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**RISK OF WINDOW DRESSING:
QUARTER-END SPIKES IN THE JAPANESE YEN LIBOR-OIS SPREAD**

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Abstract:

It is well documented in literature that funding condition is subject to the undue influence of distorted incentives of banks to lend and borrow at quarter ends under Basel III. We investigate whether or not funding risk could also possibly suffer the same. Using a state space model, we find quarter-end spikes in the Japanese yen Libor-OIS spread, which arguably reflect a higher funding risk, during the global financial crisis and in recent years. The phenomenon in the former episode suggests that quarter-end reporting under Basel II might have already had an effect on the functioning of funding markets. The spikes in the latter episode are found to be negative, reflecting partly the scarcity of high-quality collaterals against the backdrop of a large-scale asset-purchase programme of the Bank of Japan and partly a negative interest rate environment. The evidence adds to the argument in favour of supervisory practices that require banks to report their average leverage ratio for the quarter instead of their ratio for the last day of the quarter.

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The views and analysis expressed in this paper are those of the authors, and do not necessarily represent those of the Hong Kong Monetary Authority.
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I. INTRODUCTION

This paper is motivated by the peculiar phenomenon of quarterly spikes in the cost of funding in the global banking network, which is arguably caused by regulatory reporting to central banks or other banking supervisory authorities concerned under the Basel III accord. Generally speaking, banking regulations are aimed to protect the safety and soundness of the banking system. Disturbance caused by regulations to financial markets due to compliance reasons should be kept to a minimum from an efficiency point of view. In particular, any unintended compliance consequences should be dealt with promptly and properly.

Recent findings of quarter-end disruptions to global funding markets therefore concern central banks. A study group under the Committee of the Global Financial System (CGFS) (2017) on repo market functioning devotes a great deal of its report to examining the impacts of quarter-end reporting on the behaviour of banks in providing liquidity.¹ In the literature, Munyan (2015), Arai et al (2016), Borio et al (2016), Egelhof et al (2017) and Du et al (2018) all observe some quarterly regularity in the repo, cross-currency swap or other funding markets that is attributable to the new reporting requirement under Basel III.

Worse still, the hiccups caused by quarter-end reporting to funding conditions are not uniform or easily predictable. This is manifested in considerable volatility in both prices and volumes in funding markets over quarter ends.² The resulting uncertainty could cause increases in funding risk to banks during those intervals, adding an unnecessary burden, if not another source of instability, to the global financial system. The potential scale of the problem has caught the attention of the Basel Committee on Banking Supervision (BCBS), prompting it to issue a newsletter to condemn

¹ What is reported, rather than when or the frequency at which it is reported, actually holds key to the potential influence on banks' behaviour. As we shall discuss in the next section, their behaviour presumably should not change if they are required to report certain financial ratios as in their average in the quarter. It changes because they have to report the ratios as of the last day of the quarter, i.e., the supervisor takes only a snapshot of their balance sheet.

² CGFS (2017) "observed that repo markets have recently been characterized by volatilities in prices and volumes over period-ends (quarter-end and year-ends). This is likely to be driven by incentives that banks face to 'window-dress' their balance sheets. These incentives include regulatory constraints, such as the leverage ratio, the G-SIB surcharge and the SRF levy, but also include commercial or taxation considerations."

the window-dressing behaviour and subsequently also a consultative document to propose remedial revisions to leverage ratio disclosure requirements at the end of 2018 (BCBS, 2018a and 2018b).

The phenomenon of quarter-end spikes seems to be fairly recent according to the studies, but quarterly reporting has actually been in place for quite some time. Quarterly reporting on risk-adjusted capital positions by banks, though not as rigorous and demanding as under Basel III, was required under Basel II, which had been adopted by practically all major economies by 2008. Also, quarterly reporting requirements at the peripheral of the banking system could have caused strain to the funding market even before Basel II. In the US, such requirements for listed firms date back to 2002 when the Sarbanes-Oxley bill was enacted. During the global financial crisis (GFC), major regulators including the Securities and Exchange Commission and Japanese Financial Services Agency also made quarterly reporting mandatory for listed firms and a wide range of financial entities such as mutual funds.

This paper investigates whether or not funding liquidity risk (referred to as funding risk for short hereafter) also heightens at quarter ends as a consequence. Our investigation focuses on the Japanese yen (JPY) Libor market, probably the most popular funding currency in the world (Christiansen et al, 2011). The empirical work covers a much longer period of time than in previous studies. It contributes to the literature with three major findings. First, we find that quarter-end reporting results in quarter-end spikes not only in funding cost but also in the Libor-OIS spread, which is arguably attributable to increases in funding risk premium. Second, previous studies find spikes in funding cost only after 2014 but our results show that there were also spikes in the spread during the GFC. This means that a stressful environment can significantly spike up the effect of quarter-end reporting even when reporting requirement is less imposing. Third, the quarter-end spikes in the spread are negative in a negative interest rate environment.³ This ostensibly counter-intuitive result is somewhat intriguing because it means that funding risk premium is also negative. As

³ The existence of paper currency, i.e., cash, provides depositors a choice to hold cash when a negative interest rate is applied. Therefore, ZLB is a theoretical boundary for policy rates to be effective. In reality, however, negative interest rate policy is feasible as there are costs associated with holding cash. Euro Area, Switzerland, Denmark and Japan once all entered a negative interest rate era.

we shall discuss in more detail, the risk premium is negative as the penalty falls on the banks that are caught with excess liquidity in a negative interest rate environment.

This paper is organized as follows. In the next section, we review existing literature on the phenomenon of quarter-end spikes. Section III explains our methodology to detect the quarter-end spikes in funding risk. The empirical results are reported in section IV. Section V concludes with a brief discussion of the policy implication.

II. QUARTER-END EFFECTS ON FUNDING CONDITION AND FUNDING RISK

Over the past decade, the global financial landscape has encompassed considerable changes, as supervisory authorities around the world gradually implemented regulatory reforms with a view to strengthening the resilience of banks. Among these reforms, Basel III requires banks to report their leverage ratio—capital divided by total consolidated assets—on a regular basis, which has greatly impacted the behaviour of banks in borrowing and lending.

It is important to point out that quarter-end reporting *per se* is not the issue. The issue is whether banks are required to present a general picture of their financial conditions for the quarter, e.g., reporting some average ratios for the quarter, or specifically the state of their financial conditions as of the end of the quarter, i.e., providing just a snapshot of the conditions on the last day of the quarter. In the US they are required to report the average of the daily ratios in the quarter, a practice that may be referred to as quarter-average reporting. However, in most other countries, including those in Europe and Japan, the required ratio is the one for the last day of the quarter.⁴ The latter supervisory practice, which indirectly encourages banks outside the US to window-dress their balance sheet at certain times through reducing the size or changing the composition of their assets, has far-reaching implications for funding markets.

⁴ UK authorities followed their US counterparts to require banks to report their quarterly average ratios at the end of the quarter from Q1 2017. UK banks used to submit their month-end ratios on a monthly basis.

One of the outcomes is that non-US banks have the incentives to strategically avoid taking short-term positions towards quarter-ends to keep their leverage low. The overnight repo market is perhaps most clearly affected. Although US banks supposedly do not have the same incentives, funding markets have no national boundary. Considerable foreign participation means that US dollar funding is arguably subject to the same influence of foreign supervisory practices. Munyan (2015) shows contrasting seasonality patterns in the daily repo positions between quarter-end reporting banks and quarter-average reporting banks. Egelhof et al (2017) provide a lucid account of how different US and non-US banks behave in the USD overnight repo market. They find that between Q1 2016 and Q1 2017 European banks lend an average of only a net \$0.25 billion per day on quarter-end dates in the interdealer repo market, compared to a whopping net \$33 billion per day on average during the quarter.

Quarter-end reporting does not only affect overnight funding. To keep leverage low at the end of the quarter, quarter-end reporting banks would refrain from engaging in one-week lending in the last week of the quarter or one-month lending in the last month of the quarter, as any such lending will appear on the balance sheet as of the last day of the quarter.⁵ Put it another way, they have less incentive to lend in the one-week market in the last week of the quarter than in the previous 12 weeks; their appetite for lending one-month is also likely to be more subdued in the third month of every quarter than in the first two months. Not surprisingly, Arai et al (2016) find that US banks tend to raise rates at the short end of the money market towards quarter ends due to stricter leverage ratio requirements imposed in 2013. Borio et al (2016) show that one-week repo rates and the one-week USD/JPY cross-currency basis have started to exhibit quarter-end spikes since 2014, and argue that the spikes reflect increasing difficulty in arbitrage due to greater importance attached to quarter-end reporting and regulatory ratios following regulatory reforms. Similar observations in the one-week and one-month (but not the three-month) bases in the cross-currency basis swap markets are also documented by Du et al (2018), who attribute it to higher balance sheet costs arising from the quarterly leverage ratio requirements for banks under Basel III.

⁵ Loans of the three-month or longer tenor, no matter at which time of the quarter they are made, cannot escape from being captured by the snapshot at quarter ends and are thus not subject to the same distortive incentive.

As a result of banks' desire to window-dress themselves for the regulator towards quarter ends, the associated unpredictability of the funding conditions at those times raises funding risk. As observed by the CGFS (2017), repo markets have in recent years been characterized by greater volatility in prices and volumes over quarter ends. Arai et al (2016) find that uncertainty about funding conditions at quarter-ends reduces global banks' market-making activities in the cross-currency swap market. It is alleged that uncertainty about quarter-end funding rates makes it difficult for market-makers to quote bid/ask spreads for term instruments in the FX swap market over quarter ends. They show that the average hourly bid-ask spreads for the USD/JPY and EUR/USD currency forwards are usually much wider during quarter ends.

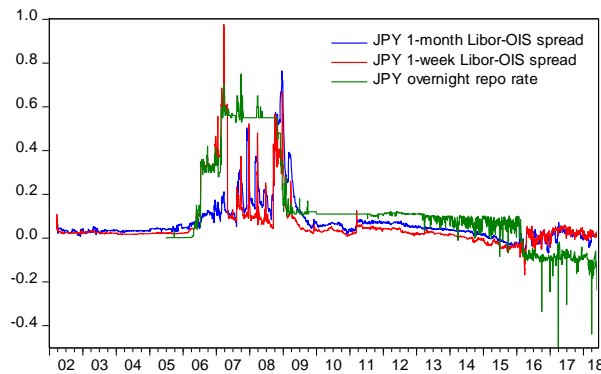
Meanwhile, there has been a major reappraisal of counterparty and funding risks since the GFC. This is reflected in the gap between the Libor and the rate of the overnight indexed swap (OIS) (Chart 1). The Libor is essentially an interest rate at which banks lend to each other on an uncollateralized basis in the Eurodollar market and, hence, considerable counterparty and funding risks are involved. However, OIS, which requires no exchange of principals, instils a minimum of these risks. The different nature of the two kinds of transactions renders the Libor-OIS spread a widely-accepted measure of counterparty and funding risk premiums, although there has been an intense debate about which risk premium accounts for more of the spread during crisis periods (Michaud & Upper, 2008; Hou & Skeie, 2014; Iida et al, 2016; McAndrews et al, 2016; Schwarz, 2018). Nonetheless, in connection with the effect of quarter-end snapshot reporting, it would be interesting to see if the spread is higher at the end of the quarter. If it is, then we would argue that it probably reflects the increase in funding risk caused by the heightened uncertainties about funding cost at quarter ends.⁶

⁶ That is, unless there are reasons to believe that counterparty risk is also subject to some quarterly influence.

III. METHODOLOGY

All data used in this paper are drawn from Bloomberg and DataQuery of JPMorgan Markets, which are detailed in the Appendix. Chart 1 shows the one-week and one-month JPY Libor-OIS spreads and overnight repo rate. All three series were close to zero before the GFC before rising sharply towards and during the crisis. While the overnight repo rate and Libor-OIS spreads returned to normal levels after the GFC, they started to fluctuate again and trended slightly downwards as accommodative monetary policies kicked in from around 2013. At the beginning of 2016 the Bank of Japan took another step further and introduced a negative rate policy, sending the repo rate into negative territory, with occasionally some very large downward spikes. Meanwhile, the Libor-OIS spreads rebounded somewhat but their volatility increased significantly.

Chart 1. One-week and one-month JPY Libor-OIS spreads and overnight repo rate

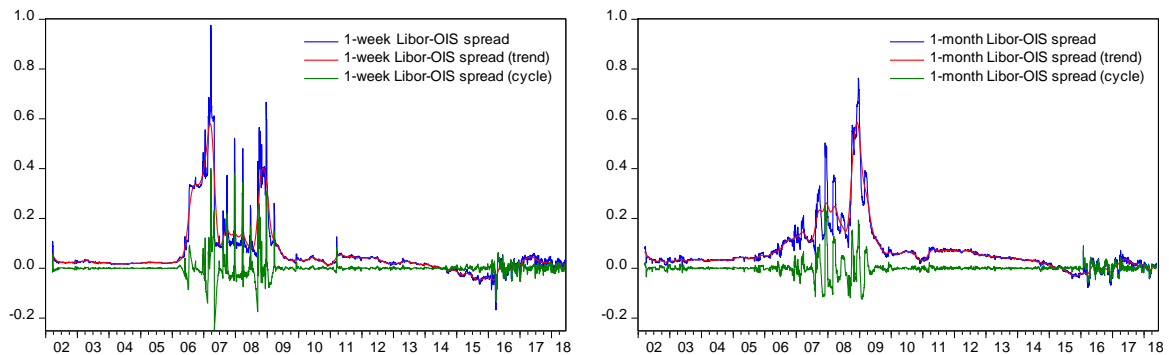


Sources: Bloomberg and JPMorgan.

To detect quarter-end spikes in the Libor-OIS spreads, we first extract the cycle component from the time series of the Libor-OIS spreads, and then build a state space model to describe the relationship between the Libor-OIS spreads and quarter-end dummies. To extract the cycle component from its trend, the Hodrick-Prescott (HP) filter is applied to the Libor-OIS spreads and repo rates to de-trend the time series, which are shown in Chart 2. We use 2 for the smoothing parameter in the HP filter, as recommended by Hodrick & Prescott (1997).⁷ The de-trended (i.e., cycle) components are then employed for our analysis.

⁷ A larger smoothing parameter generates a smoother trend line. For example, Ravn & Uhlig (2002) recommend to use 4 for the parameter instead of 2 for studying US business cycles. However, our analysis focuses on the deviations from the trend. If the trend is too smooth, the quarter-end spikes may be overstated during crisis times.

Chart 2. Trend and de-trended components of JPY Libor-OIS spreads



Source: Bloomberg.

In the model, quarter-end spikes in the de-trended Libor-OIS spreads, which are arguably driven by increases in funding risk, are depicted by latent variables. Among these variables, the model allows for the dynamics to work between the overnight repo rate and the Libor-OIS spreads as funding condition in the repo market would in theory feed through to the risk assessment of the participants in the interbank money market.⁸ The latent variables are modelled as interactions with a dummy variable, which distinguishes the quarter-end period from the remaining time of the quarter. When the latent variables are equal to zero, there are no quarter-end spikes; when the latent variables are positive (negative), the quarter-end liquidity stress is reflected in the positive (negative) quarter-end spikes.

The model is estimated in the state space form using the Kalman filter. The measurement equations describe the relationships between the output variables (i.e., the de-trended Libor-OIS spreads and the de-trended repo rate) and the state variables (i.e., latent interbank funding risk premiums), while the transition equations reflect the dynamics and interactions among the state variables, including a first-order autocorrelation structure. If there are no quarter-end spikes in the Libor-OIS spreads, the state variables in the measurement equation should be zero. The measurement and transition equations are expressed as below.

⁸ The repo market plays a key role in providing funding liquidity to banks. Repo transactions, which are collateralized by high quality liquid securities, are deemed free of counterparty credit risk such that repo rates can serve as a good proxy of funding condition.

Measurement equations:

$$\begin{pmatrix} Spread_{1W}(t) \\ Spread_{1M}(t) \\ Repo(t) \end{pmatrix} = \begin{pmatrix} c_1 \\ c_2 \\ c_3 \end{pmatrix} + \begin{pmatrix} Q_1(t) & 0 & 0 \\ 0 & Q_2(t) & 0 \\ 0 & 0 & Q_2(t) \end{pmatrix} \begin{pmatrix} sv_1(t) \\ sv_2(t) \\ sv_3(t) \end{pmatrix} + \begin{pmatrix} e_1(t) \\ e_2(t) \\ e_3(t) \end{pmatrix}$$

where $e_1 \sim N(0, c_4)$, $e_2 \sim N(0, c_5)$ and $e_3 \sim N(0, c_6)$

Transition equations:

$$\begin{pmatrix} sv_1(t) \\ sv_2(t) \\ sv_3(t) \end{pmatrix} = \begin{pmatrix} c_7 \\ c_8 \\ c_9 \end{pmatrix} + \begin{pmatrix} c_{10} & 0 & c_{11} \\ 0 & c_{12} & c_{13} \\ 0 & 0 & c_{14} \end{pmatrix} \begin{pmatrix} sv_1(t-1) \\ sv_2(t-1) \\ sv_3(t-1) \end{pmatrix} + \begin{pmatrix} \mu_1(t) \\ \mu_2(t) \\ \mu_3(t) \end{pmatrix}$$

where $\mu_1 \sim N(0, c_{15})$, $\mu_2 \sim N(0, c_{16})$ and $\mu_3 \sim N(0, c_{17})$

Spread is the de-trended Libor-OIS spread; *Repo* is the de-trended general collateral repo rate; Q_1 and Q_2 are dummy variables that equals one on the last five and twenty trading days of a quarter respectively, and zero otherwise; sv_1 and sv_2 are the latent variables representing the change in the funding risk for the one-week and one-month tenors respectively at quarter-ends, and sv_3 represents the change in the cost of funding during quarter-ends; e 's and μ 's represent the error terms in the measurement and transition equations, which follow a normal distribution.

Since all dependent variables are de-trended using the HP filter, the constants c_1 , c_2 , c_3 , c_7 , c_8 , and c_9 are expected to be zero. The coefficients c_{11} and c_{13} denote the degree of interaction between the overnight liquidity condition and the interbank funding risk at the one-week and one-month tenors, and are expected to be positive.

IV. EMPIRICAL RESULTS

Table 1 shows the results of the state space model estimated by means of maximum likelihood. The constants (c_1 , c_2 , c_3 , c_7 , c_8 , and c_9) are statistically indifferent from zero as expected. Since the coefficients for autocorrelation (c_{10} and c_{12}) are close to 1, the latent variables (sv_1 , sv_2

and sv_3) can be viewed as following a random walk with a time-varying drift term. The drift terms in the one-week and one-month Libor-OIS spreads are related to the idiosyncratic risk and the liquidity risk in the overnight repo rate (sv_3) by a degree of interaction (c_{11} and c_{13}). The estimates show that the quarter-end spike in the overnight repo rate feeds through to the interbank market by 8% at the one-week tenor and 3% at the one-month tenor.

Table 1. Estimation results of the state space model

<i>Measurement equations</i>	
c_1	0.00 (0.00)
c_2	0.00 (0.00)
c_3	0.00 (0.00)
<i>Transition equations</i>	
c_7	0.00 (0.00)
c_8	0.00 (0.00)
c_9	0.00 (0.00)
c_{10}	0.99 *** (0.00)
c_{11}	0.08 *** (0.01)
c_{12}	0.99 *** (0.00)
c_{13}	0.03 *** (0.00)
c_{14}	0.17 *** (0.04)
Log likelihood	21,289
Num. of Obs.	3,384
Sample period	6/23/2005 - 6/12/2018
AIC	-12.57
Schwarz criterion	-12.54

Notes:

1. Standard errors are in the bracket.
2. ***, ** and * denote statistically significant at 1%, 5% and 10% levels.

The sign and value of the latent variables (sv_1 , sv_2 , sv_3) indicate the direction and size of the quarter-end spikes respectively. If the values of latent variables are close to zero, there are no quarter-end spikes identified in the dependent variables. Chart 3 plots the estimated sv_1 's and sv_2 's. The dotted lines are the respective state variables plus or minus twice the standard error.

From the results we can see that there were sizable positive quarter-end spikes during the GFC, which suggests that regulatory reporting under Basel II already had an impact on the Libor-OIS spreads on a quarterly basis.⁹ This may reflect that although the reporting requirements are not as stringent at that time as under Basel III, the quarter-end impact can be amplified at a time when funding risk is extremely high. As financial markets returned to normalcy to a considerable extent, the spikes almost disappeared or became very small in the four to five years following the GFC.

It is noted that in these four to five years, the quarter-end spikes, though very small, gradually turned from positive to negative. And from 2015 the negative spikes began to grow significantly, though remaining substantially smaller than those during the GFC. The fact that the spikes are negative means that funding risk is more negative at quarter ends than at other times. Intuitively, funding risk being negative seems a bit difficult to conceive.¹⁰ But when interest rates are negative, lenders need to pay interest to borrowers as financial markets are flooded with liquidity. Hence, it is not those who are caught short of liquidity get penalized but those who turn out to be swamped with it.¹¹ In other words, funding risk is no longer the risk of

⁹ As a robustness check, we performed analyses on an alternative version of the model to control for the GFC effect by introducing a dummy variable for the GFC period, on its own or interacting with the state variables, in each of the measurement equations. Based on the estimation results, the coefficients for the GFC dummy are statistically indifferent from zero and the remaining coefficients stay largely unchanged compared with our baseline model.

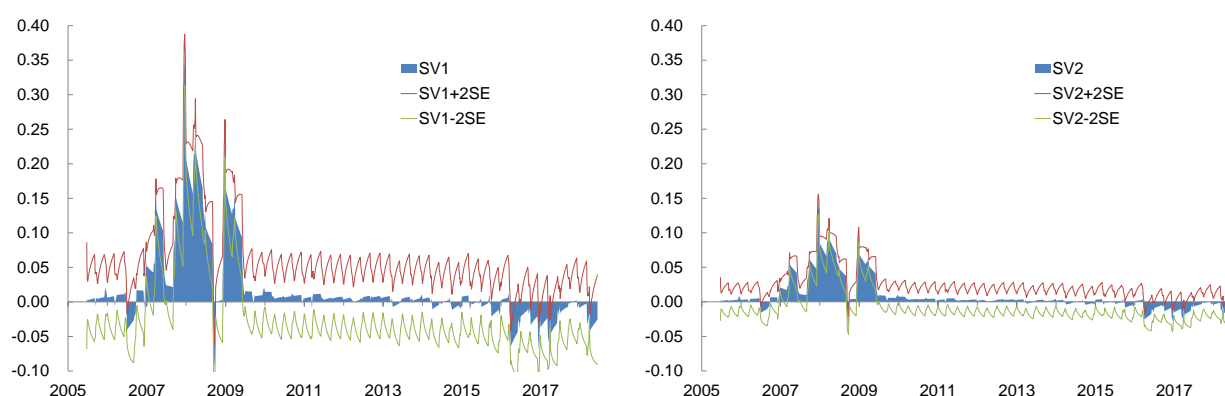
¹⁰ Christiansen et al (2011) attribute the negative systematic risk for JPY to the currency's safe haven nature. However, their theory cannot explain the phenomenon that negative spikes emerged only in a negative interest rate environment despite the fact that JPY has remained a safe haven currency for the whole sample period.

¹¹ Lopez et al (2018) find that banks in a negative interest rate environment experience statistically significant losses in net interest income and are compensated by significant increases in fees, capital gains and gains in on securities and insurance. The losses in net interest income are driven by the non-reducing deposit expenses due to difficulty in cutting nominal deposit rates to below zero. Nucera et al (2017) find that in a negative policy rate environment, some banks are more likely to become undercapitalised in a future potential crisis. Demiralp et al (2017) argues that banks with higher excess liquidity suffer more from the negative rate policy and are more sensitive to further rate cuts in the negative range.

not having sufficient funds to meet financial obligations but that of having too much. Put it another way, in a negative interest rate environment the risk lies with borrowing, not of lending, and hence falls squarely on the borrower, not the lender.

The situation was exacerbated by the introduction of a considerable increase in the purchase of government securities by the Bank of Japan in 2014 amid the backdrop of a general paradigm shift from unsecured to secured funding markets and centrally-cleared trades (both in repo and derivatives markets) in view of a major counterparty risk reappraisal following the GFC. The resulting fall in the supply of, coupled with an increase in the demand for, high-quality collaterals caused the price of liquidity to dip into negative territory, as reflected in the downward spikes in the overnight repo rate in Chart 1, a phenomenon not confined to Japan but also seen in some major economies in Europe around the same time including France and Germany (CGFS, 2017).¹²

Chart 3. Estimated one-week and one-month state variables



V. CONCLUDING REMARKS

In a drive to protect the safety and soundness of the banking system, regulators around the world have since the GFC stepped up efforts in implementing

¹² The feedback received at the CGFS study group's Roundtable with market participants reveals that some players have faced considerable difficulties in placing cash, especially at quarter ends, sometimes to the extent that some counterparties refused to take cash via reverse repos at the any price.

Basel III. While the accord is well defined and agreed upon among regulators globally, there is considerable room or freedom to manoeuvre as to how they carry out their supervisory practice for institutional or other practical reasons. In most jurisdictions, the supervisor takes only a snapshot of the balance sheet of the banks at the end of the quarter to determine if they meet certain regulatory requirements, which has given a huge incentive for banks to window-dress themselves up at the reporting time. As these banks do not necessarily operate solely in their own jurisdictions, their behaviour has an impact on funding markets globally.

As a result of the window-dressing behaviour, funding condition is subject to quarterly disturbance. What is more concerning is the unpredictability associated with the disturbance that heightens funding risk. This paper finds that funding risk is noticeably higher at quarter ends in the JPY Libor market during the GFC and since 2015. We believe that the phenomenon during the GFC reflects the amplification of the already considerable funding risk at quarter ends under Basel II, whose requirement is presumably much less imposing. In the latter episode, the higher (negative) quarter-end funding risk is attributable to snapshot reporting requirement under Basel III in an environment accentuated by a lack of supply of high-quality collaterals and negative interest rates.

The phenomenon of quarter-end spikes in funding cost as uncovered by previous studies calls for supervisory authorities concerned to assess the efficiency and effectiveness of the snapshot reporting practice. If the spikes represent disruptions to the functioning of funding markets, then there is a need to consider whether or not the costs of the practice are outweighed by the benefits of it, e.g., a lower compliance cost (compared to quarter-average reporting). However, if the phenomenon means that banks only adhere to the regulations at quarter ends but not at other times, then it is questionable whether or not the practice is an effective way of administering and ensuring compliance, as the banking system may not be as safe and sound as the regulations are targeted to achieve.

In view of the implications for financial stability, the UK, where banks were required to report month-end leverage ratios (and quarter-end leverage ratios under the Capital Requirement Directive IV since 2014), already joined the US and switched to quarter-average reporting in 2017. The potential ramification also underscores the rationale and urgency of BCBP (2018b) to seek

remedies to the current leverage ratio disclosure requirements, making the calculation of the ratio essentially quarter-average based.¹³ The finding in the paper that quarter-end snapshot reporting causes quarter-end spikes not only in funding cost but also possibly in funding risk lends further support to such moves.

¹³ The proposed key change currently is to require banks to base their calculation of the leverage ratio on the average daily value over the quarter of several major exposures comprising adjusted gross securities financing transaction assets, replacement cost of derivative exposures and central bank reserves included in on-balance sheet exposures. There is a potential for the scope of the exposures to be enlarged.

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APPENDIX

The one-week and one-month Libors are reported by ICE on every London working day at 11:55am, based on submission from a panel of international banks. The one-week and one-month OIS rates are the closing bid prices obtained from Bloomberg at daily frequency. The JPY OIS is indexed to the Bank of Japan estimated unsecured overnight call rate. The general collateral repo rates are obtained from the DataQuery of JPMorgan Markets. The sample period spans 23 Jun 2005 to 12 Jun 2018, subject to data availability. Table A1 shows the summary statistics of the de-trended variables after applying the HP Filter as explained in Section II.

Table A1. Summary statistics of de-trended variables

	JPY		
	<i>Spread_{1w}</i>	<i>Spread_{1M}</i>	<i>Repo</i>
Mean	0.00	0.00	0.00
Median	0.00	0.00	0.00
Max.	0.58	0.35	0.20
Min.	-0.22	-0.22	-0.58
Std. Dev.	0.05	0.04	0.04
Skewness	2.73	2.23	-1.37
Kurtosis	25.77	21.80	26.90
Num. of Obs.	4,238	4,238	3,384

Source: Bloomberg and JPMorgan.