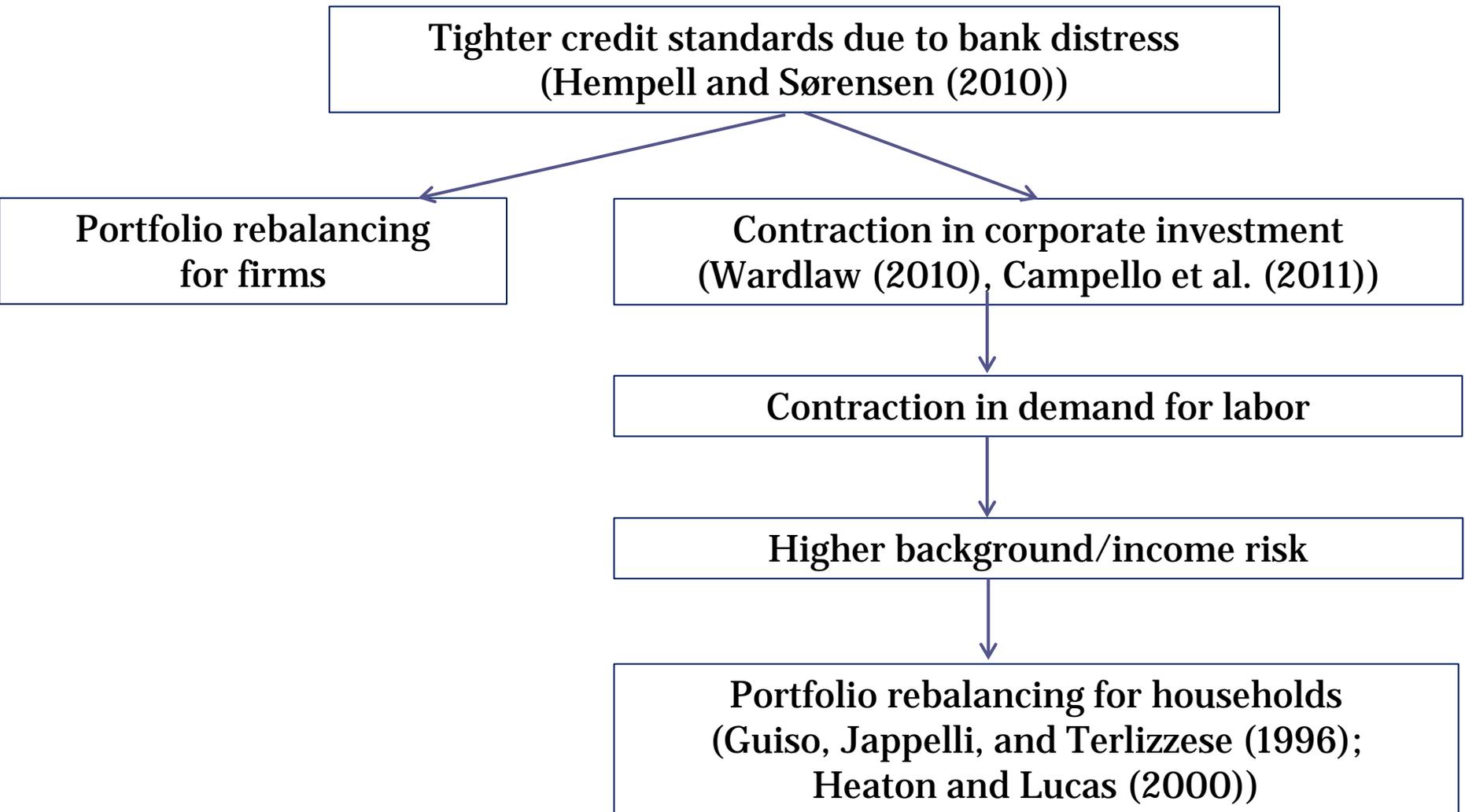
Brief literature review

- Portfolio diversification: key topic in financial economics since Markowitz (1952, 1959).
- However, individuals and households hold *under*-diversified portfolios (Kelly (1995); Polkovnichenko (2005); CCS (2007)).
- Households tend to rebalance their portfolios following changes in portfolio risk (CCS (2009)), and macroeconomic experiences affect risk preferences (Malmendier and Nagel (2011); GSZ (2012)).
- We advance this literature and document the **impact of macroeconomic shocks on portfolio diversification for both households and firms.**
- Our paper also contributes to the literature about the **role of financial intermediaries in household finance.**

Brief literature review (2)

- Many studies investigate the **role of financial intermediaries** for portfolio allocation and examine specifically the impact of financial advice on individual investors' portfolios from a static point of view (Bluethgen et al. (2008); Jansen, Fischer, and Hackethal (2008); Hackethal, Inderst, and Meyer (2011); Hackethal, Haliassos, and Jappelli (2012); Kramer (2012)).
- These papers usually obtain data from a single financial institution which casts doubts on the external validity of the findings.
- Finally, while several studies demonstrate **adverse effects of bank distress on economic growth** (Bernanke (1983); Stein (1998); Calomiris and Mason (2003)), this literature has so far overlooked the impact of diminished borrowing abilities related to credit-supply shocks due to **bank distress on portfolio choice**.

Credit-supply shocks and portfolio choice: The mechanism



Methodology

- Eurozone crisis:

$$Y_{it} = \beta_0 + Crisis_t \beta_1 + (Crisis_t \times Treatment_i) \beta_2 + \mathbf{X}_{it} \boldsymbol{\beta}_3 + u_i + \gamma_t + \varepsilon_{it} \quad (1)$$

Y_{it} is the value taken by the HHI measure of interest in year t

$Crisis_t = 1$ if $\{t = 2009, 2010, 2011, 2012\}$, and 0 otherwise

$Treatment_i = 1$ if share of PIIGS in 2009 > median, and 0 otherwise

\mathbf{X}_{it} is a $1 \times k$ vector of controls

$\boldsymbol{\beta}_3$ is a $k \times 1$ parameter vector

u_i are bank fixed effects

γ_t are year fixed effects

Methodology (2)

- Credit-supply shocks:

Identification based on IV regressions – *Customer Loans Drop (CLD)* could be endogenous because time-varying bank-specific factors may jointly determine both bank lending to its customers and customer portfolio choice.

$$\begin{aligned} \text{Customer Loans Drop}_{it} &= \mathbf{Z}_{it}\boldsymbol{\gamma}_2 + v_{it} \\ Y_{it} &= \alpha_0 + \text{Customer Loans Drop}_{it} \alpha_1 + \mathbf{X}_{it}\boldsymbol{\alpha}_2 + u_i + \gamma_t + \varepsilon_{it} \end{aligned} \quad (2)$$

CLD = 1 if loans to customers in year t decrease, and 0 otherwise

\mathbf{Z}_{it} is a $1 \times l$ vector of included (\mathbf{X}_{it}) and excluded (\mathbf{W}_{it}) instruments

Methodology (3)

- We choose \mathbf{W}_{it} on the basis of their association with bank distress and investment opportunities:
 - *Capital Injection* = 1 if the bank receives a capital injection in year t – banks in distress may be forced to decrease the volume of loans to customers (Berger et al. (2012)).
 - *HHI-Loan-15* is HHI for the loan portfolio calculated across 15 business sectors. Higher loan portfolio concentration → higher distress probability.
 - *Hidden Liabilities Dummy* = 1 if a bank has hidden liabilities in a given year. An accounting option in the German GAAP → avoid write-offs by creating hidden liabilities and postpone losses (more likely for banks in distress).
 - *Liquidity Ratio* is the ratio of overnight loans to banks divided by total assets. During times of tight liquidity conditions, banks tend to reduce the maturity of term-lending in the interbank market (Acharya and Skeie (2011)).

Data

- We match the Securities Holdings Statistics (Statistik über Wertpapierinvestments) with data on capital injections from the banking association's insurance fund and other financial data and macroeconomic indicators.
- Securities Holdings Statistics: security holdings of households and firms at the bank level (**both market value and nominal value**)
- Securities classified in terms of: asset class (**bonds, stocks, or investment certificates**), type of issuer (**government, nonfinancial corporation, or credit institution**), and country of origin (**Germany, PIIGS, or other countries**).
- We have in total nine components for HHI by issuer, and three for HHI by asset class.

Data (2)

- The median bank has around 1,600 client security accounts, comprising both households and firm accounts. Since our sample covers around 2,000 banks, we exploit information on many more security portfolios than those considered in recent studies.
- In terms of nominal values, the median portfolio is worth 34,484 euros; in market values, the median portfolio is worth 44,883 euros.
- In terms of nominal (market values) households tend to hold less (more) diversified portfolios than firms, in terms of both asset class and issuer.
- In the subsequent analysis, we focus on **changes in nominal values, similar to Hildebrand, Rocholl, and Schulz (2012)**. This allows **ruling out** that changes in portfolio composition are a result of **passive rebalancing** resulting from changes in security prices.

Main results: Eurozone crisis

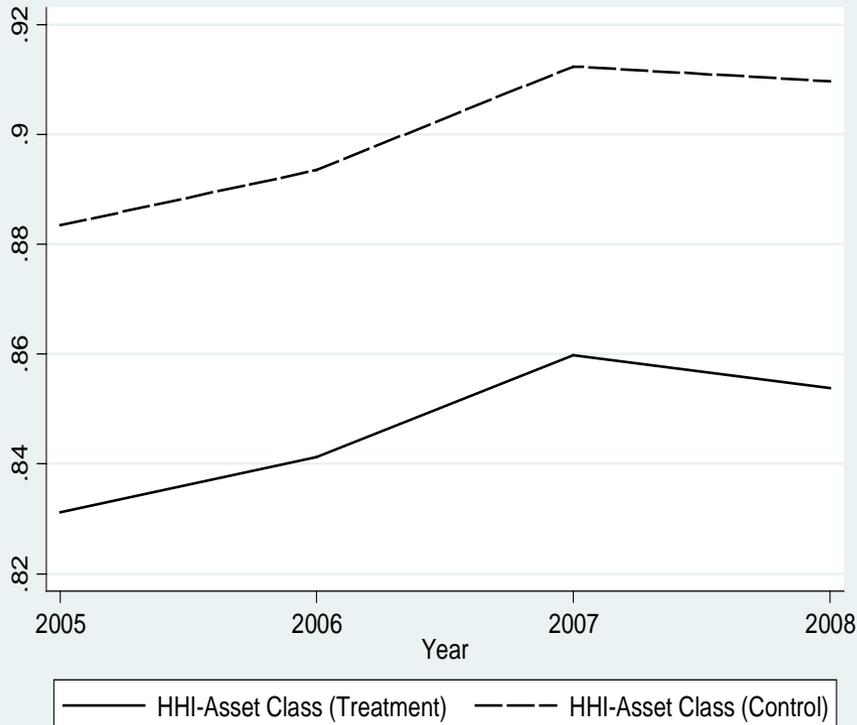
	Panel A: HHI-Asset Class			Panel B: HHI-Issuer		
	Full sample	Households	Firms	Full sample	Households	Firms
<i>Crisis</i>	-0.035*** (-12.847)	-0.033*** (-12.272)	-0.015 (-1.367)	-0.009*** (-4.841)	-0.007*** (-3.682)	-0.020*** (-2.964)
<i>Interaction</i>	-0.013*** (-3.921)	-0.014*** (-4.276)	0.019 (1.640)	-0.014*** (-6.196)	-0.014*** (-6.153)	0.012* (1.696)
<i>Fee Income Share</i>	0.001*** (3.769)	0.001** (2.512)	0.001 (1.219)	0.000 (1.197)	-0.000 (-0.108)	0.001 (0.860)
<i>CRIG</i>	0.000 (0.271)	0.000 (0.233)	0.000 (0.175)	-0.000*** (-2.705)	-0.000** (-2.453)	0.000 (0.408)
Constant	0.842*** (150.174)	0.848*** (130.435)	0.702*** (43.374)	0.354*** (79.890)	0.361*** (71.885)	0.338*** (32.754)
Year FE	YES	YES	YES	YES	YES	YES
Observations	13,647	13,647	13,647	13,647	13,647	13,647
R-squared	0.335	0.341	0.008	0.215	0.206	0.005
Bank FE	YES	YES	YES	YES	YES	YES

Results for HHI components: Credit-supply shock

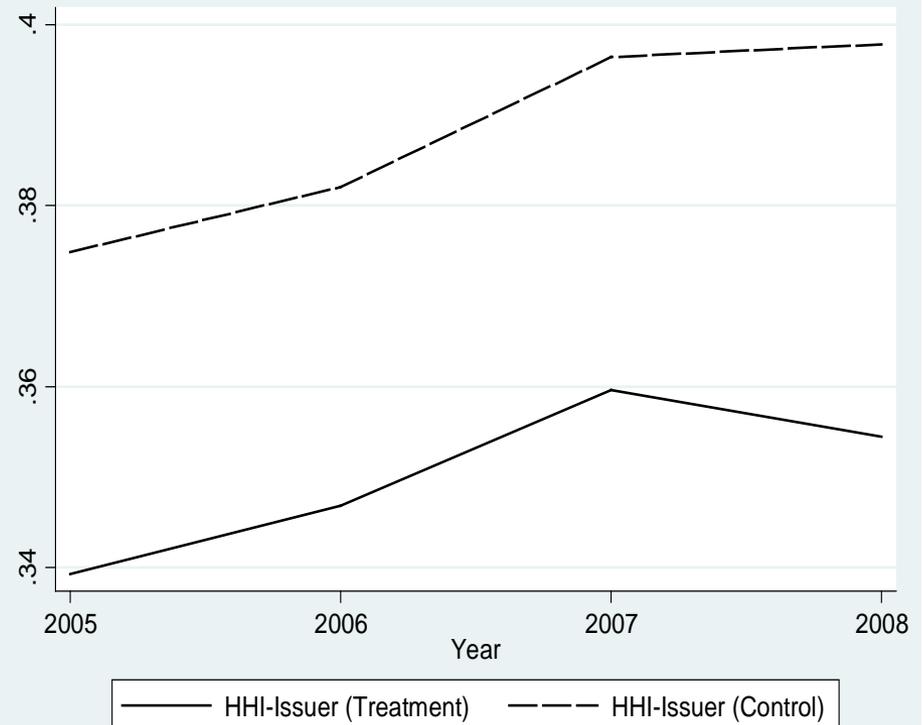
<i>Two-sample t-test (with unequal variances)</i>			
<i>Bonds Share</i>	0.381	0.531	1.775*
<i>Stocks Share</i>	-2.038**	-2.229**	-3.084***
<i>Certificates Share</i>	4.106***	4.247***	3.150***
<i>German Government Share</i>			4.845*** 4.831*** 1.898**
<i>Foreign (non-PIIGS) Gov. Share</i>			2.995*** 3.003*** 0.095
<i>PIIGS Government Share</i>			-2.490** -3.277*** -0.993
<i>Foreign (non-PIIGS) NF Share</i>			-1.483 -0.773 -3.054***
<i>Foreign (non-PIIGS) FI Share</i>			0.247 0.429 2.187**
<i>German NF Share</i>			-1.836* -3.100*** -3.471***
<i>German FI Share</i>			-1.560 1.506 3.363***
<i>PIIGS NF Share</i>			0.875 0.746 0.144
<i>PIIGS FI Share</i>			1.653 1.295 0.703

Assumptions checks for the DiD: Eurozone crisis

HHI-Asset Class



HHI-Issuer



Assumptions checks for the DiD: Eurozone crisis

	Panel A: HHI-Asset Class			Panel B: HHI-Issuer		
	Full sample	Households	Firms	Full sample	Households	Firms
<i>Placebo Crisis</i>	0.021*** (10.960)	0.021*** (10.462)	0.009 (0.896)	0.020*** (14.459)	0.021*** (15.688)	-0.001 (-0.156)
<i>Placebo Interaction</i>	0.001 (0.396)	0.003 (1.206)	0.017 (1.510)	-0.003 (-1.571)	-0.002 (-1.325)	0.010 (1.390)
<i>Fee Income Share</i>	0.000 (0.654)	-0.000 (-0.236)	0.001 (0.800)	0.002*** (3.742)	0.001 (1.320)	0.002 (1.243)
<i>CRIG</i>	-0.000 (-1.430)	-0.000 (-1.503)	0.002** (2.357)	-0.000* (-1.677)	-0.000 (-1.369)	0.001 (1.555)
Constant	0.856*** (85.977)	0.867*** (65.388)	0.694*** (24.814)	0.337*** (56.754)	0.351*** (48.984)	0.321*** (17.527)
Year FE	YES	YES	YES	YES	YES	YES
Observations	7,114	7,114	7,114	7,114	7,114	7,114
R-squared	0.104	0.111	0.005	0.140	0.157	0.002
Bank FE	YES	YES	YES	YES	YES	YES

Sensitivity checks: Eurozone crisis

Collapsing technique (Bertrand, Duflo, and Mullainathan (2004)):

	Full sample	Households	Firms	Full sample	Households	Firms
<i>Crisis</i>	-0.025*** (-11.044)	-0.025*** (-9.659)	-0.003 (-0.301)	-0.008*** (-5.922)	-0.007*** (-4.377)	-0.005 (-0.676)
<i>Interaction</i>	-0.014*** (-5.672)	-0.016*** (-5.904)	0.003 (0.247)	-0.009*** (-6.372)	-0.010*** (-6.740)	0.007 (0.851)
<i>Fee Income Share</i>	0.002*** (3.337)	0.002*** (3.680)	0.001* (1.758)	0.000 (0.503)	-0.000 (-0.325)	0.003** (2.267)
<i>CRIG</i>	0.001*** (4.309)	0.001*** (4.084)	0.002* (1.780)	0.000** (2.027)	0.000** (2.422)	-0.002* (-1.785)
Constant	0.855*** (104.594)	0.855*** (101.938)	0.693*** (28.327)	0.374*** (84.616)	0.380*** (85.498)	0.304*** (15.624)
Year FE	YES	YES	YES	YES	YES	YES
Observations	3,384	3,384	3,384	3,384	3,384	3,384
R-squared	0.398	0.355	0.010	0.232	0.200	0.011
Bank FE	YES	YES	YES	YES	YES	YES

Heterogeneous effects of treatments

- What happens if a bank receives both treatments?

The Eurozone crisis has a **stronger treatment effect** on households for banks for which there is a drop in customer loans.

- Are there any heterogeneities in the ability of households to absorb wealth shocks across counties?

Counties with more firms per capita (lower background risk) are **less likely to increase diversification** as a result of the Eurozone crisis.

- Do the results for CLD change if we consider corporate loans rather than retail loans?

A drop in retail loans does not bear any ramifications on the diversification preferences of either households or firms.

Conversely, a drop in corporate loans leads to higher diversification in terms of asset class for both the households' and firms portfolios.

Additional robustness tests

- Eurozone crisis:
 - Magnitude of the effects increase when the definition of *Treatment* is based on the first and last quartile of the distribution of the share of PIIGS in 2009, rather than on the median.
 - PSM based on regional and bank-specific characteristics → same results.
- Both Eurozone crisis & credit-supply shock:
 - Use of *Yield Curve Spread* rather than year FE produces virtually the same results.
 - Changes in our diversification measures are *NOT* driven by a reduction in the number of security accounts.

Conclusions

- The literature on portfolio choices lacks an investigation of heterogeneities in the diversification preferences of households and firms.
- This issue is important because firms can be less subject than households to behavioral biases, because they are, on average, more sophisticated investors as a result of better financial resources and experience in a business environment.
- In particular, firms should be less prone to overweighting negative experiences in their decision-making process.
- Thus, households and firms can react differently to macroeconomic shocks that affect their wealth or their borrowing abilities.

Conclusions (2)

- Our results show that macroeconomic shocks affect the degree of portfolio diversification of bank customers:
 - Wealth shocks deriving from a drop in the market value of the security portfolio.
 - Shocks in borrowing abilities deriving from a reduction in bank customer loans result in higher diversification, in terms of both asset class and issuer of the security, and flight to quality.
- Possible interpretations:
 - Wealth shocks and borrowing abilities shocks increase the degree of risk aversion, i.e. they affect risk preferences of bank customers.
 - These shocks cause revision of beliefs about future returns of different types of securities (Malmendier and Nagel (2011)).

Latter interpretation (experience hypothesis) is better suited to explain drop of bonds' share (in particular, Fin. Inst. bonds) as a result of the Eurozone sovereign debt crisis for customers with large shares of PIIGS securities.

Conclusions (3)

- Households and firms increase portfolio diversification when their bank curtails the provision of customer loans.
- A reduction in corporate loans leads to higher diversification for both households and firms, while a reduction in retail loans does not have any ramifications on our measures of portfolio diversification.
- Increased diversification in households portfolios is due to higher background/income risk generated by a drop in corporate investment (and a consequent drop in labor demand).
- ‘Missing link’ in the literature on the real effects of bank distress and household portfolio choice: Not only does bank distress affect corporate investment and labor demand, but it can also indirectly impose shocks on household portfolio choice.