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EUROSYSTEM

The 2009-2013 corporate bond issuance global frenzy, what role for US Quantitative Easing ?

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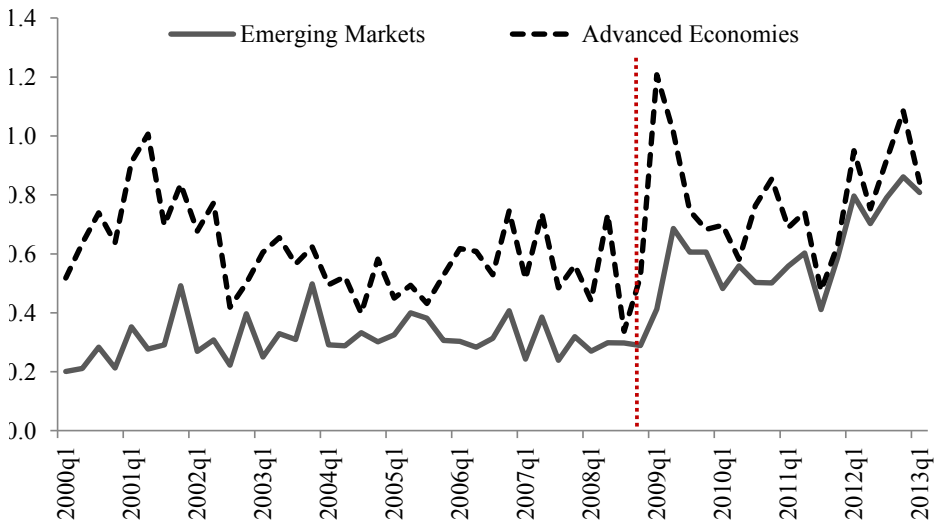
European Central Bank

XI Emerging Markets Workshop
Bank of Spain
4 November 2013

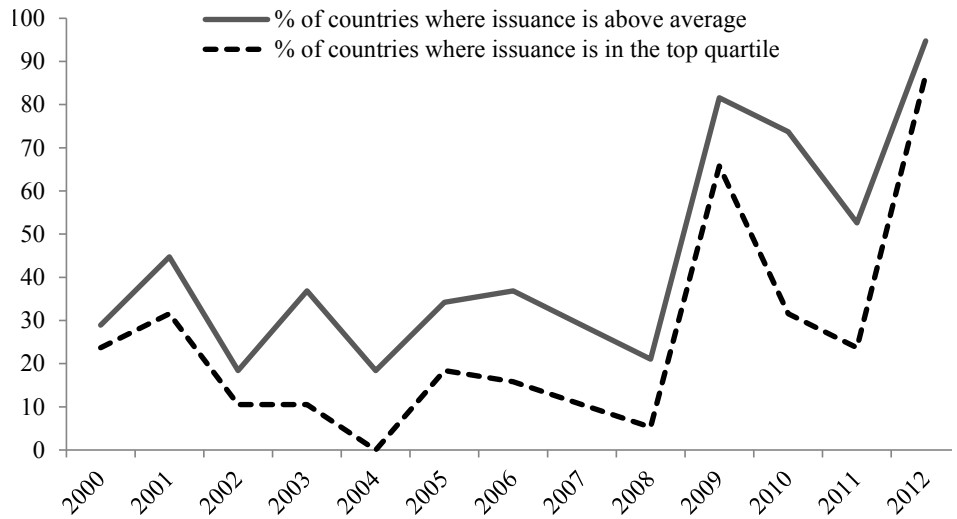
Motivation

Gross bond issuance of non-financial corporations as % GDP



- Unprecedented issuance during QE period.

Synchronization of non-financial bond issuance across countries



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Policy Relevance

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Relevant policy issues:

- How much did QE affect bond market issuance ?
- Is bond market issuance more affected by QE purchases (flow effects) or QE stock of assets (stock effects)?
- Likely impact of QE tapering ?

What we do

Quantify the impact of US quantitative easing on global corporate bond issuance across regions, for non-financial corporations.

- Regions: 18 EMEs and 19 AEs (excluding US)
- Separate assessment of policy instruments (MBS vs Treasuries)
- Impact: Stock and flow effects
- We control for substitution effects between bank loans and corporate bonds

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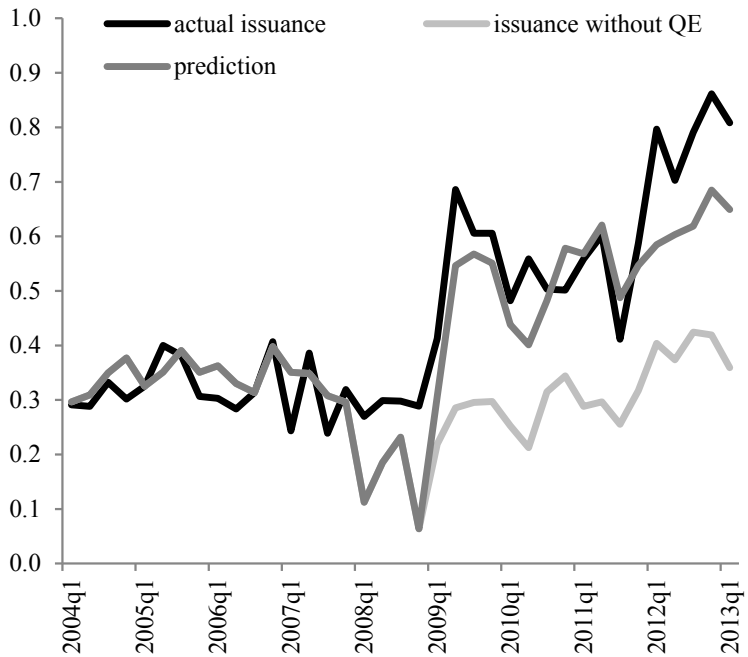
Counterfactual bond issuance in EMEs



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- Corporate bonds: Gilchrist and Zagrajeck QE (2013) and Bayoumi and Bui (2012) on yields (non-financial corporations US and international).
- QE effects on government bond yields: many (also international dimension) but D'Amico and King (2012) emphasize stock and flow effects.
- QE international effects on asset prices and portfolio flows. Fratzscher, Lo Duca and Straub (2013): announcement and purchases.

Transmission channels: from QE to bond issuance

- Portfolio re-balance: Fed purchases may produce portfolio re-balancing across asset segments.
- Corporate bonds replace the assets removed by QE ('gap-filling theory' Greenwood et al (2010) JF)
- Market timing hypothesis, manager raise issuance when interest rates expected to be low; buy–back own shares when stock market expected to rise.

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Transmission channels emphasize assets to public versus assets held at the central bank
Some channels entail flow, some entail stock effects

Outline

Bond data

- Bond Data: Micro data from Dealogic, individual bond level-data
- Aggregation by country, at quarterly frequency
- Information on **volumes**, yields, maturity, rating, currency of issuance
- Period: From 2000Q1 to 2013Q1

Variable	Description		Mean	Std Dev	Min	Max
Non-financial corporate bond issuance in % GDP	Total bond issuance by non-financial companies in % of nominal GDP. Source: Dealogic and IMF.	Emerging markets	0.45	0.60	0.00	5.13
		Advanced economies	0.60	0.83	0.00	13.29
Non-financial corporate bond issuance in bn. euros	Total bond issuance by non-financial companies in billions of euros. Source: Dealogic.	Emerging markets	2.37	6.39	0.00	84.17
		Advanced economies	9.05	21.46	0.00	197.69

Methodology

Benchmark Model (Tobit Estimator):

$$Y_{it} = \beta MP_t + \lambda_1 F_t + \lambda_2 Z_{it} + \epsilon_{it}$$
$$with\ MP_t = [treas_t, mbs_t, dtreas_t, dmbs_t]'$$

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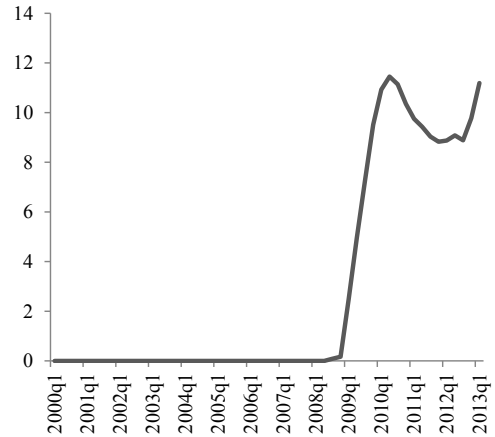
- $treas_t$ ($dtreas_t$): Stock (Purchases) of US Treasury bonds held by Fed in % of total US government debt.
- mbs_t ($dmbs_t$): Stock (Purchases) of MBS and GSE debt held by Fed in % of total stock outstanding of MBS and GSE.

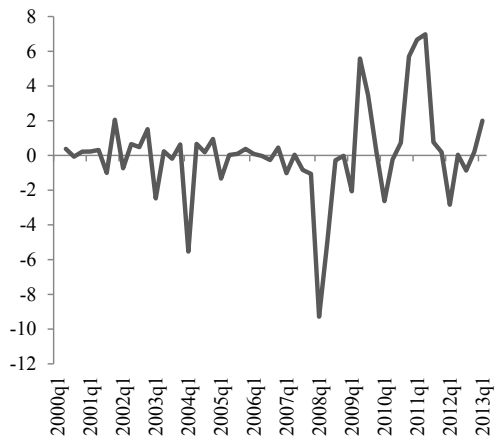
Unconventional QE actions data

Stock of US Treasury bonds held in % of US government debt

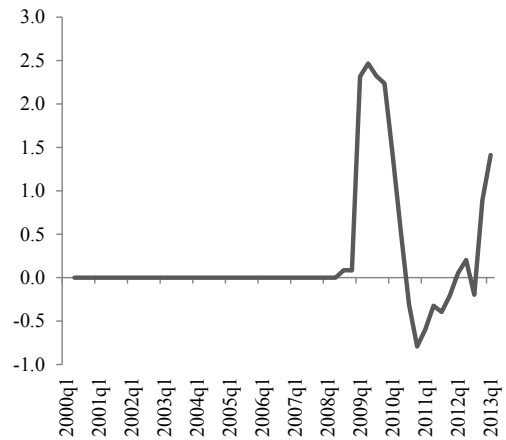
Stock of MBS&GSE debt held in % of stock outstanding of MBS&GSE



Change in US Treasury held in % of US government debt



Change in MBS&GSE held in % of stock outstanding of MBS&GSE



Total impact of QE measures

Dep. Variable: Non-financial issuance in % GDP	(1)	(2)	(3)	(4)	(5)	(6)
Explanatory variables	Domestic ALL	Domestic EME	Domestic AE	Benchmark Global	Global EME	Global AE
Central bank (real) policy rate	-0.025***	-0.015***	-0.080***	-0.006	-0.003	-0.015
	(0.006)	(0.005)	(0.020)	(0.006)	(0.005)	(0.027)
Realised volatility of equities	0.052	-0.097**	0.078	-0.139*	0.091	-0.127
	(0.052)	(0.046)	(0.071)	(0.078)	(0.058)	(0.097)
Realised volatility of equities (EME dummy)	-0.130*			0.197*		
	(0.069)			(0.104)		
Equity returns	0.006***	0.004**	0.008***	0.002	0.003*	0.001
	(0.002)	(0.001)	(0.003)	(0.002)	(0.002)	(0.003)
US 10y Bond yield				-0.079***	-0.074***	-0.076*
				(0.026)	(0.028)	(0.044)
VIX				0.006	-0.008***	0.003
				(0.004)	(0.003)	(0.005)
VIX (EME dummy)				-0.017***		
				(0.005)		
MBS held in % of total MBS				0.005	0.013*	-0.002
				(0.006)	(0.007)	(0.010)
Treasuries held in % of total US Debt				0.001	0.005*	-0.002
				(0.003)	(0.003)	(0.004)
Purchases of Treasuries in % of total US Debt				0.026***	0.014*	0.034***
				(0.007)	(0.007)	(0.012)
Purchases of MBS in % of total MBS				0.118***	0.041	0.187***
				(0.027)	(0.028)	(0.044)
Constant	0.507***	0.497***	0.585***	0.785***	0.541**	0.933***
	(0.087)	(0.121)	(0.122)	(0.198)	(0.228)	(0.309)
Observations	1,907	920	987	1,907	920	987
Number of countries	37	18	19	37	18	19

Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

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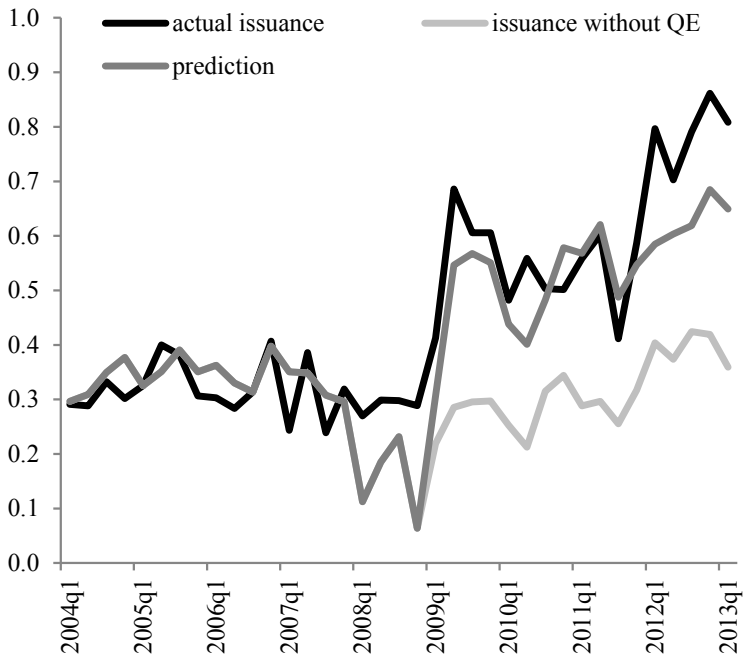
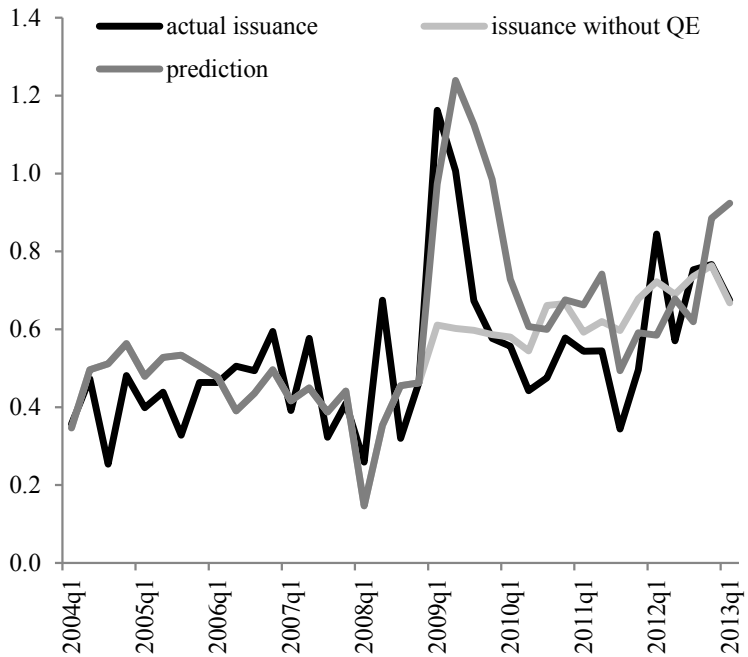
Predicted bond issuance with and without QE

Counterfactual bond issuance in EMEs



Counterfactual bond issuance in AEs



- AE: The impact is centralized in 2009 (QE1).
- EME: Bigger impact in terms of magnitudes (double the size of the counterfactual) and time extension.

Robustness analysis

- Alternative econometric techniques: FE with Driscoll-Kraay std errors and Mean group estimator
- Linear trend and country dummies
- Alternative measures of the dependent variables.
- Alternative measures of unconventional monetary policy instruments. (in bn euro, as a % GDP ...)
- **Results are robust**

Further analysis: substitution effects

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- Weak global banking can be an alternative or complementary explanation of commonalities of bond issuance across countries
- Our set of controls: domestic and international lending; bank equity; bond issuance by financial corporations.
- We allow our control to have different impact before and after 2009.
- **Substitution effects are found as complementary rather than alternative explanation**

Substitution effects

Table 8: Substitution effects

Dep. variable: Non-financial issuance in % GDP	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
Explanatory variables	**Domestic lending**			**International lending**			**Bank equity**			**Financial bond issuance**		
	ALL	**EME**	**AE**	**ALL**	**EME**	**AE**	**ALL**	**EME**	**AE**	**ALL**	**EME**	**AE**
MBS held in % of total MBS	0.007	0.024***	-0.003	0.004	0.014*	-0.004	0.005	0.013*	-0.002	0.007	0.008	0.008
	(0.007)	(0.008)	(0.011)	(0.007)	(0.007)	(0.011)	(0.006)	(0.007)	(0.011)	(0.007)	(0.007)	(0.012)
Treasuries held in % of total US Debt	0.001	0.008***	-0.003	0.001	0.004	-0.000	0.001	0.005*	-0.002	0.000	0.006**	-0.004
	(0.003)	(0.003)	(0.004)	(0.003)	(0.003)	(0.004)	(0.003)	(0.003)	(0.004)	(0.003)	(0.003)	(0.004)
Purchases of Treasuries in % of total US Debt	0.026***	0.015**	0.035***	0.025***	0.014*	0.033***	0.025***	0.013*	0.034***	0.026***	0.014*	0.036***
	(0.007)	(0.008)	(0.012)	(0.007)	(0.007)	(0.012)	(0.007)	(0.008)	(0.012)	(0.007)	(0.007)	(0.012)
Purchases of MBS in % of total MBS	0.121***	0.048	0.187***	0.123***	0.037	0.196***	0.113***	0.034	0.182***	0.122***	0.043	0.207***
	(0.028)	(0.029)	(0.047)	(0.029)	(0.032)	(0.047)	(0.027)	(0.029)	(0.045)	(0.027)	(0.028)	(0.045)
Domestic claims growth rate	0.002	0.005**	-0.002									
	(0.002)	(0.002)	(0.004)									
Domestic claims growth rate (>2009)	-0.005	-0.011**	-0.009									
	(0.005)	(0.005)	(0.012)									
International claims growth rate				-0.001	-0.001	-0.001						
				(0.001)	(0.001)	(0.002)						
International claims growth rate (>2009)				0.000	-0.000	-0.002						
				(0.002)	(0.002)	(0.004)						
Equity banks returns							0.001	0.000	0.002			
							(0.002)	(0.002)	(0.003)			
Equity banks returns (>2009)							0.001	0.003	-0.000			
							(0.002)	(0.002)	(0.003)			
Financial bond issuance in % GDP										-0.009	0.146**	-0.014
										(0.012)	(0.063)	(0.016)
Financial bond issuance in % GDP(>2009)										-0.016	0.081	-0.047*
										(0.018)	(0.066)	(0.026)
Observations	1,861	899	962	1,874	905	969	1,907	920	987	1,907	920	987
Number of countries	37	18	19	37	18	19	37	18	19	37	18	19

Only the coefficients of the relevant variables are reported, see Table 6 in the paper for the full results.

Further analysis: role of VIX and US 10 year yields

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- VIX and 10 year yields are also influenced by QE through reduction in risk premia
- Part of the QE effects on bond issuance is absorbed also by lower VIX and 10-year yield
- We remove risk premia from VIX and 10-year yield
- VIX: substitute VIX with Bloom's policy uncertainty index
- 10 year yield: decompose into term premium and expected long term rate using affine term structure model (Adrian et al 2012).
- **Stock effects of QE (slightly) stronger**

Broader QE effects

Dep. variable: Non-financial issuance in % GDP	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Explanatory Variables	**Policy uncertainty index**			**Policy incertainty & risk neutral yield**			**Term premia**		
	ALL	**EME**	**AE**	**ALL**	**EME**	**AE**	**ALL**	**EME**	**AE**
US policy uncertainty	0.000	-0.002**	0.002	0.003**	0.000	0.004**			
	(0.001)	(0.001)	(0.002)	(0.001)	(0.001)	(0.002)			
US policy uncertainty (EME dummy)	-0.001			-0.001					
	(0.001)			(0.001)					
MBS held in % of total MBS	0.006	0.023***	-0.009	0.011*	0.029***	-0.007	0.008	0.015**	0.002
	(0.007)	(0.007)	(0.011)	(0.007)	(0.007)	(0.011)	(0.007)	(0.007)	(0.011)
Treasuries held in % of total US Debt	0.001	0.007**	-0.002	0.000	0.006**	-0.004	0.000	0.004	-0.003
	(0.003)	(0.003)	(0.004)	(0.003)	(0.003)	(0.004)	(0.003)	(0.003)	(0.004)
Purchases of Treasuries in % of total US Debt	0.025***	0.012	0.034***	0.019***	0.006	0.030***	0.026***	0.015*	0.035***
	(0.007)	(0.007)	(0.012)	(0.007)	(0.007)	(0.011)	(0.007)	(0.007)	(0.012)
Purchases of MBS in % of total MBS	0.114***	0.025	0.194***	0.120***	0.031	0.199***	0.115***	0.039	0.183***
	(0.027)	(0.028)	(0.043)	(0.027)	(0.028)	(0.043)	(0.027)	(0.028)	(0.044)
Risk neutral US 10y yield				0.049*	0.034	0.071	-0.042	-0.050	-0.026
				(0.028)	(0.030)	(0.045)	(0.031)	(0.034)	(0.052)
Observations	1,907	920	987	1,907	920	987	1,907	920	987
Number of countries	37	18	19	37	18	19	37	18	19

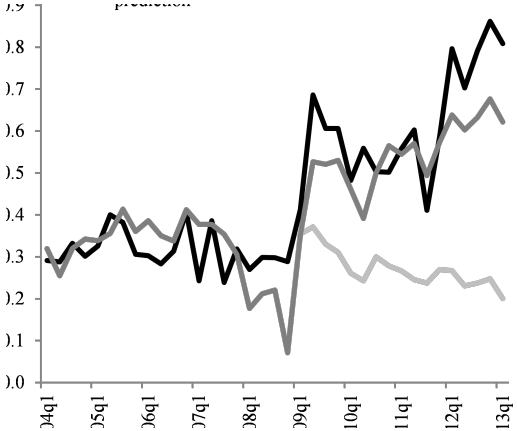
Only the coefficients of the relevant variables are reported, see Table 9 in the paper for the full results.

Role of other major central banks' QE

- Did unconventional monetary policies of other central banks also play a role ?
- Sum up Fed Treasuries and MBS (stock and flow) and express them in % of the GDP.
- Do the same for holdings of securities (in % of GDP) across major central banks (Fed, ECB, BoE and BoJ).
- Comparing counterfactuals: slightly stronger results but no substantially so.
- **US QE had a prominent role in driving global corporate bond issuance.**

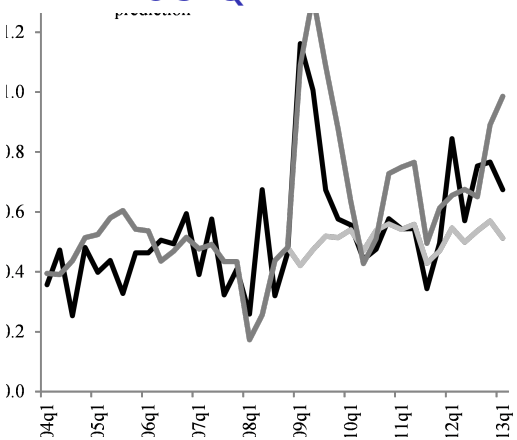
Counterfactuals: US vs Major Central Banks

US QE - EMEs

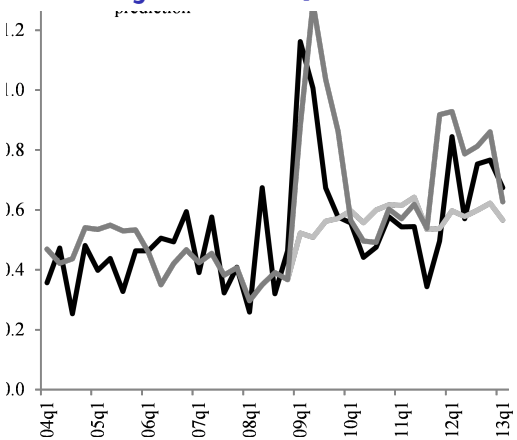


Major CB QE - EMEs

US QE - AE



Major CB QE - AE



Conclusions

- QE policies largely explain the increase in corporate issuance in the bond market.
- Flow effects, in particular MBS purchases, seem to have the larger impact.
- In Emerging Markets, stock effects are present; impact of US monetary policies is larger as of magnitude (double the size of the counterfactual) and time extension (since the first QE).
- The effect of US unconventional policies in Advanced Economies is centralized in 2009 with first QE and mainly reflecting MBS purchases.
- Substitution effects between bank loans and bonds are present, but complementary rather than alternative explanatory factor to QE.
- US QE has a dominant role vs other major central banks's QE.

Future concerns

- How are EME corporations going to get funding in the future?
- Will they be able to roll-over their debt?

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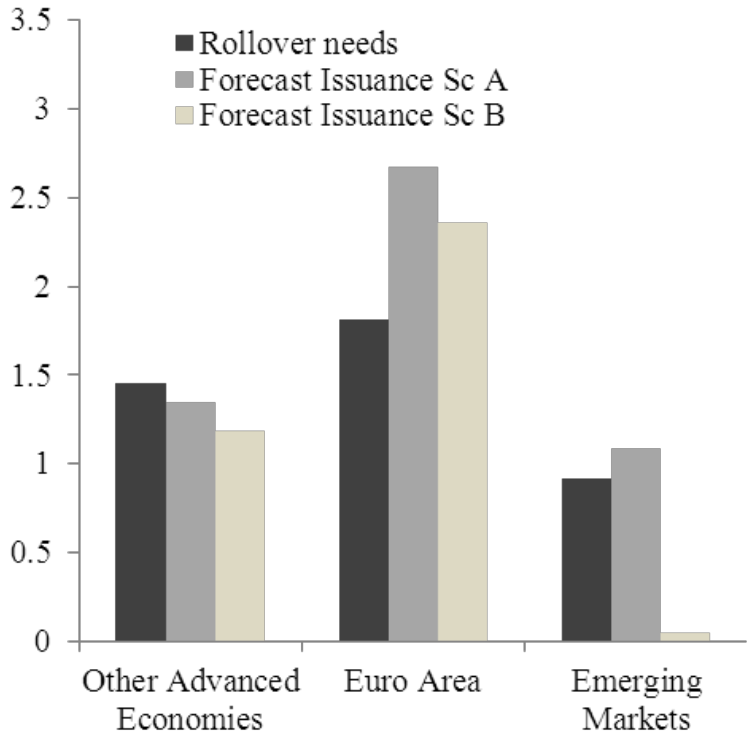
Counterfactual bond issuance in EMEs



Decomposition of US 10 year bond yield

Using Model of term structure of interest rates by Adrian, Crump, Moench.

Adrian, T., Crump, R.K., Moench, E., 2013. Pricing the Term Structure with Linear Regressions. Staff reports 340. Federal Reserve Bank of New York, NY.

Term premium = Implied-model yield - risk neutral yield

Assumption: QE mainly affects term premium component.

Term premium and risk neutral yield for US 10y bond