

**Does Lack of Financial Stability Impair
the Transmission of Monetary Policy?**

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Online Appendix

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has excess reserves it can hold these overnight in the ECB deposit facility. The interest rate is however much lower than the interest rate of the main refinancing operations and provides (in theory) a lower boundary for banks to deposit funds in general.

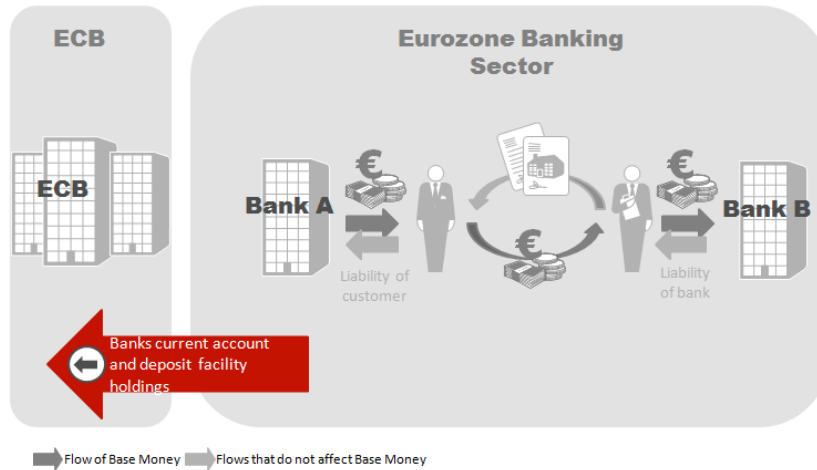
The funds required to meet the reserve requirement are provided by the ECB via the monetary policy instruments on the asset side such as the main refinancing operations (MROs), long-term refinancing operations (LTROs), and the marginal lending facility. In regular market periods, the MRO and LTRO are fixed amounts, previously determined by the ECB, which are allocated to the winning banks after a competitive bidding process. The MRO have a maturity of one week and the LTRO a maturity of three months (additional LTROs have been conducted since the crisis with maturities of up to three years). Furthermore, the ECB provides banks with overnight liquidity via the marginal lending facility at an interest rate much higher than the MRO or the LTRO interest rate. Accordingly, borrowing funds from the ECB via the marginal lending facility is very expensive and provides (in theory) an upper boundary for banks to obtain funds. With these operations the ECB ensures in regular market periods that banks are able to meet their reserve requirements while at the same time ensuring that liquidity is scarce enough to establish the targeted policy interest rate in the money market.

The only unknown for the ECB to establish the targeted policy interest rate are the autonomous factors such as banknotes in circulation, government or national central bank deposits directly held with the ECB, or foreign assets and liabilities (for example with other central banks). The ECB has to forecast the development of these.

The ECB intends to provide that amount of liquidity to banks via the refinancing operations which allows all banks to exactly hold their reserve requirement. Due to the competitive allocation mechanism funds are not optimally allocated to the individual banks immediately after allotment. Remember that borrowing at the marginal lending facility is prohibitively high while depositing at the marginal deposit facility pays only a very low (since June 11, 2014 even a negative) interest rate. Accordingly in regular time periods, the interbank market ensures an adequate allocation of central bank liquidity among banks such that each bank is able to hold its reserve requirement. If this interbank market does not function, banks might on aggregate obtain more funds via the refinancing operations than necessary to individually ensure that they are able to comply with their reserve requirement. Given that the autonomous factors do not change substantially, it should imply that banks deposit funds at the marginal deposit facility. Accordingly, holdings in the marginal deposit facility on average only reflect excess liquidity for banks and are not related to a possible credit crunch in the economy (a very common misperception).

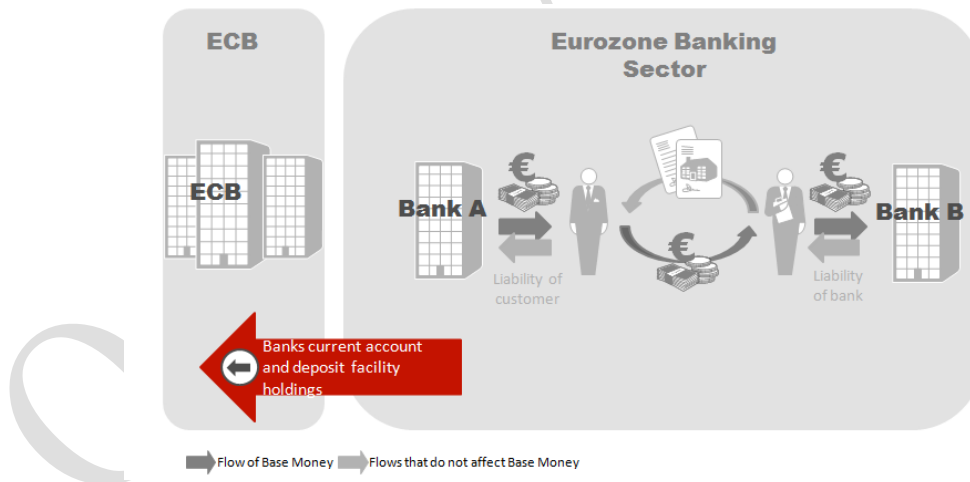
In the following, we provide examples which show that only the ECB has the ability to create Euro liquidity and that funds issued by the ECB will eventually return to an account held with the ECB if they are not held as banknotes.

Example 1: Bank liquidity is provided and deposited at the ECB or another bank



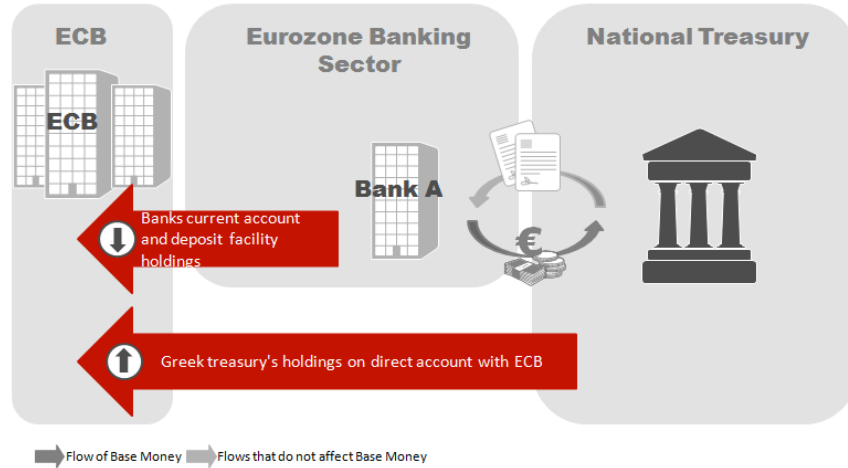
Bank A obtains liquidity via the refinancing operations from the ECB against collateral. It can deposit these funds at its account with the ECB to fulfill its reserve requirements or at the marginal deposit facility. It can also deposit the funds in the account of another bank which then has the same options as bank A. The aggregate holdings on the accounts with the ECB increase by the amount issued by the ECB via the refinancing operations.

Example 2: Bank A grants a loan to a firm which buys real estate



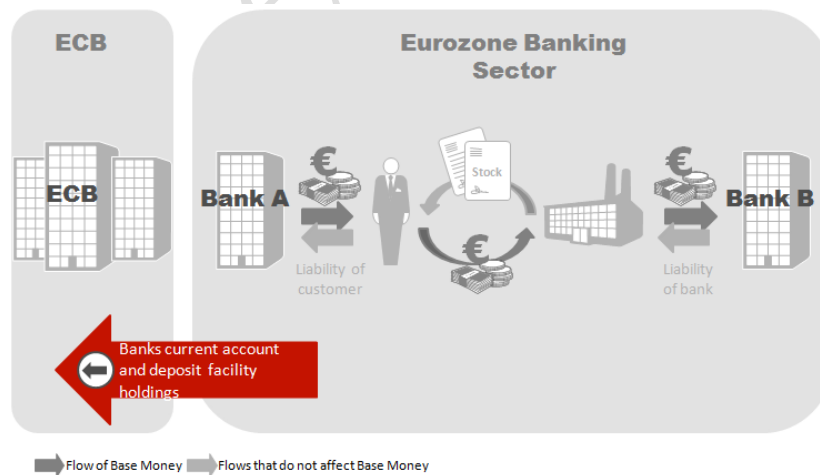
Bank A grants a loan to a firm which buys real estate from another firm which has an account at another bank. This implies that the liquidity holdings of bank A decrease by the amount transmitted to bank B. The liquidity of bank B increases by the exact same amount and accordingly the total liquidity in the banking sector as well as the aggregate holdings with the ECB remain constant. The only possibility to withdraw liquidity from the banking sector is if the money would be kept in cash. This would impact the autonomous factors to be forecasted by the ECB.

Example 3: Bank A buys government bonds in the primary market



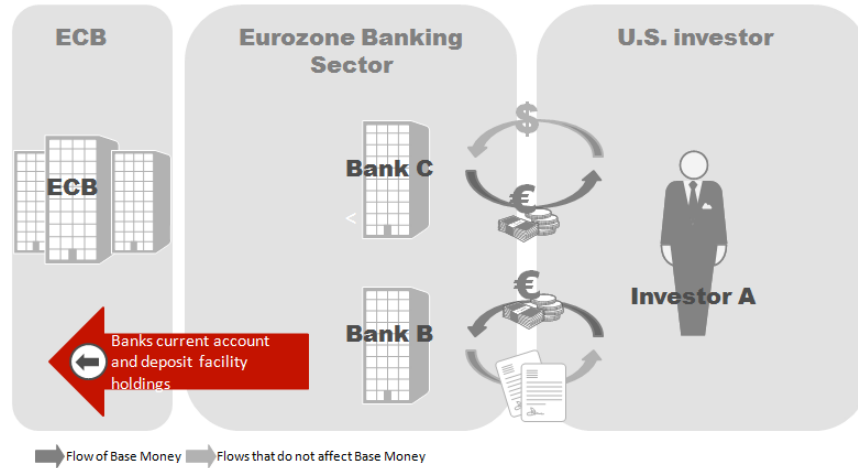
A government issues new debt and receives money from bank A against issuing claims. The government can deposit this money at a bank or buy other assets and transfer the purchase price to another bank. This increases liquidity by the same amount as it is reduced by the money bank A pays for the bonds which the latter might withdraw from its ECB account or from the account at another bank whose ECB account balance reduces. There might be a temporary reduction of liquidity in the banking sector when the government deposits the bond proceeds directly in its account at the ECB (if it has one) which should however not last very long because it is very costly.

Example 4: Investor A buys stocks of Firm B in the primary market



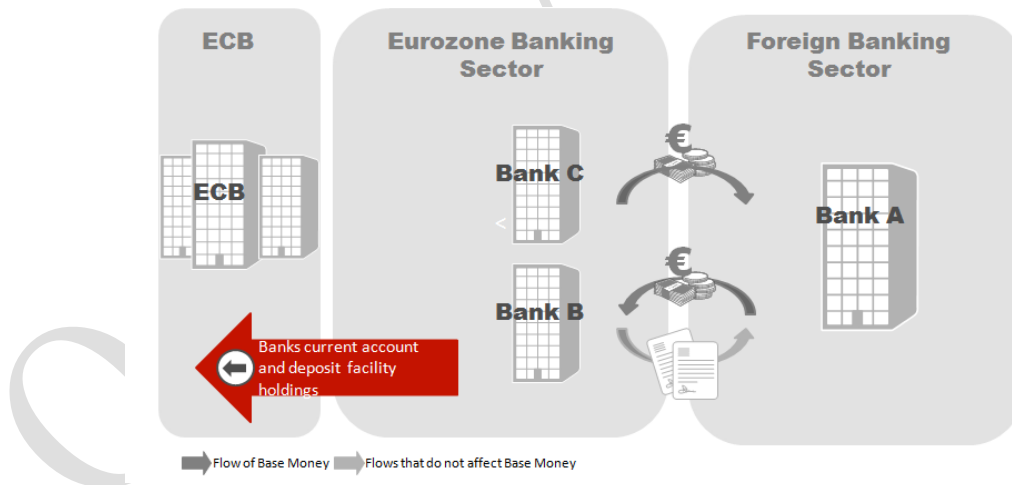
The liquidity holdings of bank A decrease by the amount the customer withdraws funds from her account. At the same time the liquidity holdings of bank B increase by the amount the issuing firm receives and transfers it to its account. The total liquidity in the banking sector as well as the aggregate holdings with the ECB remain constant.

Example 5: US investor A buys stocks of Eurozone bank B in the primary market



US investor A exchanges US\$ into Euros at bank C and buys the stock of bank B. Bank B deposits these funds at the ECB or another bank. Accordingly, the (Euro) funds of bank C decrease by the same amount as they increase for bank B. The total liquidity in the banking sector as well as the aggregate holdings with the ECB remain unchanged.

Example 6: US Bank A buys shares of Eurozone Bank B



If bank A has an account at a bank of the Eurosystem the money is again only transferred to another bank in the Eurosystem and liquidity in the banking sector as well as the aggregate holdings with the ECB do not change. The only possibility to change the amount of aggregate central bank liquidity is if US bank A holds its €-funds in cash. This changes the autonomous factors which are forecasted by the ECB. However, when these funds are transferred back to a bank in the Eurosystem due to for example a purchase of €-assets the liquidity in the banking system increases by the same amount again.

Table 11 long version. Debt Capital Structure and Firm Characteristics: Intensive Margin

The table reports OLS regressions of changes in borrower variables of intensive margin borrowers in the full allotment period on bank risk and control variables. All variables are derived on the firm-level and measured in real terms with 2006 as the base year using the consumer price index (CPI) as published by the OECD. Panels A to C use data from S&P's Capital IQ, Panels D to I use data from Compustat. Asset growth is the ratio of total assets in t divided by the value of total assets in $t-1$, minus 1. Payouts are measured by total dividends, investment is measured by total invested capital, and employment is the number of employees in thousand. The panels show regression results of either $pp.\Delta$ (percentage point differences), or $\log\Delta$ (log differences) or Δ (differences) from year t to $t+1$, t to $t+2$, and t to $t+3$, and $t-3$ to t , $t-2$ to t , and $t-1$ to t with t as the year when the loan is initiated in the full allotment period, on several control variables. High Bank Risk is a dummy variable defined using banks' CDS spreads and explained in detail in Appendix A1. High Bank Risk | only High Bank Risk Prior Full Allotment is defined as a borrower having received loans from only high risk banks prior to the full allotment period, that is from January 2006 until October 7, 2008, and receiving a loan from a high risk bank in the full allotment period. High Bank Risk | High and Low Bank Risk Prior Full Allotment is defined as a borrower having received loans from both low and high risk banks prior to the full allotment period and receiving a loan from a high risk bank in the full allotment period. All models include a borrower's log of total assets, leverage, current ratio, coverage, market to book ratio, and tangibility, and time (year) fixed effects (FE), borrower industry code FE, and borrower rating FE. All variables are defined in Appendix A1. Borrower accounting control variables are used as stated in the annual report in the year prior to the transaction. The statistical significance of results is indicated by * = 10% level, ** = 5% level and *** = 1% level using heteroscedasticity-robust standard errors clustered at the firm-level.

Panel A: Term Loans/ Total Debt	pp. Δ (t-3; t)		pp. Δ (t-2; t)		pp. Δ (t-1; t)		pp. Δ (t; t+1)		pp. Δ (t; t+2)		ppt. Δ (t; t+3)	
	I	II	III	IV	V	VI	VII	VIII	IX	X	XI	XII
High Bank Risk	-2.018		-0.144		-3.951**		-2.531**		-3.705**		0.346	
High Bank Risk only High Bank Risk Prior Full Allotment		3.995		1.493		-8.332		-3.275		-0.069		5.047
High Bank Risk High and Low Bank Risk Prior Full Allotment		-2.206		-0.200		-3.599**		-2.453**		-4.005**		-0.066
Observations	205	205	208	208	225	225	212	212	213	213	211	211
R-squared	0.875	0.878	0.802	0.802	0.695	0.699	0.791	0.791	0.829	0.831	0.839	0.841
Panel B: Revolving Loans/ Total Debt	pp. Δ (t-3; t)		pp. Δ (t-2; t)		pp. Δ (t-1; t)		pp. Δ (t; t+1)		pp. Δ (t; t+2)		ppt. Δ (t; t+3)	
	I	II	III	IV	V	VI	VII	VIII	IX	X	XI	XII
High Bank Risk	1.520		1.250		0.274		1.736		0.885		1.718	
High Bank Risk only High Bank Risk Prior Full Allotment		6.048		0.976		-2.327		-2.612		-5.678		-10.149
High Bank Risk High and Low Bank Risk Prior Full Allotment		1.411		1.268		0.492		2.266**		1.658*		3.116**
Observations	179	179	176	176	186	186	191	191	195	195	195	195
R-squared	0.825	0.833	0.834	0.834	0.762	0.765	0.866	0.874	0.856	0.872	0.791	0.833

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Panel C: Notional Outstanding/ Total Debt	pp.Δ (t-3; t)		pp.Δ (t-2; t)		pp.Δ (t-1; t)		pp.Δ (t; t+1)		pp.Δ (t; t+2)		pp.Δ (t; t+3)	
	I	II	III	IV	V	VI	VII	VIII	IX	X	XI	XII
High Bank Risk	0.245		0.580		0.684		1.654**		1.225*		1.269	
High Bank Risk only High Bank Risk Prior Full Allotment		-0.172		-1.139		1.042		2.492**		1.306		7.336**
High Bank Risk High and Low Bank Risk Prior Full Allotment		0.305		0.829		0.633		1.540*		1.213*		0.439
Observations	256	256	256	256	256	256	250	250	248	248	248	248
R-squared	0.276	0.278	0.533	0.552	0.501	0.503	0.480	0.483	0.428	0.428	0.372	0.417

Panel D: Total Liabilities	logΔ (t-3; t)		logΔ (t-2; t)		logΔ (t-1; t)		logΔ (t; t+1)		logΔ (t; t+2)		logΔ (t; t+3)	
	I	II	III	IV	V	VI	VII	VIII	IX	X	XI	XII
High Bank Risk	0.063		-0.018		0.041		-0.007		0.001		-0.007	
High Bank Risk only High Bank Risk Prior Full Allotment		-0.126		-0.251		-0.112**		-0.016		-0.016		0.023
High Bank Risk High and Low Bank Risk Prior Full Allotment		0.102		0.031		0.073		-0.006		-0.006		-0.011
Observations	270	270	270	270	270	270	267	267	261	267	258	258
R-squared	0.618	0.638	0.637	0.677	0.544	0.579	0.399	0.399	0.515	0.399	0.685	0.686

Panel E: Payouts	logΔ (t-3; t)		logΔ (t-2; t)		logΔ (t-1; t)		logΔ (t; t+1)		logΔ (t; t+2)		logΔ (t; t+3)	
	I	II	III	IV	V	VI	VII	VIII	IX	X	XI	XII
High Bank Risk	-0.124		-0.153		-0.066		-0.370***		-0.206*		-0.334***	
High Bank Risk only High Bank Risk Prior Full Allotment		0.141		0.270		0.141		-0.087		0.251		0.475
High Bank Risk High and Low Bank Risk Prior Full Allotment		-0.151		-0.196		-0.089		-0.401***		-0.241**		-0.370***
Observations	226	226	226	226	231	231	229	229	223	223	219	219
R-squared	0.691	0.701	0.736	0.761	0.747	0.756	0.515	0.530	0.629	0.659	0.651	0.691

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Panel F: Capital Expenditures	logΔ (t-3; t)		logΔ (t-2; t)		logΔ (t-1; t)		logΔ (t; t+1)		logΔ (t; t+2)		logΔ (t; t+3)	
	I	II	III	IV	V	VI	VII	VIII	IX	X	XI	XII
High Bank Risk	-0.009		0.022		0.000		-0.144*		-0.079		-0.066	
High Bank Risk only High Bank Risk Prior Full Allotment		-0.406		-0.283		-0.247*		-0.330		0.041		0.019
High Bank Risk High and Low Bank Risk Prior Full Allotment		0.074		0.085		0.052		-0.112*		-0.099*		-0.079
Observations	270	270	270	270	270	270	267	267	261	261	258	258
R-squared	0.576	0.614	0.453	0.489	0.386	0.420	0.561	0.573	0.575	0.582	0.672	0.674

Panel G: Asset Growth	pp.Δ (t-3; t)		pp.Δ (t-2; t)		pp.Δ (t-1; t)		pp.Δ (t; t+1)		pp.Δ (t; t+2)		pp.Δ (t; t+3)	
	I	II	III	IV	V	VI	VII	VIII	IX	X	XI	XII
High Bank Risk	6.756		-5.282		1.516		-1.317		-0.021		1.448	
High Bank Risk only High Bank Risk Prior Full Allotment		-17.349		-24.706		-8.241		-19.283*		-11.552**		-10.077*
High Bank Risk High and Low Bank Risk Prior Full Allotment		11.761		-1.249		3.542		1.793		1.871		3.286
Observations	270	270	270	270	270	270	267	267	261	261	258	258
R-squared	0.486	0.546	0.541	0.598	0.573	0.585	0.472	0.504	0.609	0.637	0.682	0.702

Panel H: Investment	logΔ (t-3; t)		logΔ (t-2; t)		logΔ (t-1; t)		logΔ (t; t+1)		logΔ (t; t+2)		logΔ (t; t+3)	
	I	II	III	IV	V	VI	VII	VIII	IX	X	XI	XII
High Bank Risk	0.084		0.015		0.010		0.003		-0.004		-0.013	
High Bank Risk only High Bank Risk Prior Full Allotment		-0.037		-0.193		-0.149*		0.006		-0.022		0.024
High Bank Risk High and Low Bank Risk Prior Full Allotment		0.107		0.056		0.044		0.003		-0.001		-0.019
Observations	268	268	267	267	264	264	267	267	261	261	258	258
R-squared	0.420	0.432	0.500	0.556	0.462	0.505	0.381	0.381	0.565	0.565	0.677	0.679

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Panel I: Employment	$\Delta (t-3; t)$		$\Delta (t-2; t)$		$\Delta (t-1; t)$		$\Delta (t; t+1)$		$\Delta (t; t+2)$		$\Delta (t; t+3)$	
	I	II	III	IV	V	VI	VII	VIII	IX	X	XI	XII
High Bank Risk	-2.878		-3.160		-4.545*		-1.019		-2.107		-3.502	
High Bank Risk only High Bank Risk Prior Full Allotment		-0.807		-2.475		-1.318		1.042		3.748		4.013
High Bank Risk High and Low Bank Risk Prior Full Allotment		-3.333		-3.326		-5.278*		-1.408		-2.890		-4.473
Observations	251	251	244	244	252	252	249	249	243	243	240	240
R-squared	0.751	0.752	0.810	0.810	0.719	0.723	0.367	0.373	0.562	0.569	0.571	0.577

Online Appendix