Settlement Liquidity in SIC

by *Thomas Nellen*, Silvio Schumacher and Flurina Strasser

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Environment – oldtimers Fedwire & SIC

- *Settlement liquidity:* ease with which participants can discharge payment obligations (Bech et al., 2012)
- Literature: **ST** or **QT** as proxies of *settlement liquidity*
- Fedwire - FIFO / no central queuing arrangement
- SIC - FIFO / central queuing (no hybrid elements = no bilateral or multilateral netting based on queues)
- Fedwire: automated overdrafts (immediate settlement)
  - ***Release Time (RT) ≡ Settlement Time (ST)***
- SIC: on-demand intraday liquidity (queuing of payments)
  - ***RT ≤ ST***
  - ***RT + Queuing Time (QT) ≡ ST***
- ***RT and QT*** *are the relevant proxies for queuing systems*

Hypotheses

- ***H1*****: *Increasing settlement balances induce earlier release and settlement of payments***
  - Angelini (1998, 2000), Bech & Garratt (2003), Mills & Nesmith (2008), Martin & McAndrews (2008), Martin & Jurgilas (2013), …
- ***H2*****: *Central queuing arrangements & ample settlement balances eliminate strategic payment mgt***
  - Martin & McAndrews (2008), Martin & Jurgilas (2013) – Armentier et al. (2008), Bech et al. (2012)
- ***H3*****: *Earlier release to a simple central queuing arrangement improves settlement liquidity***
  - Martin & Jurgilas (2013)

Hypotheses

- ***H4*: The integration of retail payments into RTGS payment systems improves settlement liquidity**
  - Armentier et al. (2008) for Fedwire – reuse argument
- ***H5*: Elevated default risk among RTGS participants induces participants to release later**
  - Mills & Nesmith (2008); Benos et al. (2014); literature on operational disruptions – risk mgt
- ***H6*: NIR improves settlement liquidity in RTGS systems with a central queuing arrangement**
  - Earlier release to reduce EoD uncertainty about remaining balances (repo market to change balance)

Data

- Daily & individual payment data from 2005 to April 2017
- ***Release Time (RT)***
  - Institutionalized payments (**i**): released as a direct debit by some third-party (CSD, ACH, repo, …)
  - Non-institutionalized payments (**ni**): payments subject to strategic delay – RT(ni,x) for each percentile
  - Differentiation according to category ***x***=
    - *Size*: ***t***=10'000-100'000 / ***s***=100'000-1mio / ***m***=1mio-10mio / ***l***=10mio-100mio / ***xl*=**100mio-…
    - *Purpose*: ***c***ustomer / ***b2b***
    - *Priorities*: **1** for highest priority, **2** and **3**

Data

- ***Queuing Time (QT):***
  - Focus on all payments – average QT(all)
- We rely on **settlement value (SV)-weighted indicators** for release and queuing time
- ***Many other variables and derivatives thereof:***
  - number of payments n, HHI(x), dr={CDSX, LB2UBS}, NIR dummy, RS2N, average RT(x) and QT(x), settlement value of unsecured (umm) and secured money markets (smm), share s of x in SV, ...
- ***Extracted payments:*** <CHF10’000, CLS, SNB, no Mondays & settlement days after a banking holiday

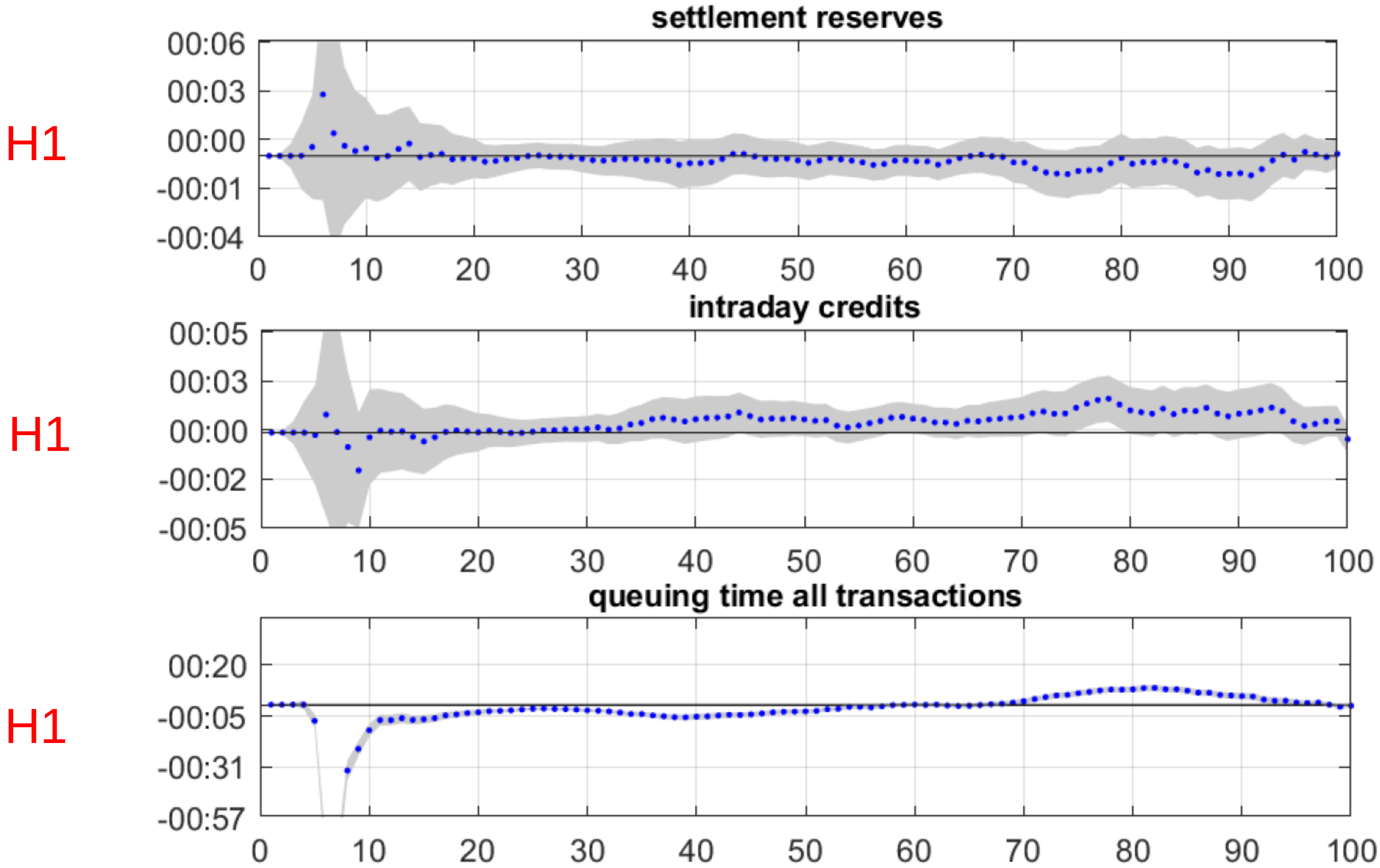
Release time

- Disentangle factors influencing RT(ni; x)
- Methodology by Armentier et al. (2008) (applied by Bech et al., 2012, and McAndrews and Kroeger, 2016)
  - Daily 100 OLS regressions (per percentile of RT(ni,x)) for the whole sample (all & subcategories)
  - Newey-West corrected standard errors

$$\triangle r_{p,t}^{ni,all} = \begin{cases} \alpha_p + \beta_p^1 \Delta sr_t + \beta_p^2 \Delta ic_t + \beta_p^3 \Delta HHIsb_t + \beta_p^4 \Delta sv_t + \\ \beta_p^5 \Delta HHIsv_t + \beta_p^6 \Delta n_t + \beta_p^7 \Delta HHIn_t + \beta_p^8 \Delta umm_t + \\ \beta_p^9 \Delta smm_t + \beta_p^{10} \Delta \bar{r}_t^i + \beta_p^{11} \Delta \bar{q}_t^{all} + \beta_p^{12} dr_t + \\ \beta_p^{13} NIR_t + \beta_p^{14} \Delta RS2N_t + \varepsilon_{p,t} \end{cases}$$

Release time

- Confidence band in grey indicates the 5% significance level
- Standardized coefficients measure changes in minutes (mind the changing scale!)
- Positive coefficients indicate later and negative coefficients indicate earlier RT(ni; x)
- Results for other explanatory variables and all subcategories are found in the paper

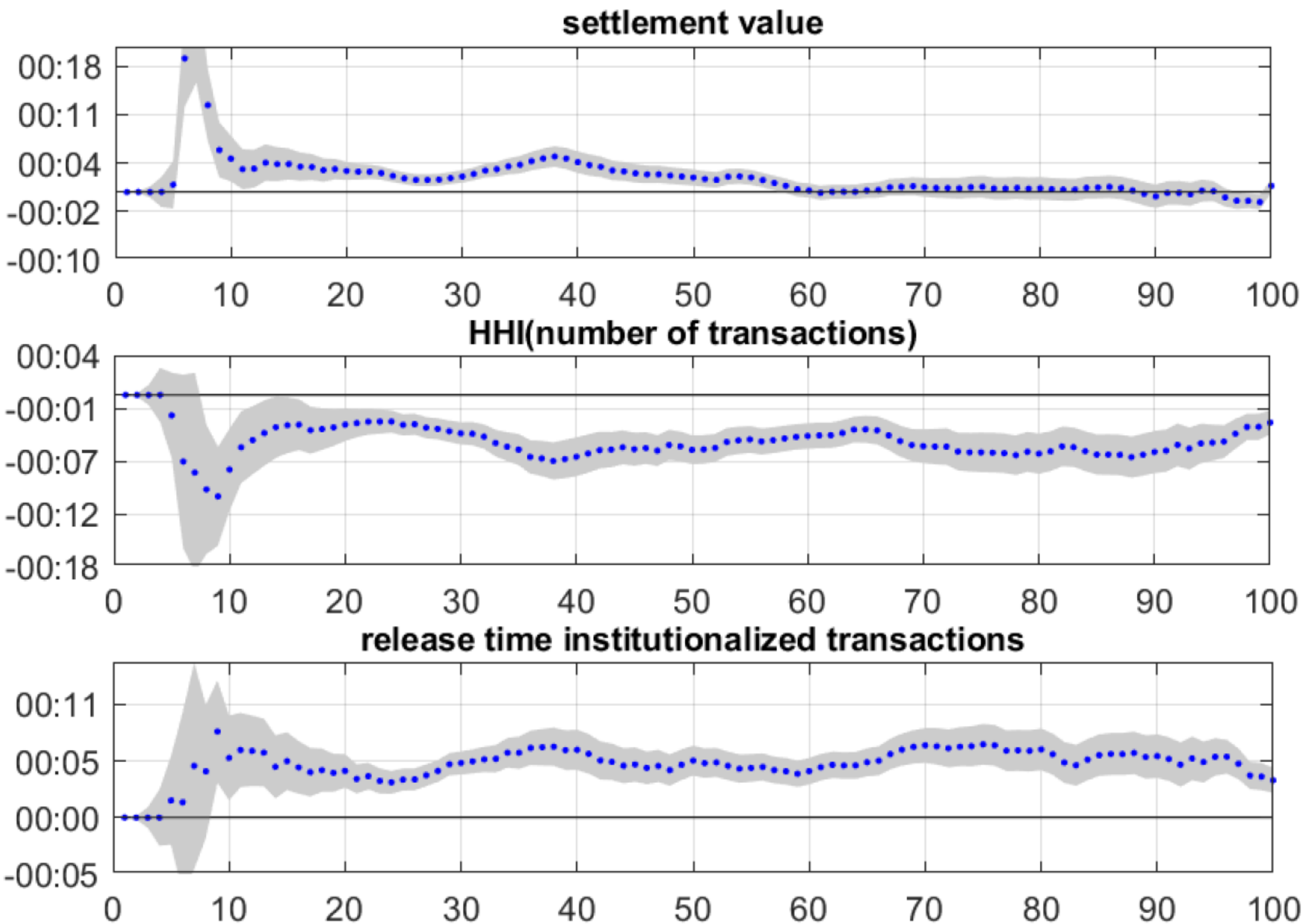


Release time

H2

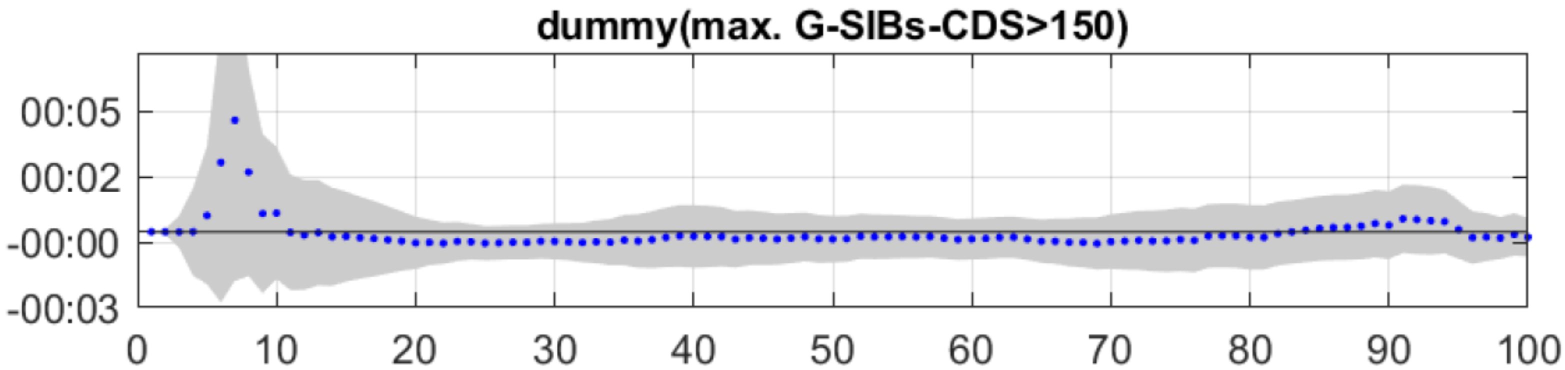
H2

H2

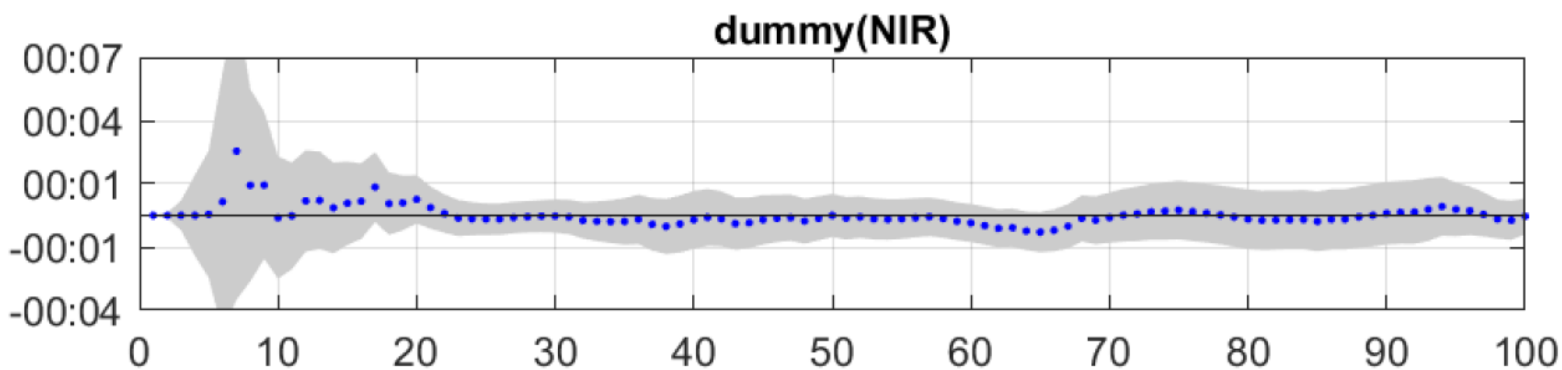


Release time

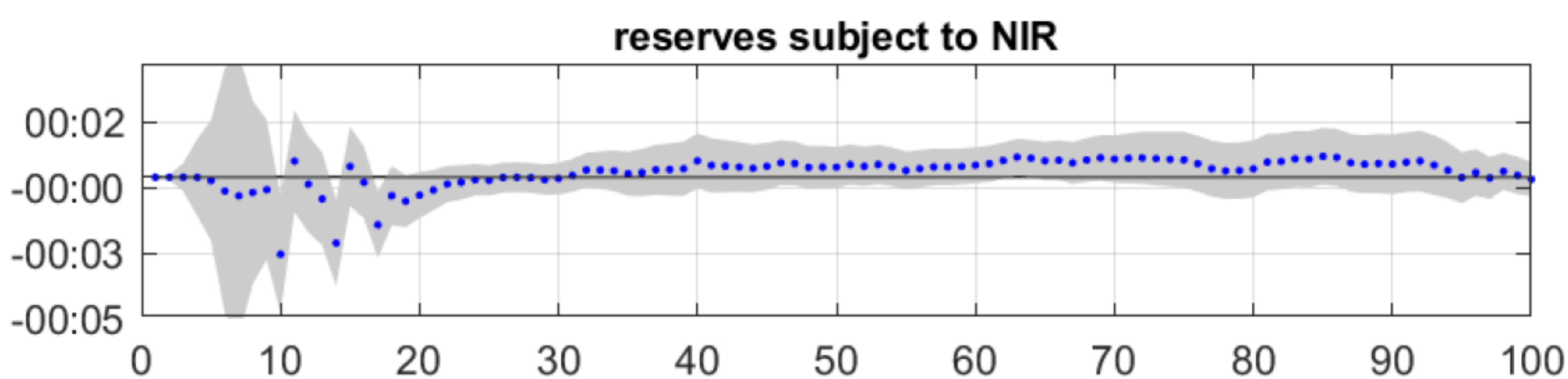
H5



H6



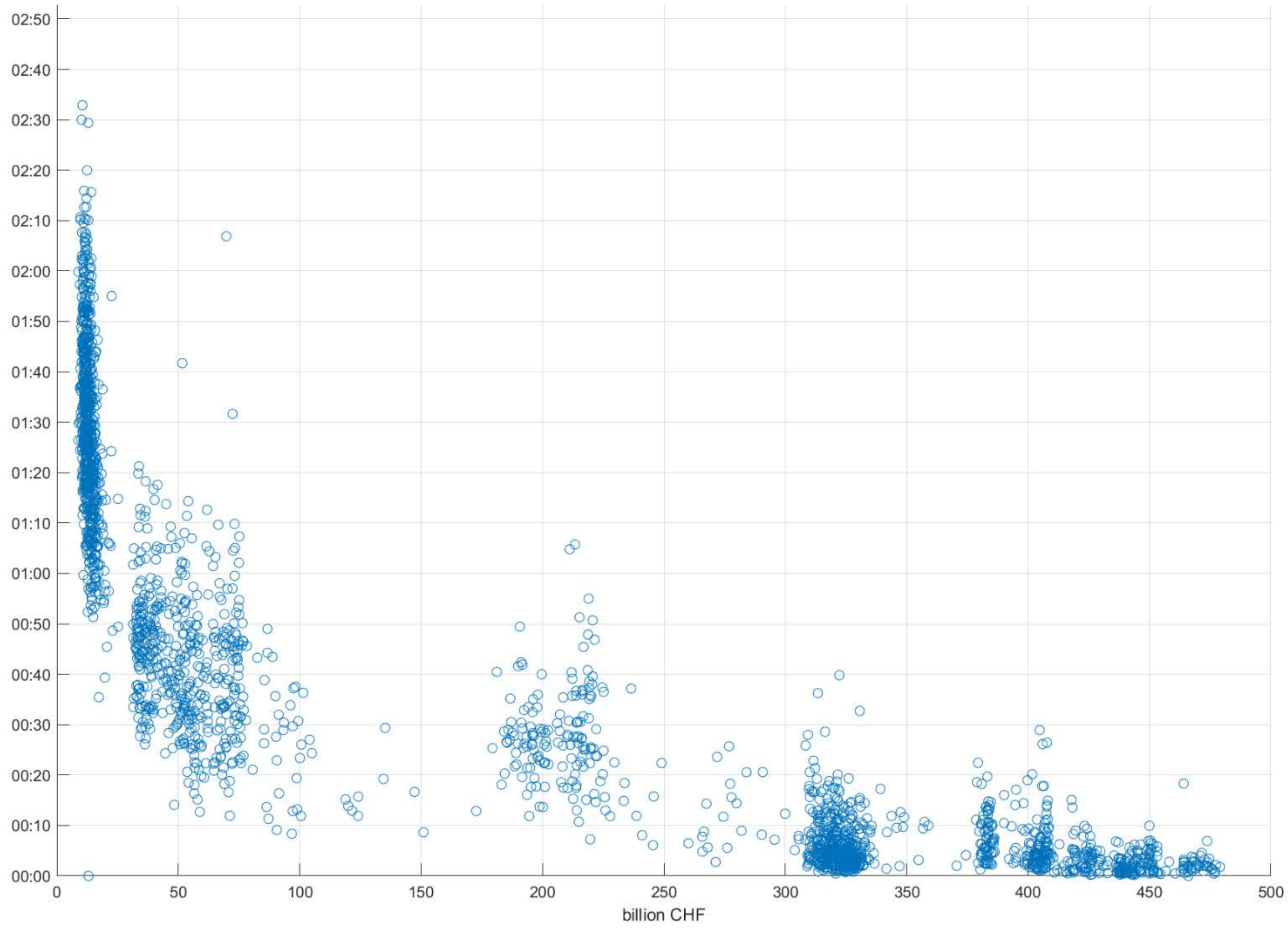
H6



SNB BNS

Queuing time

(average SV-weighted QT(all) in h:m; SB in billion CHF)



Queuing time

- What influences average QT(all)?
  - Mechanical relationship: QT=f(SB,SV,N,RT, frictions)
  - QT close but >0 for the full sample
- Regression approach:

$$\Delta ln\bar{q}_t = \begin{cases} \alpha + \beta_1 \Delta ln(sb_t) + \beta_2 \Delta ln(HHIsb_t) + \beta_3 \Delta ln(sv_t) + \\ \beta_4 \Delta ln(HHIsv_t) + \beta_5 \Delta ln(n_t) + \beta_6 \Delta ln(HHIn_t) + \\ \beta_7 \Delta ln(\bar{r}_t^{all}) + \beta_8 \Delta ln(summ_t) + \beta_9 \Delta ln(ssmm_t) + \\ \beta_{10} \Delta ln(sxl_t) + \beta_{11} \Delta ln(sl_t) + \beta_{12} \Delta ln(s1_t) + \varepsilon_t \end{cases}$$

- Newey-West corrected standard errors

Queuing time

	Coeff.	Std. Err.	p-value
Δln(sb)	- 0.189	0.084	0.024
Δln(HHIsb)	- 0.069	0.035	0.047
Δln(sv)	0.327	0.048	0.000
Δln(HHIsv)	- 0.122	0.075	0.106
H4 Δln(n)	- 0.100	0.044	0.022
Δln(HHIn)	- 0.026	0.124	0.835
H3 Δln(r)	- 1.613	0.271	0.000
Δln(summ)	0.100	0.023	0.000
Δln(ssmm)	0.047	0.008	0.000
Δln(sxl)	0.142	0.052	0.006
Δln(sl)	0.856	0.289	0.003
Δln(s1st prio)	0.071	0.030	0.018
const.	- 0.000	0.007	0.992
No. of obs.	1646		
R^2	0.095		

- More SB allow to reduce SV-weighted QT(all) to “almost” zero
- However, substantial SB are required to fully eliminate QT
- A simple central queuing arrangement fosters settlement liquidity – earlier RT(all) results in lower QT(all)
- More smaller payments smooth settlement of larger payments
- Concentration factor seems to be low – fast and efficient liquidity redistribution through settlement
- Otherwise expected signs

Conclusion

- RT and QT (instead of ST/QT only) allow for a more differentiated picture of settlement liquidity
- Findings suggest theory may be incomplete in relation to RTGS systems with central queuing arrangements
- Are hybrid RTGS systems worth the investment?
  - A simple queuing arrangement can serve as an LSM
  - Retail payment integration improves settlement liquidity
    - No integration of fast payments (QT and high priority)
- Is it safe to widen access to RTGS systems?
- Lack of similar studies does not allow to generalize
- Findings suggest greater focus on RT(ni) and RT(i)

Thank you for your attention!

thomas.nellen@snb.ch

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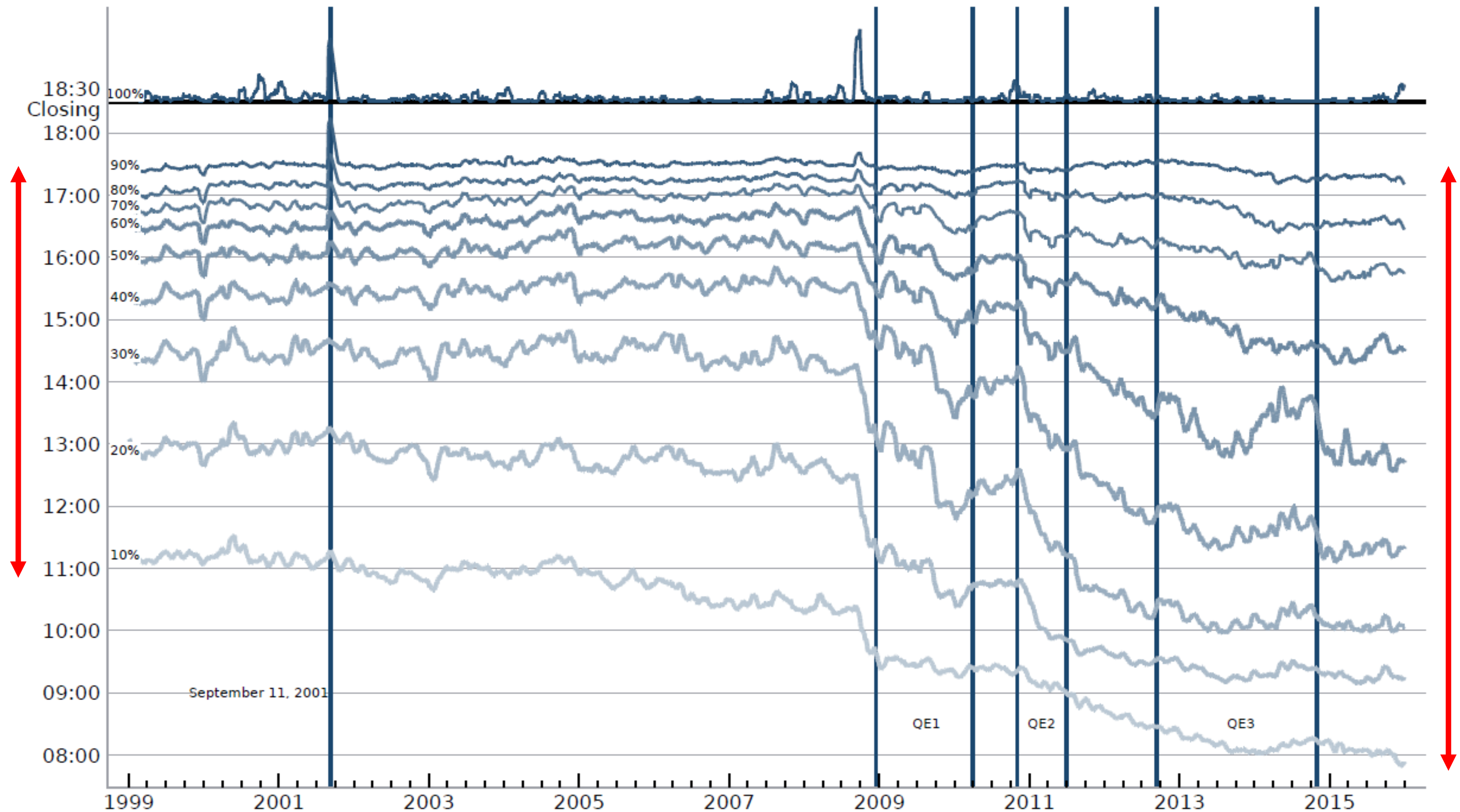
Settlement liquidity Fedwire: Settlement = Release Time

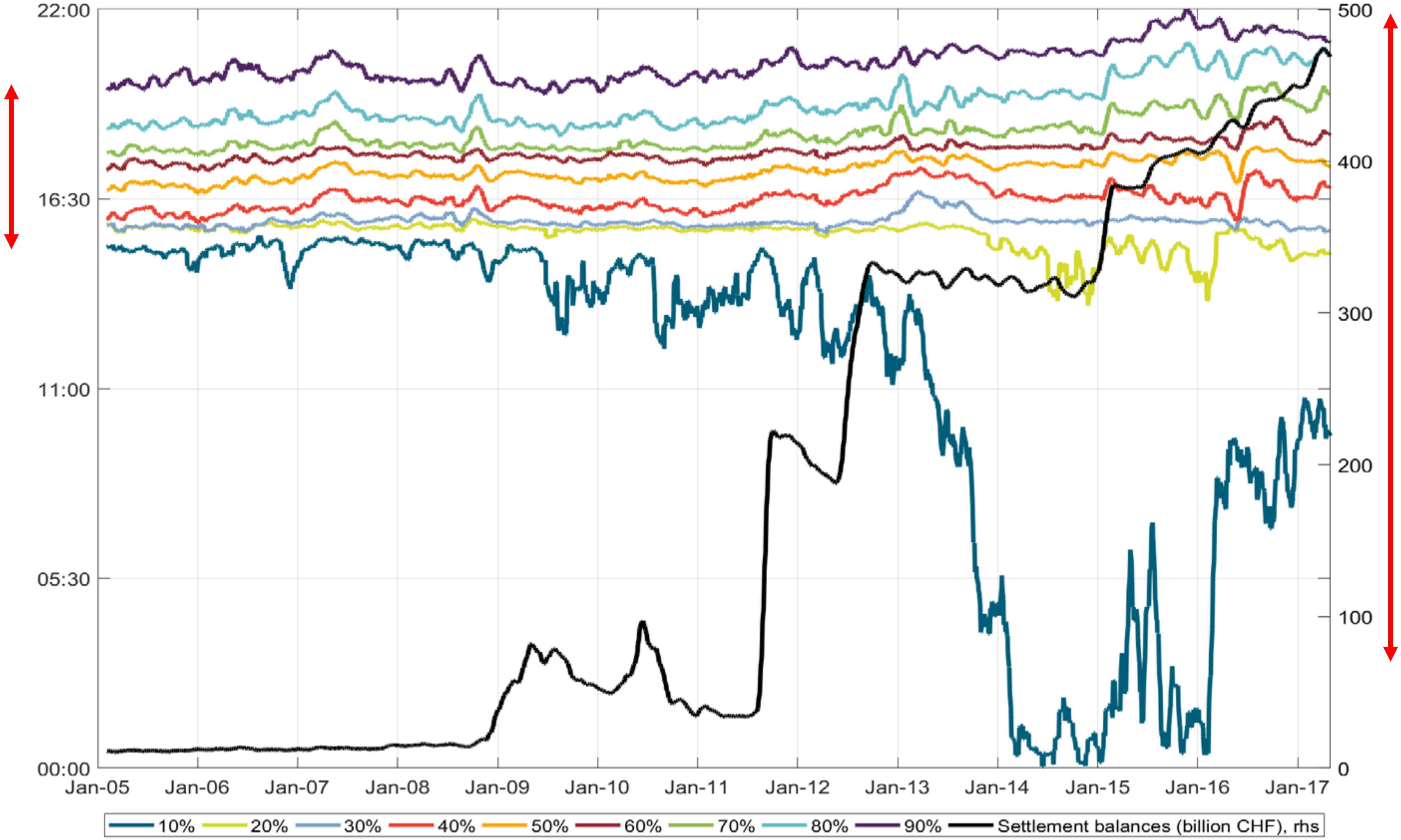
Figure 1: Time Series of Settlement Liquidity



Notes: Twenty-one-day centered moving average.
Values exclude payments related to CHIPS, CLS, DTC, and P&I payment funding.
Sources: Federal Reserve Bank of New York, Authors' calculations.

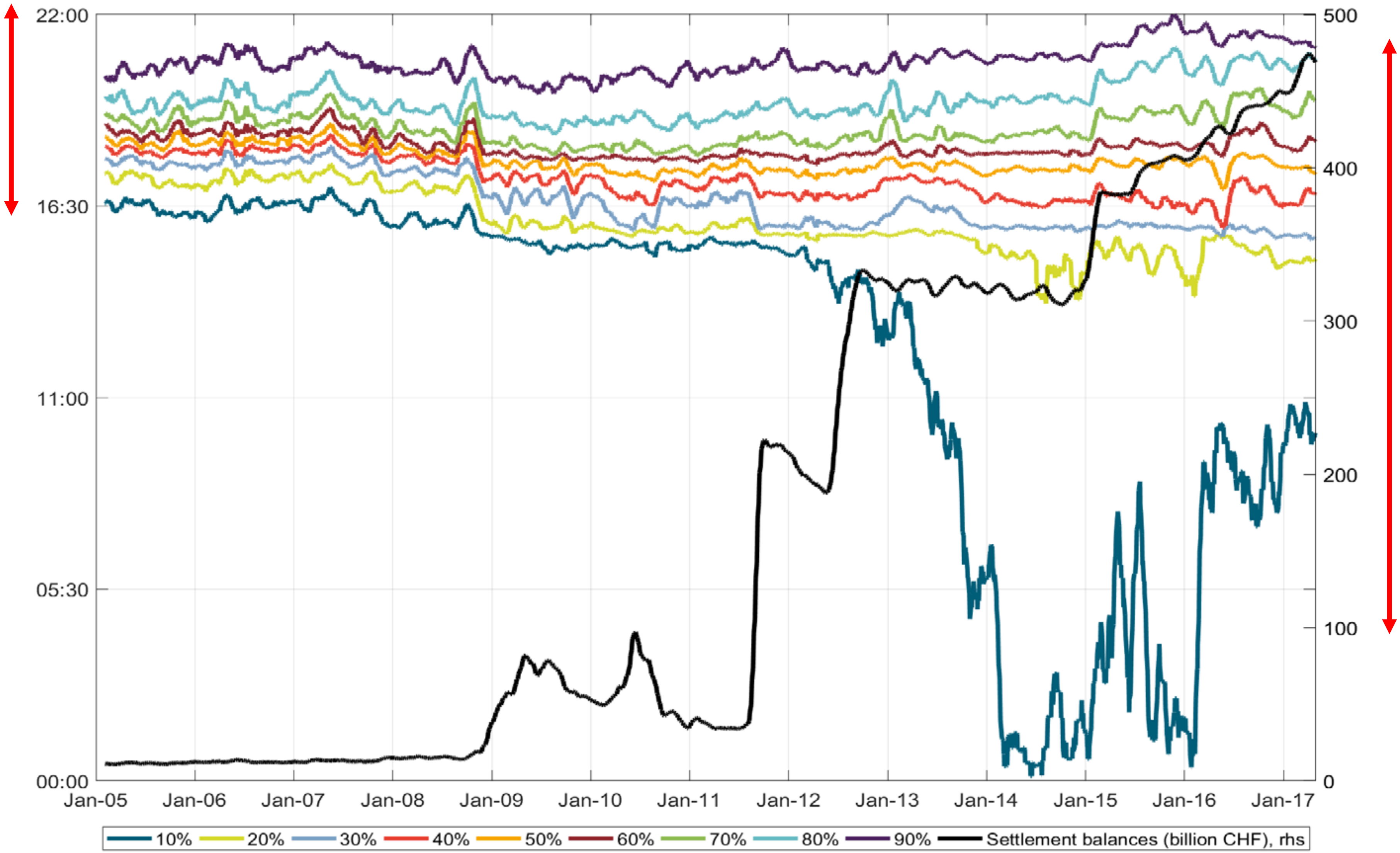
Settlement liquidity SIC: Release Time

Value percentiles of released ni payments; 20-day moving average; hours after beginning of settlement day



Settlement liquidity SIC: Settlement Time

Value percentiles of settled ni payments; 20-day ma; hours after beginning of settlement day

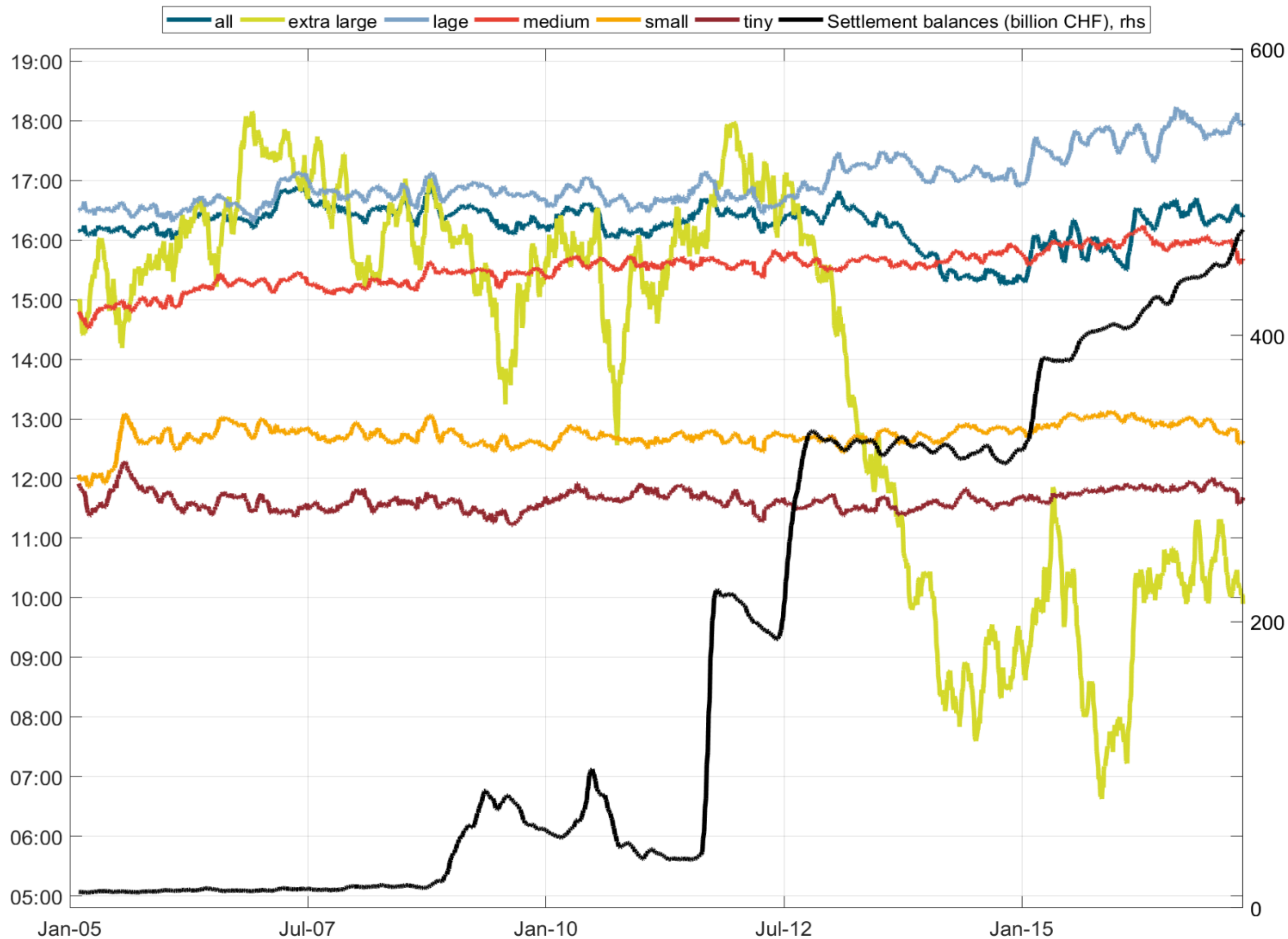


Release time

(average SV-weighted RT(ni; all/t/s/m/l/xl) in h:m after start of SIC day, 20-day ma)

H1

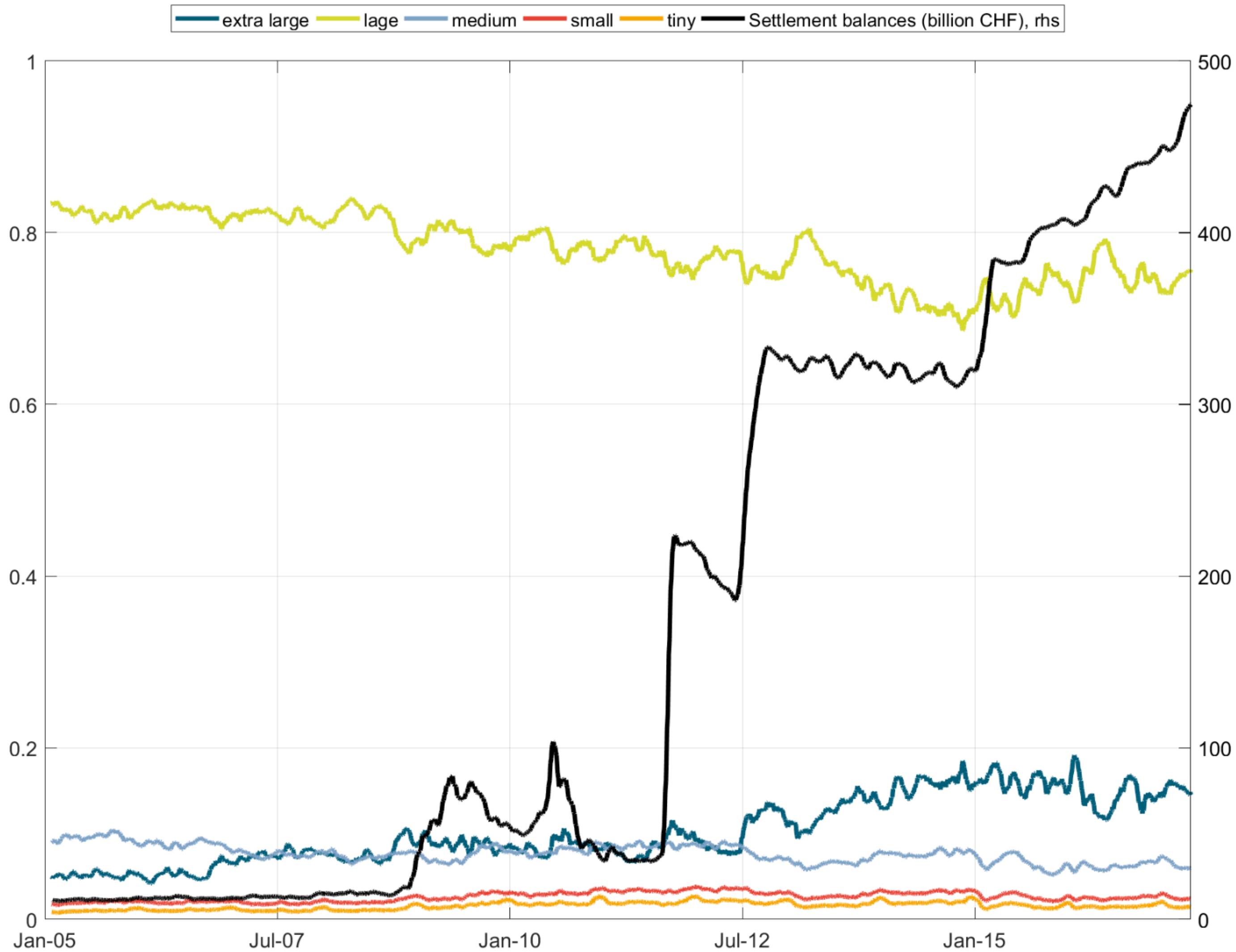
H2



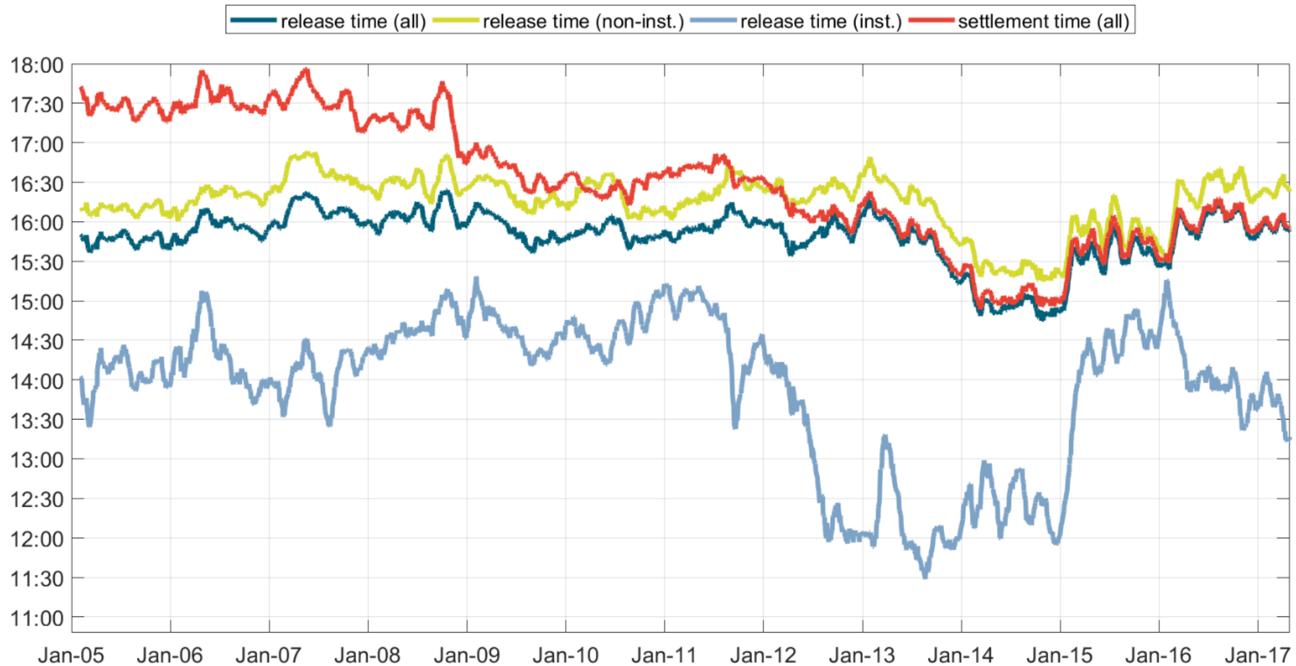
SNB BNS

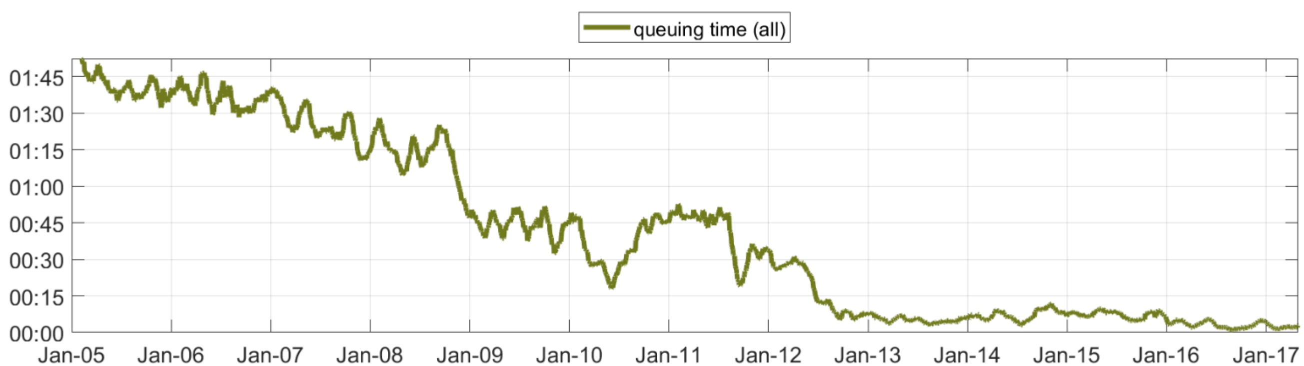
Release time
(Percentage(ni; t/s/m/l/xl) in SV of all payments, 20-day ma)

H2



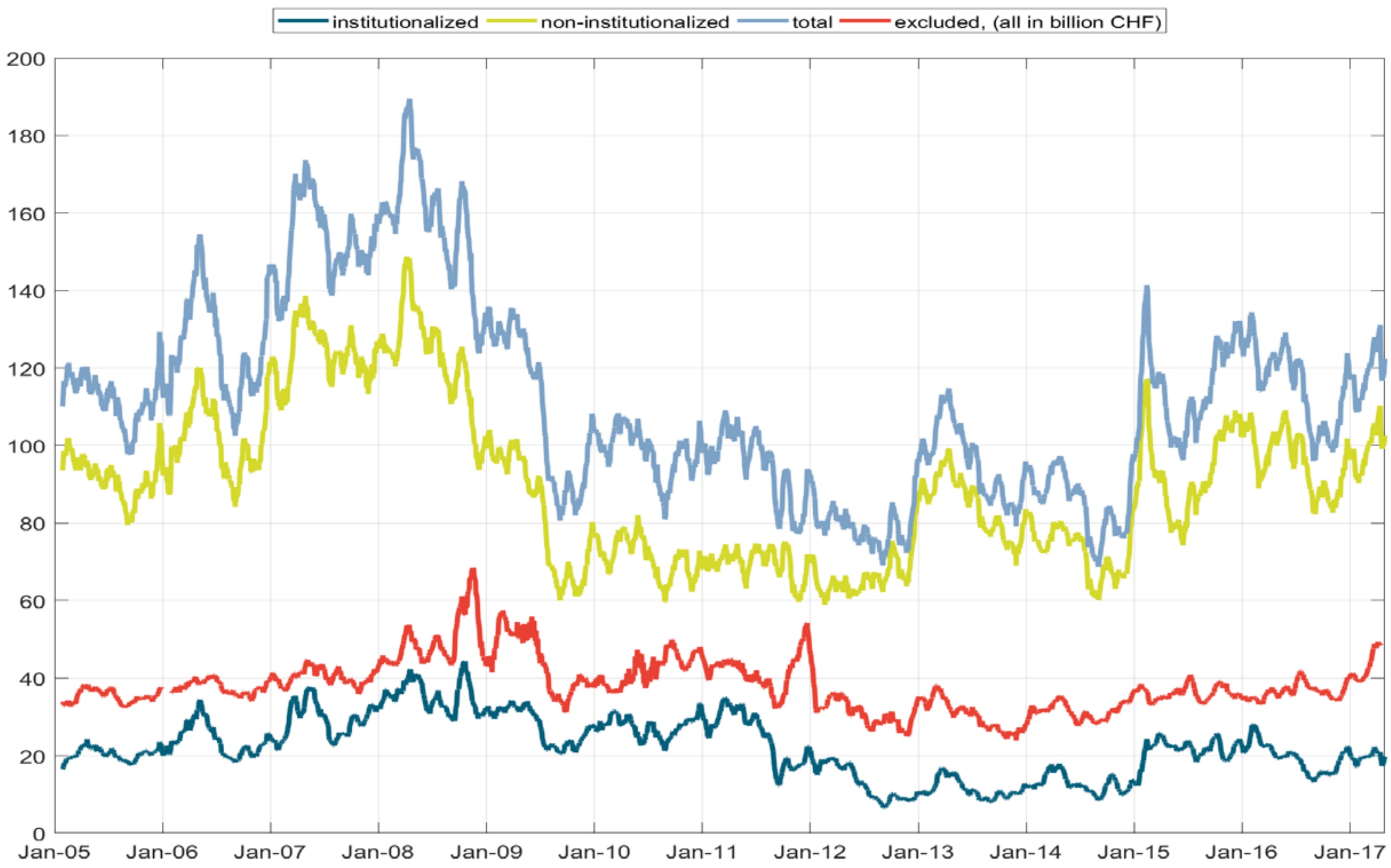
Release time
(average ST(all), RT(i/ni) in h after start of SIC day and QT(all), 20-day ma)





Data

SV(i/ni/all/excluded) (in billions CHF, 20-day ma)



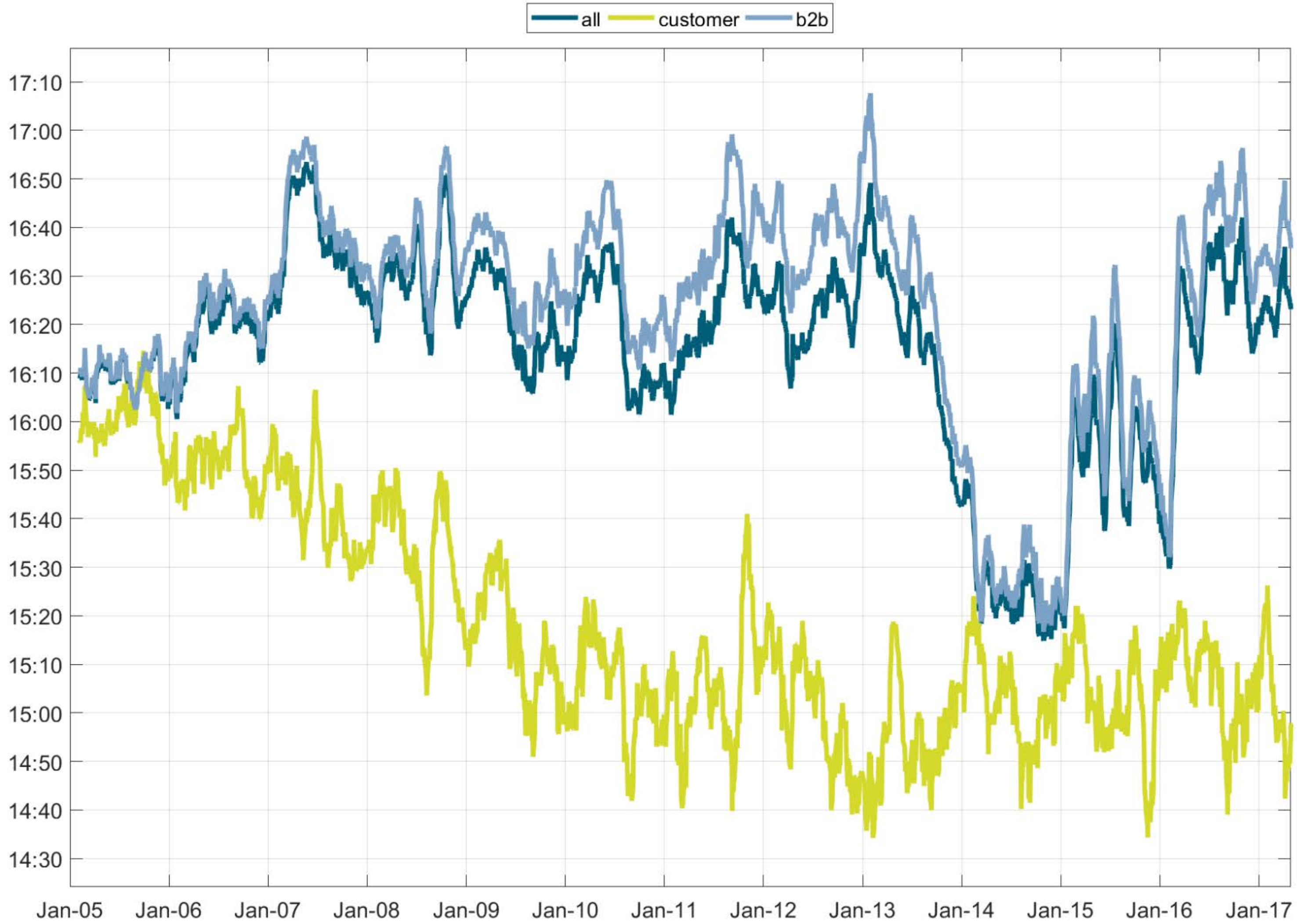
Robustness - Release time

- Results remain qualitatively unchanged for the following robustness checks
  - ***Value-weighted RT(ni)***
    - ***CDSX*** / LB2UBS / CDS
    - ***NIR&RS2N*** / NIR / RS2N
    - Only Mondays are considered
    - SB used instead of SR and IC individually
  - ***Unweighted RT(ni,all)***

Robustness - Queuing time

- Results remain qualitatively unchanged for the following robustness checks
  - ***Value-weighted RT(ni)***
    - Only Mondays are considered – n stays negative but turns out to be insignificant
    - Replace RT(all) with RT(ni)
  - ***Unweighted RT(ni,all)***

Release time
(average RT(c/b2b) in h after start of SIC day, 20-day ma)



Release time
(average RT(1/2/3) in h after start of SIC day, 20-day ma)