

How to measure the unsecured money market? The Eurosystem's implementation and validation using TARGET2

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Simulator seminar

Helsinki Finland

29-30 August 2013

Outline

Introduction

Research question

TARGET2

Basic principle

Algorithm implementation and validation

Results

Conclusions

Why identify money market transactions?

- Monetary policy: focus on well functioning interbank markets (current crisis).
- No complete data set available and have to rely on banks to provide data (LIBOR scandal).
- Monitoring: money market transactions as early warning indicators (for liquidity stress).

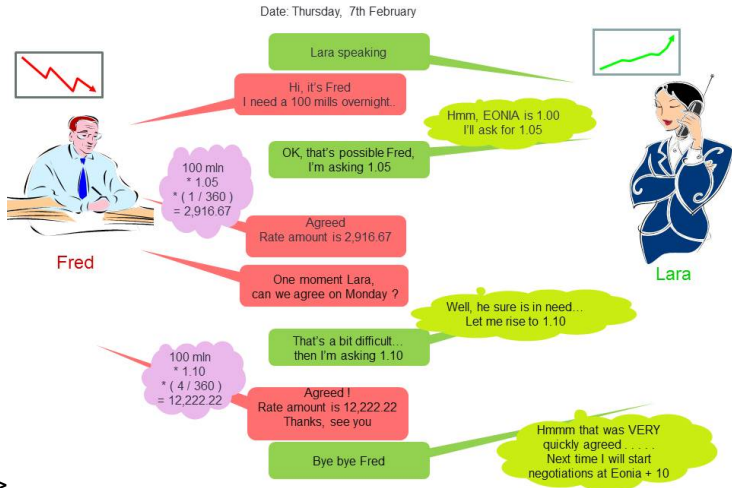


Research question

- How can unsecured interbank loans be identified from TARGET2 payment transaction?
- This paper aims at defining an identification algorithm suitable for the whole euro area, for maturities up to 1 year.

- European Real Time Gross Settlement (RTGS) System.
 - ▶ Each payment is settled immediately (Real Time) and individually (Gross).
- participants (numbers of 2011):
 - ▶ Direct participants: 1100 (mainly commercial banks).
 - ▶ Indirect participants: 3378 (only commercial banks).
- Settles euro transaction with a large average value.
 - ▶ Daily turnover \pm EUR 2,300 billion.
 - ▶ Daily number of transactions \pm 350,000.
 - ▶ Average transaction value: EUR 6.6 million.

Example



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Resulting Money Market payments (the only visible part)

- Thursday: Lara to Fred **100,000,000.00**
- Monday: Fred to Lara **100,012,222.22**
- From these two transactions, rate and maturity have to be calculated.
- Rates lie around EONIA (Euro Overnight Index Average).

Core of the algorithm

Matching of . . .

Payment on day **t**
from participant **A** to **B**
amount **X**
(rounded number)

Payment on day **t + 1**
from participant **B** to **A**
amount **X**
(plus a plausible interest rate)

- Furfine (1999) was the first to develop an algorithm.
 - ▶ US overnight market.
 - ▶ Corridor 50 bp above and below the federal funds rate.
 - ▶ Minimum loan size USD 1 million and increment 100,000.
- Heijmans et al. (2010) (DNB Working Paper 276)
 - ▶ Dutch market (in euro).
 - ▶ Corridor 50 bp above and below EONIA/EURIBOR. Temporarily increased lower bound to 100 bp.
 - ▶ Minimum loan size EUR 100,000 and increment 100,000.
 - ▶ Minimum interest rate: 5 bp.
 - ▶ Maturities up to 3 months.

- Demiralp et al. (2006): US market.
- Hendry and Kamhi (2007): Canadian market.
- Guggenheim et al. (2010): Swiss market.
- Akram and Christophersen (2010): Norwegian market.
- Whetherilt et al. (2010): British market.

General criticism

- Is the algorithm correct?
- No check with real life data (due to availability).
- Currency regions might need a different implementation.
- Also within euro area, the optimal algorithm for each country may differ.

Matching is never 100 % perfect

- Type 1 error (false positive).
 - ▶ I Payment transaction wrongly classified as interbank loan.
- Type 2 error (false negative).
 - ▶ I True interbank loan wrongly rejected.
- Type 3 error (wrong assignment maturity).
 - ▶ I Wrongly assigned to a duration.

Validation algorithm US market

- Armantier and Copeland (2012).
- Simultaneously worked on validation of the “Furfine” algorithm. (not coordinated).
- They find 81% Type 1 error and 23% Type 2 errors.
- Partly due to some participants in their system which create this ‘noise’.
- Partly due to being too radical about their Type 1 errors.
 - ▶ e.g. 3 same loan values of 1 million with one refund option.
 - ▶ You do not know which of the three to take, but they are the same and lead to the exact same conclusions.

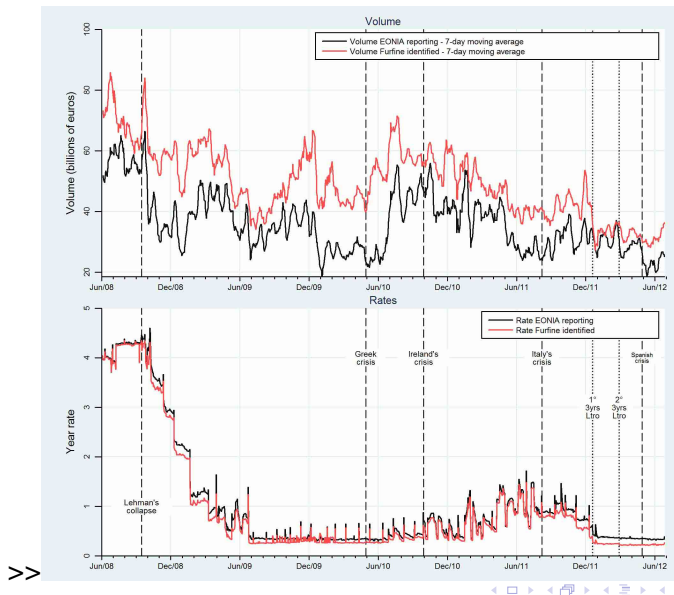
Tested algorithms (5 versions)

- The minimum loan value: 1 million euros.
- Loan values are rounded to: 10 thd , 1 mio, 10 mio , 100 mio , 1,000 mio euros (increment).
- Two types of corridors:
 - ECB (marg.lending and deposit rate) +/- 0-25 bps
 - EONIA/EURIBOR +/- 25-50-100 bps.
- Interest rates must be multiples of half a basis point, i.e. the third decimal digit is either 0 or 5.
- Multiple matches: the most plausible duration is chosen on the basis of the maturity frequencies for unique matches.
- Distinguish between intra-group and extra-group loans based on the SWIFT BIC directory information.

Data sources

- TARGET2:
 - ▶ June 2008 to October 2012.
- e-MID:
 - ▶ Privately owned (Italian) electronic money market system for interbank loans.
- EONIA: (Euro OverNight Index Average).
 - ▶ Daily quotes of all panel banks (\pm 44 large banks active in euro area).
 - ▶ Quotes contain total lending value and weighted average interest rates.

EONIA panel data



EONIA panel data

- Interest rates found by algorithm matches very well with EONIA.
- The volume reported to EONIA is roughly 33% less than identified by our algorithm. (Will decrease soon due to newly available information.)
- Identified volume can be **larger** than EONIA because:
 - ▶ Overidentification.
 - ▶ Tomorrow next and spot next (not in EONIA).
 - ▶ Rollovers.
 - ▶ Intra group transactions (not reported to EONIA, but not always possible to distinguish them).
 - ▶ Transactions concluded on behalf of a client.
- Identified volume can be **lower** than EONIA because:
 - ▶ Loans settled through other euro large value payment system (EURO1).

e-MID data

	Total automatically settled e-MID trades (A)	Matched transactions (B)	Validation rate (C=B/A)	Total false negative rate (F=D+E)	A component of total false negatives: Wrong matched (G= γ F)
ECB0	222,568	211,613	95.1%	4.92%	0.47%
ECB25	222,568	220,513	99.1%	0.92%	0.26%
EONIA25	222,568	194,464	87.4%	12.63%	1.08%
EONIA50	222,568	212,436	95.4%	4.55%	1.08%
EONIA100	222,568	218,201	98%	1.96%	0.73%

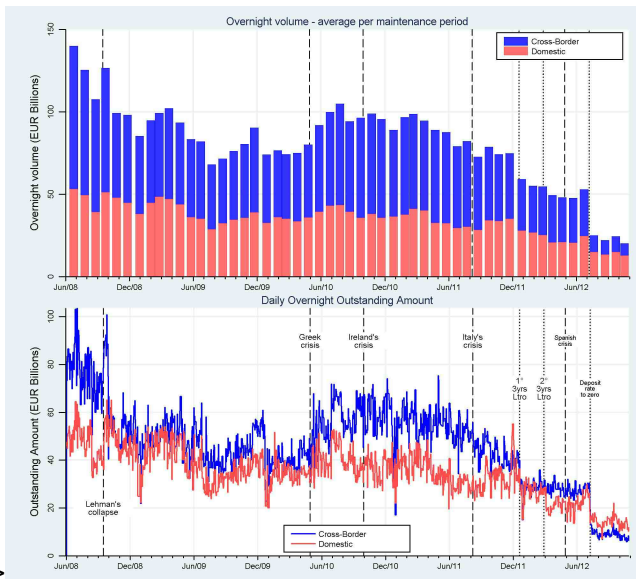
Result validation

- Type 1 error(upper limit) $\sim 33\%$ (will decrease soon, due to additional available information).
- Type 2 error $\sim 2\%$.
- Type 3 error $\sim 1\%$.

How to use outcome of algorithm?

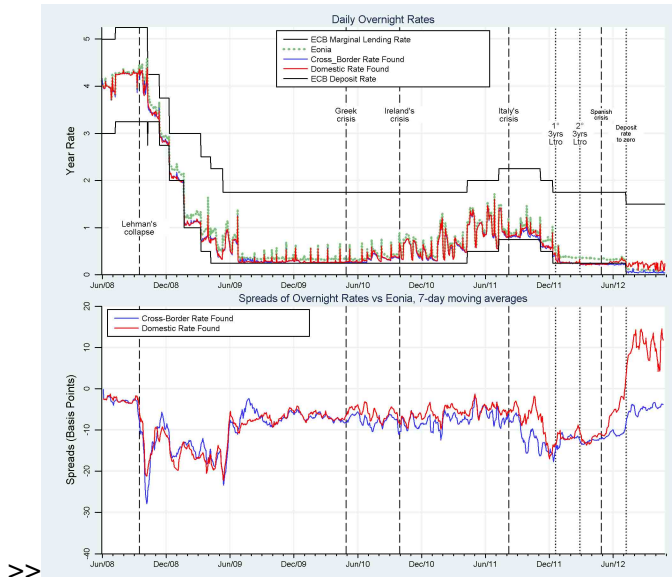
- Euro area level:
 - ▶ EONIA is made up of a small group of (large) banks.
 - ▶ Possibility to check whether banks are honest about their quotes (LIBOR scandal).
 - ▶ In contrast to EONIA spreads in rates and amount of loans.
 - ▶ Similar to EONIA, EURIBOR can be defined based on real market activity.
- Regional level: GIIPS vs non-GIIPS.
- Country level: effect of monetary policy on each individual country.
- Individual bank level.

Euro area level:

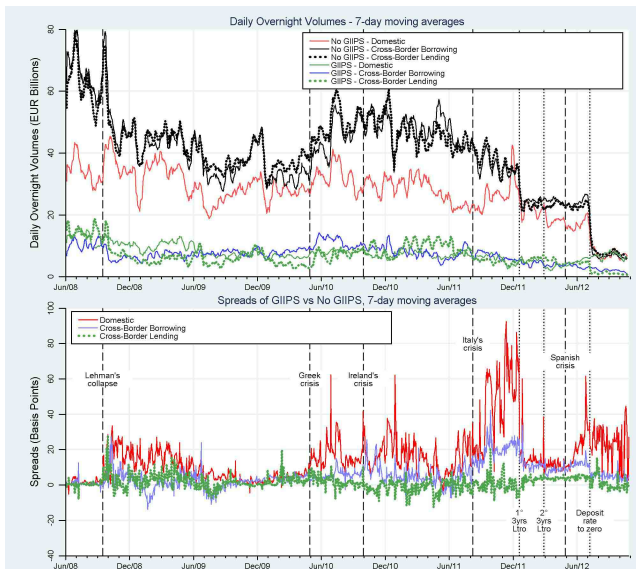


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Euro area level:



Regional level:



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Conclusions

- Best performing version is EONIA/EURIBOR +/- 100 bps.
- Algorithm performs well up until 3 months.
- Also performance 6 and 12 months is quite good.
- A data base of unsecured loans is available within ESCB.
- Data base offers great analysis opportunities at different levels.