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Portfolio Rebalancing and the Transmission of Large-Scale Asset Programs: Evidence from the Euro Area

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Research question and preview of results

Was the portfolio rebalancing channel relevant for the transmission of the ECB's APP?

Yes, with important differences across countries

- Rebalancing of security portfolios limited to vulnerable countries
- Rebalancing benefitting supply loans to NFC&HH in non stressed countries
- Significant effect on lending rates to HH

Outline

A	**Motivation**
B	Literature
C	Data
D	Empirical results
E	Conclusions

Motivation

- Unprecedented monetary policy reaction after Lehman
- ZLB and unconventional measures, including QE
- Eurosystem APP on 22 January 2015
- Portfolio rebalancing channel:
    - investors offset compression of yields by holding riskier assets (search-for-yield)
    - important, controversial and relatively unexplored

We study portfolio rebalancing in the euro area, using granular data on asset holdings and provide some evidence on banks' lending behaviour

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Literature

- Event study approach (pricing effects)
  - Krishnamurthy and Vissing-Jorgensen (2011, 2013)
  - Joyce and Tong (2012)
  - Altavilla, Carboni and Motto (2015)
- Bank lending channel (based on liquidity)
  - Butt et al (2014)
  - Kandrac and Schlusche (2016)
- Effects on macroeconomy (VAR or DSGE models)
  - Baumeister and Benati (2012)
  - Kapetanios et al. (2012)
  - Chen (2014)
- Portfolio rebalancing
  - Becker and Ivashina (2015)
  - Peydrò, Polo and Sette (2016)
  - Koijen, Koulischer, Nguyen and Yogo (2017)

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Data

Sector Security-Holding-Statistics (SSHS)

- Holdings at individual ISIN level of securities
- Holdings of each instit. sector for each euro area country
- Holdings of non-euro area residents in custody in euro area
- Quarterly, since 2013Q4
- Good coverage (90% sec. reported in the national accounts)

Group Security-Holding-Statistics (GSHS)

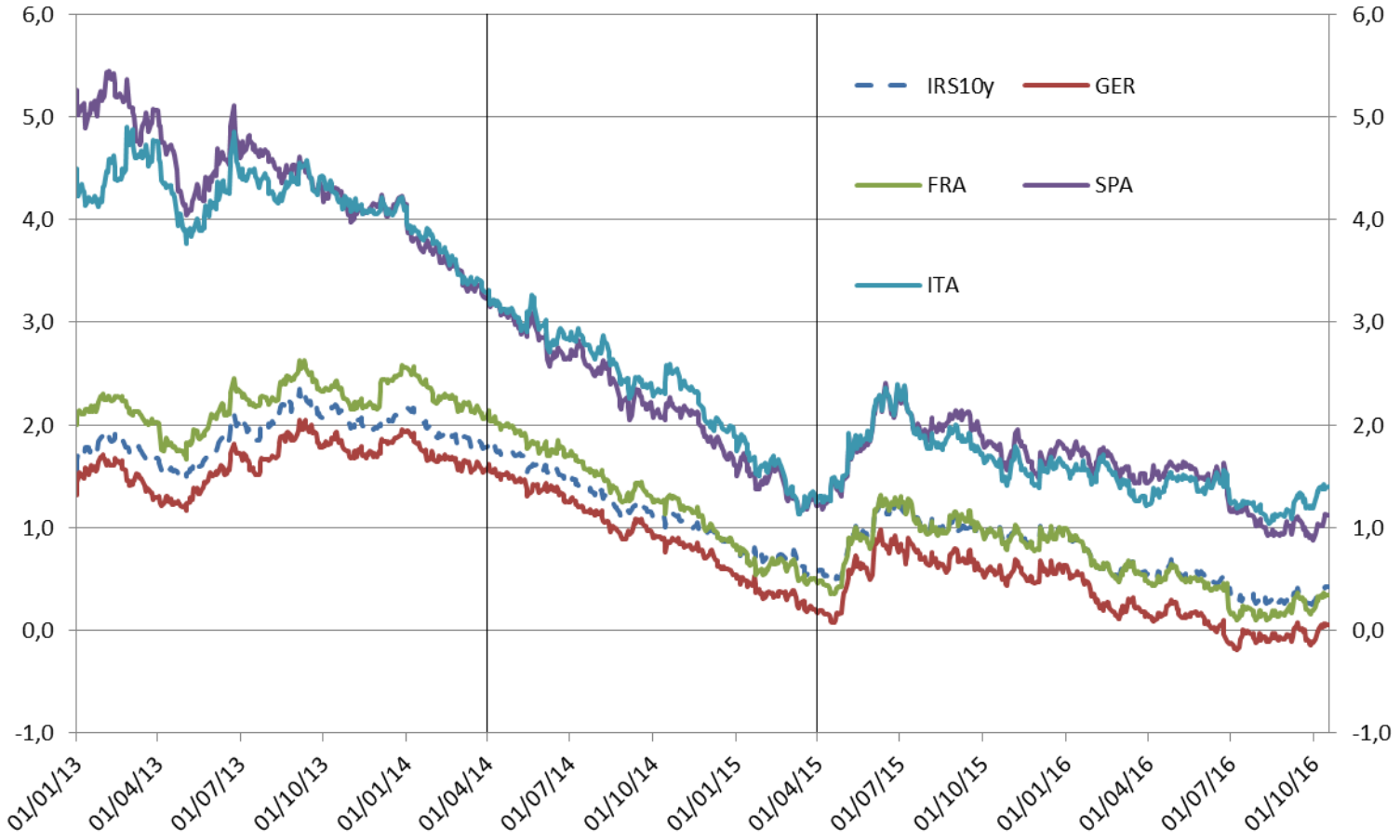
- Same info for each of the largest 25 individual banking groups in the euro area (around 70% of total assets)
- Bank-level data is matched with loan volumes and interest rates

Data

We focus on:

- Debt-securities
  - yield/risk measure
- 2 periods
  - 2014 Q1 (right after decline in yields started)
  - 2015 Q2 (right after decline in yields ended)
- Portfolio of newly issued securities (4 past quarters)
  - Aggregate and proactive rebalancing

Data



Evolution of 10-year GB yields

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Empirical results – intuition

Exploit heterogeneity across investors in exposure to decline in yields to detect its effect on risk-taking

- Mimic literature on bank lending channel in exploiting cross-sectional variation to identify shifts in credit supply driven by monetary policy
- An investor holding in 2014 Q1 securities whose yield did not decline by much can be assumed to have no need to aggressively search-for-yield

Empirical results – identification

- Incentives for rebalancing assumed to be associated with changes in valuation of the portfolio held
- Exploit granularity of dataset to control for credit risk and demand
- Purchases according to capital key rule out targeting of securities in specific countries
- Focus on newly issued securities avoids any mechanical relationship between changes in valuations and changes in portfolio composition

Empirical results – specification

Variables considered

- $h_{i,h,t}$= log (holdings of security *i* by *h* at time *t*)
- r_{it} = yield of security *i* at time *t*
- T_t = dummy for 2015 Q2 (0 for 2014 Q1, 1 for 2015 Q2)
- m_h = valuation of portfolio held by *h* in 2014 Q1

Note: sample comprises only newly issued bonds

m_h computed on seasoned securities

Empirical results – specification

Baseline model:

$$h_{i,h,t} = \ldots r_{it} \ldots$$

risk-taking measured by relationship between amount held & yield

Empirical results – specification

Baseline model:

$$h_{i,h,t} = \ldots r_{it} * T_t \ldots$$

did the relationship get steeper over 2014 Q1-2015 Q2?

Empirical results – specification

Baseline model:

$$h_{i,h,t} = \ldots r_{it} * T_t * m_h \ldots$$

was steepening related to exposure to APP shock?

Empirical results – specification

Baseline model:

$$h_{i,h,t} = \ldots r_{it} * T_t * m_h \ldots + a_{i,t} \ldots$$

controlling credit demand-risk conditions…

Empirical results – specification

Baseline model:

$$h_{i,h,t} = \ldots r_{it} * T_t * m_h \ldots + a_{i,t} + b_{h,t} \ldots$$

…and for holding-sector specific factors

Empirical results – specification

Baseline model:

$$h_{i,h,t} = \left(\beta_0 m_h + \beta'_0 r_{it} + \beta_0'' m_h r_{i,t}\right) + \left(\beta_1 m_h T_t + \beta_1' T_t r_{i,t} + \beta_1'' m_h T_t r_{i,t}\right) + \gamma T_t + a_{i,t} + b_{h,t} + \varepsilon_{i,h,t}$$

H0 (portfolio rebalancing): $\beta_1'' > 0$

Empirical results – all vs investors in vulnerable countries

	Full sample			Investors in vulnerable countries		
	(1)	(2)	(3)	(4)	(5)	(6)
yield-to-maturity (r_{it})	-0.0596	-0.0551*		-0.0968*	-0.0617**	
	(-1.26)	(-1.72)		(-1.80)	(-2.44)	
portfolio valuation (m_h)	-0.122*			0.0915		
	(-1.85)			(1.12)		
post-APP period dummy (T_t)	0.114			0.594		
	(0.46)			(1.59)		
$r_{it}*m_h$	-0.0200	-0.0195	0.0171	0.0155	0.00118	0.0487***
	(-0.95)	(-1.54)	(1.30)	(0.80)	(0.09)	(2.70)
$r_{it}*T_t$	-0.00852	-0.0778		-0.274**	-0.319**	
	(-0.07)	(-0.82)		(-2.47)	(-2.61)	
m_h*T_t	-0.0368			-0.0445		
	(-0.78)			(-0.63)		
$r_{it}*m_h*T_t$	**-0.00620**	**0.00718**	**-0.00175**	**0.0528****	**0.0708****	**0.0469***
	(-0.20)	**(0.32)**	**(-0.35)**	**(2.31)**	**(2.37)**	**(1.92)**
holder*time f.e.	No	Yes	Yes	No	Yes	Yes
security f.e.	No	No	Yes	No	No	Yes
N	232626	232618	182580	49869	49865	39450
R^2	0.051	0.320	0.558	0.030	0.244	0.635

Full sample

No significant effects.

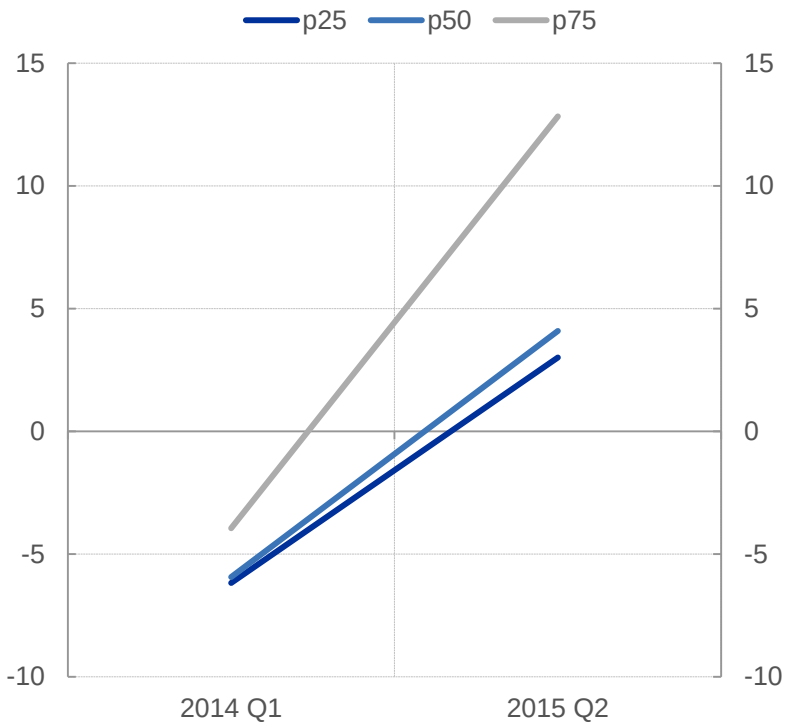
Vulnerable countries

Investors with larger portfolio re-valuations have rebalanced more intensely

Empirical results – marginal effects

$$\partial h_{i,h,t} / \partial r_{i,t} |_{m_h, T_t} = ?$$

Percentage difference between the holding amounts for two securities whose yields differ by one p.p.



Notes: Investors in stressed countries; based on coefficients from OLS estimation

Empirical results – sovereign vs corporate bonds

	Sovereign Bonds			Corporate bonds		
	(1)	(2)	(3)	(4)	(5)	(6)
yield-to-maturity (r_{it})	0.0289	-0.148*		-0.0829*	-0.0489	
	(0.25)	(-1.76)		(-1.78)	(-1.63)	
portfolio valuation (m_h)	0.0937			0.0962		
	(1.58)			(1.01)		
post-APP period dummy (T_t)	0.269*			0.620		
	(1.83)			(1.46)		
$r_{it}*m_h$	-0.0418	0.000525	0.0314	0.0175	0.00323	0.0518***
	(-1.20)	(0.03)	(1.45)	(1.01)	(0.24)	(2.98)
$r_{it}*T_t$	-0.113	-0.219*		-0.276**	-0.309**	
	(-1.63)	(-1.72)		(-2.24)	(-2.36)	
m_h*T_t	0.00333			-0.0510		
	(0.08)			(-0.61)		
$r_{it}*m_h*T_t$	**0.0259**	**0.0524**	**0.00982**	**0.0535****	**0.0689****	**0.0525***
	(1.35)	**(1.58)**	**(0.46)**	**(2.07)**	**(2.11)**	**(1.79)**
holder*time f.e.	No	Yes	Yes	No	Yes	Yes
security f.e.	No	No	Yes	No	No	Yes
N	4382	4368	3904	45487	45482	35532
R^2	0.015	0.206	0.567	0.031	0.258	0.648

Investors in vulnerable countries

Rebalancing significant ***within corporate bond portfolio***

No significant effects documented within sovereign bond holdings

Empirical results – individual risk factors

	(1)		(2)		(3)	
…	…	…	…	…	…	…
Spread $_{it}$ ****m*** $_{h}$ ****Tt***	**0.0529****	**(2.31)**	**0.0571***	**(1.87)**	**0.0435***	**(1.83)**
Maturity $_{it}$ ****m*** $_{h}$ ****Tt***	**0.000179**	**(0.72)**	**0.0000614**	**(0.41)**	**-0.0000783**	**(-0.58)**
NonEur $_{it}$ ****m*** $_{h}$ ****Tt***	**-0.0551**	**(-0.84)**	**-0.110***	**(-1.86)**	**-0.109****	**(-2.16)**
holder*time f.e.	No		Yes		Yes	
security f.e.	No		No		Yes	
N	50374		50370		40209	
R^2	0.058		0.286		0.626	

Investors in vulnerable countries

APP-related rebalancing mainly in terms of extra ***credit risk***

Empirical results – including also seasoned securities

	Full sample			Investors in vulnerable countries		
	(1)	(2)	(3)	(4)	(5)	(6)
yield-to-maturity (r_{it})	-0.0733**	-0.0695***		0.0167	-0.00149	
	(-2.58)	(-2.77)		(0.38)	(-0.11)	
portfolio valuation (m_h)	-0.0802			0.0556		
	(-1.31)			(0.77)		
post-APP period dummy (T_t)	0.184			0.307*		
	(1.55)			(1.80)		
$r_{it}*m_h$	-0.0192**	-0.0219***	0.0139	-0.0409***	-0.0305***	0.0406***
	(-2.01)	(-2.74)	(1.27)	(-2.82)	(-6.87)	(3.94)
$r_{it}*T_t$	-0.0966*	-0.124***		-0.149***	-0.151**	-456.7
	(-1.77)	(-2.83)		(-2.72)	(-2.39)	(-0.00)
m_h*T_t	-0.0326			-0.0115		
	(-1.41)			(-0.33)		
$r_{it}*m_h*T_t$	**0.0146**	**0.0213****	**0.000476**	**0.0297****	**0.0326***	**-0.00772**
	(1.24)	**(2.16)**	**(0.12)**	**(2.29)**	**(1.96)**	**(-1.60)**
holder*time f.e.	No	Yes	Yes	No	Yes	Yes
security*time f.e.	No	No	Yes	No	No	Yes
N	957680	957677	800033	249374	249372	190264
R^2	0.037	0.226	0.509	0.020	0.182	0.590

Hinting at implications for financial stability

No significant effects when controling for holding-sector specific factors and credit demand.

Empirical results – extensive margin

Dependent variable: Dummy variable identifying new holdings, i.e. security categories held in 2015Q2 but not in 2014 Q1

	(1)	(2)	(3)	(4)
yield-to-maturity (r_{it})	0.00886*		0.0105***	
	(2.40)		(3.17)	
portfolio valuation (m_h)	-0.00176	-0.00354		
	(-0.44)	(0.74)		
$r_{it} * m_h$	**-0.00101**	**-0.00141**	**-0.000412**	**-0.0000575**
	(-0.76)	**(-0.95)**	**(-0.41)**	**(-0.06)**
pseudo-security f.e.	No	Yes	No	Yes
holder f.e.	No	No	Yes	Yes
N	15179	14956	15179	14956
R^2	0.002	0.326	0.074	0.44

Investors in vulnerable countries

"Rectangularised" dataset, to model probability that holder *h* invests in a new (type) of security

Rebalancing concentrated on the intensive margin: constraints on investment strategies?

Empirical results – individual banking groups

- What about **loans** to the non-financial private sector?
  - Add information on
    - net flows of loans to NFC and HH (iBSI)
    - lending rates on new loans (iMIR)
  - Lose granularity on the side of "debtor"

Empirical results – loan growth

Dependent variable: y-o-y growth rate of loans to sector i (i=NFC, HH) in 2015Q2, by bank *h*

	(1)	(2)	(3)	(4)
portfolio valuation (m_h)	1.633**	2.335**	2.797***	3.527***
	(2.75)	(2.68)	(4.03)	(3.57)
m_h*Loans to Non Financial Corporations*		-1.405		-1.460
		(-1.04)		(-0.92)
m_h*Vulnerable countries*			-3.262***	-3.429***
			(-3.64)	(-3.72)
m_h*L_{NFC}*Vulnerable countries*				0.335
				(0.17)
sector f.e.	Yes	Yes	Yes	Yes
country f.e.	Yes	Yes	Yes	Yes
N	50	50	50	50
R^2	0.402	0.422	0.463	0.483

Positive relation on bank lending to HH and NFC alike…

…. driven by banks in ***less vulnerable countries***

Empirical results – lending rates

Dependent variable: Change between 2014Q1 and 2015Q2 in the interest rate on new loans to sector *i* (i=HH, $NFC_{<€0.25M}$, $NFC_{>€0.25M}$ and $NFC_{>€1M}$) applied by bank *h*

	(1)	(2)	(3)	(4)
portfolio valuation (m_h)	0.034	-0.250*	0.016	-0.271***
	(0.72)	(-1.77)	(0.40)	(-2.81)
*m_h*Loans to Non Financial Corporations*		0.378**		0.383***
		(2.46)		(3.13)
*m_h*Vulnerable countries*			0.05	0.071
			(0.44)	(0.24)
*m_h*Vulnerable countries*L_{NFC}*				-0.027
				(-0.09)
sector f.e.	Yes	Yes	Yes	Yes
country f.e.	Yes	Yes	Yes	Yes
N	100	100	100	100
R^2	0.315	0.455	0.317	0.457

Negative relation with interest rates on loans to HH but not NFC…

… with no difference across country groups

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Conclusions and policy implications

- Rebalancing of securities portfolios limited to vulnerable countries
  - Intensified risk taking towards higher credit risk…
  - … and within corporate bond portfolios
- Rebalancing benefitting supply of loans to NFC&HH
  - in non stressed countries only
- Significant effect on lending rates to HH

Conclusions and policy implications

- Portfolio rebalancing towards higher risk securities in jurisdictions where this can lead to material returns
- Rebalancing towards loans to the real economy in countries where
  - spreads on securities are lower
  - banks are less constrained
- This provides some evidence of transmission to real economy...
- ...but possible constrains limiting its pass-through

Thank you!