HONG KONG MONETARY AUTHORITY

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FAST INTERFACE FOR NEW ISSUANCE (FINI) AND THE HONG KONG DOLLAR INTERBANK MARKET DURING IPOS

Key points:

- *Large initial public offerings (IPOs) often create substantial funding needs and drive short-term HIBORs upward. On 22 November 2023, the Hong Kong Exchanges and Clearing Limited (HKEX) introduced the Fast Interface for New Issuance (FINI), a modernised platform designed to streamline the IPO settlements by reducing interbank transfers, shortening the settlement cycle, and introducing a compressed pre-funding requirement.*

- *This study offers a comprehensive analysis of how IPO subscriptions affect the Hong Kong dollar interbank market and FINI's transformative role in moderating HIBOR fluctuations. It analyses granular data from the HKD RTGS system to confirm a reduction in IPO-related interbank transfers; quantifies the reduction in liquidity stress during IPOs after the introduction of FINI; and develops a general interbank model that explains how increased reserve balance concentration drives up interbank rates, thereby establishing a conceptual link to account for FINI's mitigating effect.*

- *Results confirm that IPO-related interbank transfers have declined by 99.4% in volume, and the impact of IPO subscriptions on reserve balance concentration has been substantially reduced since FINI's introduction.*

- *On the impact on interbank rates, our empirical results reveal that, before FINI's introduction, when the amount of IPO subscription increases by each multiple of the AB, the overnight HIBOR increases by*

7 basis points on average, and up to 45 basis points in extreme scenarios. These effects are substantially mitigated after FINI's implementation. Overall, the results provide strong evidence that FINI is effective in moderating HIBOR fluctuations associated with IPOs.

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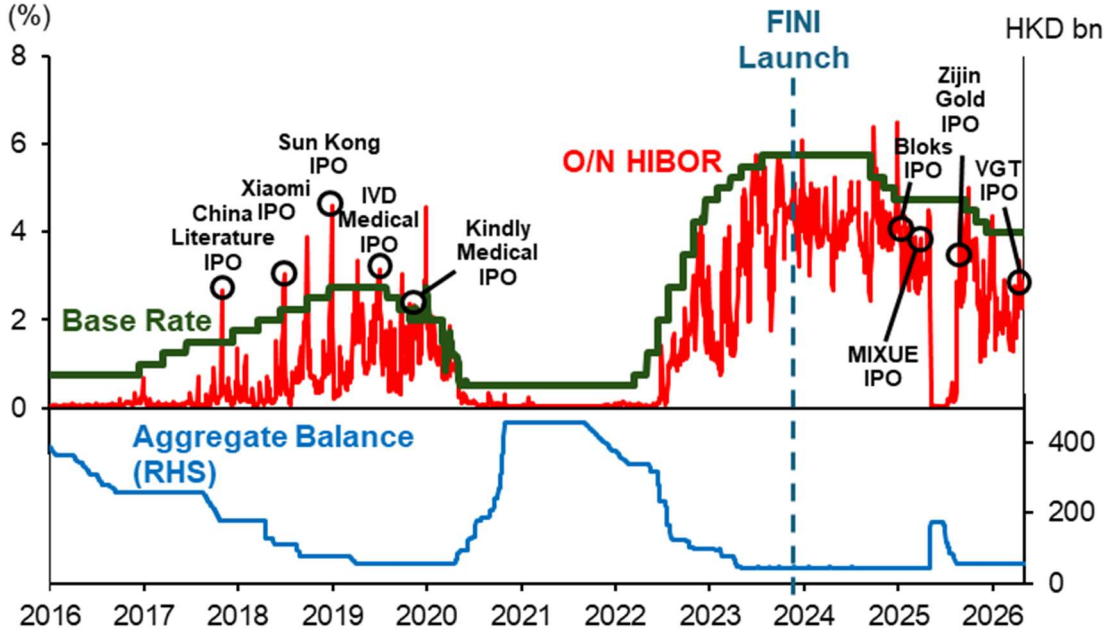
1. INTRODUCTION

Hong Kong is home to one of the world's most popular markets for initial public offerings (IPOs), consistently attracting a high volume of listings and strong interest from international investors. Under the previous IPO settlement process, interbank payments for large IPOs could create substantial funding needs and increasing reliance on interbank liquidity. These pressures drove short-term Hong Kong Interbank Offered Rates (HIBORs) upward, as shown in Chart 1, which shows overnight HIBOR spikes above the Base Rate during major IPO events.

Chart 1: Overnight HIBOR with IPO annotations



Sources: HKMA, HKEX, Bloomberg.

On 22 November 2023, the Hong Kong Exchanges and Clearing Limited (HKEX) introduced the Fast Interface for New Issuance (FINI), a modernised platform designed to streamline the IPO settlement process. FINI shortened the settlement cycle and reduced short-term liquidity lock-ups in the IPO subscription mechanism. Following the launch of FINI, overnight HIBOR volatility has declined during large IPOs. This study analyses how FINI would alleviate the impact of IPO activities on HIBORs.

This paper proceeds in three steps. First, we summarise key changes in the settlement process due to FINI. These changes include a reduction in the number of interbank transfers, as well as reduced duration and amount of fund lock-up. Based on this finding, we then analyse the granular data from the HKD Real-Time Gross Settlement (RTGS) system, which indicate that IPO-related interbank transfers have declined by 99.4% in volume. Moreover, the IPO subscriptions' impact on the

concentration of reserve balance[1] has been minimised materially after the launch of FINI.

Second, this study investigates the impact of IPO activities on the overnight HIBOR before and after the implementation of FINI. Drawing on a comprehensive dataset spanning January 2016 to December 2025, we find that before FINI's introduction, IPOs increase the overnight HIBOR. Specifically, when the amount of IPO subscription increases by each multiple of the Aggregate Balance (AB), the overnight HIBOR increases by 7 basis points on average. Moreover, only large and heavily subscribed IPOs have a significant impact on the interbank market, especially during extreme scenarios, with estimated magnitudes comparable to those observed peaks in Chart 1. Most importantly, these effects are substantially mitigated by FINI.

Finally, we develop a simple general model of the interbank market to corroborate our empirical findings. Our theoretical model shows that an increase in the concentration of reserve balance indeed leads to a rise in the interbank rate. This provides a conceptual underpinning of why FINI is effective in reducing overnight HIBOR volatility.

The remainder of the paper is organised as follows. Section 2 provides a literature review on IPO-related liquidity effects. Section 3 details the IPO arrangement under the pre-FINI regime and the post-FINI regime. Section 4 outlines our data including the IPO statistics. Section 5 presents evidence on interbank payment flows and reserve balances. Section 6 studies empirically how FINI alleviate the effect of IPO on interbank rates. Section 7 presents the theoretical foundation that connects reserve concentration to interbank rate dynamics. Section 8 concludes and provides policy implications.

2. LITERATURE REVIEW

This study contributes to the literature in two aspects. First, research on Hong Kong's monetary and payment system during large-scale IPOs reveals that temporary spikes in interbank payment can prompt banks to hold larger HKD clearing balances as a precautionary cushion, thus exerting upward pressures on interbank interest rates (see HKMA (1994, 2008)). In a similar vein, Leung and Ng (2005) and Keung (2019) provide empirical evidence that short-term HIBORs would rise during IPO subscription periods (though not refund periods). Chan et al. (2020) further enriches the literature by showing that strong market attention on future IPOs could raise medium-term interest rates even before the subscription periods. This is likely due to pre-positioning by market participants in anticipation of future large IPO settlements. To the best of our knowledge, our paper is the first to examine FINI's effect on the interbank market.

[1] In Hong Kong, reserve balances typically refer to banks' balances at their clearing accounts and are commonly known as clearing balances. See Section 5 for further details.

Second, there is a broader theoretical literature which models interbank interest rate behaviour. Building on Poole's (1968) seminal work, studies such as Afonso and Lagos (2015), Beck and Monnet (2016) and Bianchi and Bigio (2022) examine the determination of overnight interbank rate under various market conditions. This study employs that framework and formally shows that reserve balance concentration would tighten interbank rates. This result helps corroborate our empirical findings and explain why money market tightening would become less severe after the launch of FINI.

3. IPOs IN HONG KONG AND EFFECTS OF FINI

The public offering[2] of equities in Hong Kong involves three phases: (1) the public offer subscription period (the "subscription period"), during which public investors (or "applicants") submit valid applications and subscription monies; (2) share price determination (on the "pricing day", denoted as T); and (3) settlement of the allotment results.

SETTLEMENT PROCESS BEFORE FINI

Before the launch of FINI, application monies had to be transferred in full up front from "intermediary banks"[3] to "receiving banks" on behalf of their subscribing clients. The "receiving banks" then collect subscription monies for the IPO issuer. Many applicants fund their applications through broker-provided[4] share margin financing. In practice, most investors submit their applications on the final day of the subscription period[5] (i.e. the day before the pricing day, or T-1[6]), which is referred to as the *application funding date* in this study. The transfer of application monies on this

[2] In Hong Kong, an IPO typically consists of two tranches – the Hong Kong Public Offering and the International Offering. The former offers shares to general public in Hong Kong, while the latter offers shares to institutional and professional investors. Most studies, including this study, focus on the public offering because it can reduce HKD liquidity and increase short-term HIBOR, as retail subscription funds are fully funded and held in the banking system during the application period. The International Offering has far less immediate impact on interbank liquidity, as institutional allocations typically do not require large HKD amounts to be locked up in advance before settlement.

[3] For eIPO applications or the now-retired physical Yellow Form, funds are transferred from the brokers' bank accounts; for White Form applications, from the applicants' own accounts. We define intermediary banks as the banks serving brokers or applicants, which are distinct from receiving banks. For broker application, intermediary banks are typically the designated eIPO banks for CCASS non-investor participants, as described by the HKEX documents and the HKMA supervisory policy manuals. For White Form application, intermediary banks may be any bank that serve the applicants.

[4] HKSCC clearing participants, usually trade under names ending in "Securities" or "Brokerage" are referred to as "brokers" throughout this paper.

[5] To minimise the amount of interest paid on margin borrowing by retail investors.

[6] See Appendix B of FINI Concept Paper (https://www.hkex.com.hk/-/media/HKEX-Market/Services/Next-Generation-Post-Trade-Programme/Fini/FINI_Concept-Paper_EN.pdf). The interbank payment items are presented on day T-1 to Hong Kong Interbank Clearing Limited, and the money is settled on day T. For details of this next-day money settlement, see paragraph 2.2.1 of HKSCC's circular on CCASS money settlement, but be aware that "T" has a different definition in that document than this paper (Ref. No.: CD/CCO/BNK/203/2010, https://www.hkex.com.hk/-/media/hkex-market/services/circulars-and-notices/participant-and-members-circulars/hkscc/2010/ce_203_2010).

day T-1 may lead to large HKD interbank payment flows, and funding pressures on intermediary banks may arise. Intermediary banks often make borrowing arrangements from the receiving banks to alleviate IPO-induced funding pressures.

After the subscription period ends, the issuer determines the final offer price, the final number of shares allocated to the public offer tranche and the distribution among applicants. Interbank settlement takes place on the *allotment settlement date*, typically some time between T+2 to T+5[7]. On this date, unused monies associated with unsuccessful applications[8] are refunded by receiving banks to the investors via intermediary banks.[9] If an IPO is heavily subscribed, the amount of unused monies transferred can be substantial, potentially causing funding pressures for the receiving bank. To ensure sufficient funding for settlement, the receiving bank may need to borrow from intermediary banks.

EFFECTS OF FINI

FINI is a software platform introduced by the HKEX to modernise Hong Kong's IPO settlement process. It allows relevant market participants and authorities to interact digitally and seamlessly on the many important steps that comprise the end-to-end settlement process for new listings. Leveraging modern and user-friendly interfaces with common workflow logic and data standards, the use of FINI allows IPOs to achieve a 1 business day IPO settlement outcome.

FINI mitigates HKD liquidity draining during IPOs for three reasons:

1. Reducing interbank transfers

Under FINI, rather than needing to transfer subscription funds to the receiving banks as proof of their sufficiency, intermediary banks[10] will instead be required to lock these subscription funds intrabank (known as *pre-funding* under FINI) on application funding date (T-1)[11]. Interbank transfer to the receiving banks only takes place on the allotment settlement date, which occurs after the offer price, the allotted shares, and the transfer amount are finalised based on allotted shares, rather than the subscribed amount. In other words, FINI reduces the size of the interbank transfers and eliminates the need

[7] Prior to FINI, there was little shared infrastructure and no clear "conductor" for the settlement process as a whole, hence the duration of the settlement process may vary as a result of a sequence of bilateral communications. See paragraph 28 of FINI Concept Paper (https://www.hkex.com.hk/-/media/HKEX-Market/Services/Next-Generation-Post-Trade-Programme/Fini/FINI_Concept-Paper_EN.pdf).
[8] Calculated based on the final offer price, reflecting the difference between the initial subscription price per share and the final offer price.
[9] The timing of the allotment settlement date varied during the pre-FINI period. However, allotment settlement dates occurring between T+2 and T+5 accounted for more than 99% of IPOs, in terms of subscription amounts.
[10] Under this context, they are eIPO banks or "FINI banks" (i.e. designated banks for CCASS non-investor participants which accept EIPO services).
[11] The FINI arrangement applies to electronic (eIPO) applications and not to the retired physical application channels.

for interbank transfers associated with refunding of monies due to unsuccessful application.

2. Reducing duration of fund lock-up

The new digital platform under FINI allows faster end-to-end IPO settlement. As a result, the application funding date and allotment settlement date are set on T-1 and T, respectively, shortening the fund lock-up period from more than 3 business days to 1 business day.

3. Reducing amount of fund lock-up for heavily subscribed IPOs

Under FINI, securities brokers may choose to meet a "compressed" pre-funding requirement, which locks up either the subscription amount from public investors or the maximum allotted amount by the issuer[12], whichever is smaller, in the brokers' bank account at the intermediary bank. This mechanism is intended to help reduce the high amounts of liquidity[13] that are locked up during large and / or highly popular "mega" IPOs. [14]

The key differences in IPO procedures before and after the implementation of FINI is summarised in Table 1.

Table 1: Key differences in IPO procedures pre-FINI and post-FINI

	Pre-FINI	Post-FINI
Application funding date	Interbank transfer of subscription amounts from intermediary banks to receiving bank. Occurs on T-1	No interbank transfer occurs. Brokers are required to meet pre-funding requirements in their bank accounts, which is the lower of subscription amount or the maximum allotment offered. Occurs on T-1

[12] Assuming the triggering of the highest available clawback level.

[13] The liquidity is locked at the bank deposit level, and IPOs do not lock up any interbank liquidity at this stage, meaning the intermediary bank is not required to hold the pre-funding amount in its reserve balance.

[14] According to the HKEX, had FINI been applied to every Hong Kong public offer that completed between Jan 2018 and Sep 2020, total pre-funding requirement would have been 71.5% lower, while the value of interbank money movement would have been 98.3% lower. For more information, see https://www.hkex.com.hk/-/media/HKEX-Market/Services/Next-Generation-Post-Trade-Programme/Fini/FINI_Concept-Paper_EN.pdf.

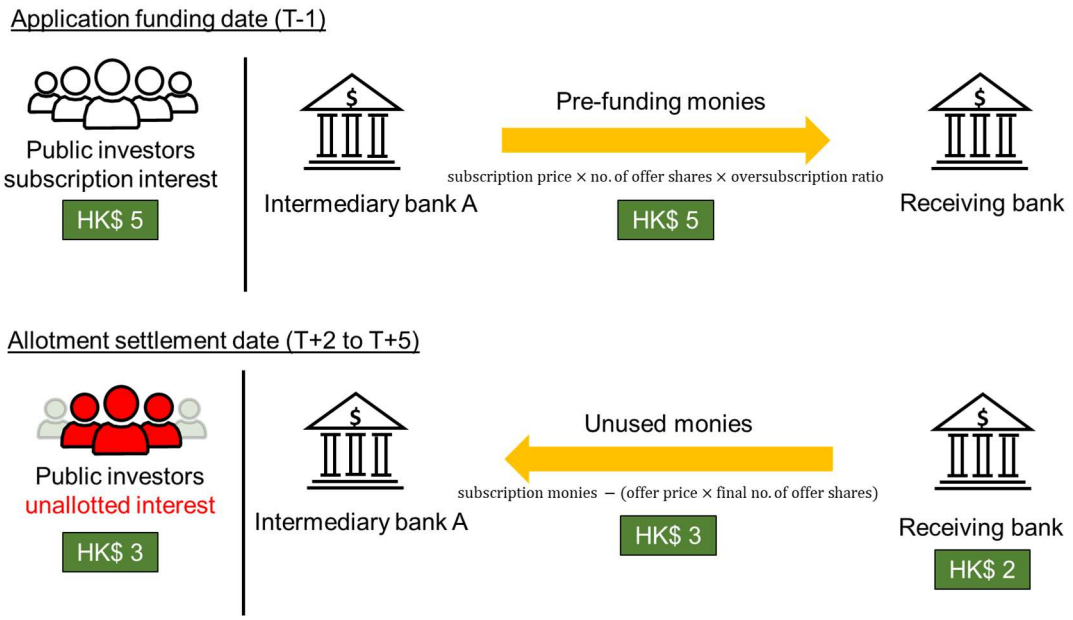
Allotment settlement date	Interbank transfer of unused amounts from receiving banks to intermediary banks Typically occurred between T+2 and T+5	Interbank transfer of the actual allotment amount per intermediary bank to receiving bank. Unused pre-funding monies are concurrently released Occurs on T
Duration	Typically 3 to 6 days	1 day

AN ILLUSTRATIVE EXAMPLE

To illustrate the changes under FINI, a simplified IPO example is presented below, highlighting the differences between the settlement processes before and under FINI.

The details of the simplified IPO are as follows: 1) An IPO issuer seeks to raise three dollars[15]; 2) intermediary bank A receives subscription applications totalling five dollars from public investors; 3) following the balloting process, intermediary bank A receives an allotment of two-dollars-worth of securities[16].

Chart 2: interbank transfers under pre-FINI settlement process



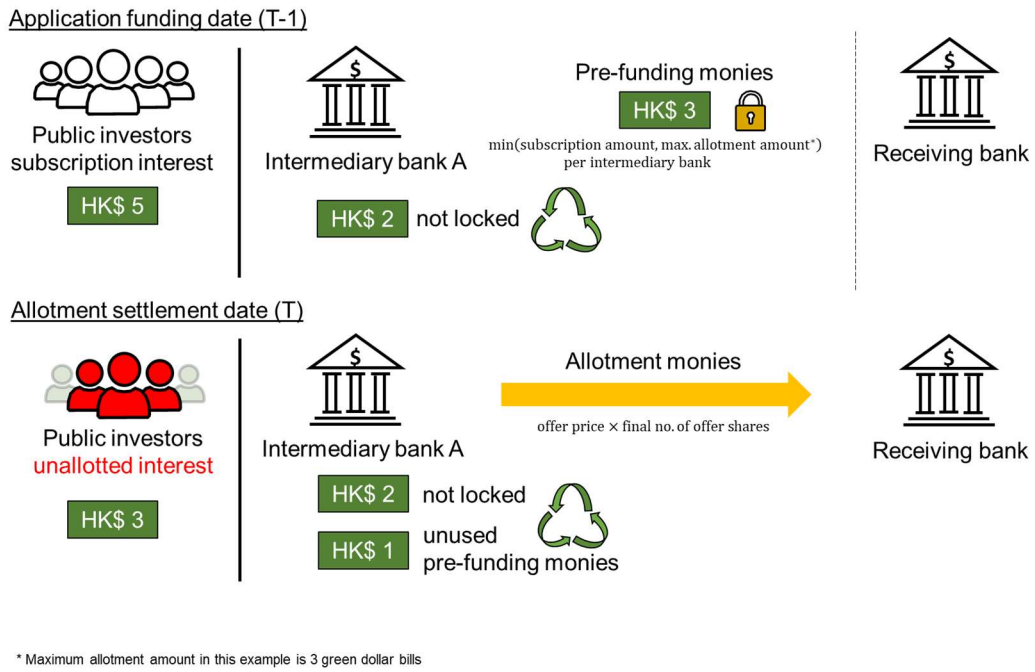
Note: Date T refers to the pricing date of the IPO.

Chart 2 illustrates the interbank transfers prior to the implementation of FINI. On the application funding date (T-1), intermediary bank A transfers five dollars to the receiving bank. On the allotment settlement date (typically a day between T+2 and

[15] Through the public tranche, with no change in offer price and no clawback provision.
[16] The remaining dollar raised is allotted to another intermediary bank not shown on Chart 2.

T+5), the receiving bank remits three dollars back to intermediary bank A for the unallotted interest and retains two dollars for the IPO issuer. This arrangement may lead to substantial funding pressures on both the application funding date and the allotment settlement date.

Chart 3: interbank transfers under FINI



Note*: Maximum allotment amount in this example is 3 green dollar bills. To explicitly elaborate, only 2 green dollar bills worth of shares are allotted to this intermediary bank, and the other 1-dollar bill worth of shares are allotted to another intermediary bank not explicitly shown on this figure.

With the implementation of FINI, given that the maximum amount the IPO issuer can raise through the public tranche is three dollars, intermediary bank A is required to lock only three dollars intrabank on T-1[17] (Chart 3). On the allotment settlement date, T, knowing that intermediary bank A is allotted two-dollars-worth of securities, it transfers two dollars to the receiving bank and concurrently releases the remaining one dollar of locked funds. This reduces both the number and size of interbank transfers, resulting in a mitigation of funding pressures.

4. DATA

This study examines the effect of FINI on interbank liquidity. It utilises four datasets over the sample period from January 2016 to December 2025: (1) IPO data sourced from Bloomberg and official IPO documents published by the HKEX, covering 1,159 IPOs over the sample period. The initial number of public offering shares are

[17] Given the broker, represented by intermediary bank A, opts in for compressed pre-funding requirement.

scraped from these documents using DeepSeek-R1-Qwen[18]; (2) Hong Kong interbank market data, including daily time series of HIBORs and the AB, obtained from the HKMA Monthly Statistical Bulletin; (3) in-house interbank transactional data, which are sourced from the HKMA's HKD real time gross settlement (RTGS) system, with IPO-related transfers to be identified and analysed in the next section; and, (4) other macroeconomic data (e.g. US interest rates[19], the Hang Seng Index, and dividend yields) sourced from Bloomberg and included as control variables in the regression analysis.

Following Leung and Ng (2008), three IPO-related variables are defined. For each IPO, the subscription interest ($Subcription$)[20] on the application funding date is:

$$Subscription = Subscription\ price \times Initial\ number\ of\ shares \times Oversubscription\ ratio$$

On the allotment settlement date, the funds raised ($FundsRaised$) and the unallotted subscription interest ($Unallotted$) are computed as follows:

$$FundsRaised = Offer\ price \times Final\ number\ of\ shares$$

$$Unallotted = Subscription - FundsRaised$$

Individual IPO data points are then aggregated into daily time series. When multiple IPOs occur on the same date, their respective funds are summed. The aggregate time series of these variables are displayed in Chart 4, which shows substantial subscription interest and funds raised both before and after the introduction of FINI.

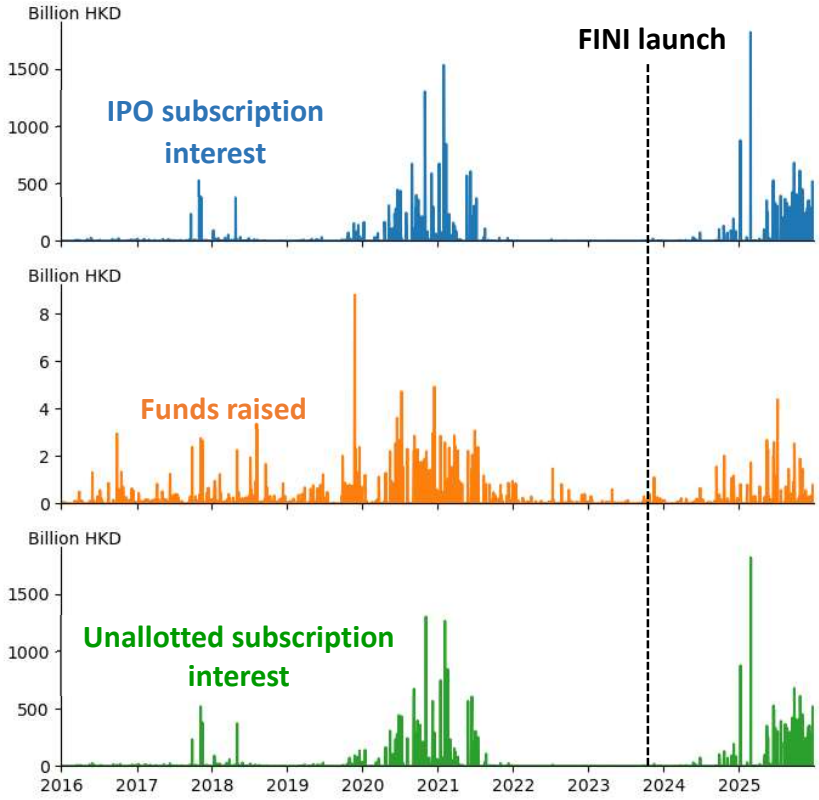
Table 2 provides a comprehensive statistical summary of these variables. The data indicate that the monthly number of IPOs and the average funds raised per IPO have remained relatively stable across the two periods—10.9 vs 8.4 IPOs per month and 256.4 vs 283.2 million HKD per IPO. We also observe that the unallotted subscription interest closely tracks the subscription interest. This is because IPOs are typically oversubscribed, with average subscription levels exceeding 100 times and median levels surpassing 10 times for both periods. Since funds raised represent only a small fraction of the total subscription, the majority of subscriptions remain unallotted.

[18] The robustness of the scraped data is verified through human audits.

[19] US reference rates prior to 20 June 2023 are the US London Interbank Offered Rate (LIBOR). The Secured Overnight Financing Rate (SOFR) is used as the reference rate afterwards. In addition, as the 1-week tenor Term SOFR is unavailable, the 1-week SOFR swap rate has been used since 2022, given that the 1-week US LIBOR also ceased at the end of 2021.

[20] The initial number of shares refers to the quantity of shares the IPO issuer intends to offer in the public tranche, as outlined in its prospectus. The final number of shares refers to the quantity of shares the IPO issuer decides to offer in the public tranche after the subscription period ends, based on public demand.

Chart 4: Total IPO subscription interest, funds raised and unallotted subscription interest over time



Sources: HKMA staff calculation, HKEX website, Bloomberg.

Table 2: IPO statistics during pre-FINI and post-FINI periods

			Pre-FINI (1 Jan 16 – 21 Nov 2023)	**Post-FINI** (22 Nov 2023 – 31 Dec 2025)
Total number of trading days			1941	515
Number of IPOs	Total		962	197
	Monthly average	≤1x AB	10.6	5.81
		>1x AB	0.35	2.52
		Total	10.9	8.4
Subscription interest per IPO (HK$bn)	Average		17.9	89.8
	Median		0.36	6.09
Funds raised per IPO (HK$mn)	Average		256.4	283.2
	Median		62.7	98.4
	Average		17.6	89.5

Unallotted interest per IPO (HK$bn)	Median	0.29	5.64
Oversubscription ratio (times)	Average	132.8	1103.3
	Median	13.1	115.1

Sources: HKMA staff calculation, HKEX website, Bloomberg.
Note: Monthly average number of IPO is calculated by average 22 days trading days multiplied by daily average number of IPOs.

Table 2 also reveals a substantial increase in subscription interest after FINI's introduction, with higher average subscription interest (17.9 vs 89.8 billion HKD per IPO) and increased average oversubscription ratios (132.8 vs 1103.3 times). The rise in subscription interest is partly attributed to the vibrant IPO activity in Hong Kong during 2025[21]. FINI also played a role. As the pre-funding arrangement under FINI reduces the need for interbank loans, interest costs associated with oversubscriptions fall, enabling major securities brokers to offer zero-interest bank financing for IPO subscriptions[22]. This increases the attractiveness of margin financing for retail investors and contributes to higher subscription interest.

5. EFFECTS OF FINI ON INTERBANK TRANSFERS DURING IPOS

This section utilises data from Hong Kong's HKD RTGS system to assess the reduction in interbank transfers under FINI. Chart 5 presents IPO subscription interest and IPO-related RTGS bank transfers[23] in the top and bottom panels respectively. The volume of IPO-related RTGS transfers closely mimics the IPO subscription interest before FINI was launched. Since the launch of FINI (black dashed line), these transfers have declined significantly by 99.4% compared to the pre-FINI period.[24]

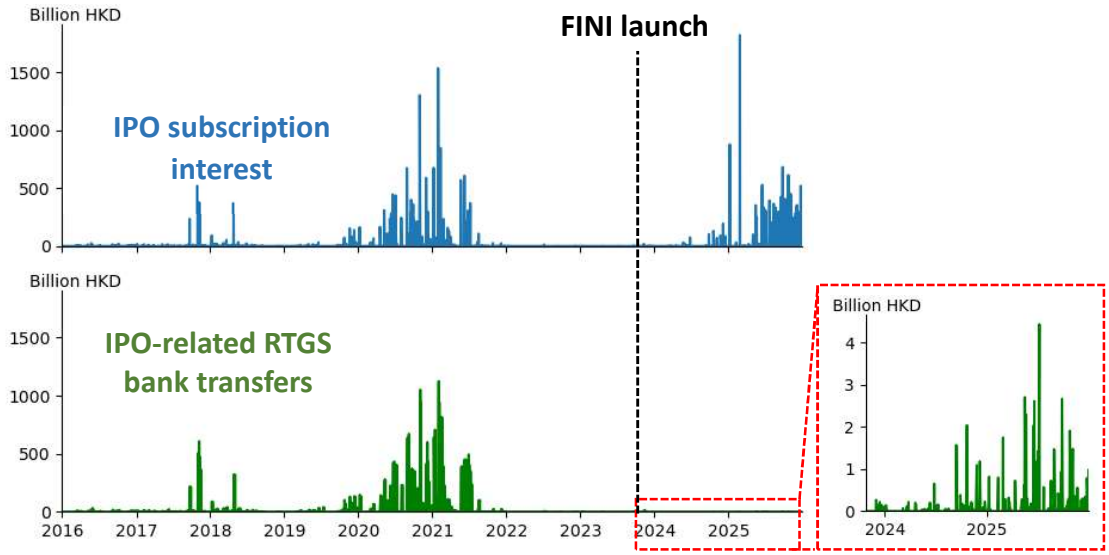
[21] Hong Kong claims the top spot in global IPO market rankings in 2025 (https://kpmg.com/cn/en/home/media/press-releases/2025/12/hk-reclaims-top-global-ipo-spot-in-2025-says-kpmg.html) and according to Bloomberg data, it shows that IPOs listed in 2025 in Hong Kong on average up 41.2% from offer price to first opening price, compared to an average of 13.9% from 2018-2024.

[22] For details, see promotion campaigns found in a number of major securities brokers' websites, with a broker quoting that "FINI significantly shortens the time and lowers interest costs between IPO pricing and listing".

[23] IPO-related RTGS bank transfers include pre-FINI application funding monies, pre-FINI refund of unused monies and the post-FINI allotment monies. They are identified through payment codes IAH, SCI and IFT26.

[24] Apart from IPO subscription data, the HKMA also monitors IPO-related loans. In the pre-FINI days, when large IPOs straddling month-end lead to significant IPO-related borrowing, information on such IPO-related loans was often included in monthly monetary statistics published by the HKMA, for example, https://www.hkma.gov.hk/eng/news-and-media/press-releases/2021/07/20210730-8/. As of the date of writing this paper, post-FINI monthly monetary statistics no longer indicate any significant impact on loans and deposits from IPO-related borrowing.

Chart 5: IPO subscription interest vs. IPO-related RTGS transfers



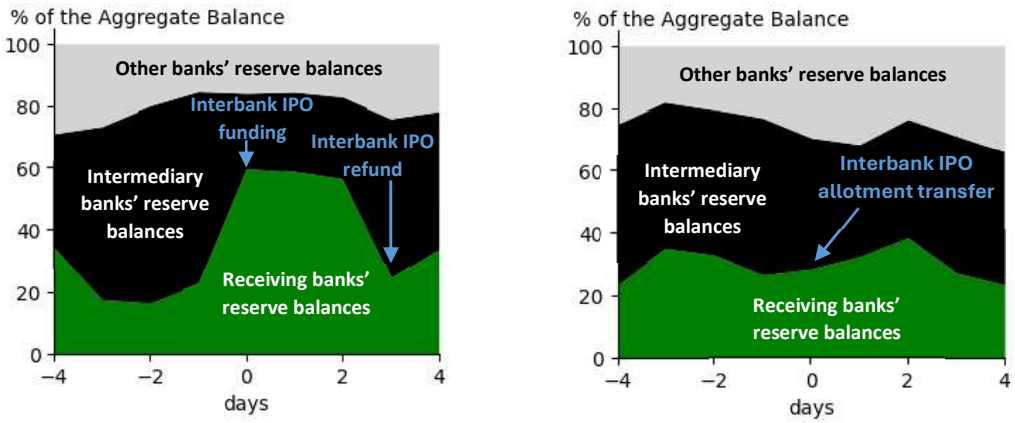
Sources: HKMA staff calculation, HKEX website, Bloomberg, HKD RTGS.
Note: IPO-related RTGS bank transfers include application funding monies pre-FINI, refund of unused monies pre-FINI and the post-FINI allotment monies. Application funding across bank has been waived since the launch of FINI.

This reduction in fund transfers is reflected in the dynamics of banks' reserve balances (i.e. bank's clearing account[25] balance, the sum of which is the AB). Chart 6 decomposes the AB into the reserve balance of the receiving banks, intermediary banks and other banks during two large IPOs, both of which recorded subscriptions in the hundreds of billions of HKD. These two large IPOs occurred before and after the introduction of FINI, respectively. In pre-FINI IPO A, approximately 40% of reserve balances shifted from intermediary banks to receiving banks on the day of interbank IPO funding (i.e. day 0), with reversal occurring upon interbank refund (i.e. day 3). In contrast, post-FINI IPO B led to less change in the reserve balances of receiving banks on the day of interbank IPO allotment transfer (i.e. day 0).

Chart 6: Banks' closing reserve balance in two selected large IPO subscriptions - pre-FINI vs. post-FINI

IPO A pre-FINI IPO B post-FINI

[25] The account maintained by banks with the central bank, or clearing house, for the purpose of paying and settling transactions between the banks themselves or between the banks and the central bank.



Sources: HKMA staff calculation, HKD RTGS.

Our econometric analysis confirms that the abovementioned change in the banks' reserve balance concentration during IPOs would hold true more generally. The econometric analysis proceeds in two steps. First, we compute the daily Herfindahl-Hirschman Index (HHI)[26] to measure banks' reserve balance concentration. The HHI is a common measure of market concentration, ranging from 0 and 1, with higher values indicating greater concentration. Second, we estimate the dynamic response of the HHI to IPO subscriptions using local projections (Jorda, 2005):

$$HHI_{t+k} - HHI_{t-1} = const_k + \xi_k \frac{Subscription_t}{AB_t} + \varepsilon_t$$

where $Subscription_t/AB_t$ is the total subscription interest normalised by the level of the AB, and t is the day when subscription interest triggers the first interbank transfer and k refers to the step in the local projection. The total subscription interest is normalised by the AB to measure the funding pressure induced by IPO activity relative to the prevailing supply of liquid fund within the banking system.

Chart 7 shows the plot of the estimated ξ_k against step k, illustrating the average IPO effect on bank balance concentration around IPOs. The left panel shows a significant increase in concentration during pre-FINI IPOs. This concentration dissipates typically within a few days, consistent with the fund-locked duration suggested in Table 1. The right panel shows that under FINI, the impact on reserve balance concentration has become statistically insignificant.[27] These findings from RTGS system data provide strong evidence of FINI's effectiveness in alleviating interbank funding pressure during heavy IPO subscriptions.

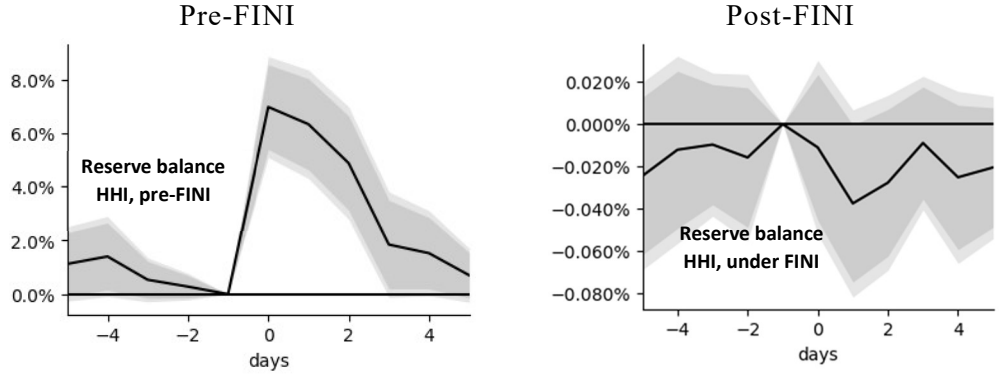
[26] Suppose bank i's reserve balance on day t is denoted by m_{it} and the AB is denoted by $M_t = \sum_i m_{it}$. The HHI is defined as:

$$HHI_t = \sum_i \left(\frac{m_{it}}{M_t}\right)^2$$

To verify the robustness of these findings, we repeat the same exercise using alternative concentration measures in Appendix A. The qualitative results remain the same.

[27] The coefficients ξ_k become smaller in magnitude after introduction of FINI, partly because the total subscription interest-to-AB ratio was on average larger.

Chart 7: Response of asset-weighted closing reserve balance HHI with respective to IPO subscriptions per multiple of the AB



Sources: HKMA staff calculation, HKEX website, Bloomberg, HKD RTGS.
Note: Dark and light shaded areas show the 90% and 95% confidence intervals respectively.

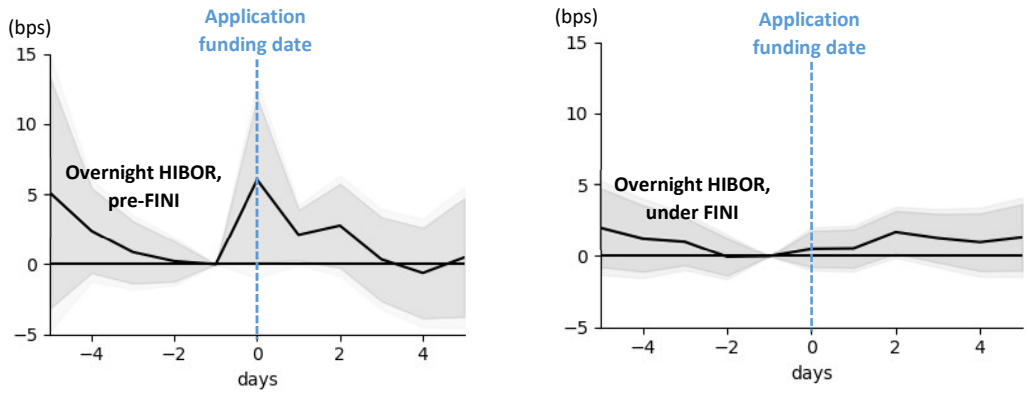
6. EFFECT OF FINI ON INTERBANK RATES DURING IPOS

Next, we turn to the impact of IPO activities on interbank rates before and after the launch of FINI. As a preliminary exercise, we estimate the dynamic response of the overnight HIBOR to IPO subscriptions per multiple of the AB using local projections, analogous to the exercise in the previous section:

$$HIBOR_{t+k} - HIBOR_{t-1} = const_k + \gamma_k \frac{Subscription_t}{AB_t} + \varepsilon_t$$

The overnight HIBOR is now used on the left-hand side of the projection equation. Chart 8 shows the analogous plot of the impulse responses, γ_k. The results indicate a notable rise in the overnight HIBOR on the application funding date for pre-FINI IPOs. This finding coincides with the observed increase in reserve concentrations, with the impact dissipating within a few days. In contrast, no significant impact on the overnight HIBOR is observed for post-FINI IPOs.

Chart 8: Response of overnight HIBOR with respective to IPO subscriptions per multiple of the AB



Sources: HKMA staff calculation, HKEX website, Bloomberg.
Note: Dark and light shaded areas show the 90% and 95% confidence intervals respectively.

The impulse responses provide suggestive evidence that FINI mitigates the spikes in the overnight HIBOR during IPOs. Given that HIBORs are also influenced by other market factors, we assess the robustness of this result by employing the regression model proposed by Leung and Ng (2008), which accounts for additional money market factors. Specifically, we consider the following model:

$$\Delta HIBOR_t = \beta_0 + \beta_1 \frac{Subscription_t}{AB_t} + \beta_2 \frac{Subscription_t}{AB_t} \times FINI_t + \beta_3 \frac{Unallotted_t}{AB_t} + \beta_4 \frac{Unallotted_t}{AB_t} \times FINI_t + \Gamma \times Controls_{i,t-1} + \varepsilon_t$$

The dependent variable in the regression is the change in HIBORs. Given the transient funding pressure caused by IPOs, it is expected that IPOs have the largest impact on the overnight HIBORs. For completeness, we also test with one-week and one-month HIBORs.

On the right-hand side, our primary interest is how a unit increase in IPO subscription interest (expressed as multiples of the AB at the time) on the application funding date affect the HIBORs. $FINI_t$ is a dummy variable which takes the value of one during which IPOs are settled under FINI, *i.e.* from 22 November 2023 until the end of the sample period, and zero otherwise. The coefficient β_1 is expected to be positive as substantial funding pressures may arise from interbank transfers under the pre-FINI settlement process. The coefficient for the interaction term, β_2, is expected to be negative, since FINI may reduce the funding pressures. We also include the unallotted subscription interest to AB ratio, $Unallotted_t/AB_t$ to gauge the interest rate response on the allotment settlement date.

$Controls_{i,t-1}$ denotes the regression controls for other factors influencing the behaviour of HIBORs. Under the Linked Exchange Rate System (LERS), HIBORs should broadly follow their US counterparts while also being influenced by the local supply and demand of HKD funding in the short run. The expectation of HKD appreciation is also controlled by including the out-of-the-money USD/HKD risk

reversal (rr)[28]. To capture changes in the local supply of HKD funding in the interbank market, the change in the AB is also included. Local demand factors may also affect the behaviour of HIBORs. First, equity-related demand, such as HKEX turnover ($HKEXTurn$), Southbound Stock Connect net inflow ($Southbound$) and HSI performance (HSI), may impact local supply and demand of HKD funding. These factors may also influence the level of subscriptions interest for IPOs as described in Section 3. Second, dummy variables are included at month-, quarter-, year-end[29] and during high HK-listed stock dividend payout seasons[30] to capture seasonal HKD demands.

[28] Risk reversal is the difference between the implied volatility of out-of-the-money calls and puts, with a positive risk reversal indicating market expectation of a depreciation in the price currency. This, in turn, according to the interest rate parity, indicates an expectation of an increase of interest rate in the price currency.

[29] The year-end dummy variable takes the value of one during the last five trading days in the month of December; quarter-end dummy variable takes the value of one during the last three trading days in the month of March, June and September; and month-end dummy variable takes the value of one during the last three trading days of all other calendar months.

[30] High HK-listed stock dividend payout seasons are the last three trading days in the month of May, last seven trading days in the month of September, and last 15 trading days June and July. This setting is based on the observed dividend payouts in HKD by Hong Kong-listed stocks.

Table 3: Impact of IPOs on overnight HIBOR

	OLS			Quantile (97.5 percentile)	OLS
Variables	(1) $\Delta HIBOR_t$	(2) $\Delta HIBOR_t$		(3) $\Delta HIBOR_t$	(4) $\frac{HIBOR\ HL\ spread_t}{Base\ Rate_t}$
$Constant$	-4.29***	-4.38***		44.48***	0.03***
$Subscription_t$	6.86**	≤1x AB	7.14	45.42***	0.06***
		>1x AB	6.81*		
$Subscription_t \times FINI_t$	-6.49*	≤1x AB	-13.98	-46.14***	-0.06***
		>1x AB	-6.45*		
$Unallotted_t$	0.74	≤1x AB	7.63	-0.05	0.02*
		>1x AB	0.28		
$Unallotted_t \times FINI_t$	-0.88	≤1x AB	-9.08	-3.42	-0.02*
		>1x AB	-0.41		
$\Delta HIBOR_{t-1}$	-0.09**	-0.09**		0.19	
$\frac{HIBOR\ HL\ spread_{t-1}}{Base\ Rate_{t-1}}$					0.53***
$\Delta SOFR_t$	0.01	0.01		-0.63	
$HIBOR_{t-1} - \delta SOFR_{t-1} + \alpha_1$	-0.07***	-0.07***		-0.01	
$\Delta lnAB_{t-1}$	-127.12***	-127.35***		-209.51	0.04
Δrr_{t-1}	-7.42	-7.46		-20.03	-0.02
ΔHSI_{t-1}	0.20	0.22		0.98	-0.00***
$\Delta Southbound_{t-1}$	6.93	6.90		12.65	-0.02
$\Delta HKEXTurn_{t-1}$	0.72	0.71		-1.30	-0.00
$Dummy_{FINI,t}$	0.14	0.38		25.27***	-0.01*
$Dummy_{Month,t}$	17.46***	17.46***		31.02***	0.04***
$Dummy_{Quarter,t}$	21.82***	21.80***		62.01***	0.06***
$Dummy_{Year,t}$	38.26***	38.19***		134.15***	0.12***
$Dummy_{Dividend,t}$	4.50**	4.58**		7.82	-0.00

Notes:

(a) Heteroskedasticity-and-autocorrelation-consistent standard errors are used.
(b) Interest rate variables are expressed in basis points.
(c) The Aggregate Balance is in HK$ million; ratios to the Aggregate Balance are in decimals.
(d) The subscripts *, ** and *** indicate statistical significance at 10%, 5% and 1%, respectively.

Table 3 reports the regression results with the overnight HIBOR. Column 1 shows our main empirical findings. First, prior to the implementation of FINI, the magnitude of the pickup in overnight HIBOR due to subscription interest is positive

and statistically significant, rising by 6.86 basis points per multiple of AB. This finding is aligned with Leung and Ng (2008). Second, when an IPO is facilitated under FINI, the impact of subscription interest is reduced by 6.49 basis points. In fact, for IPOs facilitated under FINI, the total effect on the overnight HIBOR is still positive, but no longer statistically significant ($total\ effect = 0.36$, t-stat $= 0.59$). This finding supports the proposition that FINI alleviates the short-term liquidity lock-up associated with the previous IPO subscription mechanism for public investors[31] .

The impact of an IPO on the allotment settlement date is insignificant on the overnight HIBOR before FINI, which again is aligned with the findings of Leung and Ng (2008). They reason that overnight funding pressures on the allotment settlement date may be less acute if the lead receiving bank, which is usually a large and well-funded local bank, simply reverses the credit lines extended to the intermediary banks previously on the application funding date. The reaction of HIBOR on the allotment settlement date remains muted under FINI.

Most control variables exhibit the expected signs: the overnight HIBOR rises when funding demands heighten, particularly during dividend-payout seasons and at period-ends; and falls as the AB expands. The overnight HIBOR also exhibits mean-reverting properties and tracks the US interest rates in the long run.

A follow-up question is whether small-scale IPOs and low oversubscription ratios may impose little strains on the interbank market due to small interbank transfers. Column 3 of Table 3 stratifies IPOs by whether their subscription interest exceeded the level of AB (>1x AB) at the time or not.[32] We find that, before FINI was launched, only IPOs with subscription interest exceeding AB imposes significant pressure on the interbank market on the application funding date, increasing the overnight HIBOR by 6.81 basis points per multiple of AB on average. The size of our estimated effect is in the same order of magnitude as in Keung (2019). This underscores that liquidity stress is not uniform but is instead concentrated in large and heavily subscribed IPOs. In contrast, after the launch of FINI, the impact of large IPOs is significantly reduced by 6.45 basis points per multiple of AB, compared to the baseline period prior to FINI.

[31] We do not rule out the possibility that IPOs, especially those with large funding amounts, may occasionally still tighten interbank rates. Migration of deposits by retail investors (IPO subscribers) may cause uncertainty of funding positions at banks, thus causing a tightness in liquidity. Moreover, in the post-FINI world, funding lock-up takes place at the designated banks (usually more than 30 major banks). For popular IPOs, large funding lock-up may spread across many designated banks, causing brief liquidity tightness. For instance, on the application funding date of the IPO of VGT (stock code: 2476) on 16 April 2026, whose fund-raising amount was HK$1.75 billion and oversubscription ratio was 431.5 times, overnight HIBOR increased by 34 bps, amid market friction arising from the funding lock-up and further exacerbated by some large client payments, which collectively contributed to tighter funding conditions. That said, the rise in interbank money market rates reflects the market's expected reaction to a temporary reduction in available funding, indicating a healthy and functioning market.

[32] The threshold for IPO size categorisation is designed to capture the funding pressure it imposes on intermediary banks. For robustness check, a range of thresholds was tested and was found to yield similar results.

Again, the impacts of these large IPOs facilitated under FINI are no longer statistically significant on the overnight HIBOR ($\beta = 0.36$, t-stat $= 0.62$).

Certain major IPOs have coincided with large spikes in the overnight HIBOR (See Chart 1). For instance, the IPO of China Literature (stock code: 0772), whose application funding date was on 31 Oct 2017, recorded subscription interest amounting to HK$521.1 billion – equivalent to 2.9 times the level of AB at the time. The overnight HIBOR spiked from 0.56% the previous day to 2.68%, a rise of 212.2 bps – an increase far exceeding the magnitude suggested by baseline estimates.

This observation motivates an examination of tail effects arising from IPO subscription interest. Using quantile regression, we re-estimate the model at the 97.5th percentile (Column 3). The results indicate that, under extreme scenarios, subscription interest of the size of AB could increase the overnight HIBOR by 45 basis points – a quantitative finding that aligns more closely with the magnitude of spikes observed during large IPOs in Chart 1. Applying this estimation to China Literature, we estimate the increase attributable to IPO subscription interest to be approximately 130 basis points. When combined with other concurrent factors – such as month-end liquidity tightening – the cumulative estimated impact aligns more closely with the observed HIBOR movements.

The same quantile regression (Column 3) indicates that in extreme scenarios, the impact of subscription interest is reduced by 46 basis points under FINI. This aligns with the observation that large IPOs annotated on Chart 1 no longer correspond to notable HIBOR spikes in the post-FINI era. The impact of IPOs on the allotment settlement remains statistically insignificant in extreme scenarios both before and after the implementation of FINI.

As a further robustness check, we examine the IPO effect on the intraday volatility of the overnight HIBOR. As IPOs increase the concentration of reserves, more banks are short of liquidity, and one would expect interbank rates to be more dispersed. To this end, we replace the dependent variable with the high-low spread of the overnight HIBOR, which serves as a proxy for intraday volatility in interbank rates. This spread is expressed as a ratio of the Base Rate, reflecting the range within which the overnight HIBOR is typically traded. Column 4 validates that intraday volatility of the overnight HIBOR increases around IPOs before the introduction of FINI, and that such effect is significantly mitigated after the introduction of FINI.

In Appendix B, we present the IPO effect on HIBORs for longer tenors. The main takeaways are as follows. For the one-week tenor, we observe results similar to the overnight HIBOR, but with a smaller magnitude. For tenors of one-month or longer, none of the IPO-related variables exhibit statistical significance, indicating that longer-

tenor interbank rates remain largely unaffected by IPO-related liquidity pressures. These findings are broadly consistent with Leung and Ng (2008).

THEORETICAL LINKAGE BETWEEN RESERVE BALANCE CONCENTRATION AND INTERBANK RATE

So far, we have shown that, prior to FINI, IPOs increase the concentration of banks' reserve balances and the overnight HIBOR, for a given level of AB. Furthermore, following the implementation of FINI, IPOs no longer lead to a significant increase in the concentration of banks' reserve balances, and the increase in the overnight HIBOR becomes muted. To corroborate our empirical findings, this section provides a theoretical argument explaining why a rise in the concentration of banks' reserve balances results in a rise in the interbank rate (Appendix C presents a model and a formal proof of the argument.). The argument proceeds in three steps:

First, for given total reserves in the banking system, a rise in the concentration of banks' reserve balances increases the reserve balance surpluses in the banks that have surpluses and also the reserve balance deficits in the banks that have deficits. In other words, both the supply of funds and demand for funds in the interbank market increase.

Second, for a banking sector in which the total reserves are large relative to the banks' precautionary or regulatory reserve requirement, the total surplus in reserve balances is larger than the total deficits. Therefore, even though a rise in concentration of banks' reserve balances increase both supply of funds and demand for funds in the interbank market, the proportional increase in total deficits is larger than the proportional increase in total surplus, making the interbank market tighter.

Finally, under mild assumptions, the interbank interest rate is increasing in the interbank market's tightness. taken together, these imply that a rise in the concentration of banks' reserve balances would lead to a rise in the interbank rate.

7. CONCLUSIONS

This study provides a comprehensive analysis of the impact of IPO subscriptions on the Hong Kong dollar interbank market, with a focus on the transformative role of FINI in mitigating liquidity pressures. The findings yield several important policy insights:

- Prior to the introduction of FINI, large-scale IPOs—particularly those experiencing overwhelming public subscription—generated substantial interbank payment flows that significantly strained short-term liquidity. This occurred because intermediary banks were required to transfer the full subscription amounts to receiving banks, leading to heightened demand for interbank borrowing and a consequent increase in the HIBOR. Empirical evidence from the HKD RTGS system confirms that such activities triggered sharp, temporary spikes in reserve balance concentration, with interbank funding pressures persisting for several days. Theory further supports the linkage between reserve balance distribution and the rise in HIBOR.

- The implementation of FINI on 22 November 2023 marked a pivotal shift in the IPO settlement framework. By shortening the fund lock-up period and replacing the requirement for full funding across banks with a compressed pre-funding requirement conducted within banks, FINI significantly reduced the scale of interbank transfers and the associated impact on the banks' reserve balance concentration. Empirical evidence demonstrates a near-elimination of HIBOR spikes on both the application funding date and the allotment settlement date, even for large, heavily oversubscribed IPOs.

In conclusion, the implementation of FINI represents a major structural enhancement in Hong Kong's financial infrastructure. It effectively addresses the long-standing IPO-induced liquidity volatility by reducing both the magnitude and duration of interbank payment flows triggered by large-scale subscriptions. Our empirical results confirm the effectiveness of FINI, indicating that Hong Kong's interbank market has become more efficient and resilient to future surges in IPO subscriptions. FINI demonstrates how modernising settlement infrastructure can help mitigate adverse effects of large-scale transactions on the broader monetary system.

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Appendix A: Robustness check on different measures bank's reserve balance concentration

We conduct a robustness check of our results about reserve balance concentration using alternative measures of reserve concentration: the Gini coefficient[33], the asset-weighted Gini coefficient[34] and concentration ratio[35]. All these measures range between 0% and 100%, where 0% indicates perfect equality and 100% indicates maximum concentration, with higher values indicating greater concentration.

We re-estimate the local projection model (as specified in Section 5) using each of these alternative concentration measures. As shown in Chart A.1, the results exhibit a consistent pattern across all metrics: a significant and temporary increase in concentration during pre-FINI IPOs, with concentration dissipating within a few days, while under FINI, the impact on concentration is both statistically and economically negligible. The robustness of our findings across multiple metrics affirms our conclusions regarding the effect of FINI on interbank reserve distribution during IPOs.

[33] The measure is calculated as follows. First, we let m_{it} denote bank i's reserve balance on day t and there are N banks in total. Second, we order banks by reserve balance indexed in ascending order ($m_{i,t} < m_{i+1,t}$). Finally, we compute the measure as follows:

$$\text{Gini}_t = 1 - \frac{\sum_{i=1}^{n} \frac{1}{N} \left(S_{i-1,t} + S_{i,t}\right)}{S_{n,t}}$$

where $S_{i,t} = \sum_{j=1}^{i} m_{j,t}$ and $S_{0,t} = 0$.

[34] We follow Wong and Zhang (2025) to compute the asset-weighted Gini coefficient on banks' reserve balance. First, we let m_{it} denote bank i's reserve balance on day t, $a_{i,t}$ denote bank i's assets on day t, A_t denote total bank sector assets on day t. Second, we order banks by reserve balance per assets indexed in ascending order ($\frac{m_{i,t}}{a_{i,t}} < \frac{m_{i+1,t}}{a_{i+1,t}}$). Finally, we compute the coefficient as follows:

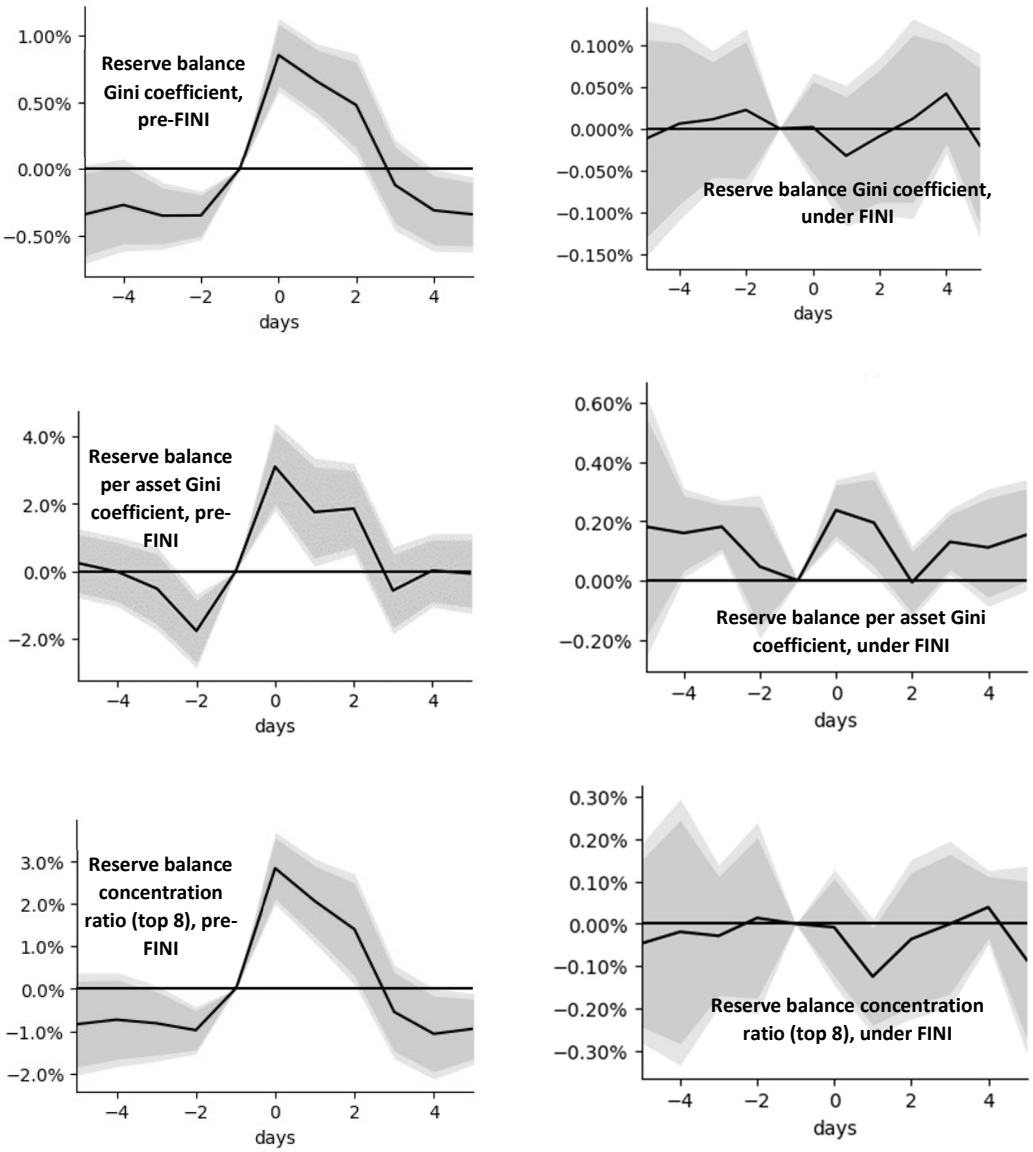
$$\text{Asset-weighted Gini}_t = 1 - \frac{\sum_{i=1}^{n} \frac{a_{i,t}}{A_t} \left(S_{i-1,t} + S_{i,t}\right)}{S_{n,t}}$$

where $S_{i,t} = \sum_{j=1}^{i} \frac{a_{j,t}}{A_t} \frac{m_{j,t}}{a_{j,t}}$ and $S_{0,t} = 0$.

[35] The concentration ratio is calculated as the sum of the percentage shares of the eight banks with the largest reserve balances.

Chart A.1: Response of banks' closing reserve balance concentration measures with respective to IPO subscriptions per multiple of the AB

Pre-FINI | Under FINI



Sources: HKMA staff calculation, HKEX website, Bloomberg, HKD RTGS.
Note: Dark and light shaded areas show the 90% and 95% confidence intervals respectively.

Appendix B: The impact of IPOs on HIBORs at longer tenors

Table 4: Impact of IPOs on 1-week and 1-month HIBOR

	1-week HIBOR			1-month HIBOR		
Variables	(1) $\Delta HIBOR_t$	(2) $\Delta HIBOR_t$		(3) $\Delta HIBOR_t$	(4) $\Delta HIBOR_t$	
$Constant$	-0.90**	-0.94**		-0.04	-0.06	
$Subscription_t$	3.49***	≤1x AB	2.58	0.59	≤1x	0.67
		>1x AB	3.52***		>1x	0.58
$Subscription_t \times FINI_t$	-3.21***	≤1x AB	1.00	-0.52	≤1x	0.89
		>1x AB	-3.24***		>1x	-0.51
$Unallotted_t$	0.46	≤1x AB	3.87	0.26	≤1x	1.92
		>1x AB	0.24		>1x	0.15
$Unallotted_t \times FINI_t$	0.02	≤1x AB	3.22	-0.12	≤1x	-0.25
		>1x AB	0.25		>1x	0.01
$\Delta HIBOR_{t-1}$	0.27***	0.27***		0.37***	0.37***	
$\Delta SOFR_t$	0.32**	0.33**		0.19***	0.19***	
$HIBOR_{t-1} - \delta SOFR_{t-1} + \alpha_1$	-0.03***	-0.03***		-0.01**	-0.01**	
$\Delta lnAB_{t-1}$	-86.08***	-86.07***		-47.77***	-47.79***	
Δrr_{t-1}	-11.18	-11.24		5.19	5.14	
ΔHSI_{t-1}	0.15	0.15		-0.10	-0.10	
$\Delta Southbound_{t-1}$	3.91	4.00		4.72***	4.71***	
$\Delta HKEXTurn_{t-1}$	0.05	0.03		-0.09	-0.10	
$Dummy_{FINI,t}$	-0.60	-0.77		-0.43	-0.47	
$Dummy_{Month,t}$	1.50*	1.51*		0.34	0.35	
$Dummy_{Quarter,t}$	-0.54	-0.59		-0.72	-0.76	
$Dummy_{Year,t}$	11.60***	11.60***		-0.57	-0.58	
$Dummy_{Dividend,t}$	2.59***	2.62***		0.55	0.56	

Notes:
(a) Heteroskedasticity-and-autocorrelation-consistent standard errors are used.
(b) Interest rate variables are expressed in basis points.
(c) The Aggregate Balance is in HK$ million; ratios of variables to the Aggregate Balance are in decimals.
(d) The subscripts *, ** and *** indicate statistical significance at 10%, 5% and 1%, respectively.

We find similar results for the IPO impacts on the one-week tenor, though with a lower magnitude. Using models similar to those in Column 2 and 3 of Table 4, but substituting the overnight HIBOR with 1-week HIBOR, we find that subscription interest on the application funding date increases the 1-week HIBOR by 3.49 basis

points per multiple of AB pre-FINI, and the effect is reduced by 3.21 basis points for IPOs facilitated under FINI (Column 2). On top of that, we once again find that only larger and more heavily subscribed IPOs induce liquidity stresses on the interbank market (Column 3). While IPO with subscription interest smaller than AB have no significant impact, IPO with subscription interest larger than AB induces 3.52 basis points increase per multiple of AB pre-FINI, which is also reduced by 3.24 basis points under FINI. The impact on the allotment settlement date remains statistically insignificant[36]. For tenors of one-month or above, none of the IPO-related variables exhibit statistical significance, indicating that longer-tenor interbank rates remain largely unaffected by IPO-related liquidity pressures. These findings are largely consistent with Leung and Ng (2008).

[36] Despite IPO impact on allotment settlement date under FINI being statistically different from impact during pre-FINI, its impact remains statistically insignificant on the 1-month HIBOR.

Appendix C: Reserve balance concentration and interbank rate

This appendix presents the full model which features a banking sector with deposit reshuffling, an interbank market, and a central bank which serves as a lender of the last resort.

There are many *ex ante* identical banks. Each bank has deposit d and reserve balance m in the beginning of a day. Assume that each bank indexed j experiences an idiosyncratic withdrawal shock to its deposits x^j, where $x^j \sim F(x)$. The bank's end-of-day deposit is $(1 + x^j)d$, and its remaining reserve balance adjusts accordingly to $(m + x^j d)$. The distribution of the shock has full support across $x \in [-1, \infty)$, and that $E_F(x) = 0$, so that deposits merely reshuffle within the banking system.

Each bank is subject to a minimum reserve requirement (out of regulation or precautionary motives) which is at least a fraction $\rho > 0$ of end-of-day deposits. Assume that the aggregate balance in the banking sector is more than enough to meet the reserve requirement, *i.e.* $m > \rho d$. Then one can define the 'surplus' or 'deficit' of reserve balances relative to this minimum reserves as:

$$s^j = \left(m + x^j d\right) - \rho\left(1 + x^j\right)d.$$

It is useful to define the interbank market tightness as $\theta \equiv S^-/S^+$, where $S^- = -\sum_j \min\{s^j, 0\}$ and $S^+ = \sum_j \max\{s^j, 0\}$ denote, respectively, the sum of deficits and surpluses in the banking sector.

Banks trade their surpluses and deficits in the interbank market. After the interbank market closes, banks which still have deficits in funds borrow through the central bank's discount window paying an exogenous interest rate i^w, whereas banks which have surpluses in funds deposit at the central bank earning an exogenous interest rate i^m, where $i^w > i^m$. The interbank market rate is given by:

$$i^f(\theta) = i^m + [1 - \varphi(\theta)](i^w - i^m)$$

Here the interbank interest rate is a weighted average between the interest rate on reserves and the interest rate on the discount window. The weight is given by $\varphi(\theta)$, which is decreasing in the interbank market tightness θ, i.e. $\varphi'(\theta) < 0$. This equation is quite general and can be derived from various interbank microfoundations, such as Poole (1968) or Bianchi and Bigio (2025).

The following proposition shows that a more spread-out distribution of bank reserves, such as one arises due to IPO fund transfers, would increase the interbank rate:

Proposition 1*: For any distributions F, G that have identical support within the interval $[-1, \infty)$, if G is a mean-preserving spread of F, then $i^f(\theta_F) \leq i^f(\theta_G)$.*

Proof: It is immediate from the interbank interest rate equation that $\frac{di^f(\theta)}{d\theta} = -\varphi'(\theta)(i^w - i^m) > 0$, so it remains to show that $\theta_F \leq \theta_G$. Define a cutoff value of the shock, x^*, below which the bank is short of reserves, where:

$$x^* = -\frac{\left(\frac{m}{d} - \rho\right)}{1-\rho} \leq 0.$$

In other words, banks which receive a shock $x^j \geq x^*$ will have surplus funds, which they can lend out. On the other hand, banks that receive a shock $x^j < x^*$ will have deficit in reserves and need to borrow. Using the definition of interbank market tightness, we have:

$$\theta_F \equiv \frac{-\int_{-1}^{x^*}(m + xd - \rho(1+x)d)dF(x)}{\int_{x^*}^{\infty}(m + xd - \rho(1+x)d)dF(x)} = \frac{-\int_{-1}^{x^*}(-x^* + x)dF(x)}{\int_{x^*}^{\infty}(-x^* + x)dF(x)}$$

$$= \frac{x^*F(x^*) - \int_{-1}^{x^*} xdF(x)}{-x^*[1-F(x^*)] + \int_{x^*}^{\infty} xdF(x)} = \frac{x^*F(x^*) - \int_{-1}^{x^*} xdF(x)}{-x^*[1-F(x^*)] - \int_{-1}^{x^*} xdF(x)}$$

$$= 1 + \frac{x^*}{-x^*[1-F(x^*)] - \int_{-1}^{x^*} xdF(x)} = 1 - \frac{(-x^*)}{\int_{-1}^{x^*} F(x)dx - x^*},$$

where the second line uses the fact that $E_F(x) = 0$, and the last equality uses integration by parts. The fact that G is a mean-preserving spread of F implies that $E_G(x) = 0$, and that F is second-order stochastic dominant over G, which implies that $\int_{-1}^{x^*} F(x)dx \leq \int_{-1}^{x^*} G(x)dx$ for any x^*. Therefore,

$$\theta_F = 1 - \frac{(-x^*)}{\int_{-1}^{x^*} F(x)dx - x^*} \leq 1 - \frac{(-x^*)}{\int_{-1}^{x^*} G(x)dx - x^*} = \theta_G.$$

□

For example, if the deposit shock x follows a shifted log-normal distribution, where $\ln(1+x) \sim N(-0.5\sigma^2, \sigma^2)$, and $E(x) = 0$. Then,

$$sgn\left(\frac{d\theta}{d\sigma}\right) = sgn\left(\phi\left(\frac{\ln(1+x^*) - 0.5\sigma^2}{\sigma}\right)\right) > 0$$

where $\phi(.)$ is the probability density function of a standard normal distribution. Hence, as reserve concentration increases, (i.e. σ increases), the interbank rate rises:

$$\frac{di^f(\theta)}{d\sigma} = \frac{di^f(\theta)}{d\theta} \times \frac{d\theta}{d\sigma} > 0.$$