No. 2025-10 BANK OF KOREA

BOK Issue Note

April 29, 2025

Covered Interest Parity Deviation (CIPD) in South Korea: Who Moves It and Why It Matters?

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① Covered interest parity deviation (CIPD) measures the differences in the cost for obtaining U.S. dollars between Korean Won (KRW)-based domestic agents and US dollar (USD)-based foreign investors. Specifically, it is the difference between the interest rate implied by the foreign exchange (FX) derivatives (i.e., the synthetic dollar funding) in Korea and the interest rate paid directly in the USD cash market. Hence, CIPD represents the additional spreads that KRW-based investors must pay to obtain USD funding in the FX derivatives market.

② CIPD is the equilibrium price for USD funding determined by the interaction of demand and supply in the FX derivatives market. On the demand side, KRW-based investors seek to raise USD by paying a premium equivalent to CIPD. On the supply side, foreign investors supply USD when the compensation exceeds the costs. It is essential to analyze both demand- and supply-side dynamics in foreign currency markets to understand changes in CIPD.

③ This paper (i) reclassifies KRW-USD derivatives transactions conducted by FX banks according to their transaction counterparties to construct a panel dataset; (ii) uses this dataset to estimate each sector of market participants' USD funding supply and demand; (iii) decomposes changes in CIPD into the contributions of each sector; and finally (iv) investigate the implications of CIPD in terms of exchange rates and capital flows.

④ The decomposition of CIPD into resident (demand-side) and foreign (supply-side) factors demonstrates that it is indeed the interaction of both supply and demand forces that determines CIPD. During the sample period, foreign factors accounted for 61% of the changes in CIPD, while resident factors represented 39%.

⑤ To account for the implications of CIPD in terms of exchange rates, it is important to consider the role of FX banks. When foreign investors buy non-deliverable forwards (NDF), FX banks—acting as counterparties (especially foreign bank branches) —purchase USD in the spot market, and at the same time, increase the supply of USD funding in FX derivative market. This process typically leads to a rise in the USD/KRW exchange rate (i.e., KRW depreciation) and decline in CIPD, indicating reduced USD funding pressure. This paper uses the decomposed CIPD resulting from foreigners' NDF transactions as an exogenous shock to verify this relationship between CIPD and exchange rates.

⑥ This paper also investigates the implications of CIPD in terms of capital flows. A rise in CIPD increases the incentive for foreign investors to invest in KRW-denominated bonds, while reducing the incentive for resident investors to invest in overseas bonds. To verify this, the analysis employs an instrumental variable (IV) approach and address the endogeneity between CIPD and the investment decisions of foreigners and residents. Specifically, for foreign investors' KRW bond investment, changes in CIPD driven by shifts in residents' demand are used as the IV. Conversely, for residents' overseas bond investment, changes in CIPD attributable to variations in the supply from foreigners' deliverable transactions serve as the IV. The analysis found that an increase in CIPD encourages the repatriation of residents' overseas investment funds and stimulates inflows of foreign investment into KRW-denominated bonds

⑦ Given the tight linkage between Korea's FX market and financial market through FX derivatives, this paper underscores the necessity of a holistic analysis that accounts for cross-market interconnectedness using the microdata of financial institutions, rather than relying on fragmented examinations of individual markets.

■ We would like to express our sincere appreciation to Yoon Kyoungsoo, Yang Yanghyeon, Park Ki-Dok, for their comments and suggestions. Any errors in this paper are solely the responsibility of the authors.

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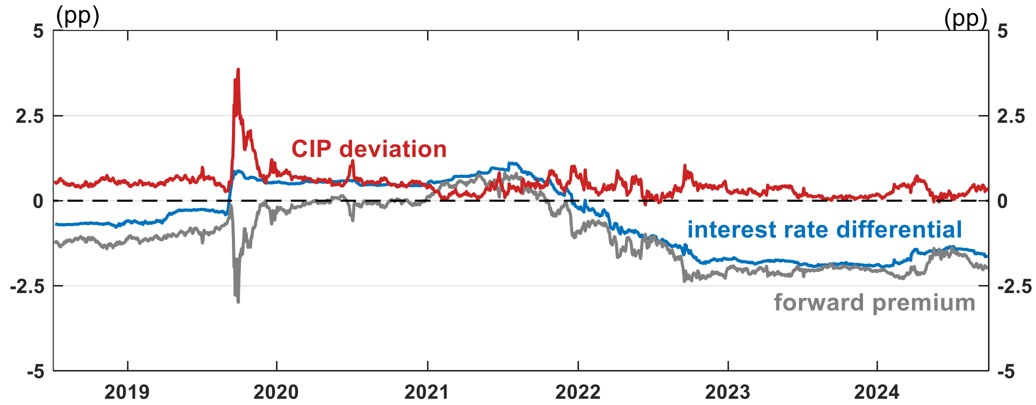
I. Background

Covered interest parity deviation (CIPD) measures the differences in the cost for obtaining U.S. dollars between Korean Won (KRW)-based domestic agents and US dollar (USD)-based foreign investors. Specifically, it is the difference between the interest rate implied by the foreign exchange (FX) derivatives (i.e., the synthetic dollar funding) in Korea and the interest rate paid directly in the USD cash market. Hence, CIPD represents the additional spreads that KRW-based investors must pay to obtain USD funding in the FX derivatives market from the foreign investors.

$$CIPD_t \equiv \underbrace{(i_t - \overbrace{(f_t - s_t)}^{\text{Swap rate}})}_{\text{USD funding rate using derivatives}} - \underbrace{i_t^{\,*}}_{\text{Interest rate in the cash market}}$$

Foreign investors are able to obtain USD funding directly (e.g., from the repo market or wholesale funding markets) using USD assets (such as U.S. Treasuries) as collateral. They can supply these USD funds in the FX swap market (in the form of Sell & Buy swap) to KRW-based investors.[1] Under this arrangement, foreign investors (the USD suppliers) earn a profit equivalent to CIPD,[2] while KRW-based investors (the USD demanders) pays this spread as the cost of accessing USD liquidity through the derivatives market.

Figure 1. CIP deviations in South Korea



Notes: The interest rate differential is the difference between the 3 month SOFR and the 3-month Korean MSB(monetary stabilization bond) rate. The forward premium is the annualized difference between the 3-month forward rate and the spot rate.CIP deviation is difference between interest differential and forward premium.

Sources: Bloomberg, Bank of Korea .

Therefore, CIPD can be interpreted the equilibrium price that emerges from the interaction between the demand for and supply of USD funding.[3] The literature indicates that, in South Korea, CIPD is primarily driven by insufficient supply in the foreign currency funding market relative to demand[4]—a tendency that becomes more pronounced during periods of global USD liquidity contraction.[5] This paper is the first study that decomposes CIPD in Korea into supply and demand factors using granular data.

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[1] The KRW funds received through this swap contract are often subsequently be invested in KRW-denominated bonds.

[2] For example, when foreign investors raise KRW by lending USD through FX swaps (Sell & Buy), they receive a benefit equal to CIPD. Conversely, resident investors who lend KRW and raise USD funds via FX swaps (Buy & Sell) incur a cost equivalent to CIPD. The table below provides data in February 6, 2025 to calculate CIPD.

As of February 6, 2025 (unit: %, %p)	Monetary stabilization bonds (i_t)(91-day)	SOFR(i_t^*)(3-month)	Domestic/international interest rate spread ($i_t - i_t^*$, A)	Swap rate ($f_t - s_t$, B)	CIPD (=A-B)
	2.87	4.30	-1.43	-1.61	0.18

[3] Cerutti, Obstfeld, and Zhou (2021), Du and Schreger (2022).

[4] See Yang Yanghyeon, Lee Hyerim (2008) for CIPD in Korea.

[5] See Jeong (2010), Du, Tepper and Verdelhan (2018).

Moreover, previous studies have primarily examined CIPD as an incentive for foreign investment in KRW-denominated bonds.[6] However, with the recent significant increase in overseas investments by Korean residents, CIPD has become an important factor for not only foreigners but also residents, as it directly affects the USD funding costs associated with their overseas investments.[7] Furthermore, the supply of USD through foreigners' non-deliverable forwards (NDFs) interacts with the spot FX market.[8] Accordingly, analyzing CIPD requires an integrated approach that incorporates domestic residents' overseas portfolio investments and their interaction with the spot FX market, alongside foreign investors' activities in KRW-denominated bonds.

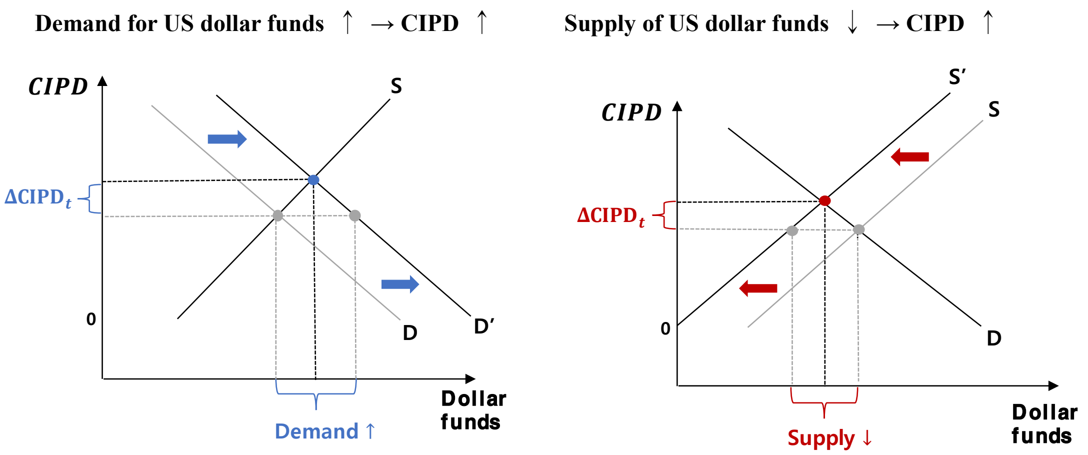
With these considerations in mind, this study establishes and estimates a model that incorporates both supply and demand factors in the dollar funding market. Based on this estimated model, it then analyzes the factors driving changes in CIPD in market participant level. Finally, the study examines the impact of a higher CIPD on the USD/KRW exchange rate, foreign investors' domestic bond investment, and residents' overseas bond investment.

II. Supply and Demand Forces Driving in CIPD

① Supply and demand by entity in dollar funding market

CIPD is the equilibrium price that reflects the outcome of supply-demand settlements in the dollar funding market. A reduction in the supply of dollar funds and/or an increase in demand for dollar funds leads to a rise in CIPD (Figure 2).[9] Therefore, analyzing changes in CIPD requires considerations of both supply and demand factors in the dollar funding market.

Figure 2. Changes in CIPD due to supply and demand factors



For example, in South Korea, the rise in CIPD during the second half of 2007 (right before the Global Financial Crisis) was primarily driven by increased demand for USD funds,[10] while the rise in CIPD in the first half of 2020 was mainly attributed to a reduction in the supply of USD funds. In 2007, increased forward selling by shipbuilders to hedge FX risks on export proceeds, along with asset management companies hedging their overseas assets, heightened the

[6] Yu Bokgeun (2018), Kang Hyeonju, Lee Hyoseop (2023), et al.

[7] There are many studies focusing the relationships between the foreign currency funding market, domestic funding market, and bond investment flows, which include Hong, Oeking, Kang, and Rhee (2021), Kubitza, Sigaux, and Vandeweyer (2025), and Tola, Koomen, and Repele (2020)

[8] When foreigners purchase NDFs, the counterparty FX banks buy FX spot to hedge FX risks.

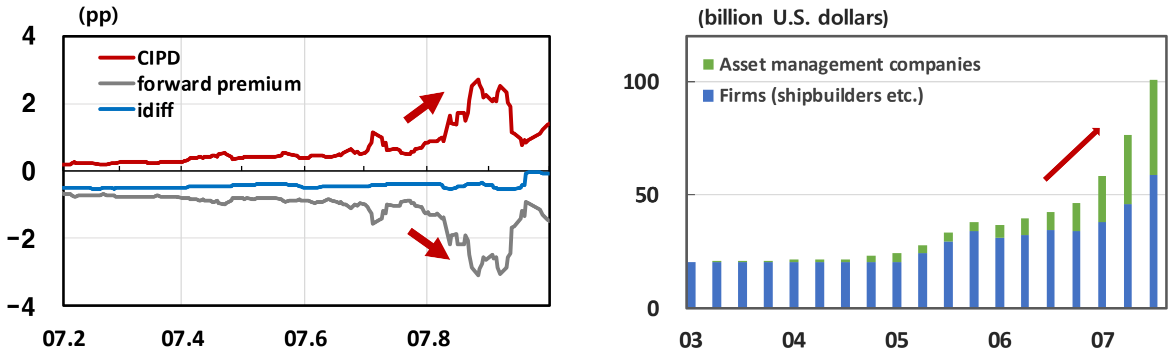
[9] For example, a Sell & Buy swap—where foreign currency is lent and then received back at maturity—indicates the supply of USD funds. Conversely, a Buy & Sell swap reflects the demand for USD funds.

[10] The increase in CIPD during the Global Financial Crisis in 2008 was largely driven by a contraction in the supply of USD funds by global banks, as documented by Du and Schreger (2022).

demand for dollar funds among FX banks. This surge in hedging activity led to a rise in CIPD (Figure 3).[11] Meanwhile, during the COVID-19 crisis in March 2020, a decrease in FX banks' dollar funds—driven by a decline in foreigners' net purchases of NDFs—caused CIPD to increase (Figure 4).[12]

Figure 3. Rise in CIPD due to forward selling by shipbuilders (2007)

(a) CIP deviation (2007) **(b) Net selling of forwards**

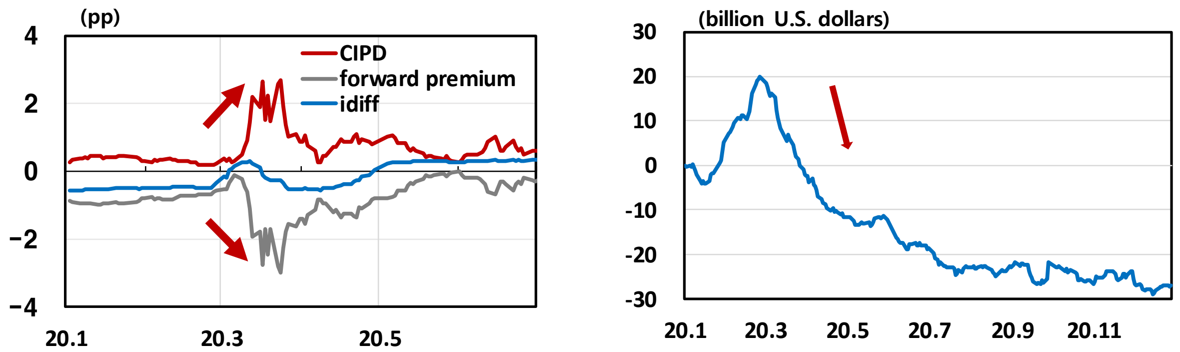


Note: CIP deviation is calculated based on 3-month monetary stabilization bond rates, 3-month Libor rate, and annualized forward premium between 3-month forward rate and the spot rate.

Sources: Bloomberg, Bank of Korea

Figure 4. Rise in CIPD due to decrease in foreigners' net NDF purchases (COVID-19 crisis, March 2020)

(a) CIP deviations (2020) **(b) Net purchase of offshore NDFs**



Note: CIP deviation is calculated based on 3-month monetary stabilization bond rates, 3-month SOFR, and annualized forward premium between 3-month forward rate and the spot rate.

Sources: Bloomberg, Bank of Korea

To enable a comprehensive analysis, the KRW-USD derivative transactions reported by FX banks are reclassified by counterparty type. After reclassification, a panel data is constructed to capture each entity's USD funding demand intermediated by banks. Demand for USD funds is measured by the change in the net balance of far-leg sold to FX banks by counterparties, encompassing Buy & Sell swaps and forward sales, including NDF transactions.[13] There are a total of 12 entities, broadly categorized as either foreigners or residents. The resident group comprises 10 entities, including FX banks (domestic banks and branches of foreign banks in Korea), insurance companies, securities companies, asset management companies, and corporations. Foreign entities are further classified as "Foreigner ND" for non-deliverable transactions and "Foreigner D" for transactions involving the delivery of principal at maturity.

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[11] When shipbuilders sell forwards to hedge export proceeds, FX banks take a long position in far leg. Banks increases the demand for USD funds (Buy & Sell) and sell USD in the spot market to manage the resulting exposure.

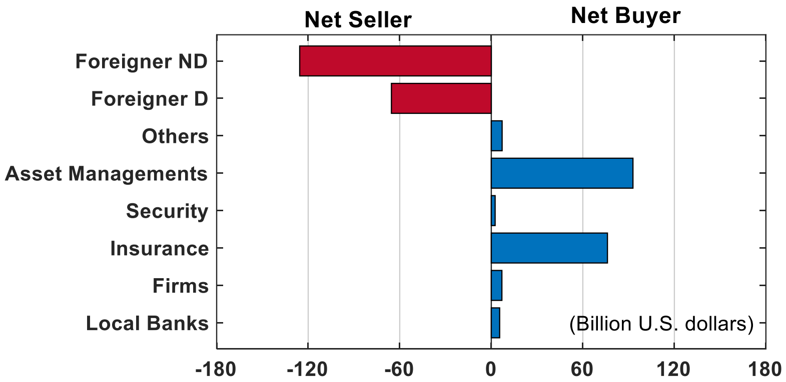
[12] When foreigners purchase NDFs, FX banks hold short positions on forwards and purchase spot positions to hedge the short position, contributing to the supply of USD funds to USD funding market (Sell & Buy). This means that a reduction in foreigners' NDF purchases leads to a decreased supply of USD in the foreign currency funding market.

[13] Supply is treated as negative (-) demand.

The constructed panel data on dollar funding demand by entity indicates that foreigners are primarily classified as suppliers of dollar funds, while residents are mostly classified as demanders (Figure 5). FX banks act as intermediaries, channeling dollar funds supplied by foreigners to residents in the market. In this way, the supply of dollar funds from foreigners is linked to residents' demand through the intermediation of FX banks. Among resident entities, asset management companies and insurance companies exhibit notably higher demand for dollar funds compared to other residents, primarily due to their overseas investment activities.

An analysis of market share based on transaction volume (sum of long and short positions) (Figure 6) shows that foreigners account for a larger share (34.2%) compared to residents (15.8%). Domestic banks (20.7%) and Korean branches of foreign banks (29.3%) together account for approximately half of all transactions. Among residents, insurance companies, securities companies, and asset management companies each account for around 3% of all transactions. For non-residents, the share of ND transactions (19.0%) is slightly higher than that of general transactions (15.2%).

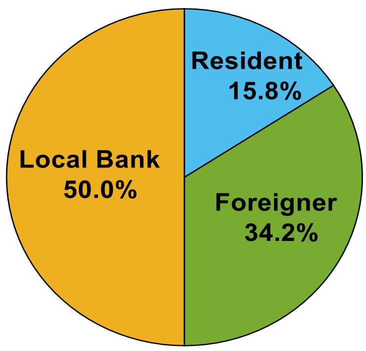
Figure 5. Demand for US dollars funding by entity[1)2)]



Notes: Net selling in far leg by each entity against FX banks, including Buy & Sell swaps and forward selling (such as NDF transactions), averaged over 2024. "Foreigner D" refers to transactions involving the actual delivery of underlying assets, while "Foreigner ND" indicates non-deliverable transactions. "Others" includes credit-specialized financial companies, other financial institutions, the government, and pension funds.

Source: Bank of Korea.

Figure 6. Share of USD funding market by entity[1)2)]



Notes: The share of the dollar funding market represents each entity's market participation as a proportion of the total market, where market participation is defined as the sum of long and short positions in far-dated contracts against FX banks (average over the entire period). "Others" includes credit-specialized financial companies, other financial institutions, the government, and pension funds.

Source: Bank of Korea

② An equilibrium model for dollar funding market

To analyze changes in CIPD based on the supply and demand dynamics of each market participant in the dollar funding market, the following model is established. Demand for dollar funds ($q_{i,t}$) by entity (i) is determined by price factors, global factors, and idiosyncratic factors.

$$q_{i,t} = \underbrace{-\zeta_i CIPD_t}_{\text{Price factors}} + \overbrace{\underbrace{\lambda_i \eta_t}_{\text{Global factors}} + \underbrace{u_{i,t}}_{\text{Idiosyncratic factors}}}^{\text{Demand shift}} \qquad (1)$$

Price factors reflect changes in the quantity demanded resulting from changes in price (i.e., CIPD), corresponding to movements along the demand curve. In contrast, global and idiosyncratic factors cause shifts of the demand curve itself. Here, supply is represented as negative (-) demand. ζ_i and λ_i represent the price elasticity of CIPD and the response coefficient for the global variable, respectively.

The price elasticity of individual entities cannot be consistently estimated via ordinary least squares (OLS) due to endogeneity. An increase in idiosyncratic factors ($u_{i,t}$) raises each entity's demand for dollar funds, which in turn leads to a higher price (i.e., CIPD). Hence, there is endogeneity between the demand of individual entities and CIPD, so estimation using OLS results in bias.

Drawing on Gabaix and Koijen (2024) and Chaudhary, Fu, and Zhou (2025), the model is estimated[14] via the generalized method of moments (GMM) using granular IV (GIV). GIV is a methodology where the price elasticity of a specific entity is identified using idiosyncratic factors of other entities as IV. The idiosyncratic factors of other entities are uncorrelated with the idiosyncratic factors of a given entity i, but still influence changes in the price variable (CIPD). This satisfies the key conditions for a valid IV. When estimated using this method, the endogeneity problem between CIPD (price variable) and demand for dollar funds (quantity variable) is addressed, thereby avoiding bias in estimation.

Using the estimated model, multiply both sides of Equation (1) by each entity's market participation share, S_i (see Figure 6), and then aggregate across all entities. This yields the following equation:

$$\underbrace{\textstyle\sum_{i=1}^{N} S_i\, q_{i,t}}_{=0} = -CIPD_t\left(\textstyle\sum_{i=1}^{N} S_i\, \zeta_i\right) + \eta_t\left(\textstyle\sum_{i=1}^{N} S_i\, \lambda_i\right) + \textstyle\sum_{i=1}^{N} S_i\, u_{i,t} \qquad (2)$$

By applying the market clearing condition ($\sum_i^N S_i\, q_{i,t} = 0$), which weights each entity's contribution by its market participation share (S_i), the following equation for CIPD can be derived.

$$CIPD_t = \textstyle\sum_i^N \omega_i\, CIPD_{i,t} \qquad (3)$$

Here, $CIPD_{i,t} = \lambda_i \eta_t + u_{i,t}$ represents the change in demand driven by global and idiosyncratic factors for each entity, i. This, in turn, affects CIPD according to each entity's market participation share (S_i) and the weight ($\omega_i = S_i / \sum_i S_i\, \zeta_i$) associated with its price elasticity ($\sum_i S_i\, \zeta_i$). Based on this, change in CIPD over a given period can be decomposed into the contributing factors ($\omega_i CIPD_{it}$) of each entity, i.

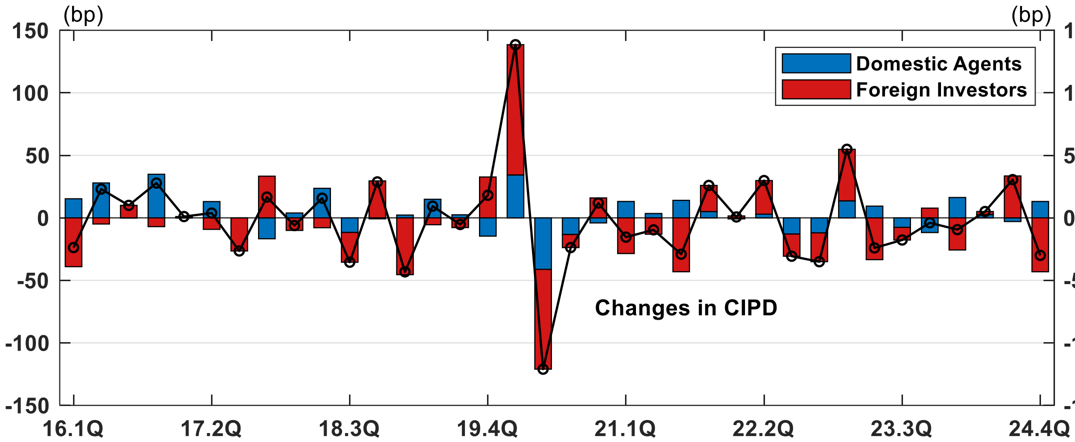
Changes in demand for dollar funds, driven by global and idiosyncratic factors of each entity, lead to changes in CIPD. However, in the process of market clearing, the impact on CIPD is scaled by each entity's market participation share and overall market elasticity. For example, even if CIPD rises sharply due to a specific entity's increased demand, a highly elastic overall market demand can reduce aggregate USD fund demand, offsetting the upward pressure on CIPD from individual entities.

[14] Baumeister and Hamilton (2023) estimated demand and elasticity in the global crude oil market using maximum likelihood estimation (MLE) with granular IV (GIV). For details on the estimation methodology, see 『Box: Estimation Method Using Granular Instrument Variables (GIV)』.

③ Drivers of CIP deviation

Based on the estimated model and Equation 2, the factors driving changes in CIPD are decomposed into resident (demand-side) and foreign (supply-side) components. The analysis shows that it is the interaction between resident and foreign factors that drives fluctuations in CIPD. Over the entire analysis period, changes in CIPD were primarily driven by foreign factors 61% of the time, while resident factors were the main driver during the remaining 39% of the period.[15] This suggests that CIPD is not determined solely by foreign factors, but rather by a combination of both resident and non-resident influences.

Figure 7. Changes in CIP deviation by domestic and foreign sectors



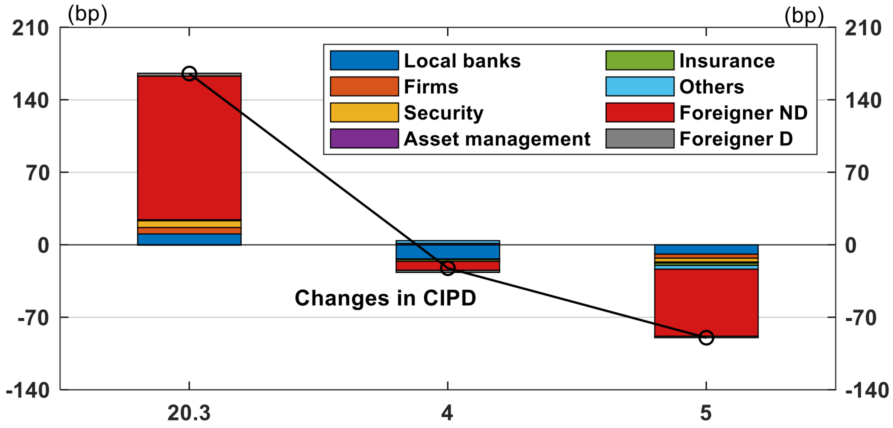
Notes: The figure shows the quarterly change in the CIPD. Contributions from domestic agents are indicated by blue bars, and those from foreign investors are indicated by red bars. The black line with circles represents the total change in the CIPD for each quarter. The quarterly decomposition is constructed by summing the monthly decomposition results. A positive value for resident (demand) factors indicates that increased demand contributed to a higher CIPD. A positive value for foreign (supply) factors indicates that reduced supply led to a higher CIPD.

Source: Author's calculation, Bank of Korea, Bloomberg

[15] If, in a given month, the overall change in CIPD moves in the same direction as the changes attributed to both resident and foreign factors, the change is attributed to the factor with the higher contribution. If the directions differ, the factor that moves in the same direction as the overall change in CIPD for that month is identified as the main contributor to the change in CIPD.

During the COVID-19 period (March 2020), the significant increase in CIPD (+165.5bp) was largely attributable to a sharp decline in the supply of USD funds from foreigners' ND transactions (+138.7bp, accounting for 83.9% of the total change). Meanwhile, the increased demand for USD from domestic banks also contributed to the rise in CIPD, though to a lesser extent (+10.5bp, 6.4%). At the time, the U.S. Federal Reserve's massive quantitative easing, including unlimited purchases of Treasuries and mortgage-backed securities, and the Korea-U.S. currency swap agreement quickly eased market stress. As dollar supply mostly from foreigners recovered, the previously sharp rise in CIPD rapidly reversed.

Figure 8. Drivers of CIPD during Covid 19 crisis



Notes: The figure presents the decomposition of monthly CIPD fluctuations by sector, based on the estimated model. `Local banks' include both domestic banks and foreign banks branches. `Foreign D' and `Foreign ND' refers to the transaction by foreigners through deliverable and non-deliverable transactions, respectively. `Others' include credit finance companies, other financial institutions, foreign exchange authorities (central bank and central government), and pension funds.

Source: Author's calculation, Bank of Korea, Bloomberg

Table 1. Drivers of CIPD during Covid 19 crisis

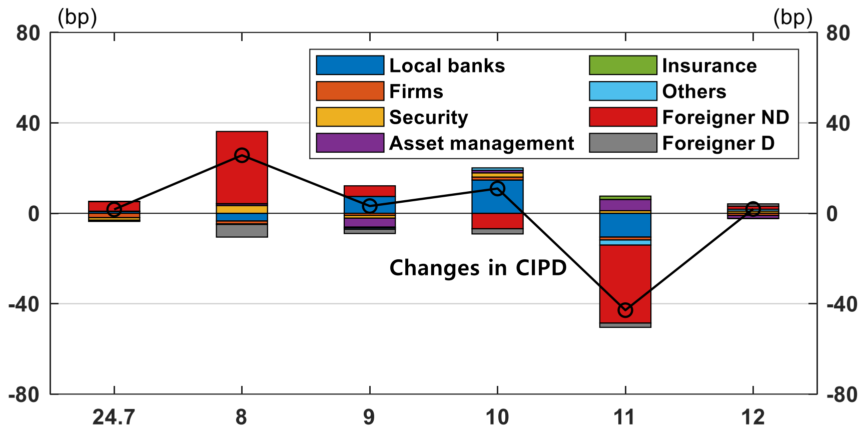
		Driver (bp)	Share (%)
Residents	Local banks	10.5	(6.4)
	Insurance companies	0.8	(0.5)
	Securities companies	6.6	(4.0)
	Asset management	-0.3	(-0.2)
	Firms	6.2	(3.8)
	Others[2)]	0.1	(0.1)
Non-residents	Foreigner ND	138.7	(83.9)
	Foreigner D	2.8	(1.7)
	(Total)	165.5	(100.0)

Notes: The monthly change in CIPD is decomposed into the contributions from each transaction entity. `Driver' refers to the increase in the CIPD attributable to each sector, while `Share' denotes the contribution of each sector's drivers ad a percentage of the overall CIPD changes. `Local banks' include both domestic banks and foreign banks branches. `Foreign D' and `Foreign ND' refers to the transaction by foreigners through deliverable and non-deliverable transactions, respectively. `Others' include credit finance companies, other financial institutions, foreign exchange authorities (central bank and central government), and pension funds.

Source: Author's calculation, Bank of Korea, Bloomberg

Based on the model estimated for November and December of 2024, when CIPD fell significantly (-41.0bp), the contributions by entity were decomposed. The main factor was the increased supply of USD funds from higher NDF purchases by foreigners (-33.1bp, 80.9%). As for residents, the increase in USD fund demand from securities companies (+2.0bp) and asset management companies (+3.7bp) during the same period partly contributed to the rise in CIPD. However, this was offset by decreased demand from FX banks (-10.4bp) and corporations (-2.3bp), resulting in an overall decline in CIPD.

Figure 9. Drivers of CIPD in November and December 2024



Notes: The figure presents the decomposition of monthly CIPD fluctuations by sector, based on the estimated model. `Local banks' include both domestic banks and foreign banks branches. `Foreign D' and `Foreign ND' refers to the transaction by foreigners through deliverable and non-deliverable transactions, respectively. `Others' include credit finance companies, other financial institutions, foreign exchange authorities (central bank and central government), and pension funds.

Source: Author's calculation, Bank of Korea, Bloomberg.

Table 2. Drivers of CIPD in November and December 2024

		Driver (bp)	Share (%)
Residents	Local banks	-10.4	(25.5)
	Insurance companies	1.5	(-3.6)
	Securities companies	2.0	(5.0)
	Asset management	3.7	(-9.0)
	Firms	-2.3	(5.5)
	Others[2)]	-1.5	(3.5)
Non-residents	Foreigner ND	-33.1	(80.9)
	Foreigner D	-0.9	(2.1)
	(Total)	-41.0	(100.0)

Notes: The monthly change in CIPD is decomposed into the contributions from each transaction entity. `Driver' refers to the increase in the CIPD attributable to each sector, while `Share' denotes the contribution of each sector's drivers ad a percentage of the overall CIPD changes. `Local banks' include both domestic banks and foreign banks branches. `Foreign D' and `Foreign ND' refers to the transaction by foreigners through deliverable and non-deliverable transactions, respectively. `Others' include credit finance companies, other financial institutions, foreign exchange authorities (central bank and central government), and pension funds.
Source: Author's calculation, Bank of Korea, Bloomberg .

Next, we examine which factors drive changes in USD funds supply and demand among major entities. We examine how the model-estimated changes (u_{it}) in USD fund supply and demand—driven by each entity's idiosyncratic factors—are related to variables that capture the specific motivations for dollar funding activity by each entity.

▪ First, for domestic banks, we consider whether a decline in the foreign currency liquidity ratio is a factor contributing to higher demand for dollar funds. The analysis shows that a decrease in the foreign currency liquidity ratio for domestic banks in the previous period is positively correlated with their idiosyncratic demand for dollar funds (Figure 10-a).

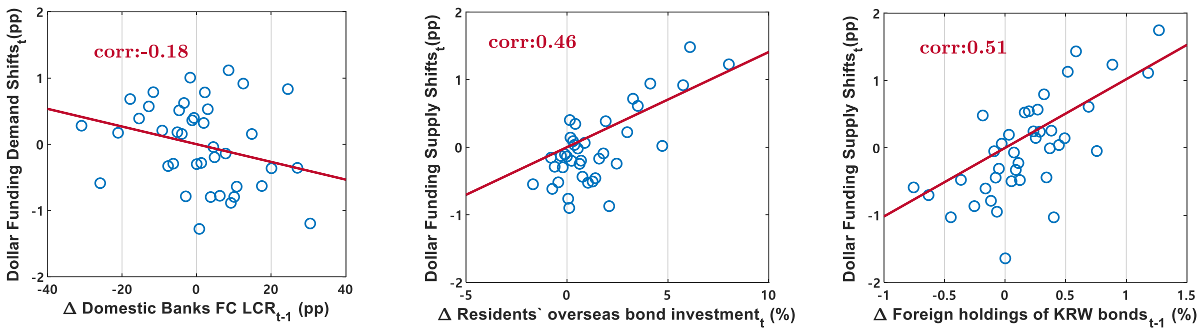
- Insurance companies raise dollar funds in the swap market, using KRW insurance premiums, to invest in overseas bonds such as U.S. Treasuries. Reflecting this transaction pattern, changes in insurance companies' demand for dollar funds—due to idiosyncratic factors extracted by the model—are found to be positively related to the overseas bond investments of other financial institutions (Figure 10-b).

- Lastly, the supply of swap funds by foreigners involving the delivery of underlying assets corresponds to a flow in which foreigners provide dollar funds through swaps and invest the received KRW in domestic bonds. The analysis results show that the increase in dollar supply driven by the idiosyncratic factors of foreigners' delivery transactions is positively correlated with foreigners' holdings of KRW-denominated bonds (Figure 10-c).

These results indicate that the idiosyncratic factors of each entity extracted by the model accurately reflect their actual foreign currency fund operations. This finding demonstrates that the model effectively captures the supply and demand dynamics of dollar funds for individual entities.

Figure 10. Estimated participant-specific dollar funding demand/supply and their motives

(a) Domestic banks **(b) Insurance companies** **(c) Foreign investors**



Notes: The increase in dollar demand reflects a shift in the demand curve driven by idiosyncratic factors specific to domestic banks, as estimated by the model. The increase in dollar demand reflects a shift in the demand curve driven by idiosyncratic factors specific to insurance companies, as estimated by the model. Growth rate of overseas bond investments by other domestic financial institutions: calculated as the log difference of the accumulated value of overseas bond investments by other financial institutions (which are residents, per the international balance of payments) multiplied by 100. The increase in dollar demand reflects a shift in the demand curve driven by idiosyncratic factors specific to foreigner D, as estimated by the model. The growth rate of foreigners' KRW-denominated bond investments is calculated as the monthly net change in foreigners' KRW bond holdings divided by the balance of Treasury bonds issued in the previous period, multiplied by 100.

Source: Author's calculation, Bank of Korea.

III. Implications of CIPD in Spot and Bond Markets

① Mechanism

The dollar funding market is closely linked to both the FX spot and bond markets through participants' direct and associated transactions. This linkage is evident when analyzing how CIPD fluctuations—driven by entity-specific supply and demand shifts as estimated above—propagate to the spot exchange rate and bond investment flows of foreign and domestic participants.

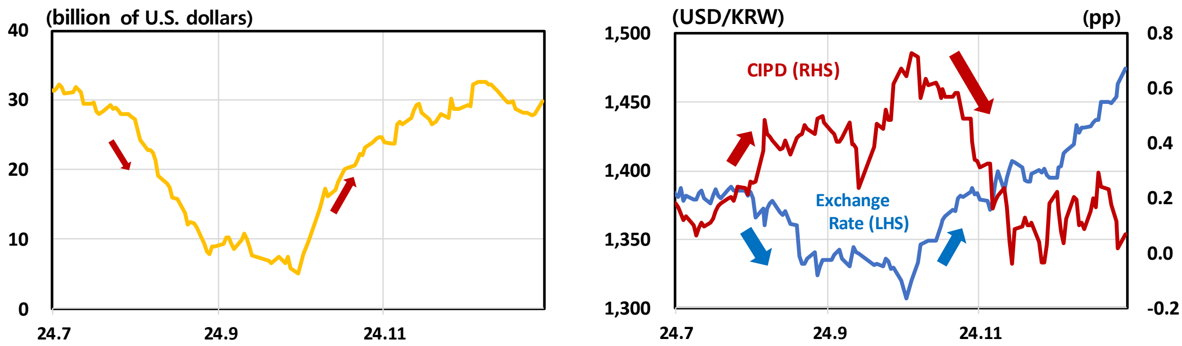
When foreign investors purchase NDFs,[16] Korean branches of foreign banks, acting as counterparties, buy FX spot to hedge FX risks. They then supply the dollar to the funding market (as a Sell & Buy swap). This series of transactions allow banks to square the FX positions. As a result, foreigners' NDF purchases (sales) result in banks buying (selling) FX spot and supplying dollar funds to the market. This leads to an increase in the USD/KRW exchange rate and decline in CIPD.

[16] NDFs refers to ND (non-deliverable) transactions as defined in the earlier analysis.

Figure 11 illustrates the second half of 2024 where this mechanism was particularly pronounced.

Figure 11. Foreigners' net purchase of NDFs and CIPD & USD/ KRW exchange rate

(a) Net purchase of offshore NDFs (cumulative) **(b) CIPD[1)] and USD/ KRW exchange rate**



Notes: Net purchase of offshore NDFs indicates the cumulative sum of net purchase by foreigners of non-deliverable forward contract, which represent their long position. CIP deviation is calculated based on 3-month monetary stabilization bond rates, 3-month SOFR, and annualized forward premium between 3-month forward rate and the spot rate.

Sources: Bloomberg, Bank of Korea

Meanwhile, for foreigners who supply dollar funds, a higher CIPD serves as an incentive to provide dollar and invest the received KRW in KRW-denominated bonds. For residents seeking dollar funds, CIPD represents costs incurred to obtain dollar for overseas bond investment. Therefore, an increase in CIPD boosts the incentive for foreigners to invest in KRW-denominated bonds, while it diminishes the incentive for residents to invest in overseas bonds.

② Methodology

This paper analyzes how foreigners' NDF transactions affect spot exchange rates through the USD funding market and how higher CIPD influences residents' overseas bond investment and foreigners' KRW bond investment, using the following approach.

To analyze the impact of foreigners' NDF transactions on the USD/KRW exchange rate through the mechanisms described earlier, it is essential to first identify the changes in the USD funding market resulting from these transactions. Thus, by using changes in CIPD associated with foreigners' ND transactions—decomposed using the earlier model—as an IV, we analyze how these changes in CIPD affect the USD/KRW exchange rate.

To examine the impact of higher CIPD on foreigners' KRW bond investment and residents' overseas bond investment, it is important to address endogeneity, as using CIPD itself as an impulse variable can lead to simultaneous causality between CIPD and bond investment by foreigners and residents. For instance, an increase in residents' overseas investment can simultaneously lead to higher CIPD and greater overseas bond investment through increased demand for dollar funds. Additionally, the supply of dollar funds from foreigners fluctuates depending on global dollar funding market conditions. This, in turn, can lead foreigners to adjust their investment in KRW-denominated bonds.

To address endogeneity, changes in CIPD driven by residents' demand for dollar funds are used as an instrumental variable for foreigners' KRW bond investment. Conversely, for residents' overseas bond investment, changes in CIPD resulting from foreigners' dollar supply through delivery transactions serve as the instrumental variable.

As outlined earlier, the impulse (exogenous shock) for each dependent variable is defined using entity-specific instrumental variables (IVs). The impulse response function is then derived via the local projection instrumental variable (LP-IV) method,[17] with the IVs and expected results summarized in Table 3.

[17] Jordà (2005), Jordà and Taylor (2025).

Table 3. Summary of analysis methods and expected results

Instrument Variable	Independent Variable	Dependent Variable
$\widehat{CIPD}_{Foreign,ND}$		Exchange Rate ↓
$\widehat{CIPD}_{Resident}$	$CIPD$ ↑	KRW-Bond Investment ↑
$\widehat{CIPD}_{Foreign,D}$		Overseas Investment ↓

The impulse response function is derived using the regression coefficient ($\widehat{\beta_h}$) estimated from the regression equation below, applying the two-stage least squares (2SLS) method. Dependent variables are the log-transformed USD/KRW exchange rate, foreigners' bond holdings, and residents' overseas bond investment.[18] $\mathrm{Controls_t}$ includes lagged values of dependent variables as well as other control variables.[19]

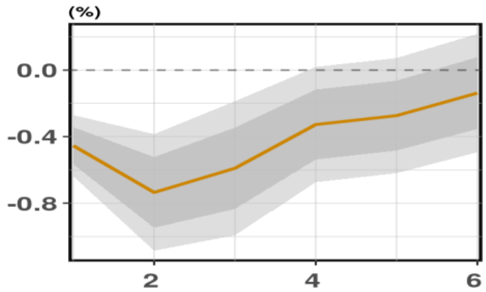
$$y_{t+h} = \alpha_h + \beta_h CIPD_t + \gamma_h{}'Controls_t + \varepsilon_{t+h}$$

③ Results

The analysis finds that a rise in CIPD, driven by foreigners' net selling of NDFs, leads to a decline in the USD/KRW exchange rate (Figure 12). This result supports the view that foreigners' NDF transactions can influence the spot exchange rate through the FX position squaring activities of banks.

Furthermore, higher CIPD is found to induce an inflow of foreigners' domestic bond investment funds (Figure 13) and a withdrawal of residents' overseas bond investment (Figure 14).

Figure 12. Foreigners' ND transactions → USD/ KRW exchange rate[1)]

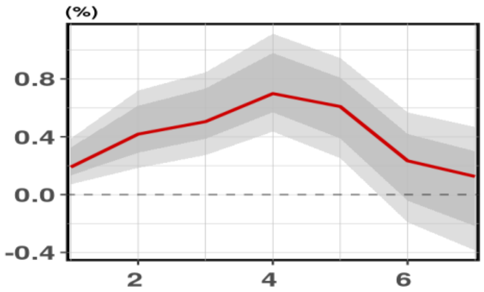


Notes: This figure describes cumulative impulse responses of the spot exchange rate (USD/KRW) to 10bp increase of CIPD instrumented with $CIPD_{Foreign\ ND}$, estimated from the model as an increase in CIPD driven by foreigners' ND transaction. The horizontal axis indicates the number of months elapsed, and the gray area represents the 90% and 68% confidence intervals. The analysis period spans from January 2015 to December 2024.

[18] This is estimated by accumulating debt securities assets as recorded in the financial account of the balance of payments.

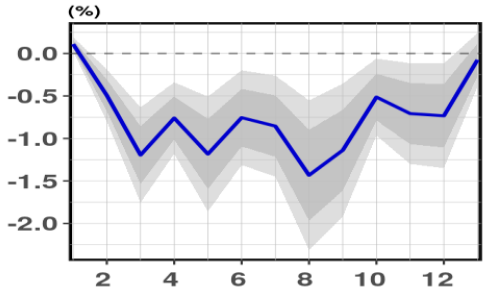
[19] For the bond funds analysis, a quadratic trend and monthly dummy variables are included to account for trends and seasonality. The analysis also includes the interest rate differential between Korea and the U.S. (10-year), the difference in growth rates based on the industrial production index, inflation, global risk factors, and current and lagged values of DXY fluctuations, while specifically controlling for the COVID-19 period. Furthermore, for foreigners' bond investment funds, changes in Korea's Treasury bond issuance volume are included as a control variable. The exchange rate analysis includes the 3-month interest rate differential (Korea vs. U.S.), inflation, global risk factors, and DXY fluctuations (current and lagged values), while controlling for the COVID-19 period.

Figure 13. Foreigners' KRW bond investment



Notes: This figure describes cumulative impulse responses of foreigners' KRW bond investment to 10bp increase in CIPD driven by higher demand of U.S dollar funding by residents, estimated from the estimated model. The horizontal axis indicates the number of months elapsed, and the gray area represents the 90% and 68% confidence intervals. Analysis periods spans from January 2015 to December 2024.

Figure 14. Residents' overseas bond investment



Notes: This figure describes cumulative impulse responses of residents' overseas bond investment to 10 bp increase in CIPD driven by lower supply of U.S dollar funding through foreigners' ND transactions, estimated from the estimated model. The horizontal axis indicates the number of months elapsed, and the gray area represents the 90% and 68% confidence intervals. Analysis periods spans from January 2015 to December 2024.

IV. Conclusion

CIPD is the price that reflects the equilibrium between the demand for and supply of dollar funding. An increase in CIPD can be driven by either a reduction in dollar supply from foreigners or an increase in dollar demand from residents, depending on prevailing market conditions. The foreigner supply factor is primarily associated with KRW bond investment and offshore NDF net purchases. In contrast, the resident demand factor is linked to the foreign currency liquidity ratios of domestic banks and overseas bond investment activities of insurance companies.

By decomposing CIPD into supply and demand factors for dollar funding, we calculate the respective contributions of each side. The results show that changes in CIPD in South Korea are driven by a combination of both foreign and resident factors. Over the entire analysis period, foreign factors accounted for 61% of the changes in CIPD, while resident factors represented 39%.

Changes in CIPD affect both the spot exchange market and bond market, with varying impacts on different economic agents. In particular, offshore NDF net purchases prompt foreign bank branches, acting as counterparties, to buy FX spot and supply dollar funds to the market. This process leads to a decrease in CIPD and increase in the USD/KRW exchange rate. A rise in CIPD—driven by increased demand for dollar funds and reduced dollar supply—is found to increase foreigners' investment in KRW-denominated bonds and decreasing residents' overseas bond investment, respectively.

Given the close interconnection between Korea's FX and financial markets via FX derivatives, understanding the spillover effects of CIPD fluctuations requires a thorough analysis of the underlying drivers behind these movements. To achieve this, a holistic approach—integrating markets, rather than examining them in isolation, and using financial institutions' transaction-level microdata—is essential.

Box Estimation Method Using Granular Instrument Variables (GIV)

Each market participant i's demand for USD funds (q_{it}) is defined as follows:

$$q_{it} \equiv \frac{\Delta f_{it}}{S_i \times Size_{t-1}}$$

Here, i's demand for USD funds (q_{it}) is calculated by dividing the change in each entity's far-dated net selling short position (Δf_{it}) by the product of the funding market in the previous period ($Size_{t-1}$) and each entity's share of the funding market (S_i).

Since the sum of entities' net selling short positions equals zero at any time ($\sum_{i=1}^{N} f_{it} = 0 \; \forall t$), the market clearing condition $\sum_{i=1}^{N} S_i \, q_{it} = 0$ is satisfied. This ensures that changes in CIPD can be induced into the sum of entity-specific factors of change.

Each entity i's demand for USD funds is determined by changes in the quantity of demand due to price changes and by shift in demand itself. The change in the quantity of demand due to price change is determined by elasticity (ζ_i). The shift of the demand curve itself can be divided into changes due to global factors (η_t)* and changes due to the idiosyncratic factors of each entity (u_{it}). Finally, i's demand for USD funds is expressed as follows.

$$q_{i,t} = \underbrace{-\zeta_i CIPD_t}_{\text{Price factors}} + \overbrace{\underbrace{\lambda_i \eta_t}_{\text{Global factors}} + \underbrace{u_{i,t}}_{\text{Idiosyncratic factors}}}^{\text{Demand shift}} \qquad (1)$$

* The analysis includes global risk indicators, DXY growth rate, lagged KRW/USD exchange rate volatility, and Korea-U.S. Treasury bond yields to account for foreign currency market dynamics. To capture asymmetric responses during risk-off periods, interaction terms with risk-off dummy variables are incorporated, alongside the ratio of foreign currency deposits to transaction volume in the foreign currency funding market.

In this model (Equation 1), the elasticity of each entity (ζ_i) cannot be consistently estimated using OLS due to endogeneity bias. For example, an increase in USD fund demand driven by idiosyncratic factors of market participant i simultaneously raises CIPD, creating endogeneity between demand shocks and price changes. Hence, we need an instrumental variable that is exogenous to idiosyncratic factors and effectively captures price changes.

This paper estimates elasticity through GMM using granular instrument variables (GIV) by referring to Gabaix and Koijen (2024), Chaudhary, Fu, and Zhou (2025), and others.

Specifically, to identify the elasticity of market participant i, the idiosyncratic factors of all entities except i are weighted by their respective market shares to construct an instrumental variable for price changes. This variable satisfies all the conditions of an instrumental variable because it (1) is not related to the idiosyncratic factors of market participant i and (2) affects price changes.

The sample moment condition that must be satisfied in the GMM is as below.

$$\hat{E}[\hat{u}_{it}(\hat{\zeta}_j) \sum_{j \neq i} S_j \, \widehat{u_{jt}}(\hat{\zeta}_j)] = 0$$

We regress changes in demand for USD funds by entity and changes in CIPD on global variables and then estimate the model parameters by finding those that satisfy the sample moment conditions using residuals.

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