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# Global liquidity and cross-border banking: A view from the euro area

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Opinions expressed are my own and do not necessarily represent those of the Central Bank of Ireland

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- Global financial crisis highlighted importance of global liquidity
- Pre-crisis period witnessed significant expansion of euro area-banks international funding
- Post crisis euro area banks are restructuring their international balance sheets
- Global factors – e.g. uncertainty and risk aversion, monetary policy stance in systemic global economies (euro area, US, UK and Japan), & funding conditions and risk attitudes of global banks - affect cross-border bank flows
- Policy implications: bank credit (domestic and cross-border) is determined not only by domestic economic and financial conditions but also on economic and financial policies in other major economies and financial centers.



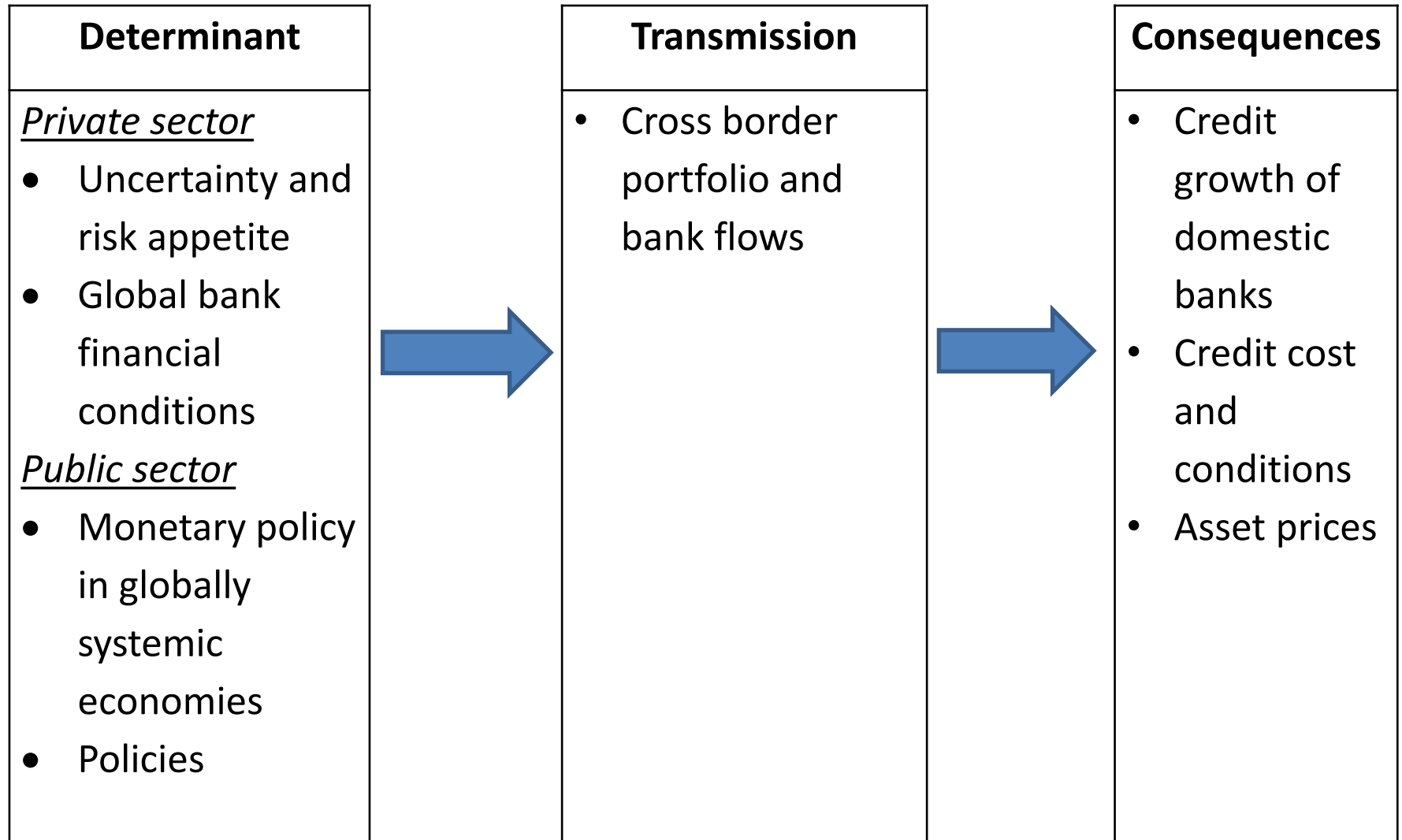
- To examine how drivers of global liquidity influence the portfolios of euro area banks
  - Export of capital: Influence of global factors on euro area bank cross-border credit during a period of contracting domestic credit supply
  - Import of global financial conditions: Do global financial conditions spill over into euro area domestic economies?
- Initial findings indicate a range of global factors influence euro area cross-border & domestic credit

# Global liquidity and cross-border bank flows



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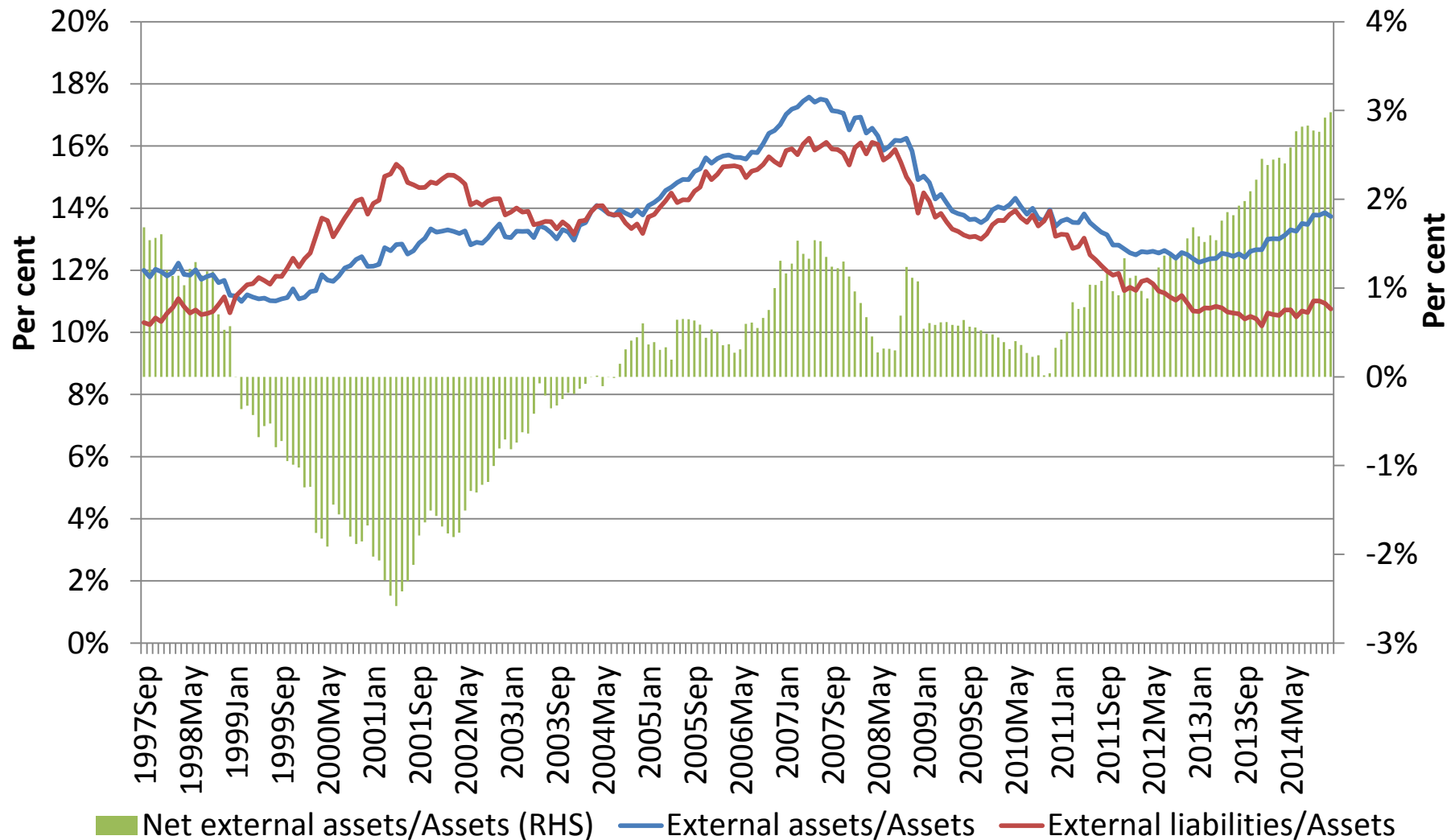
**Diagram 1: Framework of global liquidity**



# Figure 1: International balance sheet of euro area banks



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**Diagram 2: stylised euro area bank balance sheet**

Assets	Liabilities
Credit to euro area residents	M3
Net external assets	Long-term financial liabilities
Other assets	Other liabilities

$M3 = \text{credit to euro area residents} + \text{net external assets} - \text{longer-term financial liabilities} + \text{other counterparts (net)}$



**Diagram 2: stylised euro area bank balance sheet**

Assets	Liabilities
Credit to euro area residents	M3
Net external assets	Long-term financial liabilities
Other assets	Other liabilities



- M1 (currency and deposits)
- M2 (deposits < 2yr)
- M3-M2 (repurchase agreements, money market fund shares/units & debt securities < 2yr)

$M3 = \text{credit to euro area residents} + \text{net external assets} - \text{longer-term financial liabilities} + \text{other counterparts (net)}$

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**Diagram 2: stylised euro area bank balance sheet**

	Assets	Liabilities
€40bn ↑	Credit to euro area residents	M3 ↑
€40bn	Net external assets	Long-term financial liabilities
	Other assets	Other liabilities

→ €80bn

- M1 (currency and deposits)
- M2 (deposits < 2yr)
- M3-M2 (repurchase agreements, money market fund shares/units & debt securities < 2yr)

$M3 = \text{credit to euro area residents} + \text{net external assets} - \text{longer-term financial liabilities} + \text{other counterparts (net)}$

# Money and cross-border bank flows



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**Diagram 2: stylised euro area bank balance sheet**

	Assets	Liabilities
€20bn ↓	Credit to euro area residents	M3 ↑
€100bn ↑	Net external assets	Long-term financial liabilities
	Other assets	Other liabilities

→ €80bn

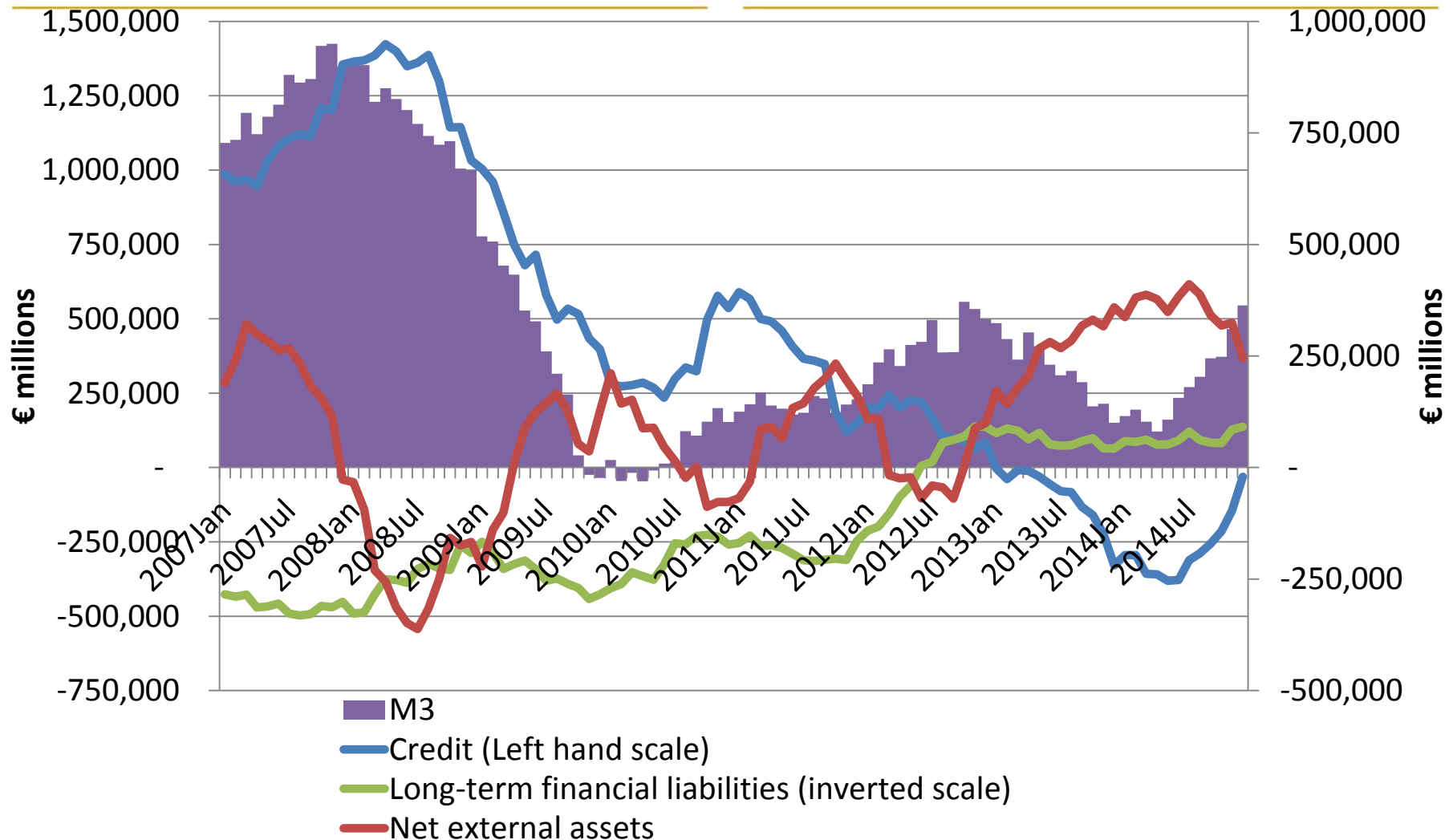
- M1 (currency and deposits)
- M2 (deposits < 2yr)
- M3-M2 (repurchase agreements, money market fund shares/units & debt securities < 2yr)

$M3 = \text{credit to euro area residents} + \text{net external assets} - \text{longer-term financial liabilities} + \text{other counterparts (net)}$

# Figure 2: Main counterparts to M3 (flows)



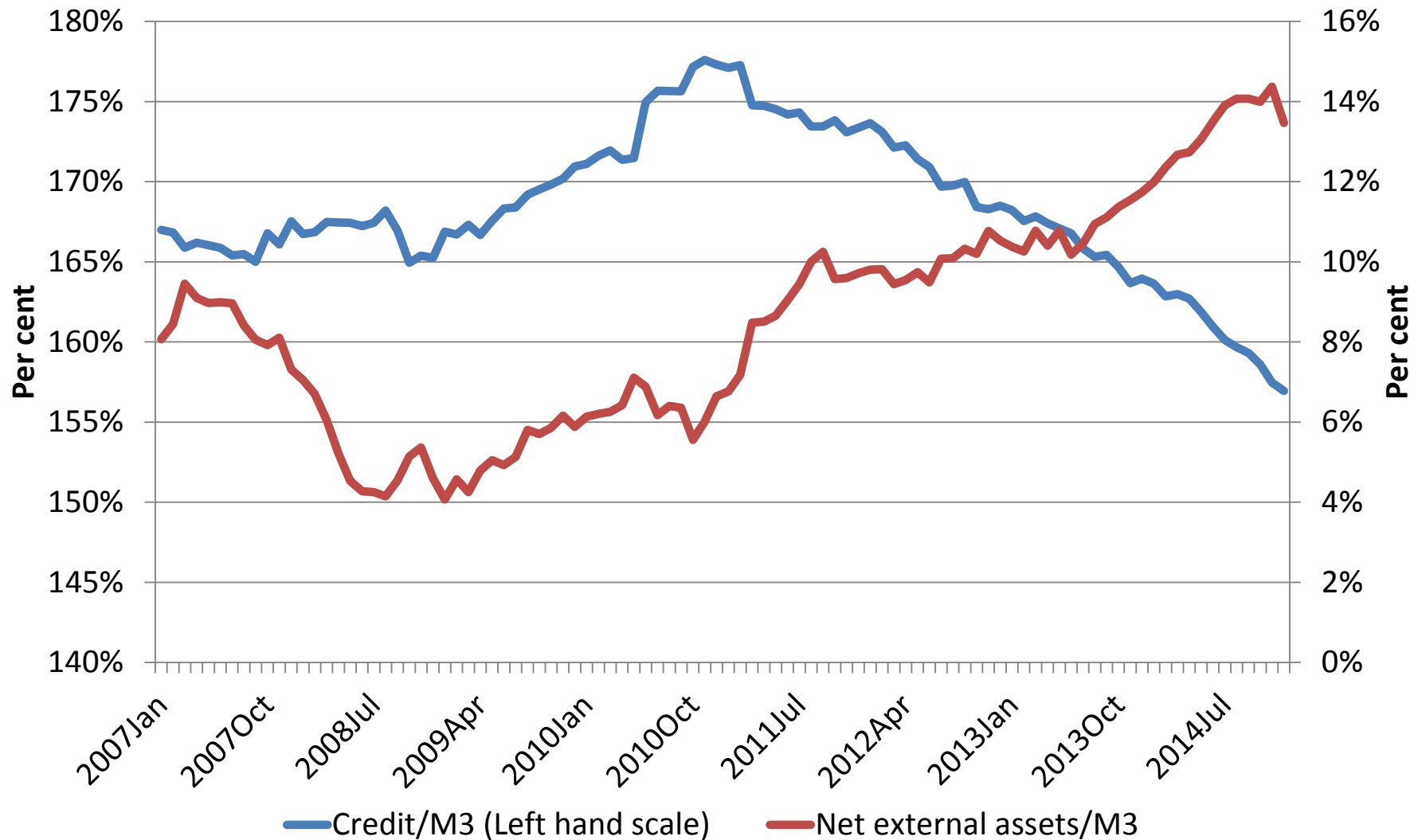
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# Figure 3: Contribution of credit and net external assets to M3 (stocks)



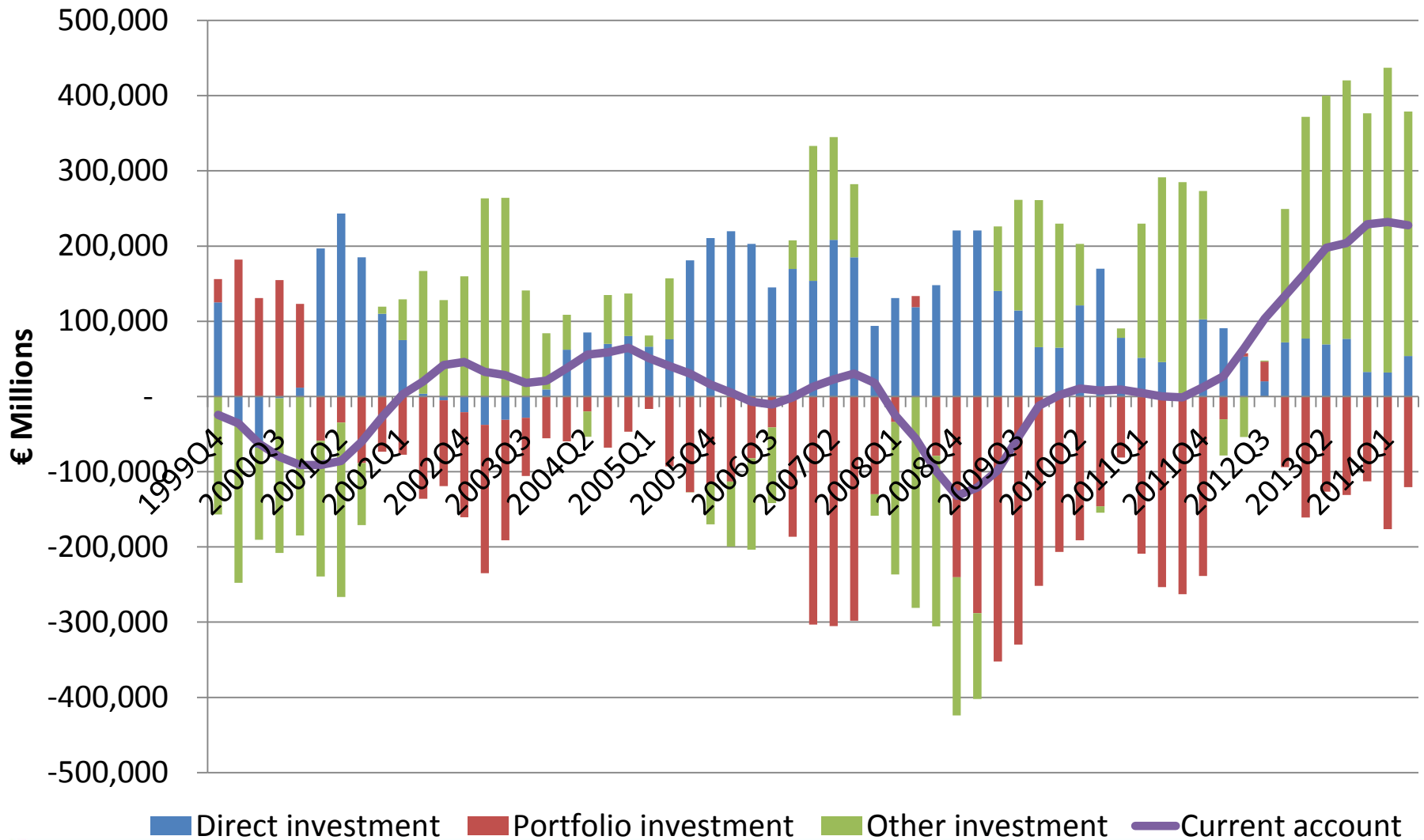
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# Figure 4: Spending the surplus: current account and financial account



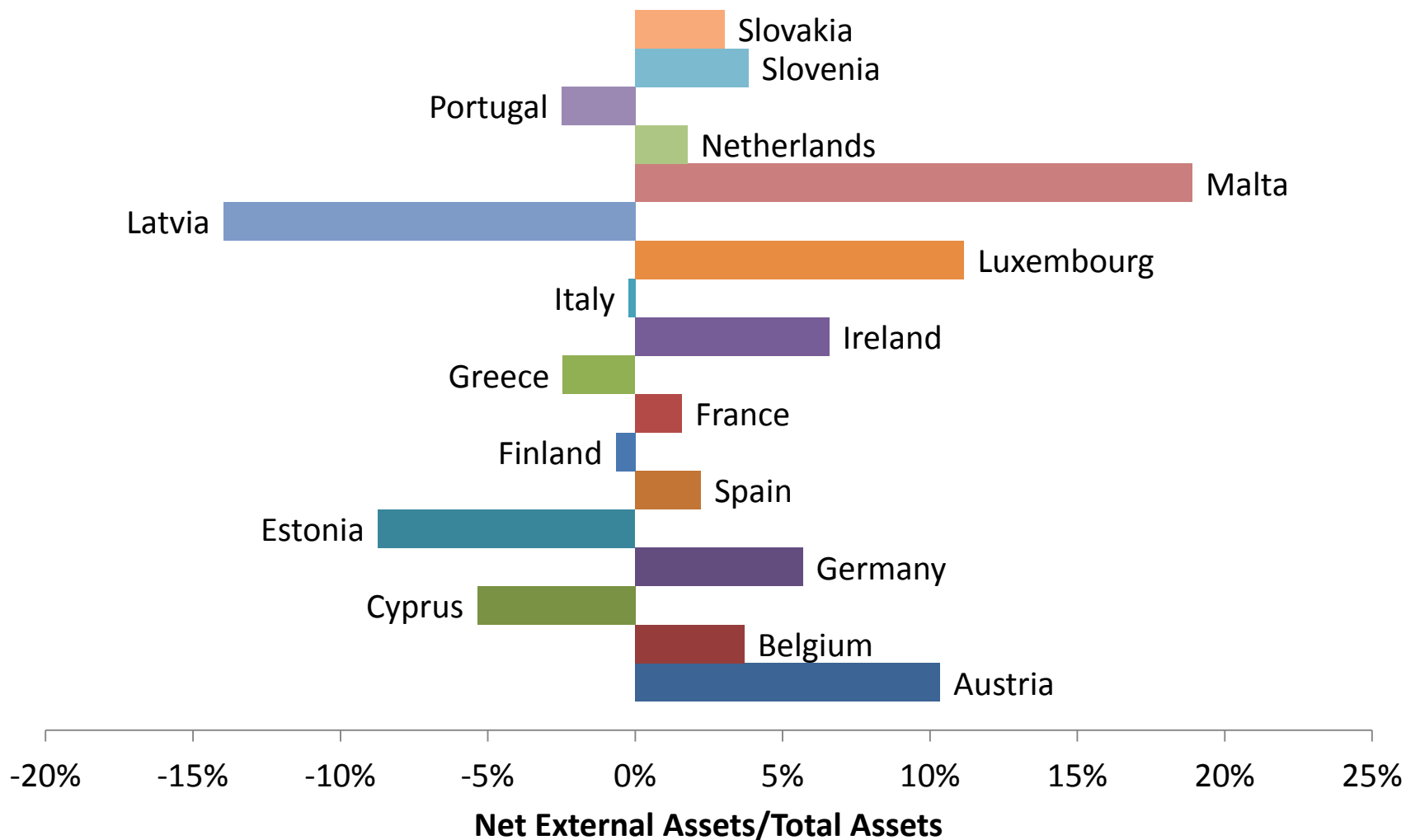
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# Figure 5: Which countries banking systems are net exporters of capital?



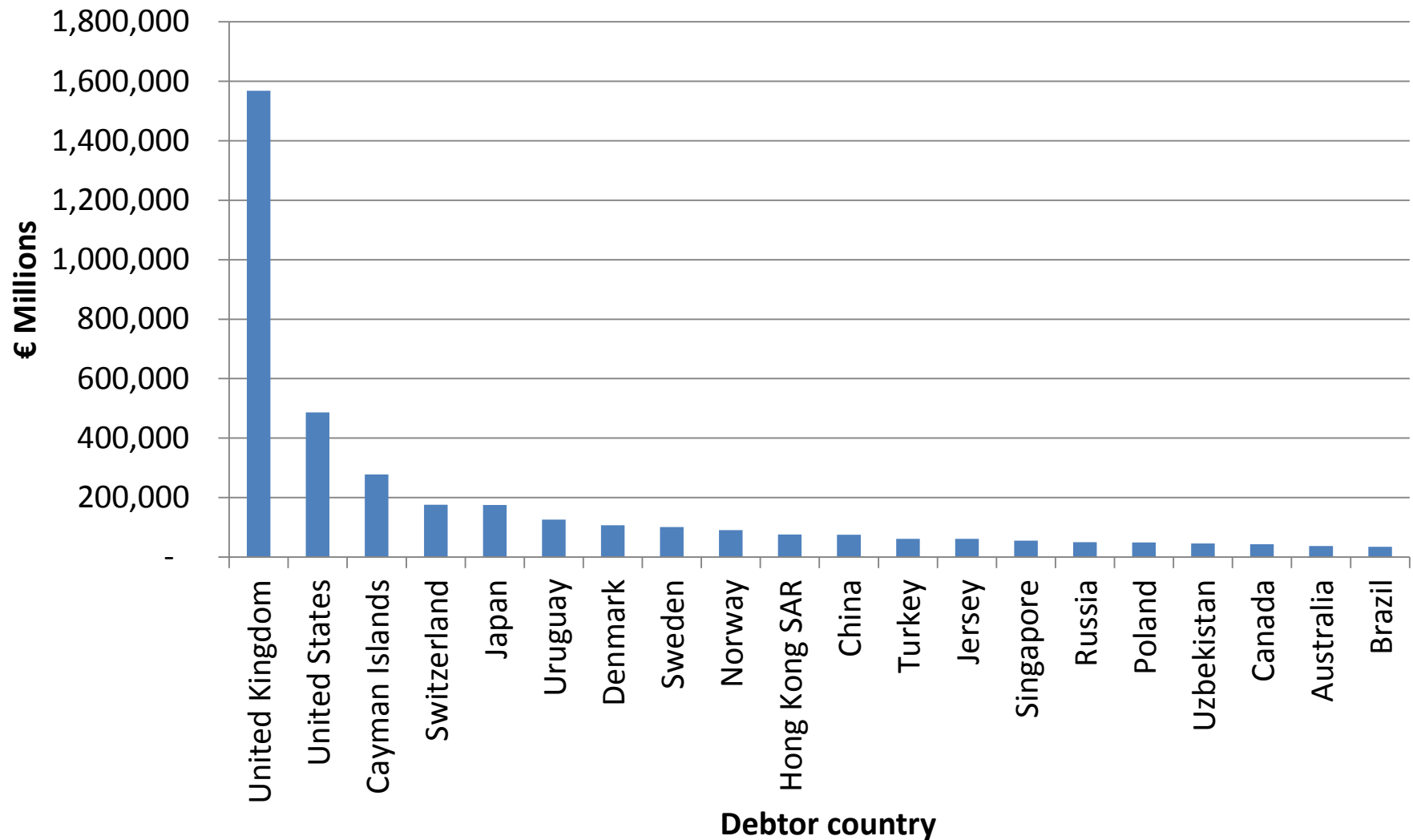
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# Figure 6: Where are euro area banks investing?



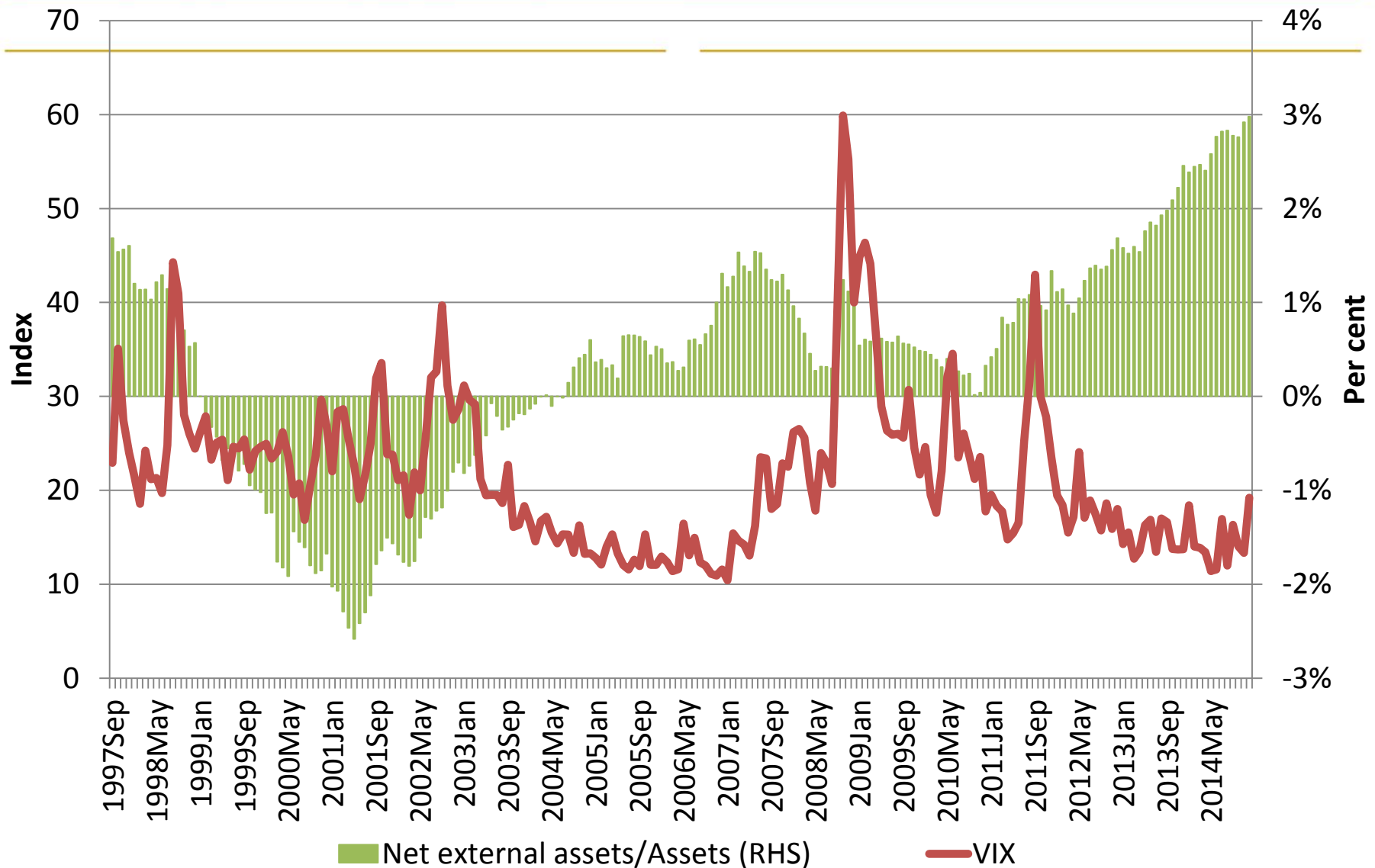
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# Figure 7: Net external assets and global risk



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- Push and pull factors determine cross-border capital flows [*Calvo et al. (1996 JEP); Forbes and Warnock (2012 JIE)*]
- Global factors influence cross-border bank flows [*Bruno and Shin (2015 RES); Cerutti et al. (2014 IMF); Cerutti (2015 JMF); Reinhardt and Riddiough (2014 BOE)*]
- A range of factors, including monetary policy in centre economies, influence global liquidity [*Rey (2012 WP); Eickmeir et al. (2014 EER); Cerutti et al. (2014 IMF); IMF (2014)*]
- Post-crisis shifts in bank cross-border flows [*Bremus and Fratzscher (2015 JIMF)*]
- Money and cross-border bank flows (*Kim et al. (IJCB 2013); Be Duc et al. (2008 ECB)*]



- Bank cross-border flow and balance sheet data
  - ECB proprietary bank-level database
- Global factors
  - Global risk: VIX [VXO, VDAX, GRAI]
  - Global bank balance sheets
  - Interest rates (interbank and slope of yield curve)
  - Unconventional monetary policy
- Global and domestic controls
  - Exchange rates
  - Global credit demand (BIS, GDP (IMF IFS))
  - Interest rate spread
  - Domestic credit demand



$$\Delta L_{ijt} = \beta Global_t + \alpha GlobalDemand_{jkt} + \rho \Delta REER_{kt} + \psi InterestRateSpread_t + \theta X_{ijt-1} + \gamma B_i + \delta C_j + \varepsilon_{ijkt}$$

where

$L$	Cross-border flows of euro area bank i resident in country j at time t
$Global$	Vector of drivers of global liquidity [Global risk, $\Delta$ Global bank equity, $\Delta$ Global interest rate, $\Delta$ Major CB balance sheets]
$GlobalDemand$	Debtor country credit demand
$REER$	Change in real effective exchange rate
$InterestRateSpread$	Spread between Euribor and average Libor for USD, GBP and Yen
$X$	Vector of bank-level time varying characteristics [Assets, Capital, Deposit base, Liquidity]
$B$	Bank fixed effects
$C$	Country fixed effects
$\varepsilon$	Error term

# Results: Effects of global factors on euro area bank net external assets



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	(1)	(2)	(3)	(4)	(5)	(6)	(7)
<i>Global factors</i>							
Global risk		-0.024** (0.012)				-0.023** (0.010)	-0.031** (0.011)
Δ Global equity			0.257** (0.106)			0.197** (0.076)	0.203** (0.078)
Δ Global interest rate				-0.131** (0.052)		-0.027 (0.028)	-0.008 (0.030)
Δ Major CB balance sheet					-0.311** (0.147)	-0.172 (0.133)	-0.191 (0.135)
<i>Global control variables</i>							
Δ REER	0.241** (0.085)	0.176** (0.076)	0.603** (0.198)	0.053 (0.090)	0.279** (0.094)	0.438** (0.173)	0.537** (0.177)
Global credit demand	-0.047 (0.040)	-0.044 (0.040)	-0.058 (0.042)	-0.011 (0.041)	-0.025 (0.040)	-0.034 (0.041)	-0.074* (0.042)
Interest rate spread	0.019 (0.018)	0.023 (0.018)	0.027 (0.020)	0.132** (0.058)	0.007 (0.014)	0.045* (0.026)	0.023 (0.027)
<i>Bank control variables</i>							
Size	-0.017 (0.011)	-0.017 (0.011)	-0.016 (0.011)	-0.016 (0.011)	-0.016 (0.011)	-0.016 (0.011)	-0.010 (0.011)
Capital	0.124 (0.186)	0.103 (0.192)	0.163 (0.185)	0.147 (0.185)	0.124 (0.187)	0.138 (0.191)	0.053 (0.219)
Deposits	0.059 (0.212)	0.052 (0.213)	0.070 (0.211)	0.062 (0.211)	0.053 (0.211)	0.057 (0.212)	0.002 (0.214)
Liquidity	0.643*** (0.175)	0.641*** (0.174)	0.650*** (0.175)	0.643*** (0.174)	0.643*** (0.173)	0.647*** (0.173)	0.566** (0.178)
Observations	11593	11593	11593	11593	11593	11593	11593
R <sup>2</sup>	0.150	0.150	0.153	0.152	0.154	0.155	0.153
Adj R <sup>2</sup>	0.134	0.135	0.138	0.136	0.138	0.140	0.138
Bank fixed effects	Y	Y	Y	Y	Y	Y	Y
Country fixed effects	Y	Y	Y	Y	Y	Y	Y

# Results: Sensitivity analysis



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	(1)	(2)	(3)	(4)	(5)	(6)	(7)
<i>Global factors</i>							
Global risk	-0.022** (0.009)	-0.005** (0.002)	-0.038** (0.013)		-0.022** (0.010)	-0.010 (0.009)	-0.004 (0.010)
Δ Global equity	0.194** (0.076)	0.187** (0.078)	0.206** (0.083)	0.226** (0.082)	0.242*** (0.070)	0.211** (0.078)	0.113** (0.052)
Δ Global interest rate	-0.029 (0.029)	-0.021 (0.028)	-0.024 (0.028)	-0.060* (0.031)			
Δ Major CB balance sheet	-0.175 (0.133)	-0.175 (0.129)	-0.133 (0.114)	-0.103 (0.126)	-0.179 (0.130)	-0.107 (0.121)	-0.088 (0.126)
Global bank leverage				-0.188*** (0.052)			
Interest rate slope (average)					-0.009 (0.005)		
Interest rate slope euro area						-0.020*** (0.005)	-0.018* (0.009)
Interest rate slope US							-0.007 (0.019)
Interest rate slope UK							0.028 (0.021)
Interest rate slope Japan							-0.035 (0.038)
<i>Global control variables</i>							
Δ REER	0.432** (0.172)	0.446** (0.171)	0.453** (0.171)	0.200 (0.154)	0.525** (0.162)	0.465** (0.161)	0.341** (0.127)
Global credit demand	-0.034 (0.041)	-0.035 (0.041)	-0.039 (0.041)	-0.051 (0.043)	-0.041 (0.041)	-0.054 (0.042)	-0.066 (0.045)
Interest rate spread	0.046* (0.026)	0.042 (0.026)	0.042 (0.026)	0.086** (0.032)	0.026* (0.014)	0.023 (0.015)	0.008 (0.013)
Observations	11593	11593	11593	11593	11593	11593	11593
R <sup>2</sup>	0.155	0.156	0.156	0.157	0.155	0.156	0.157
Adj R <sup>2</sup>	0.140	0.140	0.140	0.142	0.140	0.141	0.142
Bank control variables	Y	Y	Y	Y	Y	Y	Y
Bank fixed effects	Y	Y	Y	Y	Y	Y	Y
Country fixed effects	Y	Y	Y	Y	Y	Y	Y

# Results: Bank category



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	(1) Large	(2) Small	(3) High capital	(4) Less capital	(5) Large deposit base	(6) Small deposit base	(7) Stressed country	(8) Non- stressed country
<i>Global factors</i>								
Global risk	0.001 (0.005)	-0.042** (0.020)	-0.007 (0.007)	-0.039* (0.020)	-0.009 (0.006)	-0.029 (0.018)	-0.014 (0.012)	-0.027* (0.014)
Δ Global equity	-0.011 (0.027)	0.353** (0.141)	0.019 (0.027)	0.455** (0.165)	-0.004 (0.023)	0.443** (0.160)	0.025 (0.039)	0.286** (0.106)
Δ Global interest rate	-0.024 (0.015)	-0.079 (0.052)	-0.020 (0.019)	-0.012 (0.054)	-0.010 (0.008)	-0.036 (0.055)	-0.032 (0.027)	-0.055 (0.036)
Δ Major CB balance sheet	0.026 (0.030)	-0.315 (0.262)	0.073 (0.070)	-0.440 (0.268)	0.046 (0.032)	-0.336 (0.261)	0.192 (0.120)	-0.280 (0.172)
<i>Global control variables</i>								
Δ REER	-0.056 (0.057)	0.730** (0.289)	0.028 (0.090)	0.915** (0.307)	-0.035 (0.028)	0.913** (0.336)	-0.300* (0.155)	0.711** (0.225)
Global credit demand	-0.032 (0.024)	0.065 (0.114)	0.001 (0.029)	-0.027 (0.140)	-0.014 (0.020)	-0.100 (0.091)	-0.004 (0.042)	0.145 (0.190)
Interest rate spread	0.024* (0.014)	0.099* (0.054)	0.001 (0.016)	0.082 (0.058)	-0.004 (0.014)	0.100* (0.054)	0.014 (0.019)	0.075** (0.035)
<i>Bank control variables</i>								
Size	-0.004 (0.003)	-0.008 (0.027)	-0.003 (0.005)	-0.015 (0.017)	-0.003** (0.002)	-0.026 (0.019)	0.001 (0.003)	-0.023 (0.018)
Capital	-0.049 (0.081)	0.283 (0.325)	0.001 (0.145)	-1.810 (2.273)	-0.144 (0.208)	0.386 (0.512)	0.102 (0.083)	0.302 (0.493)
Deposits	0.075 (0.056)	-0.056 (0.385)	-0.095 (0.097)	0.583* (0.339)	0.061** (0.025)	0.432 (0.619)	-0.100 (0.112)	0.104 (0.358)
Liquidity	0.122 (0.093)	0.896*** (0.245)	0.143 (0.087)	1.022*** (0.256)	-0.003 (0.031)	1.051*** (0.210)	-0.041 (0.042)	0.862*** (0.226)
Observations	6027	5566	6429	5164	6074	5519	3165	8428
R <sup>2</sup>	0.539	0.183	0.194	0.252	0.300	0.211	0.153	0.183
Adj R <sup>2</sup>	0.529	0.164	0.175	0.231	0.284	0.192	0.135	0.168
Bank fixed effects	Y	Y	Y	Y	Y	Y	Y	Y
Country fixed effects	Y	Y	Y	Y	Y	Y	Y	Y

# Results: International spill overs of unconventional monetary policy



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	(1)	(2)	(3)	(4)	(5)	(6)
<i>Global factors</i>						
Global risk	-0.039** (0.014)	-0.041** (0.014)	-0.031** (0.013)	-0.007 (0.007)	-0.008 (0.008)	-0.006 (0.007)
Δ Global equity	-0.039** (0.014)	-0.041** (0.014)	-0.031** (0.013)	-0.007 (0.007)	-0.008 (0.008)	-0.006 (0.007)
Δ Global interest rate	-0.059* (0.032)	-0.051* (0.031)	-0.114** (0.049)	-0.117** (0.048)	-0.008 (0.027)	-0.032 (0.039)
Δ Major CB UMP	0.018 (0.023)					
Δ UMP US		0.027 (0.020)				0.029 (0.021)
Δ UMP UK			0.105** (0.041)			0.086 (0.054)
Δ UMP Japan				0.194** (0.071)		-0.020 (0.049)
Δ UMP Euro area					-0.154** (0.065)	-0.179** (0.080)
<i>Global control variables</i>						
Δ REER	0.347** (0.140)	0.270** (0.127)	0.166 (0.142)	0.089 (0.144)	0.254* (0.138)	-0.085 (0.115)
Global credit demand	-0.039 (0.042)	-0.038 (0.042)	-0.047 (0.042)	-0.058 (0.042)	-0.052 (0.042)	-0.060 (0.043)
Interest rate spread	0.083** (0.041)	0.076* (0.039)	0.129** (0.055)	0.149** (0.061)	0.057* (0.033)	0.077** (0.037)
<i>Bank control variables</i>						
Size	-0.016 (0.011)	-0.016 (0.011)	-0.016 (0.011)	-0.015 (0.011)	-0.015 (0.011)	-0.015 (0.011)
Capital	0.146 (0.193)	0.148 (0.193)	0.141 (0.190)	0.086 (0.199)	0.078 (0.203)	0.084 (0.204)
Deposits	0.062 (0.213)	0.063 (0.212)	0.061 (0.211)	0.039 (0.213)	0.034 (0.214)	0.037 (0.214)
Liquidity	0.648*** (0.174)	0.649*** (0.174)	0.649*** (0.174)	0.647*** (0.173)	0.646*** (0.173)	0.648*** (0.173)
Observations	11593	11593	11593	11593	11593	11593
R <sup>2</sup>	0.155	0.155	0.155	0.156	0.157	0.158
Adj R <sup>2</sup>	0.139	0.139	0.140	0.141	0.141	0.142
Bank fixed effects	Y	Y	Y	Y	Y	Y
Country fixed effects	Y	Y	Y	Y	Y	Y

# Results: Spill over to domestic economy?



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	(1)	(2)	(3)	(4)	(5)	(6)	(7)
<i>Global factors</i>							
Global risk	0.009** (0.004)	0.011** (0.004)	0.011** (0.004)	0.009** (0.004)	0.002 (0.003)	0.002 (0.002)	0.000 (0.002)
Δ Global equity	0.030** (0.013)	0.028** (0.014)	0.029** (0.014)	0.020 (0.015)	-0.004 (0.018)	0.000 (0.018)	-0.009 (0.020)
Δ Global interest rate	0.010** (0.003)	0.009** (0.003)	0.009** (0.003)	0.010** (0.003)	0.005 (0.004)	0.003 (0.004)	0.003 (0.004)
Δ Major CB Balance Sheet	0.016 (0.016)						
Δ Major CB UMP		-0.008 (0.005)					
Δ UMP US			-0.005 (0.003)				-0.001 (0.003)
Δ UMP UK				-0.023** (0.009)			-0.003 (0.009)
Δ UMP Japan					-0.055*** (0.016)		-0.034** (0.013)
Δ UMP Euro area						0.039*** (0.012)	0.024** (0.012)
<i>Domestic control variables</i>							
Domestic credit demand	0.001 (0.001)	0.001 (0.002)	0.001 (0.002)	0.001 (0.002)	0.001 (0.002)	0.001 (0.002)	0.001 (0.002)
<i>Bank control variables</i>							
Size	-0.006** (0.002)	-0.006** (0.002)	-0.006** (0.002)	-0.006** (0.002)	-0.006** (0.002)	-0.006** (0.002)	-0.006** (0.002)
Capital	0.087 (0.117)	0.086 (0.117)	0.086 (0.117)	0.091 (0.118)	0.111 (0.120)	0.106 (0.119)	0.114 (0.120)
Deposits	0.059** (0.027)	0.058** (0.027)	0.058** (0.027)	0.060** (0.027)	0.068** (0.027)	0.067** (0.027)	0.070** (0.028)
Liquidity	0.083*** (0.024)	0.083*** (0.024)	0.083*** (0.024)	0.083*** (0.024)	0.084*** (0.024)	0.084*** (0.024)	0.084*** (0.024)
Observations	11593	11593	11593	11593	11593	11593	11593
R <sup>2</sup>	0.362	0.362	0.362	0.363	0.368	0.367	0.369
Adj R <sup>2</sup>	0.350	0.350	0.350	0.351	0.356	0.356	0.358
Bank fixed effects	Y	Y	Y	Y	Y	Y	Y
Country fixed effects	Y	Y	Y	Y	Y	Y	Y



- Greater international expansion by euro area banks during the sovereign debt crisis when domestic credit growth has been contracting.
- Determinants of global liquidity matter for euro area banks' cross-border flows.
- Evidence in support of risk-taking channel of monetary policy.
- The effect of global factors is heterogeneous across euro area banks.
- Evidence of international spill overs of unconventional monetary policy. Euro area UMP influences cross-border bank flows and domestic credit in the euro area but so does that of the other G3 countries.