The evolving landscape of payment systems

October 14 – 15, 2014 Mexico City

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

Luca Arciero
Banca d'Italia

Joint work with Cristina Picillo, Francesco Vacirca (Banca d'Italia), Ronald Heijmans and Richard Heuver (De Nederlandsche Bank) and Marco Massarenti (ECB)

Disclaimer

The views expressed in this presentation and in the related papers are those of the authors and do not necessarily reflect the views of the European Central Bank, Banca d'Italia or De Nederlandsche Bank. Any errors and omissions are the sole responsibility of the authors.

Overview

Overview

Money market and payment system 1/4

Why do payment system people care for money market?

Borrowing from other banks through the **money market** is one of the possible funding sources in a **RTGS** system, the others being:

- balances maintained on accounts with the central bank;
- daylight credit from the central bank;
- incoming payments.

Money market trades "… *can only serve to redistribute funds already within the system, although that may nevertheless make an important contribution to reducing the reliance on banks' reserve balances and central bank credit extensions…" (BIS, RTGS Report, 1997)*

Money market and payment system 2/4

Then, we do expect a negative impact of a freeze in the money market on RTGS functioning…

but after Lehman default, several money markets were stressed across the world while RTGS systems continued to work smoothly

It is because of CBs injecting additional liquidity in the system and banks' desks adapting their liquidity management strategies

Therefore, it is not immediate to evaluate the impact of a shrinkage in the money market on RTGS performance on the basis of actual data

Money market and payment system 3/4

After all, it is still the same old story of the Milton Friedman's thermostat.. (with some adaptations of my own)

If a house has a good thermostat, we should observe a strong negative correlation between the amount of gas burned in the boiler (**Monetary base**), and the outside temperature (**Money market trades**). Furthermore, we should observe no correlation between the amount of gas burned in the boiler (**Monetary base**) and the inside temperature (**RTGS performance**) and - again - no correlation between the outside temperature (**Money market trades**) and the inside temperature (**RTGS performance**).

Money market and payment system 4/4

Within a counterfactual exercise using a simulator tool like the BoF-PSS2 simulator, it is possible to replicate a number of operational days in the life of RTGS systems with different money market conditions, keeping constant the central and commercial banks behaviour (i.e. the gas burned in the boiler)

E.g. such an analysis has been carried out for the Italian component of TARGET2 after the Lehman default by Arciero (2009) showing that a reduction in the level of money market flows may turn out into effects of similar magnitude, albeit milder, to those triggered by an analogue reduction of cash balances

But we need to know the money market trades settled in the RTGS system

Overview

Money market trades – 1/3

Date: Tuesday, 1 October 2013

Fred

Lara

Lara speaking…

Hi, it's Fred
I need a 100 mills overnight..

Hmm, EONIA is 8 bp..I'll ask for 10 bp

OK, that's possible Fred, I'm asking 10 bp

100 mln * 0.10 * (1 / 36000) = 277.78

Agreed
Rate amount is 277.78

One moment Lara, can we agree on Friday?

Well, he definitely needs cash…let me rise to 13 bp

That's a bit difficult… then I'm asking 13 bp

100 mln * 0.13 * (3 / 36000) = 1,083.33

Agreed !
Rate amount is 1,083.33
Thanks, see you

Hmmm that was VERY quickly agreed…next time I will start negotiations at Eonia + 3 bp

Bye bye Fred

Money market trades – 2/3

In an RTGS system, TARGET2 for the euro area, there will be two payments:

- Tuesday 1 October, Lara -> Fred EUR 100,000,000.00

- Friday 4 October, Fred -> Lara EUR 100,001,083.33

Loan amount, agreed annualized rate and maturity lead to accrued amount

Rates lie (usually) around EONIA

Money market trades – 3/3

Identification of overnight money market trades in payment systems data by means of the Furfine (1999) algorithm:

Matching of..

- payment on day ***t***
- from participant **A** to **B**
- amount **X** (rounded to 1 million dollars)

- payment on day ***t+1***
- from participant **B** to **A**
- amount **X** + **plausible interest rate**

Money market trades – Literature review

Fedwire (US)

Furfine (1999), Furfine (2001), Demiralp *et al.* (2004), Afonso *et al.* (2011), Armantier and Copeland (2012), Kuo *et al.* (2013), …

CHAPS (UK)

Millard and Polenghi (2004), Whetherilt *et al.* (2010), Jurgilas and Žikeš (2012), …

Other payment systems

Hendry and Kamhi (2007) – Canadian LVTS

Akram and Christophersen (2010) – Norwegian NBO

Heijmans *et al.* (2010) – TARGET2-NL

Arciero (2012) - TARGET2-BdI

…

Overview

Eurosystem implementation – Added value

Aim

Developing a database for the whole euro area serving multiple purposes: oversight, financial stability, monetary policy

Maturities

Maturities up to three months reliably estimated (with a high degree of uncertainty also maturities from three months to one year)

Validation

"Furfine" algorithm validated for the first time with subsections of the whole euro area money market data (e-MID and EONIA)

Eurosystem implementation – 1/6

Data

a. Only bank-to-bank payments and selected ancillary systems transactions

b. Removing intra-group transaction using Group BIC consolidation based on SWIFT directory

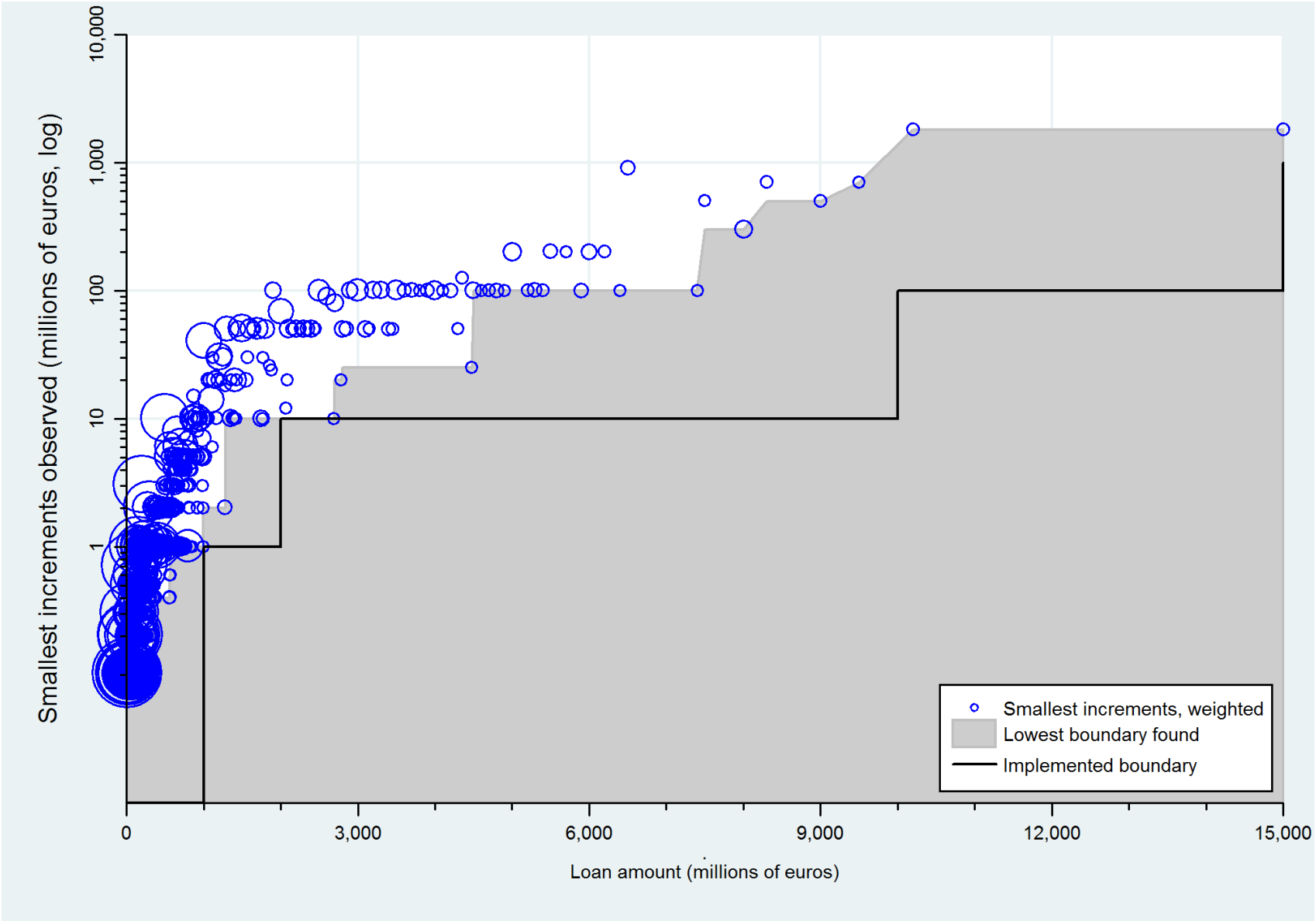
c. Initial limitation due to the missing ordering and beneficiary information

Loan and increment

a. Minimum loan value, EUR 1 million

b. Loan increments depending on loan values

Eurosystem implementation – 2/6



Eurosystem implementation – 3/6

Corridors

a. ECB corridor (Overnight Deposit and Marginal Lending)

b. ECB corridor ± 25 bps (OD-25 bps and ML+25 bps)

c. EONIA/EURIBOR ± 25 bps

d. EONIA/EURIBOR ± 50 bps

e. EONIA/EURIBOR ± 100 bps

Plausible interest rates

a. Must be within corridor

b. Only interest rates rounded to ½ basis points are considered plausible

Eurosystem implementation – 4/6

Multiple matches

a. Multiple matches possible (matched loan not taken out)

b. Most plausible duration will be chosen on number of unique matches per duration

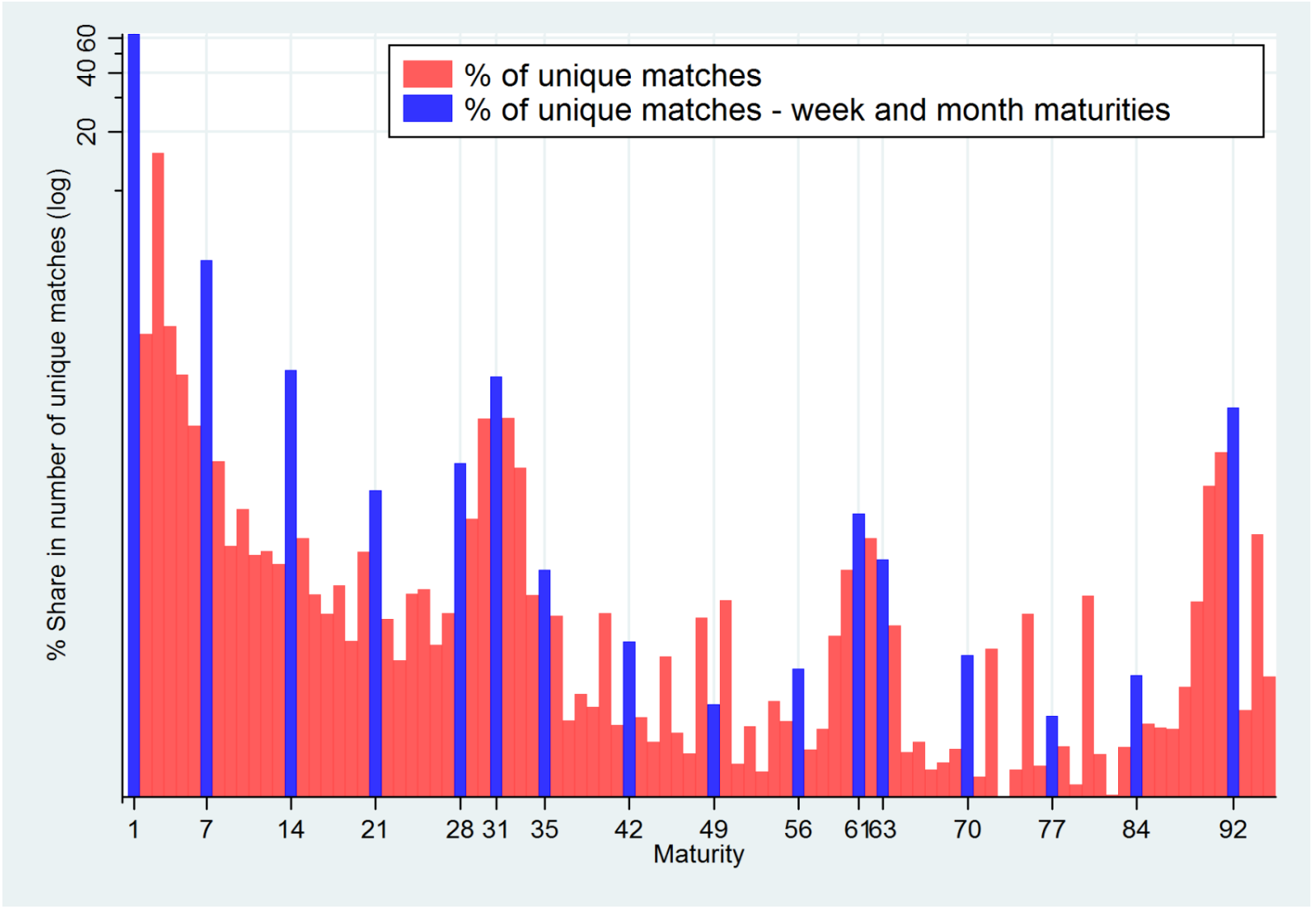
c. Information on choice is kept in the final dataset

Maximum durations

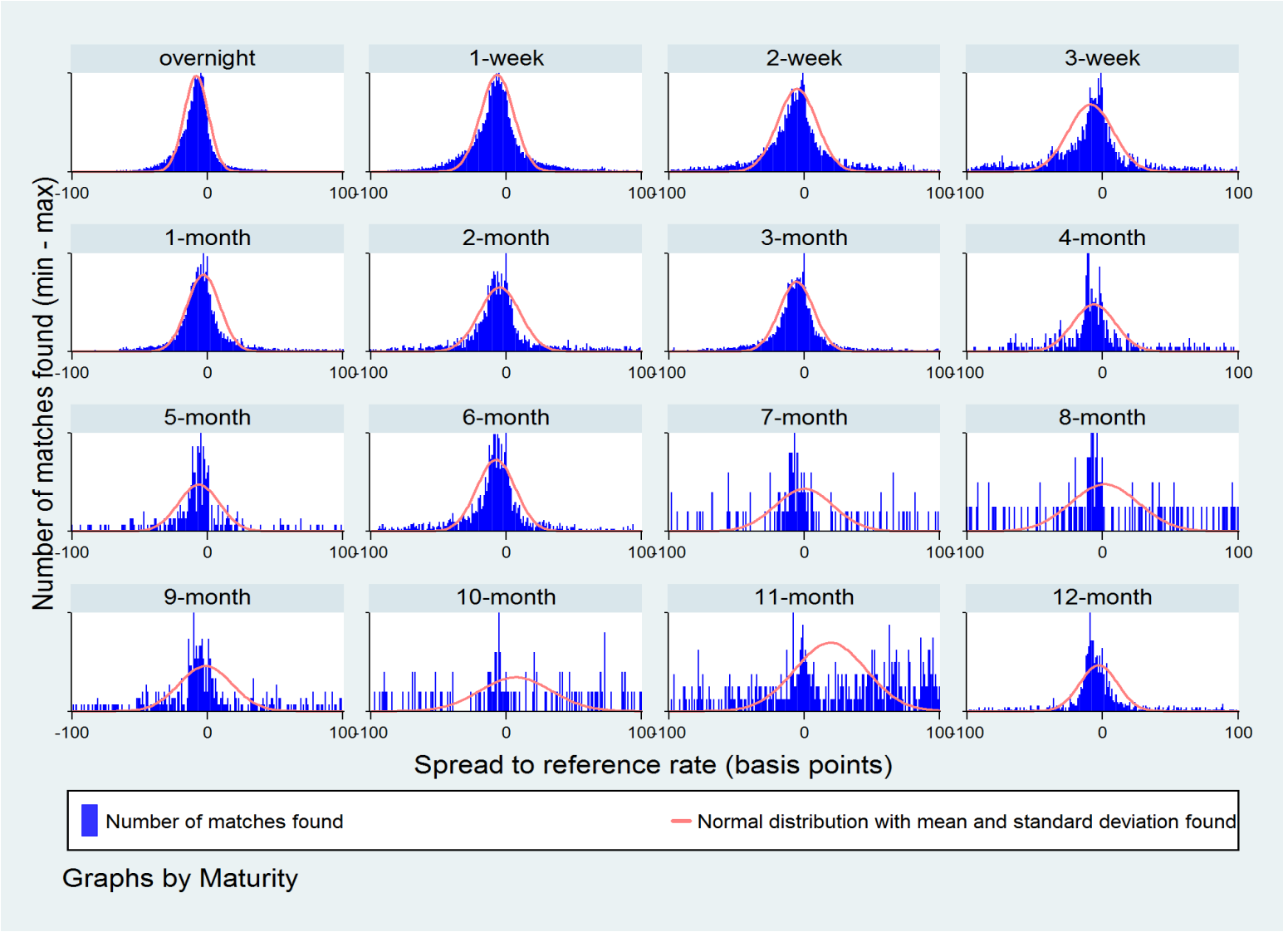
a. Up to 3 months reliably estimated

b. Loans with maturity from 3 to 12 months to be interpreted with caution

Eurosystem implementation – 5/6



Eurosystem implementation – 6/6



Overview

Validation – 1/4

Cross-check with e-MID data

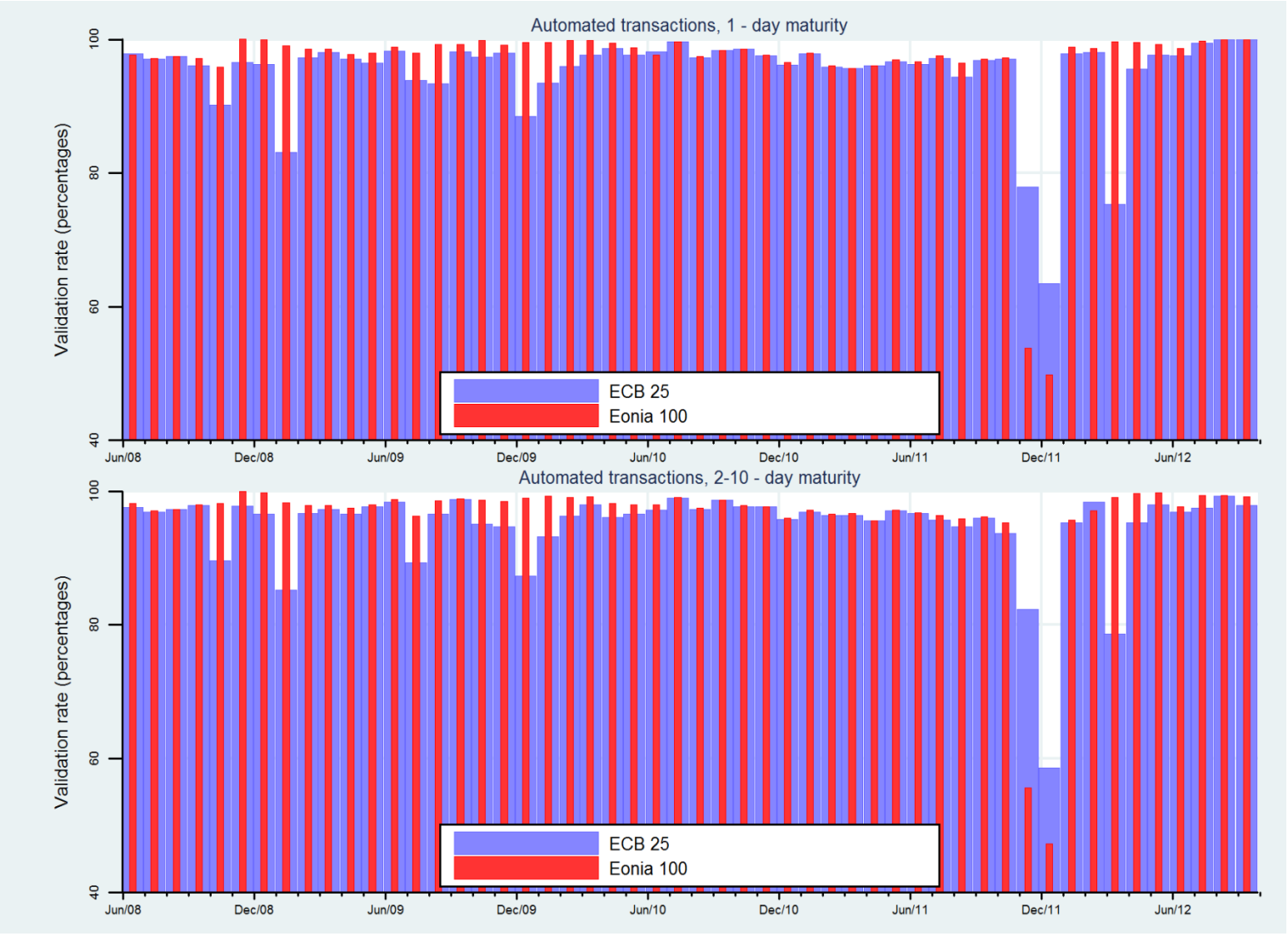
a. Italian electronic money market system for all maturities, with participation of foreign banks and sizeable market share until end 2009 (euro-area benchmark)

b. Two validation strategies, depending on the settlement procedure

c. Corridors ECB ± 25 bps and EONIA ± 100 bps perform best (in terms of false negatives in the overnight segment - 0.92% to 1.96%)

d. Significant improved results compared to Armantier and Copeland (2012)

Validation – 2/4



Validation – 3/4

Cross-check with EONIA data

a. Weighted average rate of all unsecured overnight lending transactions and total volume (euro-area benchmark)

Higher turnover identified

a. Loans concluded on behalf of clients

b. Tomorrow-next and spot-next transactions included in TARGET2 data

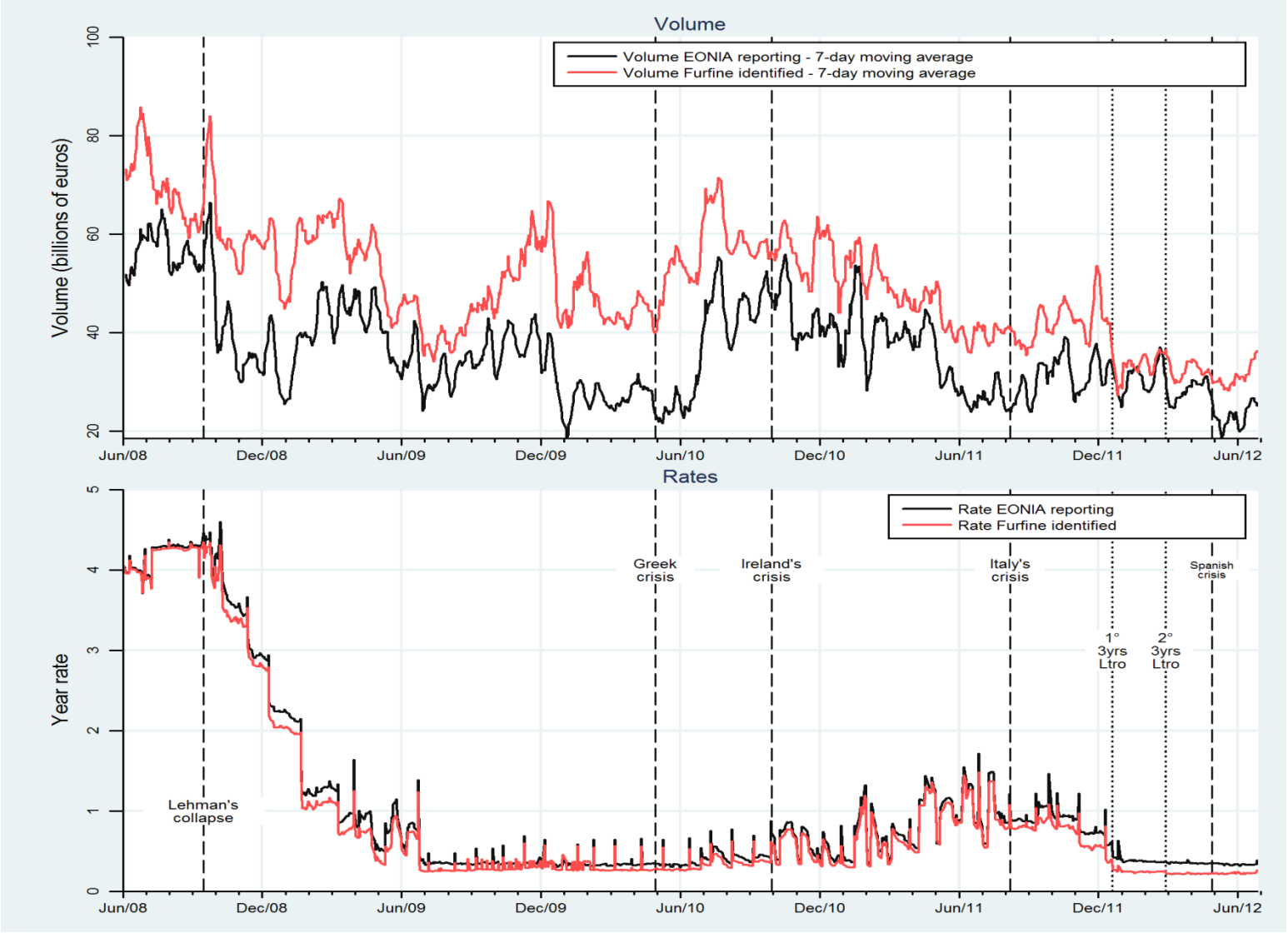
c. Possible over-identification

Lower turnover identified

a. Loans settled on the accounts of a commercial bank

b. Transactions settled via another payment system, e.g. EURO1

Validation – 4/4



Overview

Paradise lost? (1/2)

Negative interest rates and Furfine

On 5 June 2014 the Governing Council of the ECB took the decision of decreasing the interest rate on the deposit facility to -0.10%.

In principle, negative interest rates do not impair the ability of our Furfine methodology to identify money market trades from settlement data

However, **some concerns arise** for those market trades agreed exactly at **zero b.ps.**

Paradise lost? (2/2)

Negative interest rates and Furfine

Given the relatively high number of round payments, by enlarging the corridors we could identify spurious contracts agreed at zero b.ps. even when interest rates are high.

Now, we know for sure that a certain number of contracts have been traded at zero b.ps. over the last months.

If we took on board all zero b.ps. contracts identified, we would incur the risk of serious over identification and vice versa.

Need to refine the methodology

References

- Afonso, G., Kovner, A. and Schoar, A. (2011), Stressed, Not Frozen: The Federal Funds Market in the Financial Crisis, The Journal of Finance
- Akram, F. and Christophersen, C. (2010), Interbank overnight interest rates - gains from systemic importance, Working Paper 2010/11, Norges Bank
- Arciero, L. (2009), Exploring the link between RTGS systems and money market: A simulation approach, Presentation delivered at the 7th Bank of Finland Simulator Seminar and workshop, http://pss.bof.fi/Documents/Seminar2009/10a_Arciero_2009%20Simulator%20seminar.pdf
- Arciero, L. (2012), Evaluating the impact of shock in the supply of overnight unsecured money market funds on the TARGET2-Banca d'Italia functioning: a simulation approach, Rivista Bancaria - Minerva Bancaria
- Armantier, O. and Copeland, A. (2012), Assessing the quality of "Furfine-based" algorithms, Staff Report No. 575, Federal Reserve Bank of New York
- BIS (1997), RTGS Report, Bank for International Settlement, Basel
- Demiralp, S., Preslopsky, B. and Whitesell, W., (2006), Overnight interbank loan markets, Journal of Economics and Business

References

- Furfine, C. (1999), The Microstructure of the Federal Funds Market, Financial Markets, Institutions & Instruments
- Furfine, C. (2001), Banks monitoring banks: evidence from the overnight federal funds market, The Journal of Business
- Heijmans, R., Heuver, R. and Wallraven, D. (2010), Monitoring the unsecured interbank money market using TARGET2 data, Working Paper No. 276, De Nederlandsche Bank
- Hendry, S. and Kamhi, N. (2007), Uncollateralized overnight loans settled in LVTS, Working paper 2007-11, Bank of Canada
- Jurgilas, M. and Zikes, F. (2012), Implicit intraday interest rate in the UK unsecured overnight money market, Working paper No. 447, Bank of England
- Kuo, D., Skeie, D., Vickery, J. and Youle, T. (2013), Identifying term interbank loans from Fedwire payments data, Staff Report No. 603, Federal Reserve Bank of New York
- Millard, S. and Polenghi, M. (2004), The relationship between the overnight interbank unsecured loan market and the CHAPS sterling system, Quarterly Bulletin, Bank of England
- Wetherilt, A., Zimmerman, P. and Soramaki, K. (2010), The sterling unsecured loan market during 2006-08: insights from network theory, Working Paper No. 398, Bank of England

Thank you for your attention!