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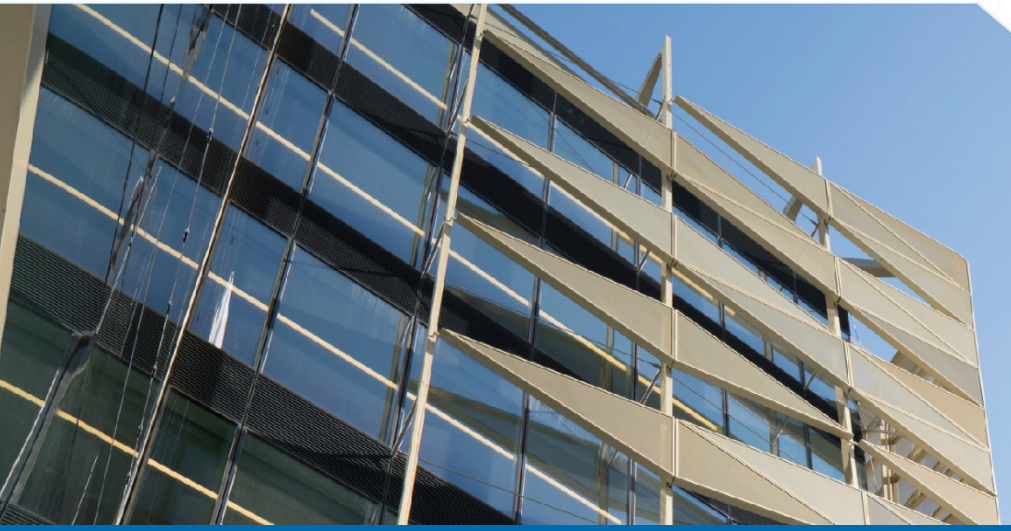

Interbank lending and fragmentation during the financial crisis

Edward Gaffney

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Preface

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Thanks for useful discussions to colleagues in Financial Stability and Financial Operations directorates, Central Bank of Ireland, and the Market Infrastructure Management TARGET2 Analytics team, European Central Bank.

(And to the organisers of this conference over the last 7 years!)

Structure

1. **Introduction to interbank lending**
2. Features of TARGET2 payments
3. Algorithm to identify interbank lending
4. Loan characteristics
5. Overnight borrowing
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Introduction

Today, I present my research into interbank unsecured money market lending and borrowing by Irish banks between 2008 and mid-2017.

The research informing this presentation aims to identify interbank lending activity by Irish banks, and the prices they paid for short-term funds.

In particular, I focus on **loss of market access** in 2010, prior to the EC-ECB-IMF Financial Measures Programme.
(Official support to the Irish sovereign, which had purchased Irish pillar banks.)
I also focus on how **lending relationships** appeared to behave.

I identify loans using records of interbank payments from TARGET2, provided to my division for financial stability purposes.

Motivation

Usually, here, I motivate why thinking about payments systems is useful for economists and financial stability experts.

Bank of Finland 16th Payment and Settlement System Simulation Seminar:

Maybe I should motivate why economics is useful for payment and settlement experts!

Interbank lending and bank liquidity

Financial crises tend to involve demand for liquidity among risk-averse credit institutions, which exacerbate funding problems for financial intermediaries, potentially leading to problems in the real economy (Diamond and Dybvig, 1983).

The global financial crisis altered market-based interbank liquidity distribution and gravely impaired particular banks' business models. Non-conventional policy: ***market-based liquidity*** never really recovered.

Monetary authorities changed policies to alleviate liquidity shortages among otherwise solvent banks. Ten years later, central banks in the developed world continued to provide substantial liquidity directly to banks, in part to remedy continued failures and inefficiencies in market-based liquidity distribution.

Problem in the euro area: bank credit risk determined access to liquidity. (Gilchrist and Mojon, 2017)

Interbank lending and bank liquidity

Irish banks used interbank lending in the money markets as a source of liquidity ("wholesale funding") to complement customers' deposits ("retail funding") in meeting their reserve requirements.

At the beginning of the global financial crisis, the Irish domestic banking sector was a net borrower of wholesale funding from the rest of the world.

The Irish banking sector used euro money markets to access liquidity and thereby fulfil short-term obligations to their customers.

Problem: losing access to wholesale funding caused many banks around the world to fail (Shin, 2009).

(This story has changed a little since 2008. Wholesale funding is now much more collateralised.)

Interbank lending and bank liquidity

Irish banks suffered a two-step freeze-out from money markets prior to the Financial Measures Programme in late 2010.

First, **foreign lenders charged a large premium** above the average rate paid by the typical European bank for funds, and far above the rate the Eurosystem paid for deposits.

Then there was a **sudden stop of lending**, which had to be replaced by the Eurosystem.

This research provides detailed research and evidence for the first step:

the **large premium** on borrowing in late 2010.

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TARGET2

TARGET2 is the real-time gross settlement (RTGS) system owned and operated by the Eurosystem to settle large-value euro payments:

monetary policy operations, interbank and customer payments, other payments relating to financial market infrastructures handling the euro, such as securities settlement systems and central counterparties.

I analyse interbank payments sent between the **main domestic credit institutions** that were covered by the Irish government bank guarantee and other private credit institutions following the accession of Ireland to TARGET2 on 18 February 2008.

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Algorithm

We can match pairs of payments in TARGET2 that resemble loans with maturities of between one and 90 days.

Relevant papers:

Furfine (1999): We can match pairs of payments in TARGET2 that resemble US interbank loans in Fedwire.

Armantier and Copeland (2012): This algorithm produces too many pairs of unrelated Fedwire payments that mislead us about actual loans.

Frutos et al. (2016), Arciero et al. (2016): In the euro area, we can use TARGET2 fields to get a good match rate to securities trade data in Spain and Italy.

	Payment 1 (Principal)	Payment 2 (Repayment)
Day	t	$t + maturity$, where $maturity \in [1, 90]$
Sender	Bank A	Bank B
Receiver	Bank B	Bank A
Amount	P, where $P > €500{,}000$ *and* P is an integer multiple of €10,000	$P + i$, where i is a plausible interest amount

Algorithm: plausibility guidelines

Inspired by Frutos et al. (2016) and Arciero et al. (2016).

Principal should be a rounded figure: an integer multiple of €10,000.

When we compute the interest rate using the standard simple interest convention, it should be a rounded number of basis points.

Interest rates should be reasonably close to the Eurosystem deposit facility rate. For Ireland, 2%.

Use TARGET2 payment message fields to identify the true originator or beneficiary (correspondent banking).

	Payment 1 (Principal)	Payment 2 (Repayment)
Day	20 July	21 July
Sender	Bank A	Bank B
Receiver	Bank B	Bank A
Amount	€100,000,000	€100,001,388.89 (0.5 per cent interest rate, paid for 1 / 360 days of the year)

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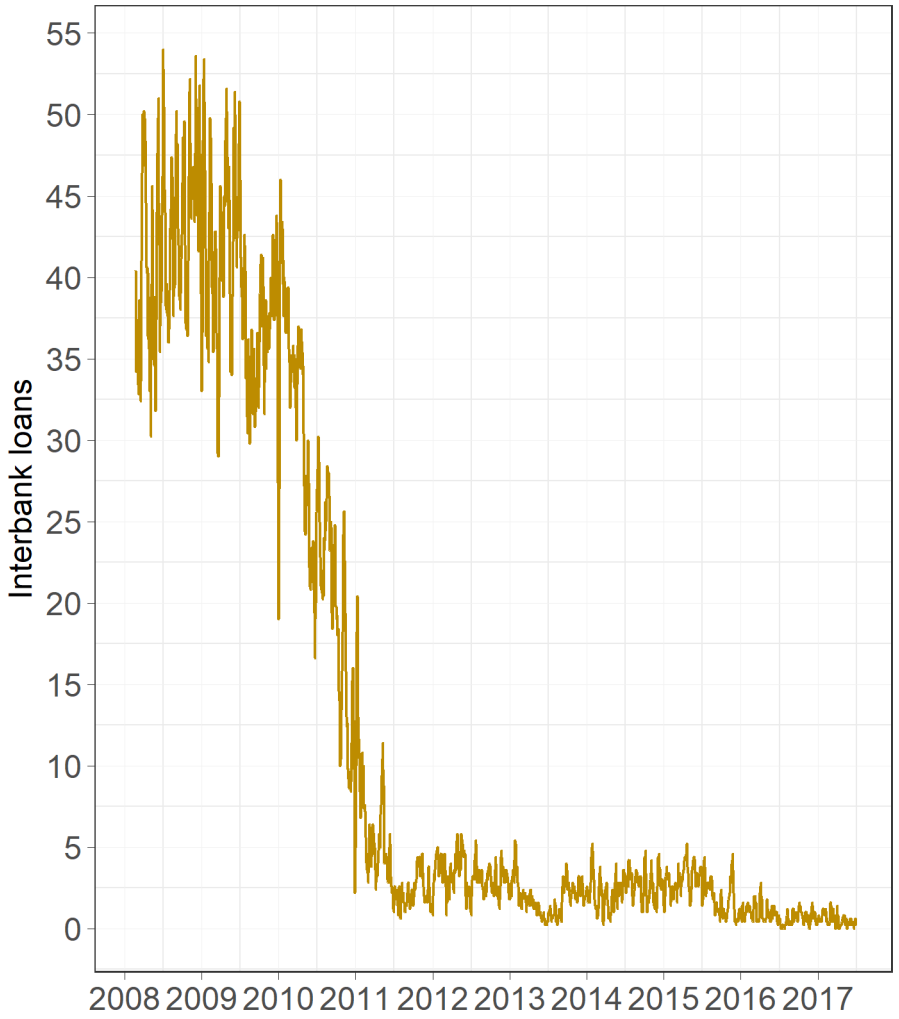
Loan database

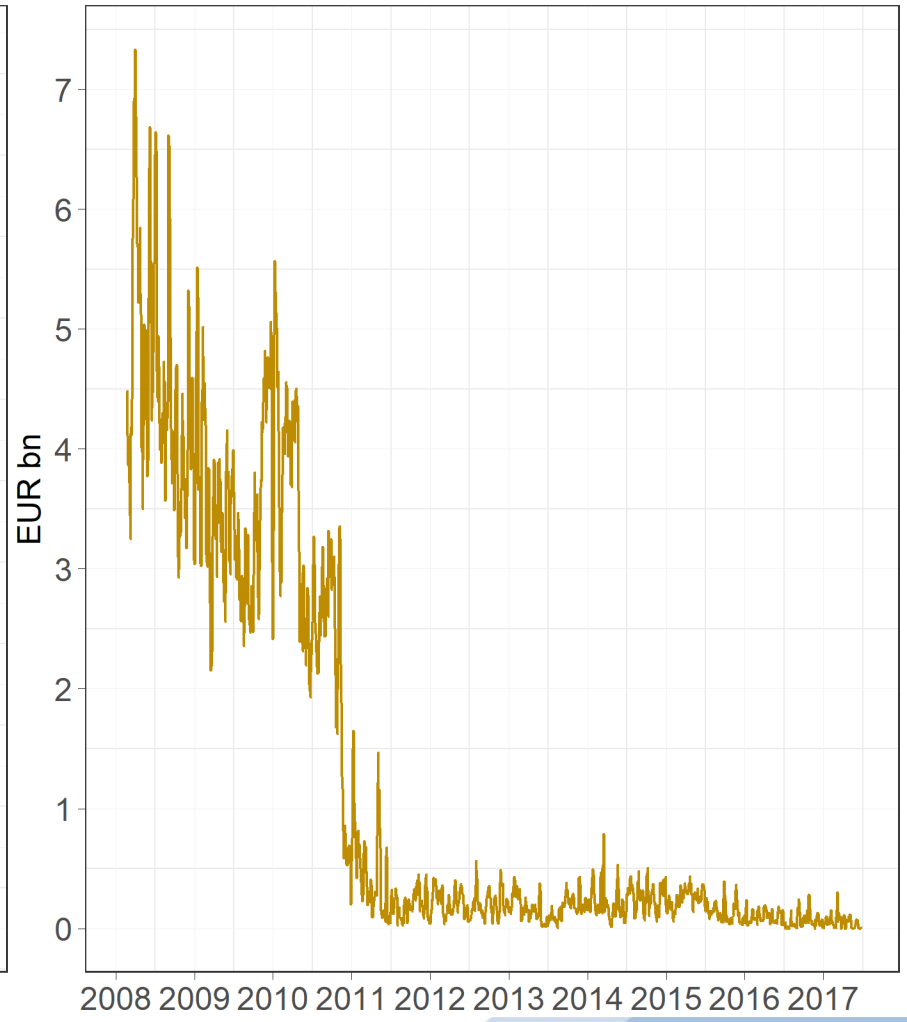
29,574 implied interbank loans.

2,398 working days, of which 2,042 have some loan activity.

91% by count and 93% of value is in 2008-11.
(Just 41% of working days!)

(Charts of loan numbers and value show **five-day moving averages**.)





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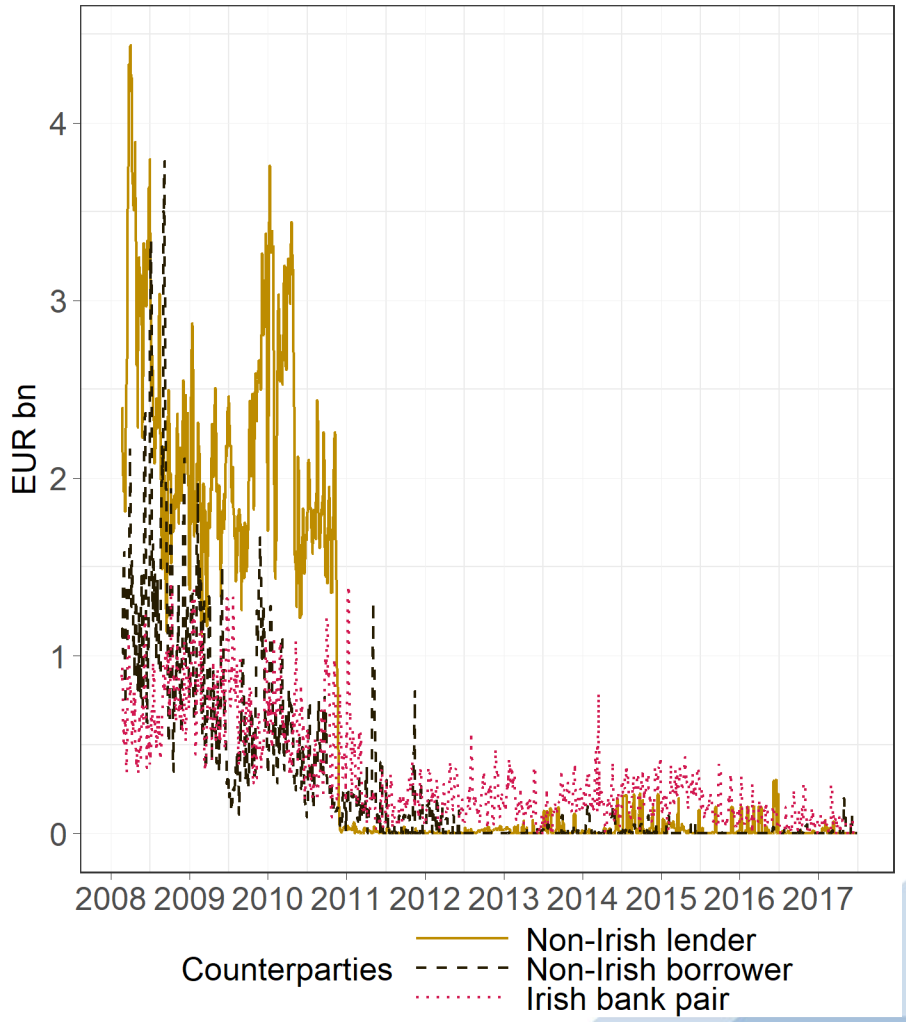
Interbank loan relationships

Most loans involved Irish borrowers and foreign lenders, i.e. inflow of liquidity.

Foreign lenders accounted for c. 60 per cent of lending value before 2011, but only c. 6 per cent since 2011.

After 2011, Irish borrowing from Irish lenders was predominant.



Interbank loan maturities

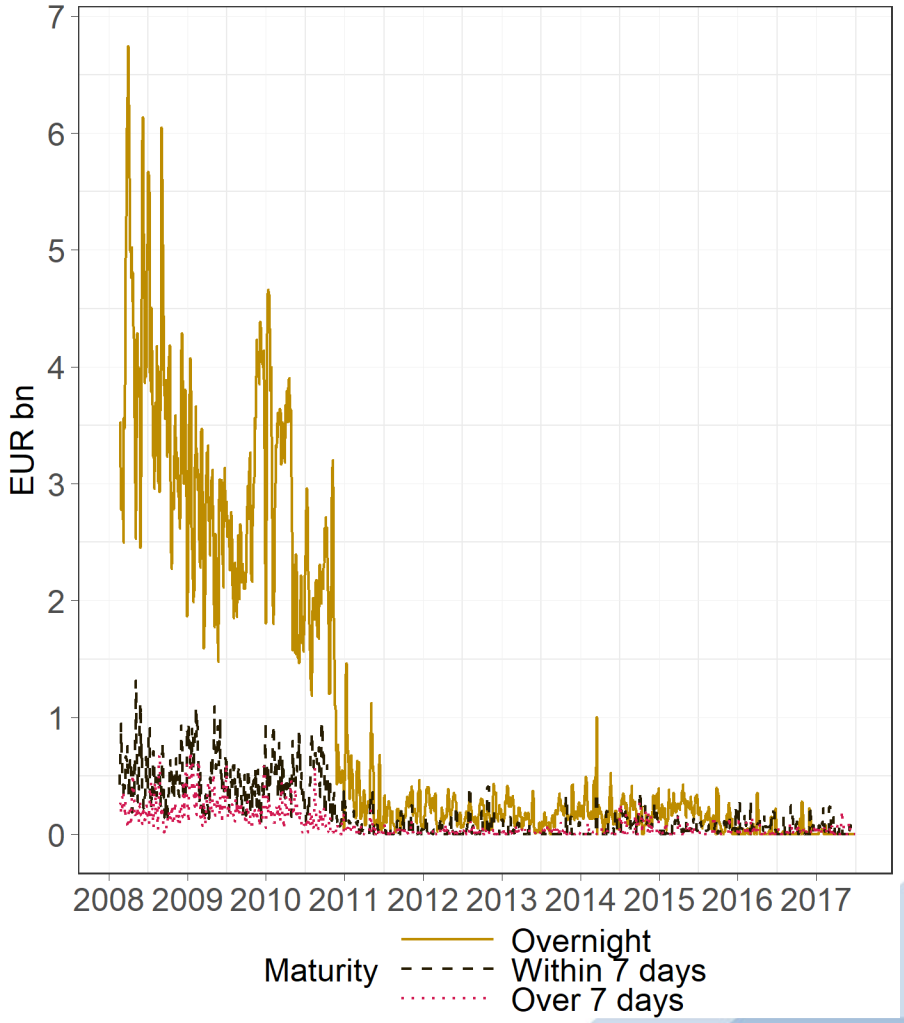
Most lending was at the overnight maturity.

76 per cent of loans and 86 per cent of lending value in the database are repaid on the next trading day.

Almost all the remainder was at one-week maturity or less.

14 per cent of loans and 10 per cent of value.

This is good, because the algorithm is most reliable at shortest maturities.



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Overnight borrowing by Irish banks from foreign banks

Overnight borrowing reflects short-term liquidity demand and access.

Volumes fell sharply between mid-2010 and mid-2011. Access suffered a sudden stop between September and November 2010.

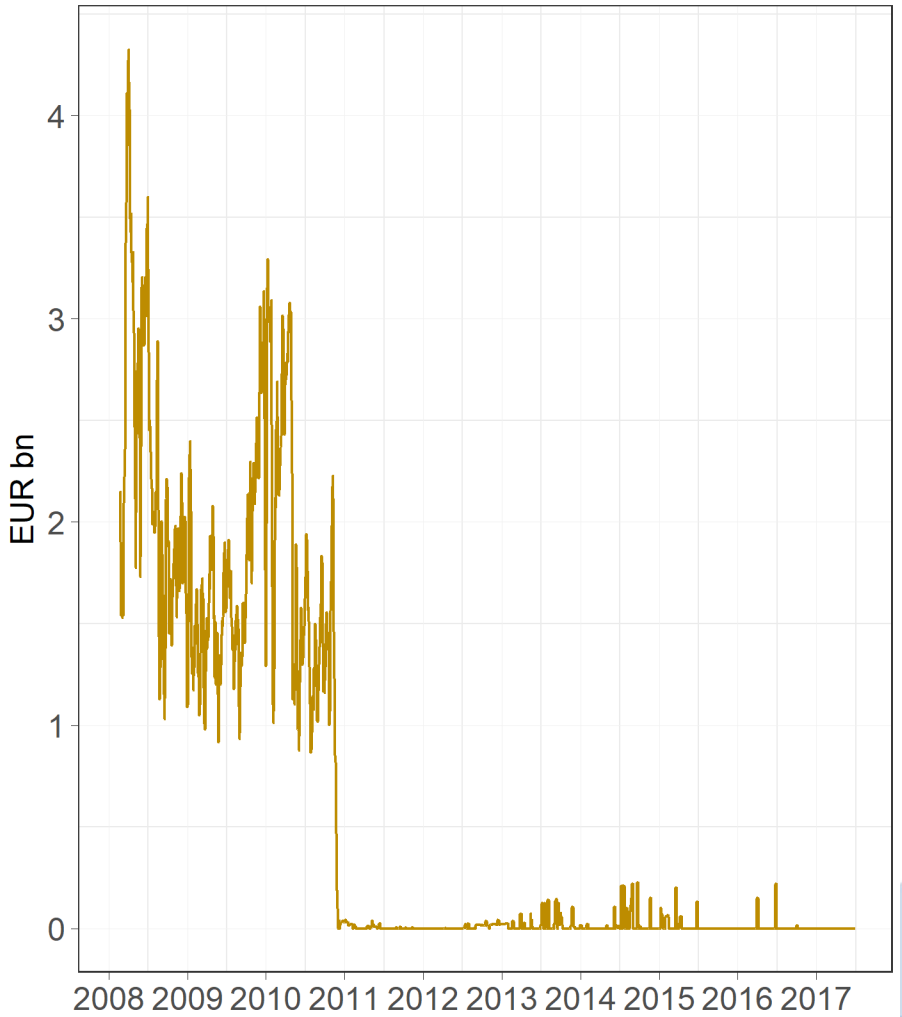
This reflects a **financial fragmentation** aspect to the loss of private-sector liquidity, as it does not reflect general euro area liquidity conditions.

The general European shock to interbank money markets was in 2008

Lehman Brothers etc.

Later, euro area-wide volumes fell for other reasons.

Furthermore, Dunne et al. (2014) report similar impact on Irish borrowers seeking secured repo funding.



Overnight borrowing by Irish banks from foreign banks

The sudden stop story is interesting.

We now use the loan-by-loan detail to consider overnight foreign borrowing by Irish banks in greater detail.

We must introduce a discussion of **interest rates** to complement the foregoing analysis of volumes.

Question: Did risk perceptions become evident in price first, before the fall in quantity?

If so, interbank lending rates could be used as an indicator of risk.

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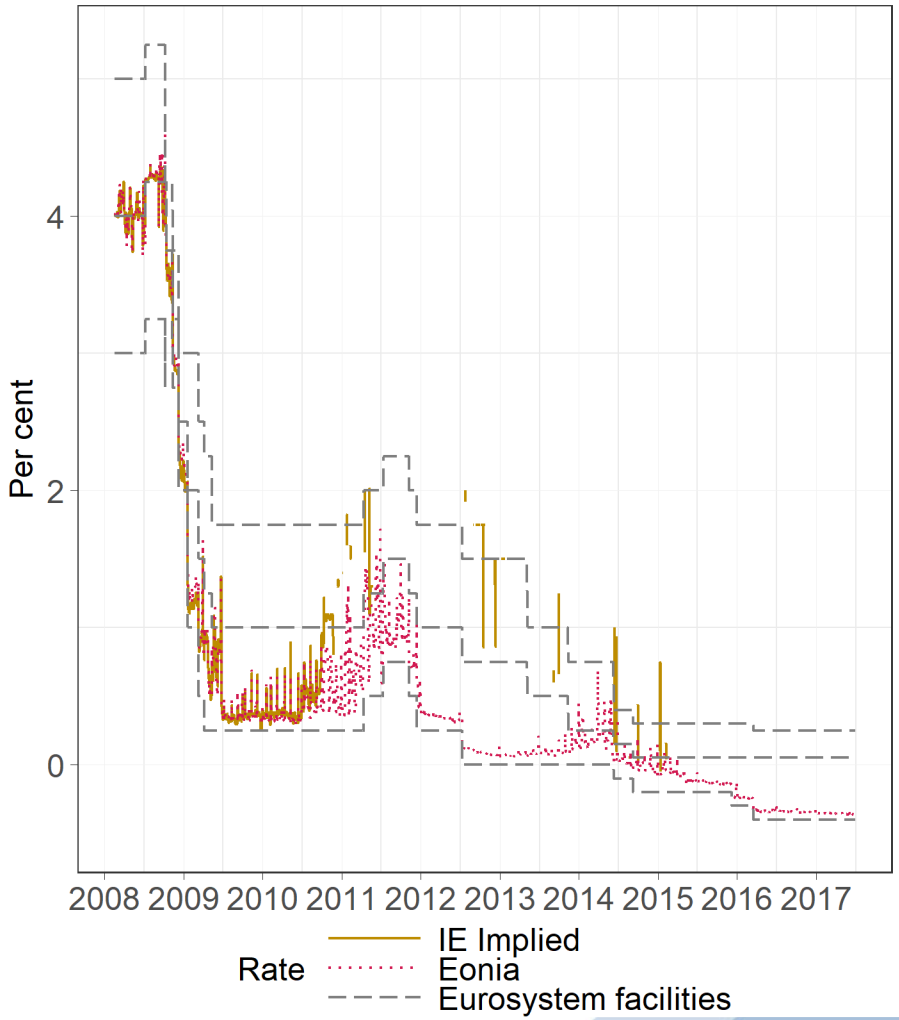
Rates on overnight borrowing by Irish banks from foreign banks

Here, we compare Irish overnight rates to the Eonia euro area benchmark.

Since 2008, Eonia has typically fallen between the Eurosystem rate on overnight deposits and the rate charged for main refinancing operations (MRO), due to unconventional monetary policy, excess liquidity, etc.

Irish average rates began to go above MRO in 2010. This happened only in quite stressed situations elsewhere in the euro area.

(Of course, later in the time period, we don't have enough data.)



Spreads on overnight borrowing by Irish banks from foreign banks

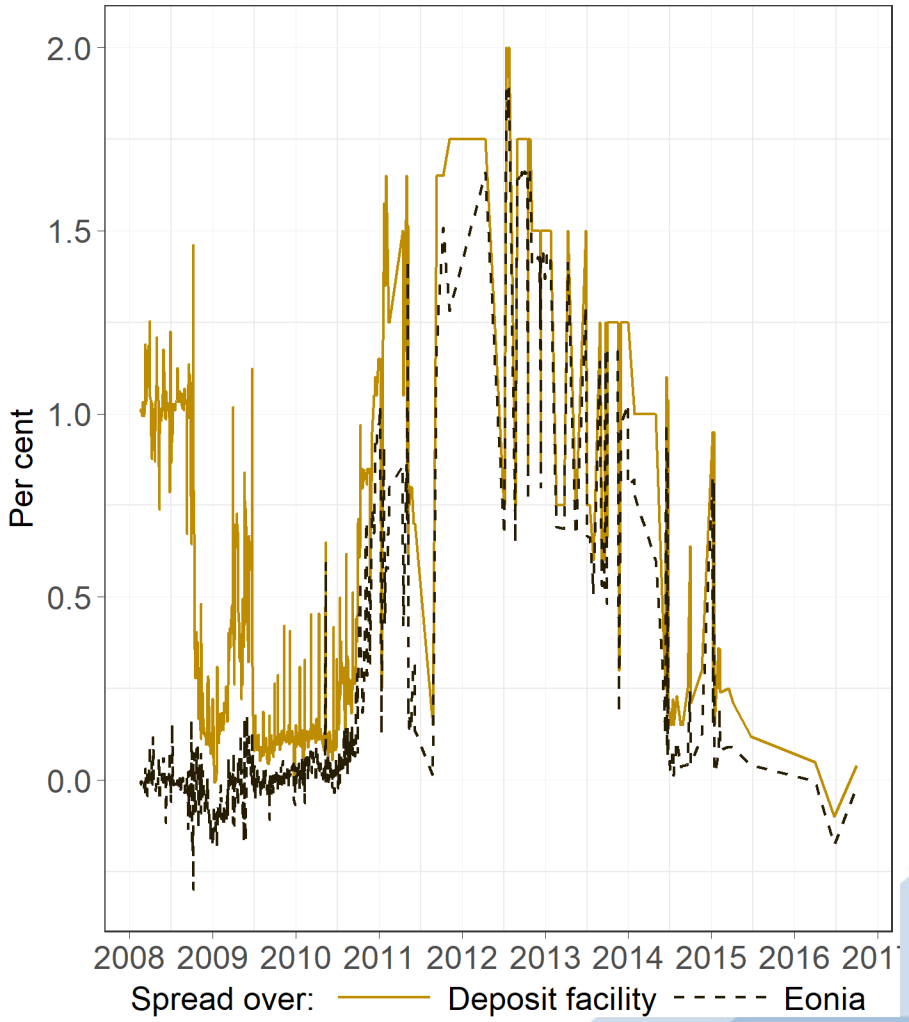
Irish banks paid interest rates close to Eonia between 2008 and mid-2010.

From September 2010, the spread becomes larger, up to 1 percentage point, even on days with high loan volumes.

But the funding doesn't get cut off until November.

This chart reflects risk perceived in the Irish banking sector by other banks.

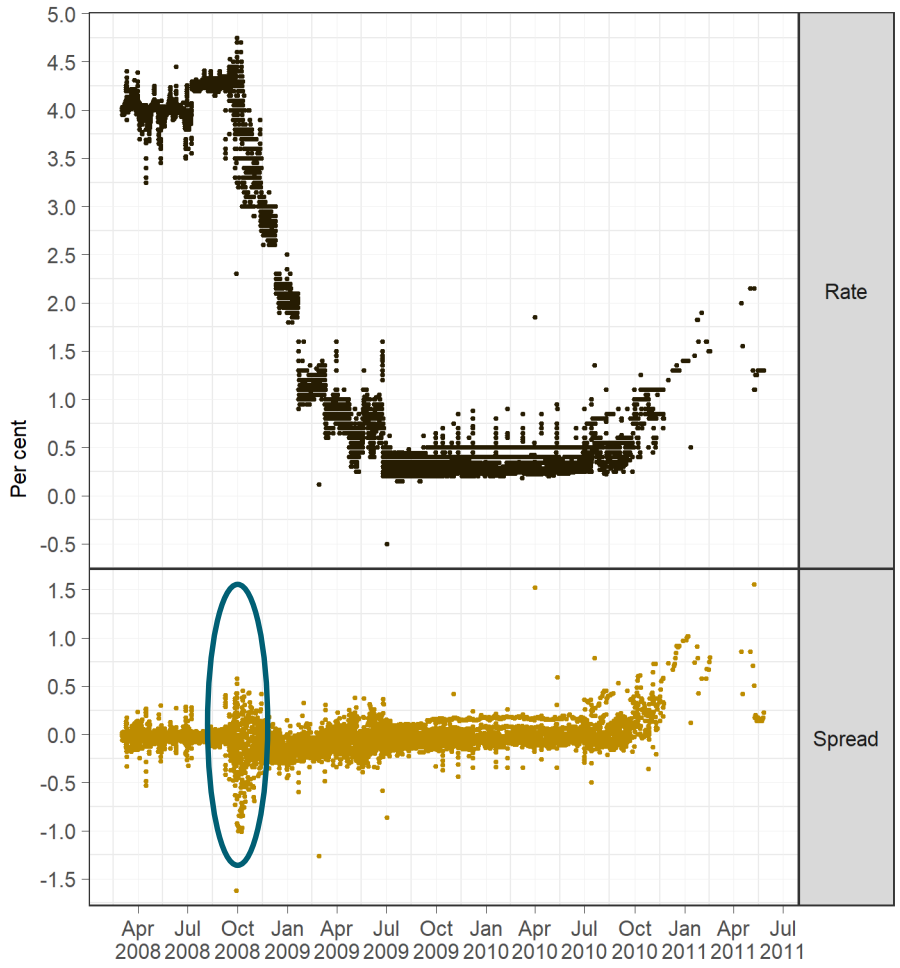
After 2011, there is significant official funding for the banking sector, and spreads become quite unrepresentative of funding costs.



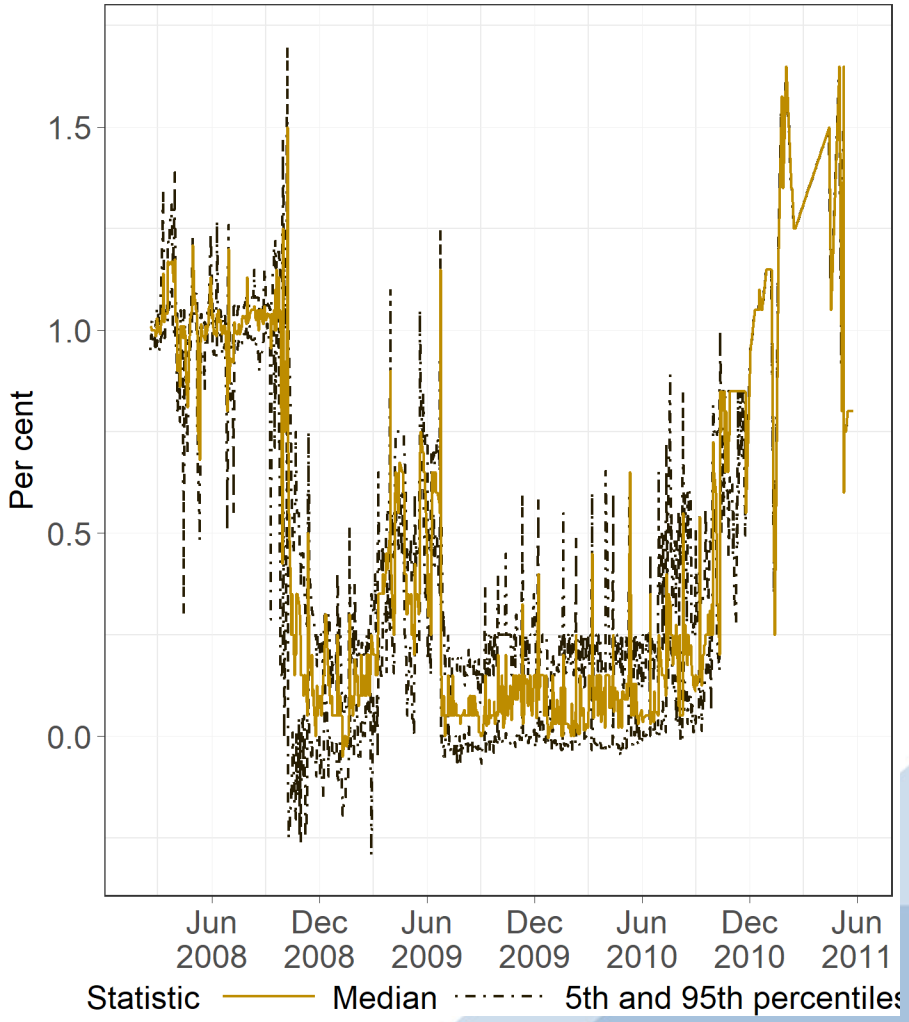
Spreads on overnight borrowing by Irish banks from foreign banks

Distributions of rates and spreads to 2011…

Over Eonia…



Over DF rate…



Lehman

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A little about lending relationships

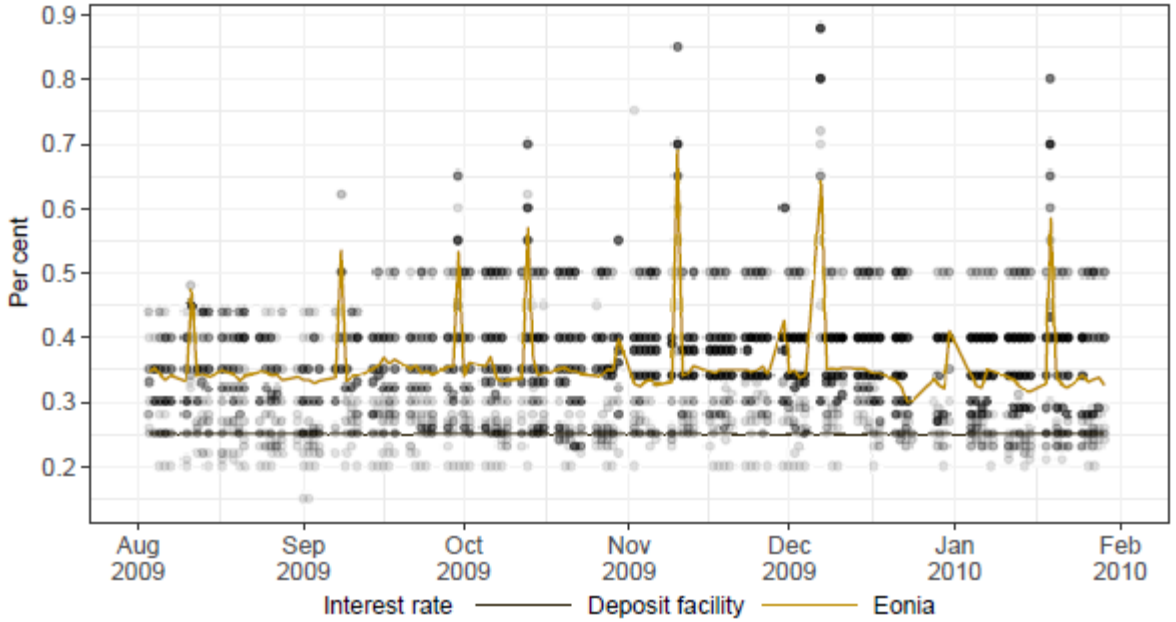
Interest rates embody economic actions, but how do borrower and lenders behave in this market?

Liquidity conditions were stable during Aug 2009 – Feb 2010.

It's clear that certain "modal", rounded interest rates were extremely popular, and didn't seem to get updated frequently.

About 61% of loans have a matching loan with the same rate, borrower and lender within 3 working days.

What happens when these relationships break down?



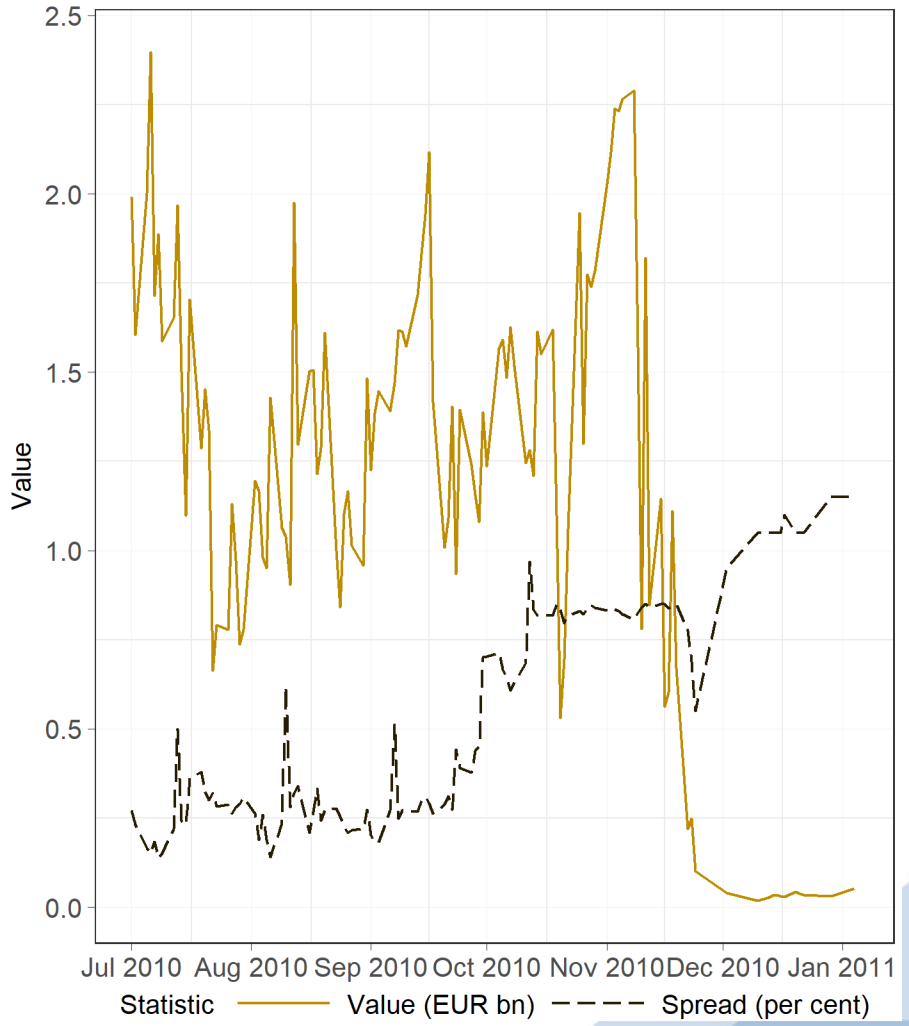
Event study of late 2010

- Did risk perceptions first become evident in high price or low quantity?
- Furthermore, does price effectively indicate changes in risk?

Spreads begin to rise in September 2010, ending the month around the 95th percentile of preceding years.

High rates persist in October and early November – access continues.

Borrowing falls in mid-November, before the announcement of the Financial Measures Programme.



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Conclusion

Money markets were an important contributor to Irish bank funding prior to 2010.

Banks lost market access at the end of 2010, as is well known in Ireland.

As interbank fell as a source of overnight liquidity for Irish banks, other funding sources served as substitutes, such as emergency liquidity assistance and customer deposits.

We now have evidence of a price effect before the fall in quantities, as counterparty relationships broke down.

Irish banks didn't return to the market even as their funding model moved away from official support in the mid-2010s.

(There's a general euro area trend this way, of course.)

No matter the source of market funding in the future, implied interest rates would indicate perceptions of the risk profile at Irish banks as seen by their lenders or depositors, perhaps more promptly than quantities.

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