ASIA ECONOMICS ANALYST

Korea – Tracking Corporate Cash and Financial-market Flows

Irene Choi
+82(2)3788-1722 | irene.choi@gs.com
Goldman Sachs (Asia) L.L.C., Seoul Branch

Goohoon Kwon, CFA
+852-2978-0048 | goohoon.kwon@gs.com
Goldman Sachs (Asia) L.L.C.

Andrew Tilton
+852-2978-1802 | andrew.tilton@gs.com
Goldman Sachs (Asia) L.L.C.

- Korea has experienced substantial corporate cash generation alongside exceptional equity-market volatility, driving significant shifts in financial flows throughout 2026. First, Korean semiconductor companies are projected to generate roughly KRW150trn (or 4.9% of GDP) in net cash in 2026 and 9.3% of GDP in 2027. While these net cash-flow estimates do not automatically equate to inflows into Korea's domestic financial system, repatriation of foreign-affiliate earnings has historically averaged at around 60%. Thus far in 2026, robust corporate inflows into MMFs have directly supported demand for money-market instruments, while overall bank funding conditions have faced offsetting pressures due to a significant slowdown in household bank deposit growth.
- Second, large equity-market fluctuations have impacted other non-bank household financial flows. Increases in brokerage cash balances and equity-fund assets have coincided with higher insurance policy surrenders and elevated policy-loan demand. This has created competing cash needs for insurers, constraining their capacity to add bond holdings on the margin.
- Third, household leverage linked to equity investments remains elevated despite some reduction from its peak, with the expansion in leverage accompanied by increased short-term funding by securities companies. Concurrently, leveraged investment products have strengthened the channel through which rebalancing and hedging flows could amplify equity-market price movements.
- Looking ahead to 2027, the semiconductor upcycle is expected to generate an even larger pool of corporate cash, although the extent of repatriation will remain a critical determinant of domestic financial market dynamics. Wage and dividend payments by major semiconductor producers could reach 5.2% of GDP in 2027, marking the highest level in available historical data, and modification in patterns for household financial asset distribution (which shifted almost entirely towards equities in 2026) will have major implications for bank funding, money markets, and equity flows. Additionally, the demand-supply backdrop for KTBs could become more supportive in 2027, helped by lower KTB supply, potential NPS rebalancing and a recovery in WGBI-related inflows.

Investors should consider this report as only a single factor in making their investment decision. For Reg AC certification and other important disclosures, see the Disclosure Appendix, or go to www.gs.com/research/hedge.html.

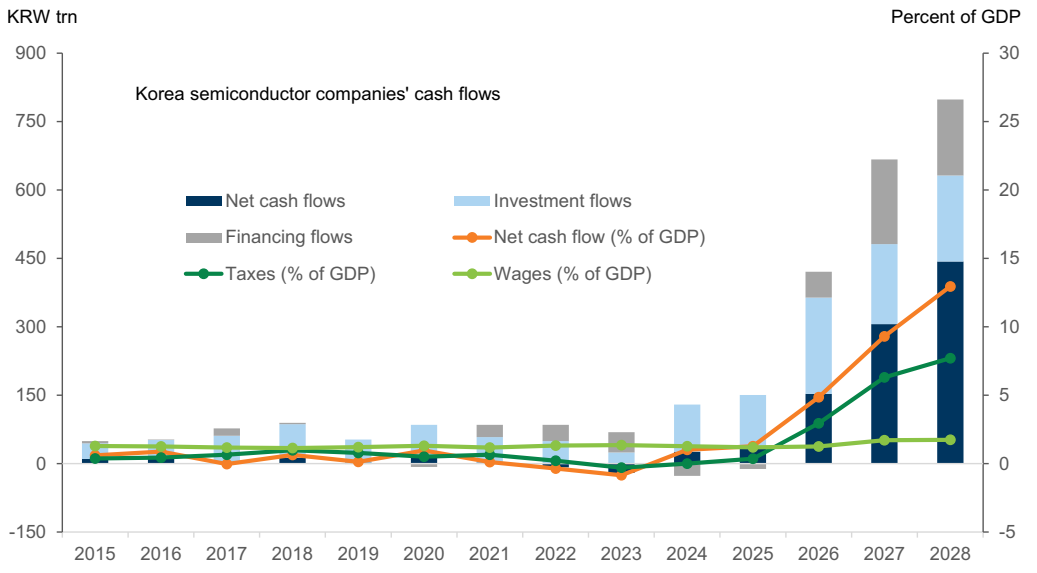
Background

Korea has experienced substantial corporate cash generation alongside exceptional equity-market volatility, driving significant shifts in financial flows throughout 2026. The ongoing semiconductor boom is generating unprecedented cash flows for Korean corporates. However, the extent to which offshore earnings are repatriated remains a critical determinant of domestic liquidity. Concurrently, sharp equity price fluctuations have coincided with major shifts in household financial balances and leverage demand. Against this backdrop, this report examines the evolution of financial flows across Korea's primary financial intermediaries and analyzes their implications for domestic financial markets.

1. Semiconductor cash generation

The semiconductor upcycle is driving an exceptionally large increase in cash flow for Korea's major semiconductor producers. Based on estimates from our technology analysts, major Korean semiconductor companies are projected to generate approximately KRW 150 trn in net cash flow in 2026—equivalent to nearly 5% of GDP—with a further substantial increase to over KRW 300 trn projected for 2027 (Exhibit 1). The scale of this cash generation is particularly remarkable given the substantial cash outlays involved: capital expenditures, investments, and financing activities (including dividends) are expected to total approximately KRW 270 trn (8.5% of GDP) in 2026, alongside wage and tax payments of KRW 130 trn (4.2% of GDP). Even after accounting for these outlays, Korea's semiconductor producers retain a substantial—and rapidly growing—pool of cash available for allocation across financial assets.

Exhibit 1: Unprecedented cash inflow for Korea from the semiconductor upcycle

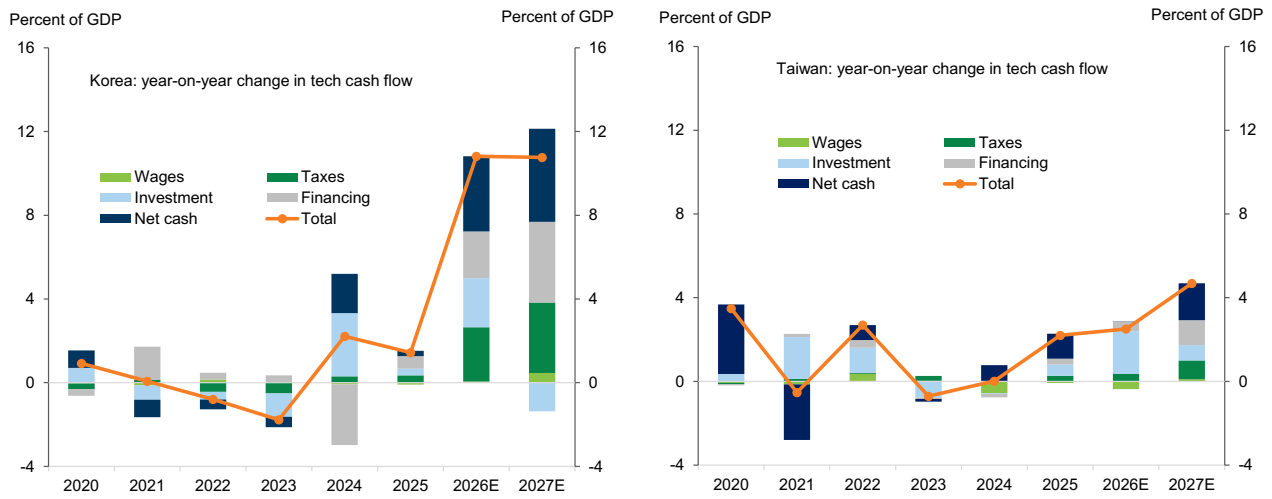


Source: Goldman Sachs Global Investment Research

Even when compared to Taiwan—a highly relevant regional peer given its significant exposure to the semiconductor upcycle—Korea's semiconductor-related cash generation is both larger and expanding at a faster pace (Exhibit 2). Net cash retained by Korean semiconductor firms is approximately 50% larger relative to GDP than in Taiwan. More importantly, the incremental cash-flow impulse is considerably stronger in Korea.

On a broader metric combining taxes and wages, the year-on-year (YoY) change is equivalent to approximately 11% of GDP in both 2026 and 2027 for Korea, compared to 2.5% and 4.2% of GDP, respectively, for Taiwan. These flows could potentially accrue to different sectors of the economy—including the public sector (taxes), households (dividends and wages), and other corporates (investments)—and therefore carry distinct financial market implications.

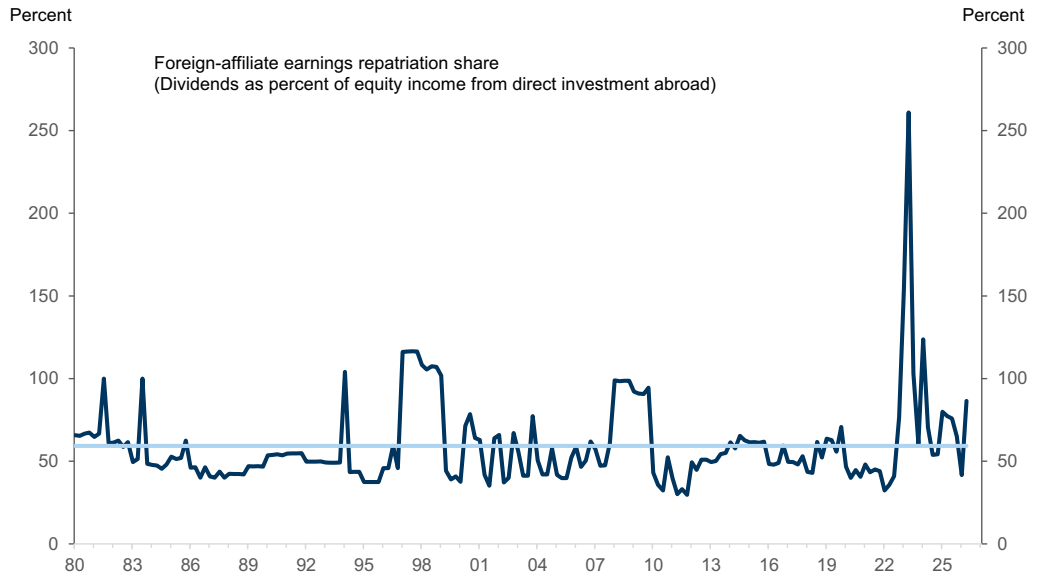
Exhibit 2: Tech-related cash flow has been significantly stronger and growing more rapidly in Korea relative to Taiwan



Source: Goldman Sachs Global Investment Research

However, these net cash-flow estimates do not automatically equate to inflows into Korea's domestic financial system, as cash generated by overseas operations can remain offshore rather than being repatriated. Taiwan serves as a recent case in point: its overseas deposits increased by approximately 4% of GDP in 2025—the highest level in available data since 1984—suggesting that a substantial share of cash generated during a strong semiconductor upcycle may accumulate abroad. As a conservative benchmark, we assume that all net cash generated is held overseas and apply the historical repatriation ratio of around 60% for foreign-affiliate earnings, implying potential domestic inflows equivalent to roughly 3% of GDP in 2026 and 5.6% in 2027. The historical ratio is calculated as dividends relative to current-period foreign-affiliate earnings. These estimates are illustrative, as the historical ratio is based on foreign-affiliate earnings rather than net cash flow and fluctuates over time. Notably, the repatriation ratio has risen in recent years due to more favorable tax policies: starting in 2023, 95% of qualifying dividends received from foreign subsidiaries were excluded from taxable corporate income, and this exclusion was raised to 100% in 2026. (Exhibit 3).

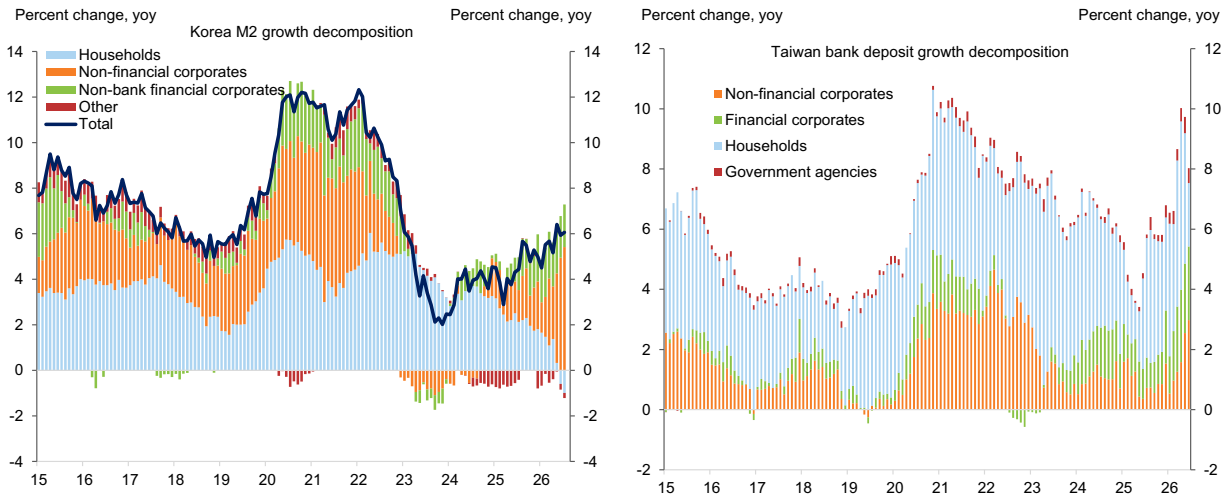
Exhibit 3: Historical repatriation of foreign-affiliate earnings has averaged around 60%, with recent shares higher



Source: Haver Analytics

Aggregate monetary data reflect a significant increase in Korean corporate cash holdings in 2026. Broad money (M2) growth has averaged approximately 6% YoY in recent months, with non-financial corporates accounting for roughly 80% of this expansion in part due to KRW depreciation that increases KRW value of corporate USD holdings—the highest contribution share in available data since October 2003 (Exhibit 4). This contrasts sharply with Taiwan, where bank deposit growth has accelerated above 9% YoY (close to its post-pandemic peak) but has been driven predominantly by households (note: a detailed M2 holder breakdown is unavailable for Taiwan). Non-financial corporates contributed approximately 2.4 percentage points to Taiwan's deposit growth in recent months, which remains below their contribution during the 2021–2023 semiconductor upcycle. While structural differences complicate a direct comparison, this divergence suggests that the current semiconductor upcycle has translated more directly into domestic corporate financial balances in Korea than in Taiwan.

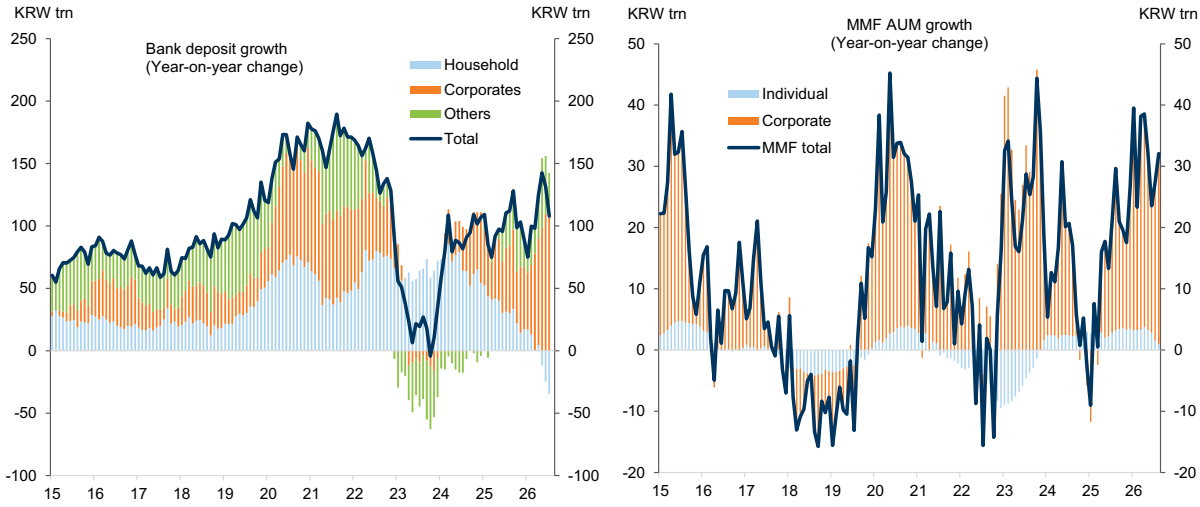
Exhibit 4: Korea's M2 growth is driven by non-financial corporates, showing a much higher concentration than in Taiwan



Source: Bank of Korea, Haver Analytics

The expansion in corporate M2 holdings has been concentrated in bank deposits and money market funds (MMFs). Year-on-year growth in bank deposits has averaged 6.3% YoY (approximately KRW130trn) in recent months, with the corporate sector accounting for roughly 80% of the increase. Conversely, household bank deposits have declined for the first time since 2008 (Exhibit 5). This corporate cash accumulation is even more pronounced in MMFs, which are heavily utilized by the corporate sector: MMF assets under management (AUM) have increased by 12.7% YoY (approximately KRW 30trn) in recent months, with corporates accounting for over 90% of the growth. Collectively, the data points to a substantial accumulation of corporate funds in bank deposits and money-market products, aligning with the surge in corporate cash generation.

Exhibit 5: Robust banks and MMF AUM growth, driven by corporates



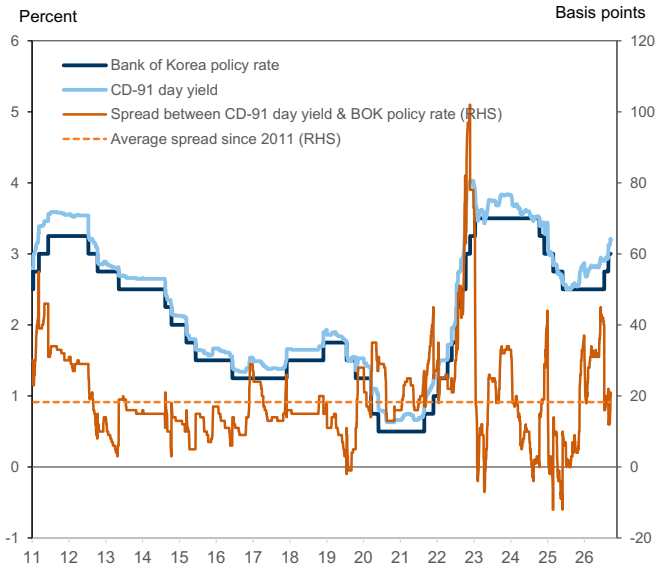
Source: Quantiwise, Ministry of Data and Statistics (MODS)

While the accumulation of corporate cash in bank deposits and MMFs provides a supportive backdrop for money-market conditions, the ultimate impact on certificate of deposit (CD) rates depends heavily on where these funds are held. Strong corporate inflows into MMFs have provided a direct source of demand for money-market

instruments, but declining household bank deposits have increasingly offset this support. In previous research, we established that higher bank demand deposits and larger MMF AUM are associated with narrower CD spreads over the Bank of Korea (BOK) policy rate. However, a more granular decomposition of bank deposits suggests that household deposits, rather than corporate deposits, are the primary driver of bank funding conditions. Our estimates indicate that a 1% increase in household deposits is associated with an approximate 1.1 basis point (bp) cumulative narrowing of the CD-to-policy rate spread. In contrast, an equivalent increase in MMF AUM is associated with only a 0.5 bp narrowing, after controlling for policy-rate differentials and broader bond and money-market funding conditions. This suggests that the robust expansion in MMF AUM may not have fully compensated for the drag of weak household deposit growth on bank funding conditions, explaining why the surge in corporate cash did not translate uniformly into lower CD spreads earlier in the year (Exhibit 6). The larger estimated impact of household deposits likely reflects their important role as a relatively stable source of bank funding which could reduce banks' reliance on wholesale funding.

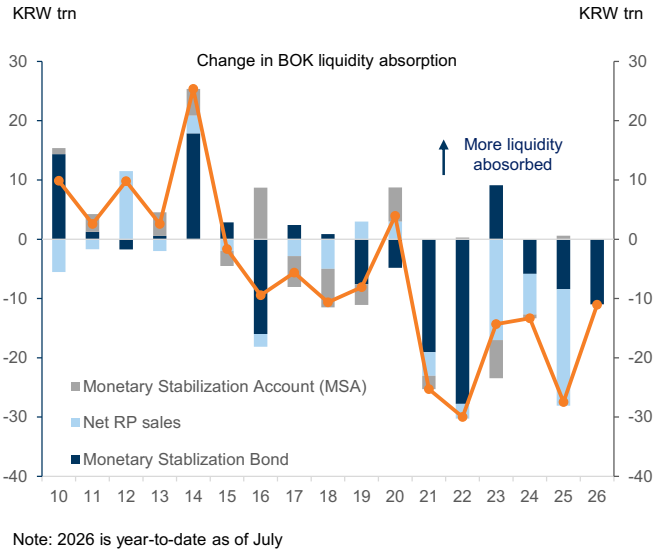
The net impact on money-market conditions also depends on the BOK's liquidity operations. An increase in liquidity absorption via open-market operations can reduce banking-system reserves, potentially offsetting the easing in short-term funding conditions driven by stronger bank deposits and MMF flows. In 2026, the outstanding balance of net repurchase agreement (RP) purchases remained broadly unchanged, while the stock of Monetary Stabilization Bonds (MSBs) continued to decline (Exhibit 7).

Exhibit 6: CD rate spread with the BOK policy rate stayed elevated in 2026



Source: Bank of Korea, Quantiwise, Goldman Sachs Global Investment Research

Exhibit 7: Outstanding stock of Monetary Stabilization Bonds has continued to fall year-to-date in 2026



Note: 2026 is year-to-date as of July

Source: Bank of Korea, Goldman Sachs Global Investment Research

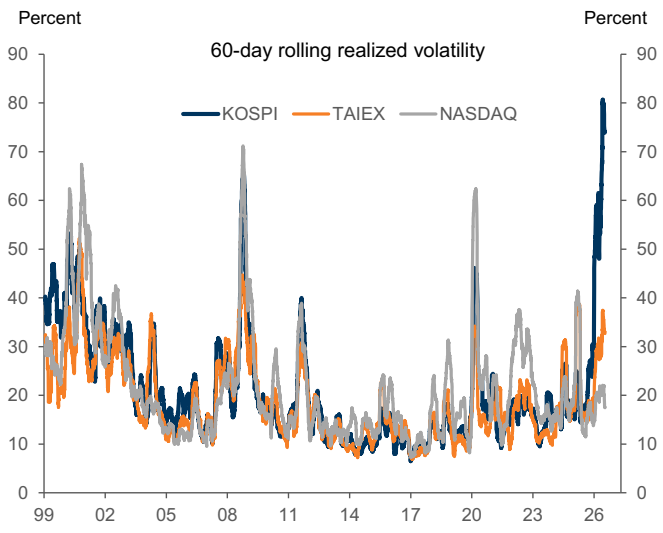
2. Equity market volatility

Exceptional volatility in Korea's equity market also had important implications for household financial flows and portfolio allocation. The KOSPI rose by as much as 116% YTD to its mid-June peak, before declining roughly 30% from that peak by mid-September. Its 60-day realized volatility has surged above 70% on an annualized basis—well above the approximately 30% recorded in Taiwan and 17% in the US (Exhibit

8). This heightened volatility is particularly impactful given households' increased exposure to equities.

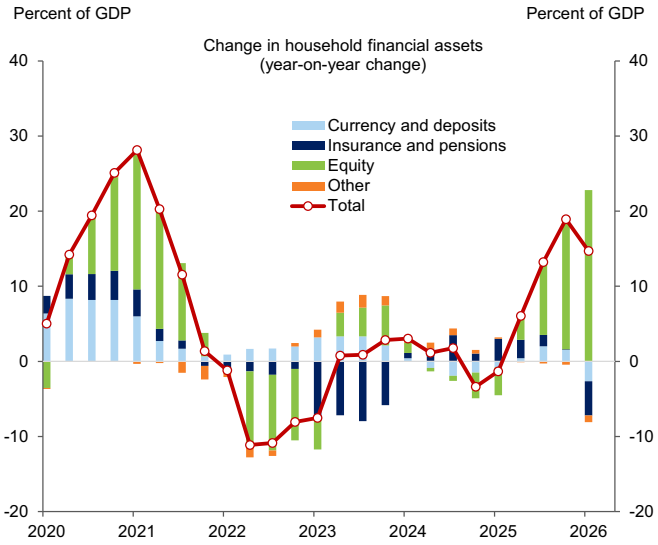
The latest Flow of Funds data (available through Q1 2026) shows that household equity holdings had increased by approximately 23 percentage points of GDP from a year earlier, continuing a meaningful upward trend that began in mid-2025 (Exhibit 9). Concurrently, household holdings of insurance and pension assets declined by 4.6 percentage points of GDP from a year ago and by approximately KRW 25 trn from the previous quarter, marking the first sequential decline since Q3 2023. Although these quarterly data predate both the June equity-market peak and the subsequent correction, they highlight a meaningful shift in household balance-sheet exposure toward equities, increasing the likelihood that large market swings will disrupt subsequent portfolio allocations across financial products and institutions.

Exhibit 8: Exceptionally high volatility in Korea equity markets



Source: Haver Analytics

Exhibit 9: Large shifts in household financial assets

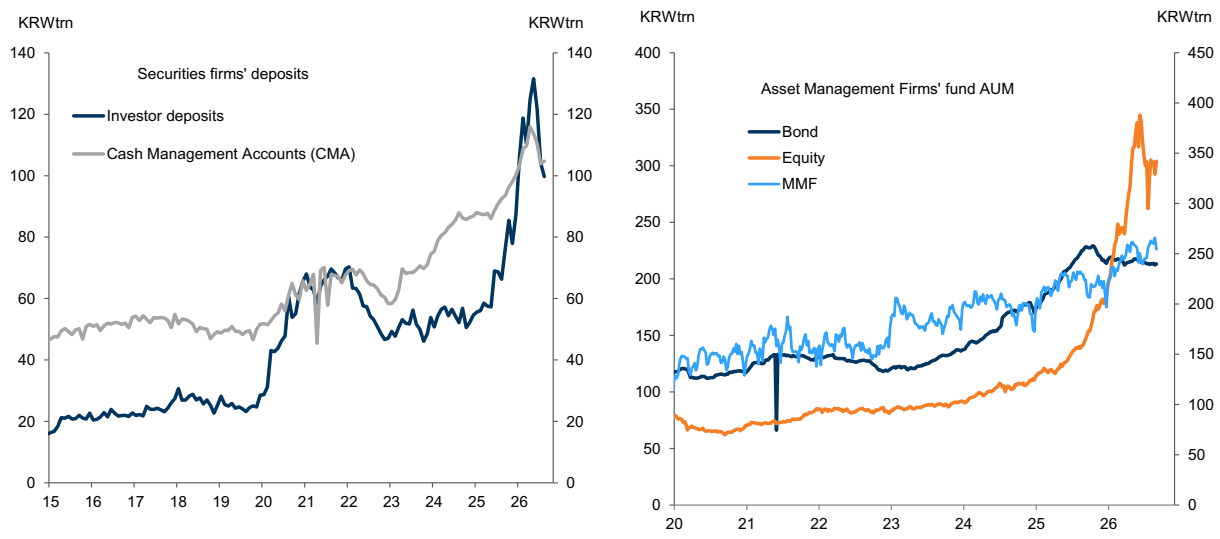


Source: Haver Analytics

Higher-frequency financial-sector data suggest that the substantial accumulation of household market-related financial balances earlier this year has partially reversed alongside the equity-market correction. Investor deposits at securities firms and Cash Management Account (CMA) balances had increased by approximately KRW 50trn and KRW 15trn, respectively, from their end-2025 levels to their mid-June peaks, but have since declined by roughly KRW 30trn and KRW 8trn, respectively (Exhibit 10). While both metrics remain higher than at end-2025 and a year earlier, they are considerably below their market-peak levels.

A similar pattern is evident in equity funds, where AUM rose from around KRW210trn at end-2025 to a peak of nearly KRW390trn, before falling to approximately KRW 340trn by mid-September. Unlike brokerage cash balances, however, equity-fund AUM has recovered more robustly from its initial post-peak decline, rising from approximately KRW 295trn in late July. Taken together, these movements suggest that while the large build-up in household financial assets associated with equity-market activity has partially unwound since June, the subsequent recovery in equity funds underscores continued household exposure to the equity market despite heightened volatility.

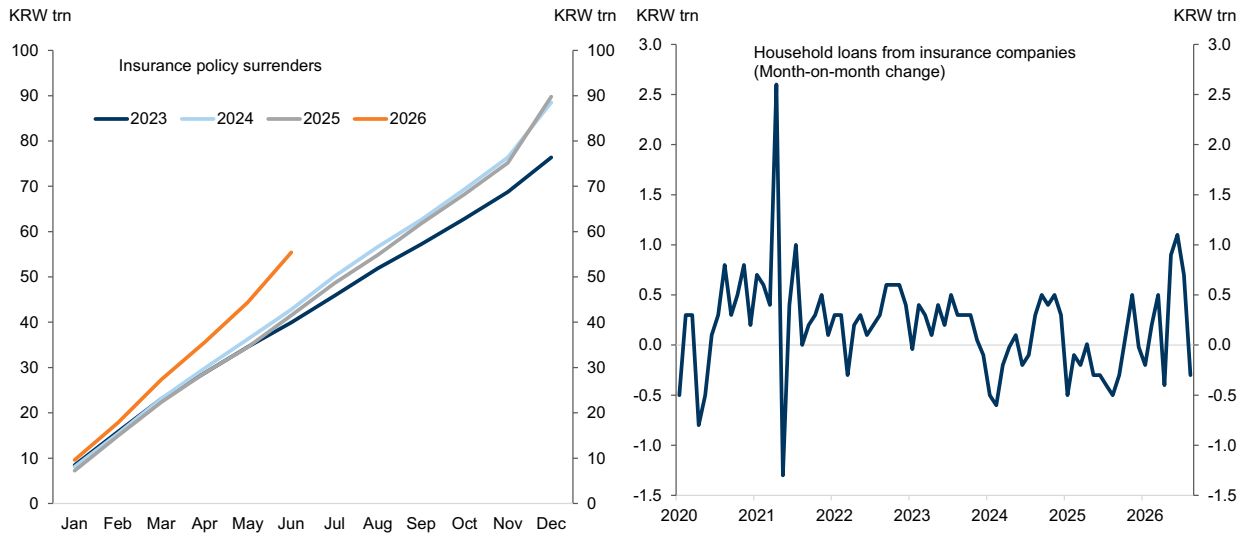
Exhibit 10: Equity investment funds remain up YTD despite volatility; likewise for money market investment funds



Source: Quantiwise

The shift in household financial flows may also be constraining insurers' investment capacity at the margin. Insurance-policy surrenders reached approximately KRW55trn through June, compared with an average of around KRW40rn over the same period in the preceding three years (Exhibit 11), thereby increasing cash outlays to policyholders. Concurrently, household borrowing from insurers accelerated from May to July, with the monthly increase reaching its highest level since early 2021. The acceleration coincided with tighter credit management in the banking sector and a subsequent shift toward non-bank funding channels. While these developments do not indicate systemic liquidity stress for insurers, elevated surrender payments and policy lending both absorb cash that would otherwise be allocated to financial assets, potentially limiting insurers' capacity for incremental securities purchases. Insurance-sector household lending subsequently moderated in August, as insurers progressively tightened lending standards and policy-loan availability in response to heightened regulatory scrutiny of household debt.

Exhibit 11: Insurance companies experienced elevated policy surrenders and household loan growth in 2026

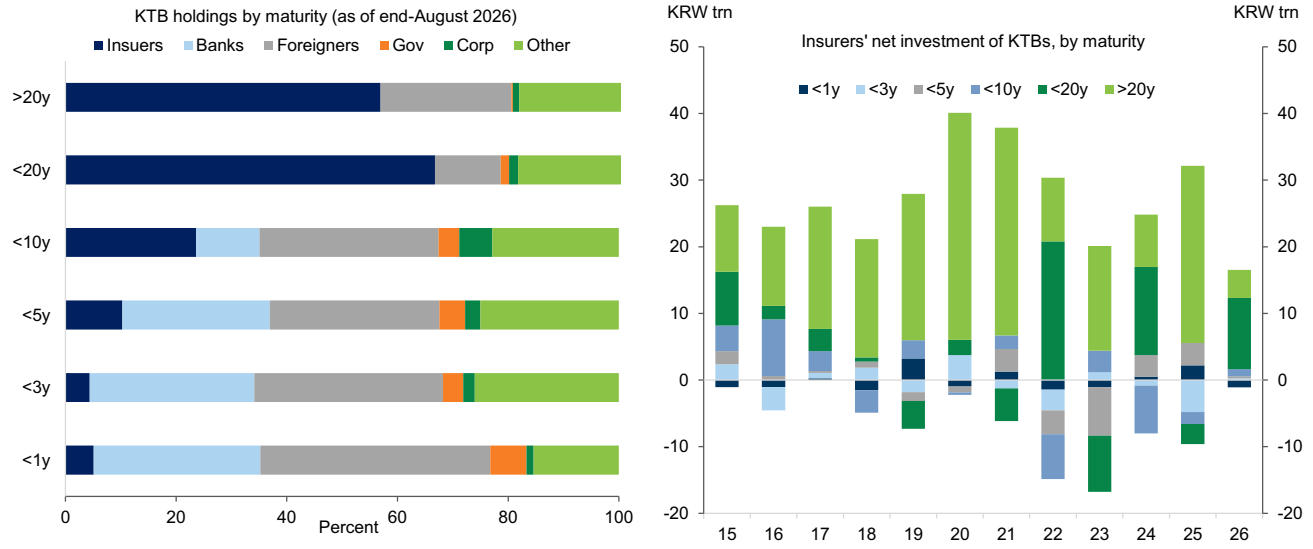


Source: Haver Analytics

The moderation in insurers' investment capacity has potentially important implications for Korea Treasury Bond (KTB) demand, particularly at the long end of the curve. Insurers hold around one-third of outstanding KTBs overall, but their presence is substantially greater in longer maturities, accounting for around 67% of outstanding 10-20 year KTBs and 57% of bonds with maturities exceeding 20 years (Exhibit 12). Against this backdrop, insurer net investment in KTBs has slowed meaningfully in 2026. Net investment amounted to around KRW15trn through August, down from KRW22trn over the same period last year, with nearly all of this year's purchases concentrated in maturities above 10 years. Notably, net investment in KTBs with maturities exceeding 20 years was the weakest for any comparable period in available data since 2012.

The weakness in long-end demand may also reflect a reduced need for further duration extension following several years of asset-liability management. The impact of higher long-term rates on insurers' Korean Insurance Capital Standard (K-ICS) positions depends on insurers' existing asset-liability duration gaps, while regulatory pressure to extend duration has become more gradual after the authorities slowed the extension of the final observation maturity, which will remain at 23 years through 2027 before gradually increasing from 2028. Although World Government Bond Index (WGBI)-related foreign inflows provided an offset to weaker insurer demand in 1H of the year, the pace of foreign KTB purchases has slowed considerably since peaking in May, falling to near zero in July and August. That said, the maturity composition of foreign purchases has been relatively supported of longer dated KTBs, with around 40% of net investment in 2026 concentrated in maturities exceeding 20 years. Consequently, a recovery in WGBI-related inflows could therefore provide some offset to weaker insurer demand at the long end of the curve.

Exhibit 12: While insurers maintain substantial presence in longer maturity KTBs, net investment has slowed in 2026



Source: CheckExpert, Goldman Sachs Global Investment Research

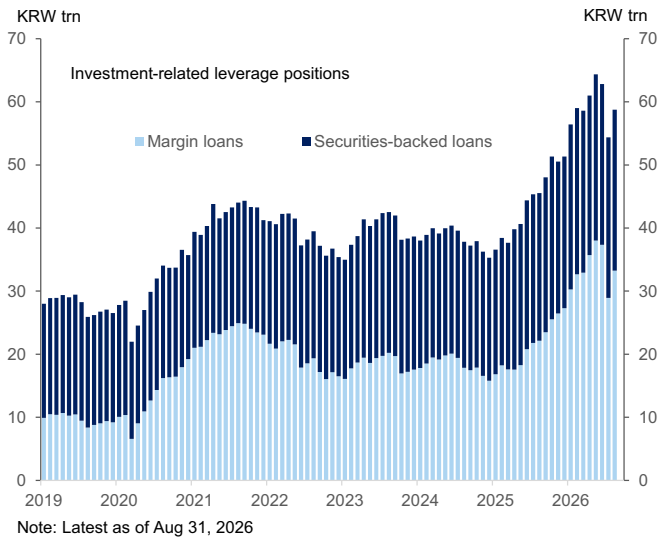
3. Equity market leverage

The large upswing in equity-market activity has been accompanied by greater use of leverage, adding another dimension to financial flows in Korea. Unlike shifts between deposits, funds, and other financial assets, leverage expands investors' market exposure beyond their initial cash outlays, while direct borrowing can create additional funding demands within the financial system.

Household leverage linked to equity investments remains elevated despite some deleveraging from its peak. Margin-loan balances rose alongside the equity market rally, peaking at approximately KRW38trn before declining to around KRW33trn by end-August, but still well above KRW27trn at end-2025 (Exhibit 13). In comparison, securities-backed lending has remained broadly stable at around KRW25-26trn throughout the year. This divergence suggests that the expansion in securities-firm lending in 2026 has been concentrated primarily in credit used directly to finance equity purchases, with elevated loan balances indicating continued vulnerability to further large market movements.

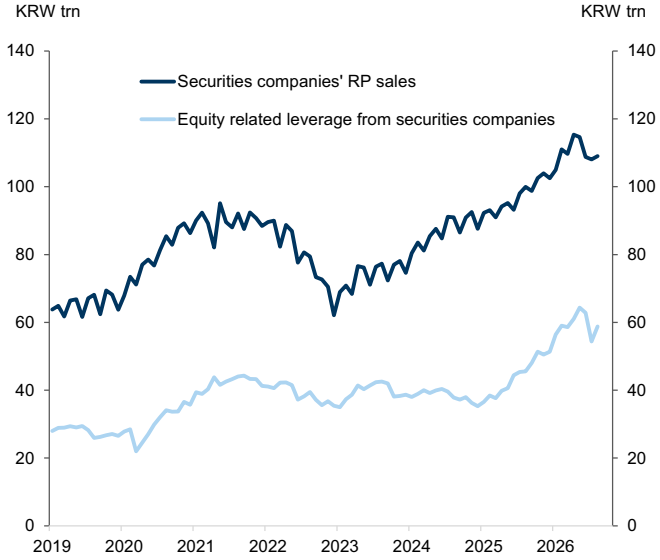
The increase in equity-related lending has also coincided with greater funding raised by securities firms in the money market. Customer RP sales have increased by around KRW6trn ytd, broadly matching the increase in the combined balance of margin loans and securities-backed lending (Exhibit 14). While RP funding cannot be directly mapped to individual securities-firm assets, the close co-movement is consistent with securities firms partly funding their customer lending expansion through short-term secured borrowing. This dynamic has implications for broader money-market conditions, as higher equity-market leverage increases securities firms' demand for funds in the RP market, thereby absorbing a portion of the additional cash accumulating in money-market products.

Exhibit 13: Equity-related leveraged positions remain elevated...



Source: KOFIA, Quantiwise

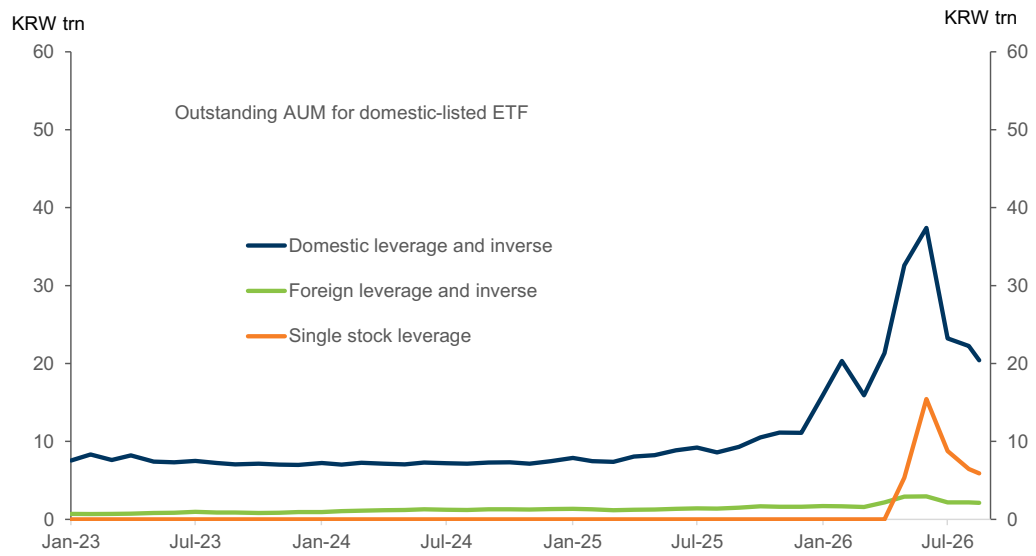
Exhibit 14: ... along with outstanding RP sales from securities companies



Source: Quantiwise

Leveraged investment products represent an alternative channel of equity-market leverage, affecting market flows rather than directly generating additional funding demand. Combined AUM in domestic leveraged and inverse ETFs has fallen by nearly half from a peak of slightly below KRW40trn, and AUM in single-stock leveraged ETFs has declined from around KRW15trn to KRW6trn (Exhibit 15), partly reflecting the government's measures to curb leveraged-product activity following the sharp increase in market volatility. Unlike margin lending, leveraged ETFs allow investors to obtain market exposure exceeding their initial cash investment without a corresponding increase in household borrowing or securities-firm funding. Nonetheless, their market impact can be significant, as leveraged products must dynamically rebalance their derivatives exposure as underlying prices fluctuate in order to maintain their target leverage ratios. This rebalancing can generate procyclical trading flows, potentially amplifying large market movements. The decline in leveraged ETF AUM since the market peak suggests that the potential scale of these procyclical rebalancing flows has moderated.

Exhibit 15: Declines in leveraged ETF AUM since the market peak



Note Inverse ETFs seek to deliver the opposite of the daily return of the underlying index or asset and can also be leveraged, targeting a multiple of the opposite return

Source: Quantiwise, Goldman Sachs Global Investment Research

Looking ahead to 2027

Looking into 2027, the semiconductor upcycle should generate a still larger pool of corporate cash, with net cash projected to reach 9.3% of GDP, according our technology analysts' estimates. The extent of repatriation and the ultimate domestic accumulation of this cash will remain critical determinants of domestic financial market dynamics.

However, a potentially more significant shift could emerge from the household sector as a larger share of semiconductor earnings is redistributed through compensation and dividends. We estimate that bonus payments by semiconductor companies could amount to approximately 1.7% of GDP, while the increase in dividend payments could reach around 3.5% of GDP. The combined total would represent the largest share of GDP in available historical data since 2005. In 2026, household bank deposits declined as financial flows shifted almost entirely toward equities; any reversal or modification of this pattern in 2027 will have major implications for bank funding, money markets, and equity flows.

The demand-supply backdrop for KTBs is also poised to become more supportive in 2027. On the supply side, KTB issuance ceiling is set to decline by around KRW13trn next year, equivalent to 0.9% of GDP (Exhibit 16). While this reduction is modest relative to the scale of the government's revenue gains, authorities have also indicated they may adjust the maturity composition of issuance in response to weak demand for ultra-long bonds.

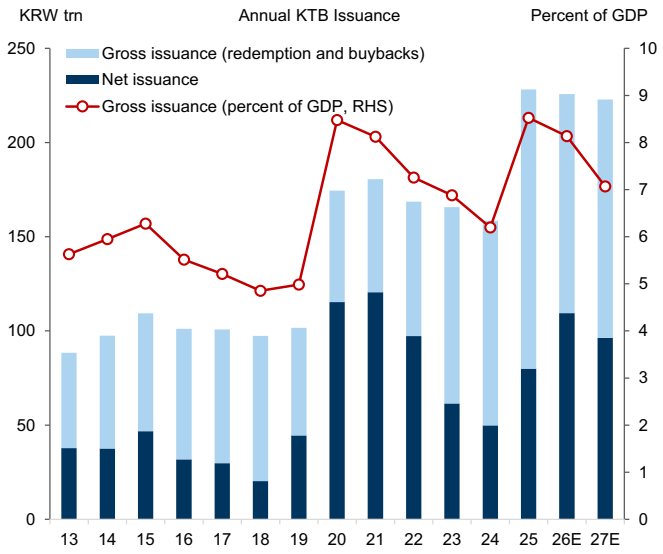
On the demand side, the National Pension Service (NPS) could provide an additional source of support. As of June 2026, domestic bonds accounted for just 15.4% of its KRW1866trn portfolio, around 7.7pp below its revised 23.1% year-end target for 2026 (Exhibit 17). While the NPS is not required to close this gap immediately—and its permitted allocation bands allow substantial deviation from target—the difference points to scope for potentially significant domestic bond purchases as the portfolio is

gradually rebalanced.

Additionally, non-financial corporate demand could rise alongside further semiconductor cash generation, though direct corporate participation in the KTB market has historically remained small (totaling around KRW 0.9trn in 2026, concentrated in maturities under 10 years). Overall, reduced supply combined with potential demand from the NPS and cash-rich corporates should provide a more supportive backdrop for KTBs in 2027, though the impact is likely to vary considerably across the yield curve.

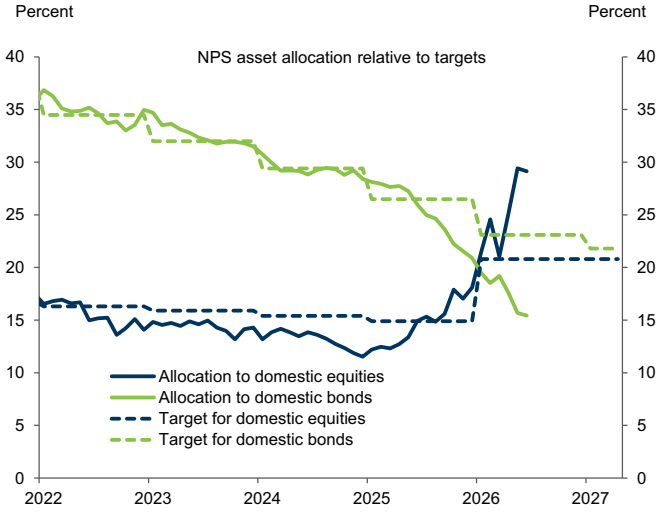
Overall, the flow picture appears relatively more supportive at the front end of the KTB curve, as substantial cash would be available for investment for semiconductor producers and banks, whose KTB holdings tend to be skewed toward shorter maturities. Around 40% and 60% of their respective KTB holdings are in maturities of less than two years. This flow dynamic would be directionally consistent with our rates strategy team's recommendation to receive KRW 2Y IRS, which is driven primarily by the gap between our BOK policy rate forecast of one more 25bp hike in this cycle and the roughly four hikes currently priced by the market.

Exhibit 16: KTB supply to decline only slightly in 2027



Source: Korea Ministry of Planning and Budget, Haver Analytics, Goldman Sachs Global Investment Research

Exhibit 17: NPS underexposed in domestic bond markets relative to targets in 2026 and 2027



Source: Haver Analytics, NPS, Goldman Sachs Global Investment Research

人在草木间

Disclosure Appendix

Reg AC

We, Irene Choi, Goohoon Kwon, CFA and Andrew Tilton, hereby certify that all of the views expressed in this report accurately reflect our personal views, which have not been influenced by considerations of the firm's business or client relationships.

Unless otherwise stated, the individuals listed on the cover page of this report are analysts in Goldman Sachs' Global Investment Research division.

Contributing Authors: Irene Choi Goldman Sachs (Asia) L.L.C., Seoul Branch, Goohoon Kwon, CFA Goldman Sachs (Asia) L.L.C., Andrew Tilton Goldman Sachs (Asia) L.L.C..

Unless otherwise stated, the individuals listed in the Contributing Authors disclosure of this report are analysts in Goldman Sachs' Global Investment Research division.

Disclosures

Regulatory disclosures

Disclosures required by United States laws and regulations

See company-specific regulatory disclosures above for any of the following disclosures required as to companies referred to in this report: manager or co-manager in a pending transaction; 1% or other ownership; compensation for certain services; types of client relationships; managed/co-managed public offerings in prior periods; directorships; registered market maker. Goldman Sachs trades or may trade as a principal in debt securities (or in related derivatives) of issuers discussed in this report.

The following are additional required disclosures: **Ownership and material conflicts of interest:** Goldman Sachs policy prohibits its analysts, professionals reporting to analysts and members of their households from owning securities of any company in the analyst's area of coverage. **Analyst compensation:** Analysts are paid in part based on the profitability of Goldman Sachs, which includes investment banking revenues. **Analyst as officer or director:** Goldman Sachs policy generally prohibits its analysts, persons reporting to analysts or members of their households from serving as an officer, director or advisor of any company in the analyst's area of coverage. **Non-U.S. Analysts:** Non-U.S. analysts may not be associated persons of Goldman Sachs & Co. LLC and therefore may not be subject to FINRA Rule 2241 or FINRA Rule 2242 restrictions on communications with a subject company, public appearances and trading in securities covered by the analysts.

Additional disclosures required under the laws and regulations of jurisdictions other than the United States

The following disclosures are those required by the jurisdiction indicated, except to the extent already made above pursuant to United States laws and regulations. **Australia:** Goldman Sachs Australia Pty Ltd and its affiliates are not authorised deposit-taking institutions (as that term is defined in the Banking Act 1959 (Cth)) in Australia and do not provide banking services, nor carry on a banking business, in Australia. This research, and any access to it, is intended only for "wholesale clients" within the meaning of the Australian Corporations Act, unless otherwise agreed by Goldman Sachs. In producing research reports, members of Global Investment Research of Goldman Sachs Australia may attend site visits and other meetings hosted by the companies and other entities which are the subject of its research reports. In some instances the costs of such site visits or meetings may be met in part or in whole by the issuers concerned if Goldman Sachs Australia considers it is appropriate and reasonable in the specific circumstances relating to the site visit or meeting. To the extent that the contents of this document contains any financial product advice, it is general advice only and has been prepared by Goldman Sachs without taking into account a client's objectives, financial situation or needs. A client should, before acting on any such advice, consider the appropriateness of the advice having regard to the client's own objectives, financial situation and needs. A copy of certain Goldman Sachs Australia and New Zealand disclosure of interests and a copy of Goldman Sachs' Australian Sell-Side Research Independence Policy Statement are available at: https://www.goldmansachs.com/disclosures/australia-new-zealand/index.html. **Brazil:** Disclosure information in relation to CVM Resolution n. 20 is available at https://www.gs.com/worldwide/brazil/area/gir/index.html. Where applicable, the Brazil-registered analyst primarily responsible for the content of this research report, as defined in Article 20 of CVM Resolution n. 20, is the first author named at the beginning of this report, unless indicated otherwise at the end of the text. **Canada:** This information is being provided to you for information purposes only and is not, and under no circumstances should be construed as, an advertisement, offering or solicitation by Goldman Sachs & Co. LLC for purchasers of securities in Canada to trade in any Canadian security. Goldman Sachs & Co. LLC is not registered as a dealer in any jurisdiction in Canada under applicable Canadian securities laws and generally is not permitted to trade in Canadian securities and may be prohibited from selling certain securities and products in certain jurisdictions in Canada. If you wish to trade in any Canadian securities or other products in Canada please contact Goldman Sachs Canada Inc., an affiliate of The Goldman Sachs Group Inc., or another registered Canadian dealer. **Hong Kong:** Further information on the securities of covered companies referred to in this research may be obtained on request from Goldman Sachs (Asia) L.L.C. **India:** Further information on the subject company or companies referred to in this research may be obtained from Goldman Sachs (India) Securities Private Limited, Research Analyst - SEBI Registration Number INH000001493, 10th Floor, Ascent-Worli, Sudam Kalu Ahire Marg, Worli, Mumbai-400 025, India, Corporate Identity Number 60634, Phone +91 22 6616 9000, Fax +91 22 6616 9001. Goldman Sachs may beneficially own 1% or more of the securities (as such term is defined in clause 2 (h) the Indian Securities Contracts (Regulation) Act, 1956) of the subject company or companies referred to in this research report. Registration granted by SEBI and certification from NISM in no way guarantee performance of the intermediary or provide any assurance of returns to investors. Goldman Sachs (India) Securities Private Limited compliance officer and investor grievance contact details, a copy of the annual compliance audit report and other relevant information and disclosures can be found at this link: https://www.goldmansachs.com/worldwide/india/research-analyst. **Japan:** See below. **Korea:** This research, and any access to it, is intended only for "professional investors" within the meaning of the Financial Services and Capital Markets Act, unless otherwise agreed by Goldman Sachs. Further information on the subject company or companies referred to in this research may be obtained from Goldman Sachs (Asia) L.L.C., Seoul Branch. **New Zealand:** Goldman Sachs New Zealand Limited and its affiliates are neither "registered banks" nor "deposit takers" (as defined in the Reserve Bank of New Zealand Act 1989) in New Zealand. This research, and any access to it, is intended for "wholesale clients" (as defined in the Financial Advisers Act 2008) unless otherwise agreed by Goldman Sachs. A copy of certain Goldman Sachs Australia and New Zealand disclosure of interests is available at: https://www.goldmansachs.com/disclosures/australia-new-zealand/index.html. **Russia:** Research reports distributed in the Russian Federation are not advertising as defined in the Russian legislation, but are information and analysis not having product promotion as their main purpose and do not provide appraisal within the meaning of the Russian legislation on appraisal activity. Research reports do not constitute a personalized investment recommendation as defined in Russian laws and regulations, are not addressed to a specific client, and are prepared without analyzing the financial circumstances, investment profiles or risk profiles of clients. Goldman Sachs assumes no responsibility for any investment decisions that may be taken by a client or any other person based on this research report. **Singapore:** Goldman Sachs (Singapore) Pte. (Company Number: 198602165W), which is regulated by the Monetary Authority of Singapore, accepts legal responsibility for this research, and should be contacted with respect to any matters arising from, or in connection with, this research. **Taiwan:** This material is for reference only and must not be reprinted without permission. Investors should carefully consider their own investment risk. Investment results are the responsibility of the individual investor. **United Kingdom:** Persons who would be categorized as retail clients in the United Kingdom, as such term is defined in the rules of the Financial Conduct Authority, should read this research in conjunction with prior Goldman Sachs research on the covered companies referred to herein and should refer to the risk warnings that have

been sent to them by Goldman Sachs International. A copy of these risks warnings, and a glossary of certain financial terms used in this report, are available from Goldman Sachs International on request.

European Union and United Kingdom: Disclosure information in relation to Article 6 (2) of the European Commission Delegated Regulation (EU) (2016/958) supplementing Regulation (EU) No 596/2014 of the European Parliament and of the Council (including as that Delegated Regulation is implemented into United Kingdom domestic law and regulation following the United Kingdom's departure from the European Union and the European Economic Area) with regard to regulatory technical standards for the technical arrangements for objective presentation of investment recommendations or other information recommending or suggesting an investment strategy and for disclosure of particular interests or indications of conflicts of interest is available at https://www.gs.com/disclosures/europeanpolicy.html which states the European Policy for Managing Conflicts of Interest in Connection with Investment Research.

Japan: Goldman Sachs Japan Co., Ltd. is a Financial Instrument Dealer registered with the Kanto Financial Bureau under registration number Kinsho 69, and a member of Japan Securities Dealers Association, Financial Futures Association of Japan Type II Financial Instruments Firms Association, and Investment Management Association of Japan. Sales and purchase of equities are subject to commission pre-determined with clients plus consumption tax. See company-specific disclosures as to any applicable disclosures required by Japanese stock exchanges, the Japanese Securities Dealers Association or the Japanese Securities Finance Company.

Global product; distributing entities

Goldman Sachs Global Investment Research produces and distributes research products for clients of Goldman Sachs on a global basis. Analysts based in Goldman Sachs offices around the world produce research on industries and companies, and research on macroeconomics, currencies, commodities and portfolio strategy. This research is disseminated in Australia by Goldman Sachs Australia Pty Ltd (ABN 21 006 797 897); in Brazil by Goldman Sachs do Brasil Corretora de Títulos e Valores Mobiliários S.A.; Public Communication Channel Goldman Sachs Brazil: 0800 727 5764 and / or asil@gs.com. Available Weekdays (except holidays), from 9am to 6pm. Canal de Comunicação com o Público Goldman Sachs Brasil: 0800 727 5764 e/ou asil@gs.com. Horário de funcionamento: segunda-feira à sexta-feira (exceto feriados), das 9h às 18h; in Canada by Goldman Sachs & Co. LLC; in Hong Kong by Goldman Sachs (Asia) L.L.C.; in India by Goldman Sachs (India) Securities Private Ltd.; in Japan by Goldman Sachs Japan Co., Ltd.; in the Republic of Korea by Goldman Sachs (Asia) L.L.C., Seoul Branch; in New Zealand by Goldman Sachs New Zealand Limited; in Russia by OOO Goldman Sachs; in Singapore by Goldman Sachs (Singapore) Pte. (Company Number: 198602165W); and in the United States of America by Goldman Sachs & Co. LLC. Goldman Sachs International has approved this research in connection with its distribution in the United Kingdom.

Goldman Sachs International ("GSI"), authorised by the Prudential Regulation Authority ("PRA") and regulated by the Financial Conduct Authority ("FCA") and the PRA, has approved this research in connection with its distribution in the United Kingdom.

European Economic Area: Goldman Sachs Bank Europe SE ("GSBE") is a credit institution incorporated in Germany and, within the Single Supervisory Mechanism, subject to direct prudential supervision by the European Central Bank and in other respects supervised by German Federal Financial Supervisory Authority (Bundesanstalt für tungsaufsicht, BaFin) and Deutsche Bundesbank and disseminates research within the European Economic Area.

General disclosures

This research is for our clients only. Other than disclosures relating to Goldman Sachs, this research is based on current public information that we consider reliable, but we do not represent it is accurate or complete, and it should not be relied on as such. The information, opinions, estimates and forecasts contained herein are as of the date hereof and are subject to change without prior notification. We seek to update our research as appropriate, but various regulations may prevent us from doing so. Other than certain industry reports published on a periodic basis, the large majority of reports are published at irregular intervals as appropriate in the analyst's judgment.

Goldman Sachs conducts a global full-service, integrated investment banking, investment management, and brokerage business. We have investment banking and other business relationships with a substantial percentage of the companies covered by Global Investment Research. Goldman Sachs & Co. LLC, the United States broker dealer, is a member of SIPC (https://www.sipc.org).

Our salespeople, traders, and other professionals may provide oral or written market commentary or trading strategies to our clients and principal trading desks that reflect opinions that are contrary to the opinions expressed in this research. Our asset management area, principal trading desks and investing businesses may make investment decisions that are inconsistent with the recommendations or views expressed in this research.

We and our affiliates, officers, directors, and employees will from time to time have long or short positions in, act as principal in, make a market or act as liquidity provider in, and buy or sell, any securities, derivatives, or other financial instruments referred to in this research (including any financial instruments issued by the companies referred to herein), unless otherwise prohibited by regulation or Goldman Sachs policy.

The views attributed to third party presenters at Goldman Sachs arranged conferences, including individuals from other parts of Goldman Sachs, do not necessarily reflect those of Global Investment Research and are not an official view of Goldman Sachs.

Any third party referenced herein, including any salespeople, traders and other professionals or members of their household, may have positions in the products mentioned that are inconsistent with the views expressed by analysts named in this report.

This research is focused on investment themes across markets, industries and sectors. It does not attempt to distinguish between the prospects or performance of, or provide analysis of, individual companies within any industry or sector we describe.

Any trading recommendation in this research relating to an equity or credit security or securities within an industry or sector is reflective of the investment theme being discussed and is not a recommendation of any such security in isolation.

This research is not an offer to sell or the solicitation of an offer to buy any security in any jurisdiction where such an offer or solicitation would be illegal. It does not constitute a personal recommendation or take into account the particular investment objectives, financial situations, or needs of individual clients. Clients should consider whether any advice or recommendation in this research is suitable for their particular circumstances and, if appropriate, seek professional advice, including tax advice. The price and value of investments referred to in this research and the income from them may fluctuate. Past performance is not a guide to future performance, future returns are not guaranteed, and a loss of original capital may occur. Fluctuations in exchange rates could have adverse effects on the value or price of, or income derived from, certain investments.

Certain transactions, including those involving futures, options, and other derivatives, give rise to substantial risk and are not suitable for all investors. Investors should review current options and futures disclosure documents which are available from Goldman Sachs sales representatives or at https://www.theocc.com/about/publications/character-risks.jsp and https://www.goldmansachs.com/disclosures/cftc_fcm_disclosures. Transaction costs may be significant in option strategies calling for multiple purchase and sales of options such as spreads. Supporting documentation will be supplied upon request.

Differing Levels of Service provided by Global Investment Research: The level and types of services provided to you by Goldman Sachs Global Investment Research may vary as compared to that provided to internal and other external clients of GS, depending on various factors including your

individual preferences as to the frequency and manner of receiving communication, your risk profile and investment focus and perspective (e.g., marketwide, sector specific, long term, short term), the size and scope of your overall client relationship with GS, and legal and regulatory constraints. As an example, certain clients may request to receive notifications when research on specific securities is published, and certain clients may request that specific data underlying analysts' fundamental analysis available on our internal client websites be delivered to them electronically through data feeds or otherwise. No change to an analyst's fundamental research views (e.g., ratings, price targets, or material changes to earnings estimates for equity securities), will be communicated to any client prior to inclusion of such information in a research report broadly disseminated through electronic publication to our internal client websites or through other means, as necessary, to all clients who are entitled to receive such reports.

All research reports are disseminated and available to all clients simultaneously through electronic publication to our internal client websites. Not all research content is redistributed to our clients or available to third-party aggregators, nor is Goldman Sachs responsible for the redistribution of our research by third party aggregators. For research, models or other data related to one or more securities, markets or asset classes (including related services) that may be available to you, please contact your GS representative or go to https://research.gs.com.

Disclosure information is also available at https://www.gs.com/research/hedge.html or from Research Compliance, 200 West Street, New York, NY 10282.

© 2026 Goldman Sachs.

You are permitted to store, display, analyze, modify, reformat, and print the information made available to you via this service only for your own use. You may not resell or reverse engineer this information to calculate or develop any index for disclosure and/or marketing or create any other derivative works or commercial product(s), data or offering(s) without the express written consent of Goldman Sachs. You are not permitted to publish, transmit, or otherwise reproduce this information, in whole or in part, in any format to any third party without the express written consent of Goldman Sachs. This foregoing restriction includes, without limitation, using, extracting, downloading or retrieving this information, in whole or in part, to train or finetune a machine learning or artificial intelligence system, or to provide or reproduce this information, in whole or in part, as a prompt or input to any such system.