

US Internet/Video Games & Interactive Media

Mobile AdTech Preview: Ringing in the new year with a deservedly better outlook

Estimate Change

Mobile gaming no-longer ex-growth, green shoots seen

The CY24 backdrop for gaming-focused mobile ad networks has improved slightly: Data.ai forecasts mobile gaming IAP revenues to grow 4% Y/Y in CY24 (vs. BofA +2% Y/Y, Street implied +5% Y/Y), after two consecutive years of declines. Moreover, risk appetite to launch new games, which spend the most on advertising, appeared to thaw slightly in 3Q23 & 4Q23 after troughing in 4Q22. Although 3P ests of industry ad prices (excluding APP) were down Q/Q in 4Q23, we think the slight upwards trend in engagement, a proxy for supply, and declines in AdMob prices, were primarily responsible. We view the industry's shift to RTB in 2024 is a tailwind to the mobile gaming ecosystem. On the regulatory front, we expect neither Apple nor Google privacy policy to adversely affect mobile ad networks in CY24. Nor do we believe the dismissal of the Epic vs. Apple case will have a significant effect on industry growth in CY24.

APP: more Q/Q momentum not expected by Street in 1Q24

Expectations for Q4 have risen significantly (at least six consensus estimates forecast 4Q revenues > guidance), but not on 1Q24, where no Q4 bullish analysts (on Factset), expect Q/Q growth in Software segment revenues. BofA's 1Q24 seq growth assumption is driven by rising RTB (aka Real-Time or Header Bidding) fees and the beginnings of CTV advertising, offset by a slight in-game advertising decline due to seasonality. Our 1Q24 in-game forecast does not assume significant improvements to APP's AI-advertising engine Axon 2.0. An above consensus 1Q24 guide, if driven by expectations for Axon 2.0 improvements, would imply that AppDiscovery quarterly run-rate could continue to grow as CY24 unfolds, forcing upward revisions to CY24 consensus estimates. We would not expect new CFO Matt Stumpf to initiate CY24 guidance in his first call with investors. Commentary that APP broadened its supply or demand base (i.e. CTV and non-gaming verticals) in 4Q has the potential to raise APP's valuation multiple.

U: Strategic review before 4Q

We expect Unity's strategic review to be largely complete when the company announces results on February 26. To date, the company has announced headcount reductions (we estimate \$270mn in annual savings), separation from Weta (we estimate \$70mn in revenue) and exiting of office leases. We believe incremental announcements regarding business sales or separations could come before results. In aggregate, we view the strategic review as positioning Unity for higher revenue growth and profitability with greater focus on core markets. Maintain Buy.

APPS: Lack of near-term catalyst keeps stock sideways

APPS' product suite and technology capability position it well to benefit from app publishers' push towards alternative app distribution, which in our view, underpins the bull case for the stock. However, we have difficulty underwriting an inflection in revenues until the opportunity size and potential economics of the SingleTap & Hubs product become clear. Meanwhile, near-term headwinds in the core business keep us in a wait-and-see mode. We see limited downside risk to 3FQ Street/Guide, [as our industry checks suggest generally upbeat advertiser sentiment & better-than expected ad spend trends](#). We reiterate Neutral & \$7 PO, on 8.5x (unchanged) EBITDA.

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Acronyms:

CPI: Cost per Install

3P: Third Party

RTB: Real Time Bidding

APP: AppLovin

APPS: Digital Turbine

U: Unity

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APP: 1Q24 guide may raise Street models

APP is our top pick with in our coverage for 2024. At 9x FY24 EV/EBITDA (on BofA estimates), APP trades like a mobile game developer, despite the potential to grow its core business by ~50% Y/Y in 2024. We think APP's depressed valuation is partially attributed to a lack of investor familiarity, as well as concerns that 1) the mobile gaming end market is only a low-single-digit grower, capping the growth in marketing spend that goes to Broker Ad Networks such as AppLovin and Unity, 2) Broker Ad Networks lack differentiation and sustainable edge as compared to Walled Gardens such as Meta & Google, 3) changes in the privacy landscape (i.e. Apple's Privacy Manifest, Google's cookie deprecations) could again disrupt the mobile ad ecosystem.

We expect the dissipation of the investor concerns to drive re-rating over time, and catalysts could begin to emerge at the 4Q results call on February 14th:

1. Evidence of traction in non-gaming advertising, CTV advertising, as well as mediation services could raise Street models and investor confidence in these non-core verticals, where the opportunity size is still underappreciated. This should also expand APP's addressable market and dispel concerns around end market growth over time
2. Concerns around the impact of iOS privacy policy has somewhat dissipated after [Apple's release of its SDK list](#), and we think Google's deprecation of GAID is unlikely to happen in 2024 (cookie deprecation doesn't affect APP's core mobile in-app advertising business)
3. Google's transition into real-time bidding on partner mediation platforms (AppLovin MAX, Unity LevelPlay, Chartboost, Digital Turbine Fairbid) by end of January could reshape the competitive landscape among both demand-side and supply-side platforms. APP as an early adopter of real-time bidding technology could emerge as a beneficiary

We suspect a 4Q beat is already somewhat anticipated: 6 (incl. BofA) out of 12 sellside analysts have 4Q revenue forecast above the high end of guidance, with buy-side expectations likely higher than the sellside. However, Street 1Q24 consensus appears conservative, implying a Q/Q decline in Software revenue in aggregate. We expect sequential growth in Software revenue in 1Q24, driven by incremental revenue from MAX RTB fees (Google bidding), as well as contribution from CTV advertising's early rollout; we model \$10mn Q/Q decline in core AppDiscovery (in-app ads) revenue driven by seasonality, conservatively assuming no further gains from Axon 2.0's model improvements, which is APP's next generation AI advertising engine.

For the Gaming segment, we forecast +3% Q/Q growth in in-app purchase revenue in 4Q23, consistent with 3P estimates, and slightly trim FY24 revenues by \$70mn assuming performance inline with industry forecasts (LSD growth in 2024).

We reiterate Buy with \$57 PO unchanged, on a SOTP framework that values the Software business at 12x FY24E EBITDA, and the Gaming (Apps) business at 5x FY24E EBITDA. Our Software multiple is inline with the valuations of Meta & Alphabet, which we see as comps for APP, and our Gaming multiple is consistent with casual mobile gaming publishers.



Exhibit 1: BofA APP Software Segment Line of Business (LOB) Build

We expect AppDiscovery to drive Software growth in in FY23E & FY24E, and assume incremental revenue contributions from header bidding and Wurl (CTV) in FY24E

| | 2022 Dec-22 | 1Q23 Mar-23 | 2Q23 Jun-23 | 3Q23 Sep-23 | 4Q23E Dec-23 | 2023E Dec-23 | 1Q24E Mar-24 | 2Q24E Jun-24 | 3Q24E Sep-24 | 4Q24E Dec-24 | 2024E Dec-24 |
|---------------------------------------|----------------|----------------|----------------|----------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|
| Software Revenue | \$1,049 | \$355 | \$406 | \$504 | \$575 | \$1,840 | \$611 | \$656 | \$692 | \$749 | \$2,709 |
| of which AppDiscovery (BofA Est) | \$946 | \$274 | \$312 | \$404 | \$464 | \$1,454 | \$469 | \$494 | \$519 | \$544 | \$2,026 |
| of which Mobile Apps Supply | | \$274 | \$312 | \$404 | \$454 | \$1,444 | \$444 | \$444 | \$444 | \$444 | \$1,776 |
| of which CTV (Wurl) Supply | | | | \$0 | \$10 | \$10 | \$25 | \$50 | \$75 | \$100 | \$250 |
| of which ALX DSPs Clients (BofA Est) | \$100 | \$15 | \$20 | \$20 | \$20 | \$75 | \$22 | \$25 | \$25 | \$33 | \$105 |
| of which Header Bidding (BofA Est) | \$80 | \$30 | \$35 | \$40 | \$50 | \$155 | \$80 | \$95 | \$105 | \$120 | \$400 |
| of which Adjust (BofA Est) | \$111 | \$29 | \$29 | \$29 | \$29 | \$116 | \$30 | \$30 | \$30 | \$35 | \$126 |
| of which Wurl SSP/CDN only (BofA Est) | \$21 | \$7 | \$10 | \$11 | \$12 | \$40 | \$10 | \$12 | \$13 | \$17 | \$52 |
| of which publisher bonus adjustment | (\$210) | | | | | | | | | | |
| Software Revenue Y/Y Growth | 56% | 8% | 28% | 65% | 88% | 46% | 72% | 62% | 37% | 30% | 47% |
| of which AppDiscovery (BofA Est) | 77% | 14% | 29% | 75% | 100% | 54% | 71% | 58% | 28% | 17% | 39% |
| of which ALX DSPs Clients (BofA Est) | 69% | -63% | 0% | 0% | 0% | -25% | 47% | 25% | 25% | 65% | 40% |
| of which Header Bidding (BofA Est) | | | | | | | 167% | 171% | 163% | 140% | 158% |
| of which Adjust (BofA Est) | 40% | 4% | 4% | 4% | 7% | 5% | 5% | 5% | 5% | 21% | 9% |
| of which Wurl SSP/CDN only (BofA Est) | | | 43% | 57% | 71% | 90% | 43% | 20% | 18% | 42% | 30% |
| of which publisher bonus adjustment | | | | | | | | | | | |

Source: BofA Global Research estimates, Company reports

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Exhibit 2: Sum of the Parts Valuation for \$57 Price Objective

AppLovin's valuation is driven by its Software segment, which we value at 12x FY23 EBITDA

| (\$ Mn) | Target Valuation | | | Current SOTP | | |
|----------------------|------------------|-------------|------------|--------------|-------------|------------|
| | PO | Software | Gaming | Stock Price | Software | Gaming |
| \$Value/Share | \$57 | \$55 | \$2 | \$43 | \$41 | \$2 |
| FDSO (Mn) | 379 | 379 | 379 | 379 | 379 | 379 |
| Market Cap | \$21,608 | \$20,961 | \$647 | \$16,344 | \$15,697 | \$647 |
| Net Cash | (\$2,795) | (\$2,556) | (\$239) | (\$2,795) | (\$2,556) | (\$239) |
| EV | \$24,403 | \$23,517 | \$886 | \$19,139 | \$18,253 | \$886 |
| FY24 Revenue | \$4,187 | \$2,709 | \$1,477 | \$4,187 | \$2,709 | \$1,477 |
| FY24 EBITDA | \$2,074 | \$1,897 | \$177 | \$2,074 | \$1,897 | \$177 |
| EV/Revenue | 6x | 9x | 1x | 5x | 7x | 1x |
| EV/EBITDA | 12x | 12x | 5x | 9x | 10x | 5x |

Source: BofA Global Research estimates, Company Reports

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Exhibit 3: BofA Estimates vs. Street, 2023E to 2025E

We expect 4Q beat driven by Software, and our FY24 Revenue/EBITDA estimates are well above Street

| | 2022 | 23Q1 | 23Q2 | 23Q3 | 23Q4E | 2023E | 2024E | 2025E |
|--|--------|--------|--------|--------|-------|--------|-------|-------|
| Revenue - Consolidated | | | | | | | | |
| B of A (After) | 2,817 | 715 | 750 | 864 | 945 | 3,274 | 4,187 | 4,607 |
| B of A (Before) | | | | | 945 | 3,274 | 4,260 | 4,688 |
| STREET | | | | | 927 | 3,256 | 3,841 | 4,280 |
| Delta vs. STREET | | | | | 1.9% | 0.6% | 9.0% | 7.6% |
| GUIDE (Midpoint) | | | | | 920.0 | | | |
| Revenue - Consolidated YoY Growth % | | | | | | | | |
| B of A (After) | 0.9% | 14.4% | -3.4% | 21.2% | 34.5% | 16.2% | 27.9% | 10.0% |
| B of A (Before) | | | | | 34.5% | 16.2% | 30.1% | 10.0% |
| STREET | | | | | 31.9% | 15.6% | 17.9% | 11.4% |
| Delta vs. STREET | | | | | 2.6% | 0.6% | 9.9% | -1.4% |
| GUIDE (Midpoint) | | | | | 31.0% | | | |
| Revenue - Software | | | | | | | | |
| B of A (After) | 1,049 | 355 | 406 | 504 | 575 | 1,840 | 2,709 | 3,098 |
| B of A (Before) | | | | | 575 | 1,840 | 2,709 | 3,098 |
| STREET | | | | | 556 | 1,821 | 2,347 | 2,736 |
| Delta vs. STREET | | | | | 3.4% | 1.0% | 15.4% | 13.2% |
| GUIDE (Midpoint) | | | | | | | | |
| Revenue - Apps | | | | | | | | |
| B of A (After) | 1,768 | 360 | 344 | 360 | 370 | 1,434 | 1,477 | 1,509 |
| B of A (Before) | | | | | 370 | 1,434 | 1,550 | 1,590 |
| STREET (IMPLIED) | | | | | 371 | 1,435 | 1,493 | 1,544 |
| Delta vs. STREET | | | | | -0.2% | -0.1% | -1.1% | -2.3% |
| GUIDE (Midpoint) | | | | | | | | |
| Revenue - Software YoY Growth % | | | | | | | | |
| B of A (After) | 55.5% | 8.1% | 27.9% | 64.5% | 87.8% | 46.2% | 47.2% | 14.3% |
| B of A (Before) | | | | | 87.8% | 46.2% | 47.2% | 15.0% |
| STREET | | | | | 81.5% | 73.6% | 28.9% | 16.5% |
| Delta vs. STREET | | | | | 6.3% | -27.4% | 18.3% | -2.2% |
| GUIDE (Midpoint) | | | | | | | | |
| Revenue - Apps YoY Growth % | | | | | | | | |
| B of A (After) | -16.6% | -28.9% | -25.0% | -11.5% | -6.6% | -18.9% | 3.0% | 2.2% |
| B of A (Before) | | | | | -6.6% | -18.9% | 8.1% | 2.6% |
| STREET | | | | | -6.4% | -18.8% | 4.0% | 3.4% |
| Delta vs. STREET | | | | | -0.2% | -0.1% | -1.0% | -1.3% |
| GUIDE (Midpoint) | | | | | | | | |
| EBITDA Non-GAAP | | | | | | | | |
| B of A (After) | 1,063 | 274 | 334 | 419 | 454 | 1,480 | 2,074 | 2,335 |
| B of A (Before) | | | | | 454 | 1,480 | 2,110 | 2,375 |
| STREET | | | | | 439 | 1,465 | 1,830 | 2,083 |
| Delta vs. STREET | | | | | 3.4% | 1.0% | 13.3% | 12.1% |
| GUIDE (Midpoint) | | | | | 430.0 | | | |
| EBITDA Margin Non-GAAP % | | | | | | | | |
| B of A (After) | 35.1% | 38.3% | 44.5% | 48.5% | 48.0% | 45.2% | 49.5% | 50.7% |
| B of A (Before) | | | | | 48.0% | 45.2% | 49.5% | 50.7% |
| STREET | | | | | 47.4% | 45.0% | 47.7% | 48.7% |
| Delta vs. STREET | | | | | 0.7% | 0.2% | 1.9% | 2.0% |
| GUIDE (Midpoint) | | | | | 46.7% | | | |
| EBITDA - Software | | | | | | | | |
| B of A (After) | 809 | 219 | 273 | 364 | 400 | 1,255 | 1,897 | 2,169 |
| B of A (Before) | | | | | 400 | 1,255 | 1,897 | 2,169 |
| STREET | | | | | 386 | 1,242 | 1,585 | 1,835 |
| Delta vs. STREET | | | | | 3.6% | 1.1% | 19.7% | 18.2% |
| GUIDE (Midpoint) | | | | | | | | |

Exhibit 3: BofA Estimates vs. Street, 2023E to 2025E

We expect 4Q beat driven by Software, and our FY24 Revenue/EBITDA estimates are well above Street

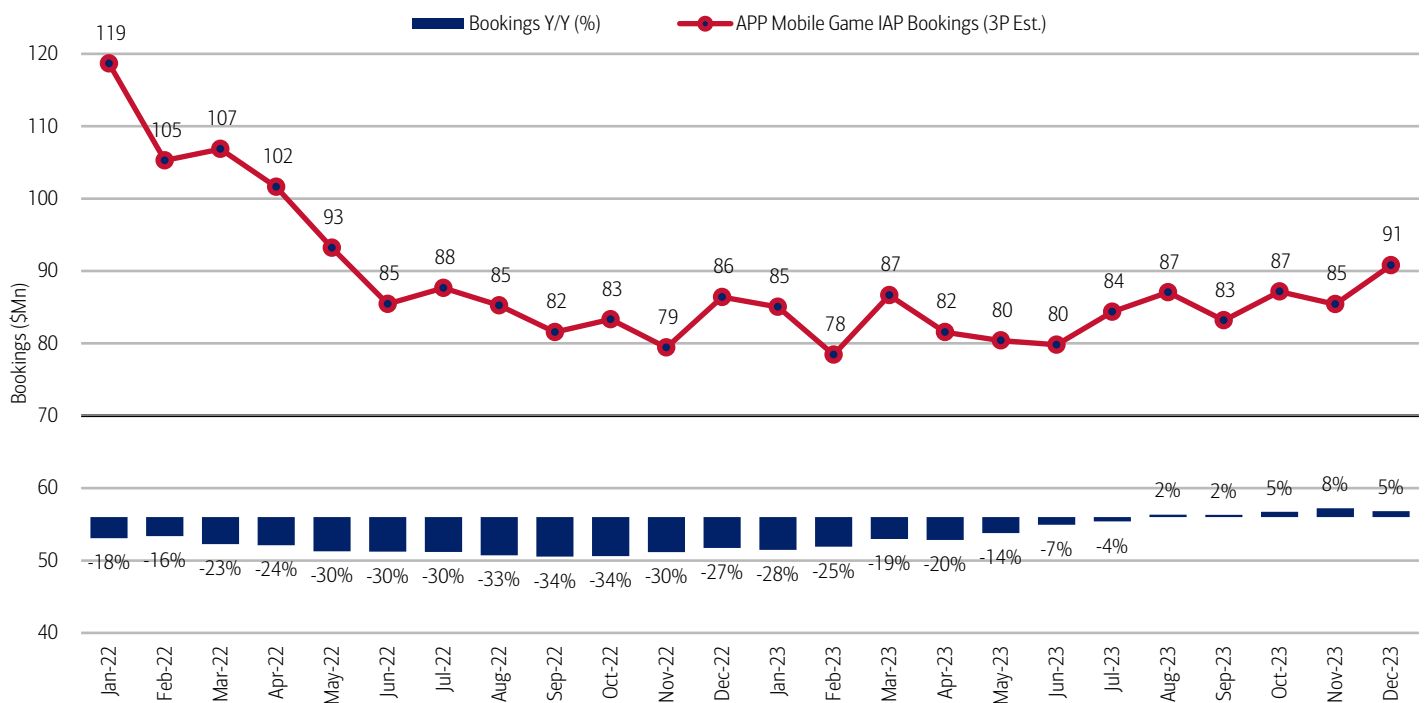
| | 2022 | 23Q1 | 23Q2 | 23Q3 | 23Q4E | 2023E | 2024E | 2025E |
|-----------------------------------|-------|-------|-------|-------|-------|-------|--------|--------|
| EBITDA - Apps | | | | | | | | |
| B of A (After) | 255 | 55 | 61 | 55 | 54 | 225 | 177 | 166 |
| B of A (Before) | | | | | 54 | 225 | 213 | 207 |
| STREET | | | | | 52 | 223 | 214 | 216 |
| Delta vs. STREET | | | | | 3.7% | 0.9% | -17.3% | -23.2% |
| GUIDE (Midpoint) | | | | | | | | |
| EBITDA Margin % - Software | | | | | | | | |
| B of A (After) | 64.2% | 61.6% | 67.1% | 72.2% | 69.6% | 67.6% | 70.0% | 70.0% |
| B of A (Before) | | | | | 69.6% | 67.6% | 70.0% | 70.0% |
| STREET | | | | | 69.5% | 68.2% | 67.5% | 67.1% |
| Delta vs. STREET | | | | | 0.1% | -0.6% | 2.5% | 2.9% |
| GUIDE (Midpoint) | | | | | | | | |
| EBITDA Margin % - Apps | | | | | | | | |
| B of A (After) | 14.4% | 15.3% | 17.7% | 15.3% | 14.5% | 15.7% | 12.0% | 11.0% |
| B of A (Before) | | | | | 14.5% | 15.7% | 13.8% | 13.0% |
| STREET | | | | | 14.0% | 15.5% | 14.3% | 14.0% |
| Delta vs. STREET | | | | | 0.6% | 0.2% | -2.3% | -3.0% |
| GUIDE (Midpoint) | | | | | | | | |

Source: BofA Global Research estimates, Visible Alpha, Company Reports

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Exhibit 4: Mobile IAP Bookings (3P Ests) Y/Y Growth, APP Top Games, Jan '22 - Dec '23

APP mobile IAP bookings (3P Ests) grew +5% Y/Y in December, and were up sequentially on seasonal strength; Q/Q growth was +3%

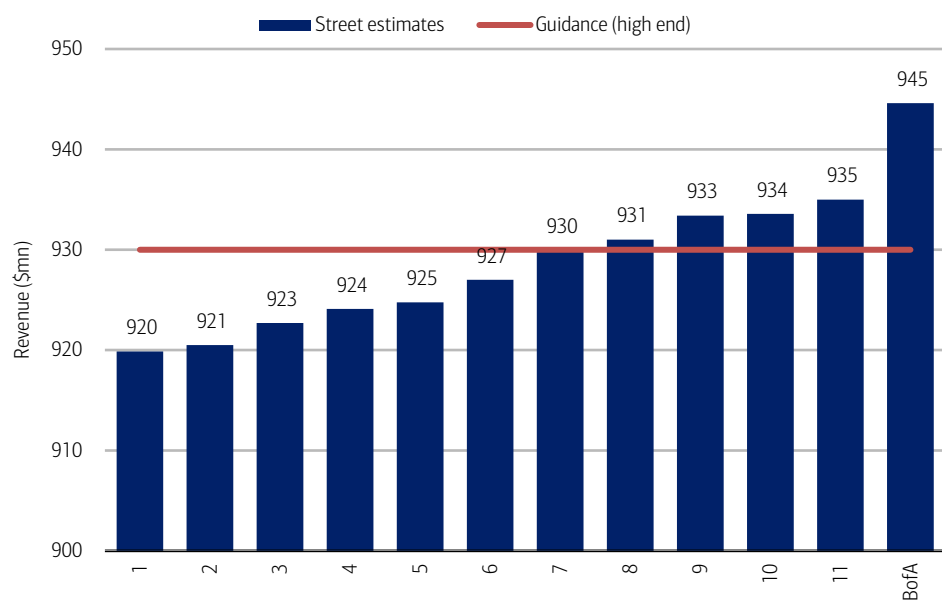


Source: Sensor Tower, BofA Analysis of 250+ APP mobile games

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Exhibit 5: 12 Sell Side Analyst Estimates of 4Q23 Total Revenues, as of Jan 21, 2024

Half of the 12 sellside 4Q23 Revenue estimates that we track are above high end of guidance



Source: FactSet, BofA Global Research

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APPS: catalysts needed to re-rate stock

The Ignite software's system level integration with carrier phones allows it to install apps directly onto devices, in a much more frictionless way (one-click install through SingleTap) than sideloading (web to app), which is commonly used by most publishers looking to bypass the Google Play Store. This unique technology capability positions APPS well to benefit from publishers' push into alternative app distribution, particularly as tech partners to Big Tech (e.g. Meta, Microsoft). However, the opportunity remains hard to underwrite as its alternative app store product (Hubs) is still in the early stage of rollout, making it difficult to assess the product fit, opportunity size, or potential economics. We expect the stock to stay in holding patterns in the interim because 1) core business growth remains pressured due to near-term headwinds (weak device activation trends, business consolidations), and 2) SingleTap (licensing product) and Hubs have yet to show significant traction.

Meanwhile, we see limited downside risk to 3FQ guidance and Street estimates, as our industry checks suggest generally upbeat advertiser sentiment & better-than expected ad spend trends. We slightly trim our FY25 Revenue/EBITDA forecasts now modeling lower revenue contribution from SingleTap (licensing) & Hubs (~\$20mn).

Exhibit 6: BofA Forecasts vs Street, FY24E - FY25E

We expect 3FQ Revenue/EBITDA inline with guidance

| | FY23 | 1Q24 | 2Q24 | 3Q24E | 4Q24E | FY24E | FY25E |
|------------------------------------|--------|--------|--------|--------|--------|--------|-------|
| Net Revenues | | | | | | | |
| B of A (After) | 666 | 146 | 143 | 146 | 139 | 574 | 640 |
| B of A (Before) | | | | 146 | 139 | 574 | 665 |
| STREET | | | | 146 | 138 | 574 | 627 |
| Delta vs. STREET | | | | 0.3% | 0.2% | 0.1% | 2.2% |
| GUIDE | | | | 147 | - | - | - |
| Net Revenues YoY Growth % | | | | | | | |
| B of A (After) | -10.9% | -22.4% | -18.1% | -10.0% | -1.0% | -13.7% | 11.5% |
| B of A (Before) | | | | -10.0% | -1.0% | -13.7% | 15.7% |
| STREET | | | | -10.2% | -1.2% | -13.9% | 9.2% |
| Delta vs. STREET | | | | 0.2% | 0.2% | 0.1% | 2.3% |
| GUIDE | | | | | | | |
| On-Device Solutions Revenue | | | | | | | |
| B of A (After) | 420 | 98 | 99 | 100 | 99 | 396 | 450 |
| B of A (Before) | | | | 101 | 103 | 401 | 479 |
| STREET | | | | 97 | 99 | 394 | 437 |
| Delta vs. STREET | | | | 3.1% | -0.3% | 0.7% | 3.0% |
| ODS Revenues YoY Growth % | | | | | | | |
| B of A (After) | -16.4% | -17.2% | -8.7% | 3.8% | 2.2% | -5.7% | 13.5% |
| B of A (Before) | | | | 4.9% | 6.3% | -4.5% | 19.4% |
| STREET | | | | 0.7% | 2.5% | -6.3% | 11.0% |
| Delta vs. STREET | | | | 3.1% | -0.3% | 0.6% | 2.6% |
| App Growth Platform Revenue | | | | | | | |
| B of A (After) | 253 | 49 | 46 | 48 | 41 | 184 | 199 |
| B of A (Before) | | | | 47 | 37 | 179 | 194 |
| STREET | | | | 50 | 40 | 185 | 196 |
| Delta vs. STREET | | | | -4.8% | 1.9% | -0.9% | 1.6% |
| AGP Revenues YoY Growth % | | | | | | | |
| B of A (After) | -3.6% | -32.3% | -32.3% | -29.5% | -8.6% | -27.4% | 8.1% |
| B of A (Before) | | | | -31.0% | -17.5% | -29.3% | 8.8% |
| STREET | | | | -26.0% | -10.3% | -26.7% | 5.5% |
| Delta vs. STREET | | | | -3.5% | 1.7% | -0.6% | 2.6% |
| Non-GAAP Gross Margin % | | | | | | | |

Exhibit 6: BofA Forecasts vs Street, FY24E - FY25E

We expect 3FQ Revenue/EBITDA inline with guidance

| | FY23 | 1Q24 | 2Q24 | 3Q24E | 4Q24E | FY24E | FY25E |
|--------------------------------------|-------|-------|-------|--------|-------|--------|-------|
| B of A (After) | 49.0% | 47.1% | 46.8% | 47.0% | 46.1% | 46.8% | 47.5% |
| B of A (Before) | | | | 47.0% | 46.1% | 46.8% | 48.2% |
| STREET | | | | 47.1% | 46.1% | 46.8% | 47.3% |
| Delta vs. STREET | | | | (0.1%) | 0.0% | (0.0%) | 0.3% |
| Non-GAAP Operating Margin % | | | | | | | |
| B of A (After) | 22.0% | 15.0% | 15.9% | 16.7% | 14.7% | 15.6% | 18.9% |
| B of A (Before) | | | | 16.7% | 14.7% | 15.6% | 19.3% |
| STREET | | | | 17.5% | 15.5% | 16.5% | 18.3% |
| Delta vs. STREET | | | | | | (1.0%) | 0.6% |
| Non-GAAP Adj. EBITDA | | | | | | | |
| B of A (After) | 163 | 27 | 28 | 29 | 25 | 108 | 138 |
| B of A (Before) | | | | 29 | 25 | 108 | 146 |
| STREET | | | | 29 | 25 | 108 | 127 |
| Delta vs. STREET | | | | 1.0% | 0.8% | 0.6% | 8.5% |
| GUIDE | | | | 29 | - | - | - |
| Non-GAAP Adj. EBITDA Margin % | | | | | | | |
| B of A (After) | 24.5% | 18.4% | 19.3% | 19.7% | 17.9% | 18.9% | 21.6% |
| B of A (Before) | | | | 19.7% | 17.9% | 18.9% | 21.9% |
| STREET | | | | 19.6% | 17.8% | 18.8% | 20.3% |
| Delta vs. STREET | | | | 0.1% | 0.1% | 0.1% | 1.3% |
| GUIDE | | | | | | | |

Source: BofA Global Research estimates, Visible Alpha

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Exhibit 7: BofA vs. Consensus, Valuations & Price Objective

Our Price Objective of \$7/share represents a 31% upside from current valuation, and is driven by 9x EV/EBITDA multiple on the average of FY24 & FY25 EBITDA

Digital Turbine -- Valuation Worksheet

(\$ in millions, except per share amounts)

| | BofA Target Valuation | | | BofA Market Valuation | | | Market Consensus Valuation | | |
|-----------------------|-----------------------|---------|---------|-----------------------|---------|---------|----------------------------|---------|---------|
| (Mn) | FY24E | FY25E | Avg | FY24E | FY25E | Avg | FY24E | FY25E | Avg |
| Upside/Downside | 31.1% | | | | | | | | |
| Price Objective | \$7.00 | | | | | | | | |
| Share Price | | | | \$5.34 | | | \$5.34 | | |
| Diluted Shares Outst. | 104.7 | 104.7 | 104.7 | 104.7 | 104.7 | 104.7 | 104.7 | 104.7 | 104.7 |
| Market Value | \$733 | \$733 | \$733 | \$559 | \$559 | \$559 | \$559 | \$559 | \$559 |
| Net Cash | (\$325) | (\$325) | (\$325) | (\$325) | (\$325) | (\$325) | (\$325) | (\$325) | (\$325) |
| Enterprise Value | \$1,058 | \$1,058 | \$1,058 | \$884 | \$884 | \$884 | \$884 | \$884 | \$884 |
| EV/EBITDA | 9.8x | 7.6x | 8.6x | 8.2x | 6.4x | 7.2x | 8.2x | 6.9x | 7.5x |
| EBITDA (BofA/STREET) | \$108 | \$138 | \$123 | \$108 | \$138 | \$123 | \$108 | \$127 | \$118 |
| FCF Yield | 8.5% | 14.1% | 11.3% | 11.2% | 18.5% | 14.8% | 9.8% | 16.6% | 13.2% |
| FCF (BofA/STREET) | \$63 | \$103 | \$83 | \$63 | \$103 | \$83 | \$55 | \$93 | \$74 |
| EV/Sales | 1.8x | 1.7x | 1.7x | 1.5x | 1.4x | 1.5x | 1.5x | 1.4x | 1.5x |
| Sales (BofA/STREET) | \$574 | \$640 | \$607 | \$574 | \$640 | \$607 | \$574 | \$627 | \$600 |

Source: BofA Global Research estimates, Bloomberg, FactSet, Visible Alpha

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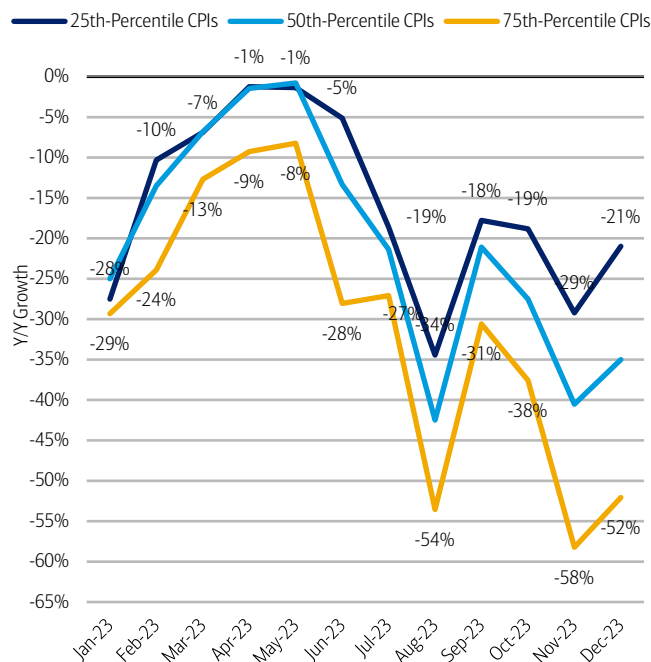
Pricing December: iOS lower, Android remained at trough

Cost per Install (CPI) and cost per 1000 impressions (CPM) are important indicators because they reflect the expected lifetime value of the gamers who install a game based on an ad served through an ad network.

- In November 2023, Google started to transition into real-time bidding on both AdMob as well as partner mediation platforms (AppLovin MAX, Unity LevelPlay, Chartboost, Digital Turbine Fairbid), a process that would complete by January 2024. We expect this change to result in ad pricing improvements over time as real-time bidding introduces more competition into ad auctions, though some near-term volatility is expected as the ecosystem adjusts to the transition.
- CPI (3P estimates) of US Android apps were sequentially stable in December but remained at trough levels seen in 2023. Average pricing on Android has fallen significantly since June 2023, with AdMob driving most of the decline.
- CPI (3P estimates) of US iOS apps fell low-teens sequentially in December, driven by broad-based declines across platforms except AdMob. Overall in 2023, average pricing on iOS appears to have stabilized after two years of steep declines, particularly for less expensive installs.

Exhibit 8: Cost per Install Y/Y Growth, US Android Apps (all categories)

Average Android CPIs (3P ests) were about flat sequentially in December, with Y/Y comps improved from November levels



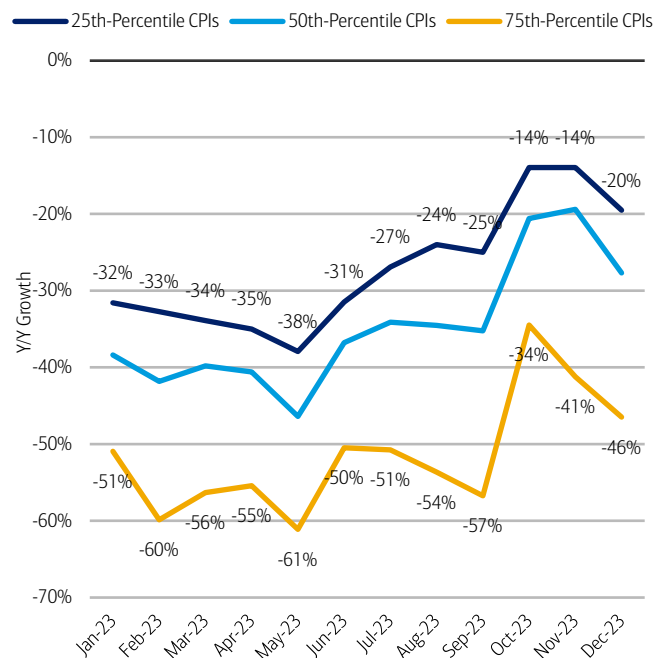
Source: Data.ai

Note: major networks included are AdMob, UnityAds, ironSource, Chartboost, Vungle, AdColony, InMobi

BofA GLOBAL RESEARCH

Exhibit 9: Cost per Install Y/Y Growth, US iOS Apps (all categories)

Average iOS CPIs (3P ests) fell low teens sequentially in December



Source: Data.ai

Note: major networks included are AdMob, UnityAds, ironSource, Chartboost, Vungle, AdColony, InMobi

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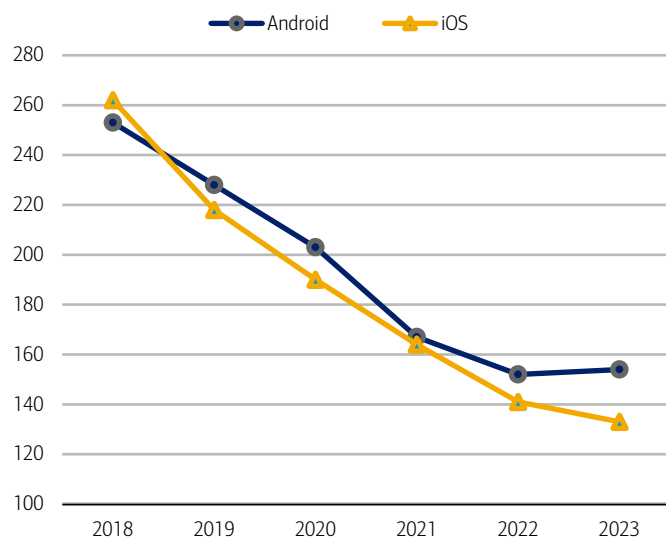
New launch: early signs of rebound, but no inflection yet

New game launches are important growth drivers of ad network revenues because publishers tend to spend the most on advertising at launch in an effort to scale users that can make the game profitable. Moreover, most mobile games see their revenue flatten or decline after a few years in operation, making new game launches critical to the financial success (and ongoing advertising spend) of any publisher with a portfolio.

We track the number of newly launched games among the top 1500 grossing gaming apps on iOS and Android respectively to gauge the pace and success of new game launches. An acceleration in the pace of new launches could suggest 1) an increase in risk appetite by publishers, 2) an increase in VC/private market funding in mobile gaming, and 3) user targeting may be improving, lowering the bar for scaling new games, both of which could indicate higher industry growth going forward, a positive for Mobile AdTech platforms such as AppLovin, Unity, Vungle, and Digital Turbine. Our analysis suggests that new launches within top games have declined consistently since 2018, reaching a new low in 2023. However, there are early signs that new launches have been picking up since 3Q23. Overall, our data does not indicate an inflection in mobile gaming industry growth driven by new launches. We look for more clues if the rebound since 3Q23 marks a turning point.

Exhibit 10: Number of New Launches Among Top 1500 Game Apps by Revenue, US iOS & Android, YTD (thru December)

The number of new launches among top gaming apps have consistently declined since 2018; new launches continued to fall in 2023 on iOS, but appeared flat on Android



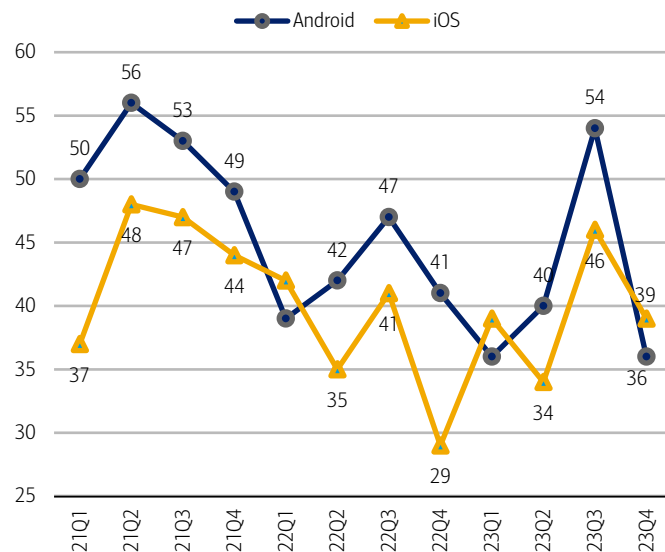
Source: SensorTower, BofA Global Research

Note: New launch defined as a game that was released in the year

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Exhibit 11: Number of New Launches Among Top 1500 Game Apps by Revenue, by Quarter, US iOS & Android

The number of new launches per quarter has showed early signs of rebound since 3Q23, particularly on iOS



Source: SensorTower, BofA Global Research

Note: New launch defined as a game that was released in the quarter

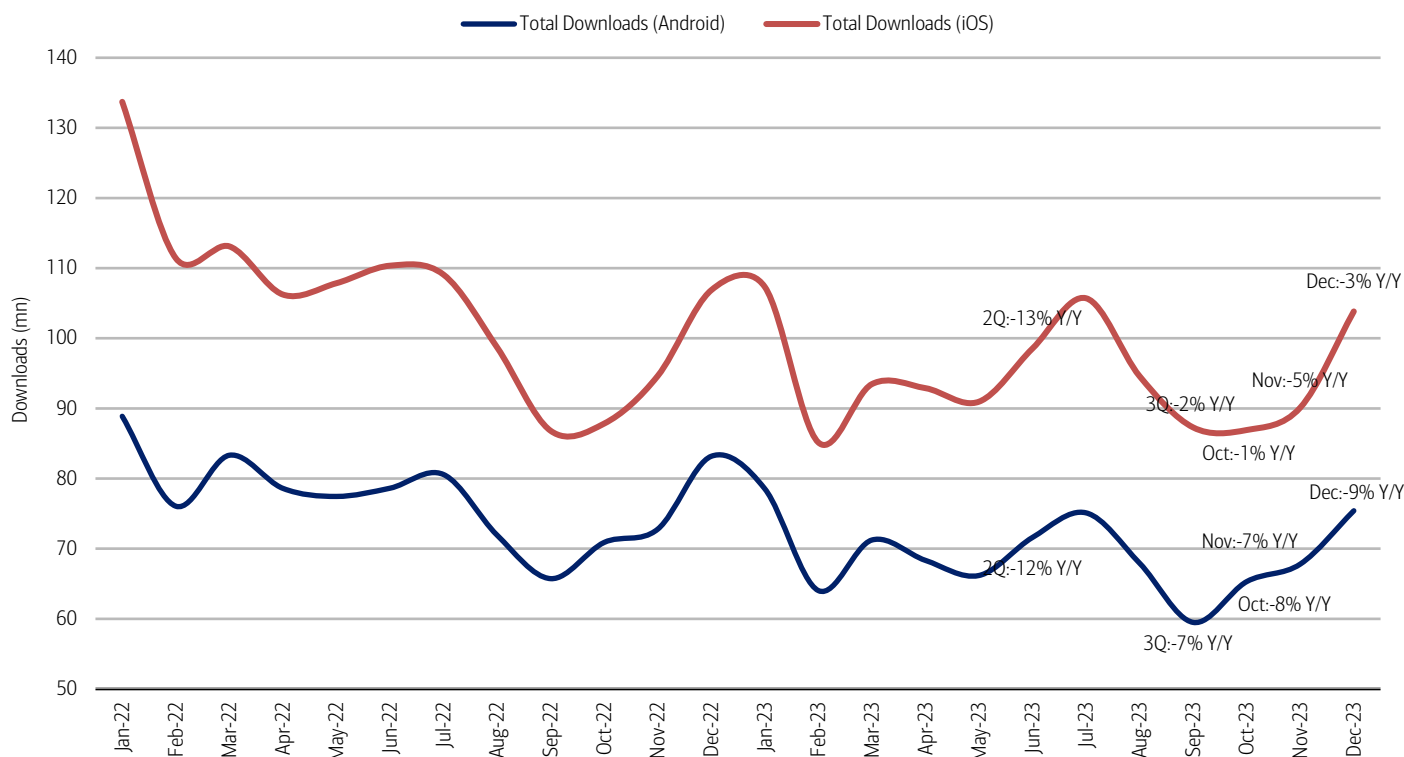
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Volumes: Y/Y comps stable, but up M/M

The volume of downloads of mobile game apps is an indicator of volume of paid installs through mobile ad networks. Mobile game install volumes appeared to have trended sideways since August '22, though Y/Y declines have slowly moderated since early 2023 as comps eased. Summer seasonality appeared more pronounced than last year, with sequential upticks in June & July and normalizations in August & September. In December, game downloads ticked up on seasonal strength, extending the uptrend since October; Y/Y comps remained roughly stable. Overall, 4Q seasonality appears consistent with that in 2022.

Exhibit 12: Monthly Total Downloads of Top US Mobile Games

Total downloads of US top mobile games were still lower Y/Y in December, with Y/Y comps stable; total downloads in 4Q overall fell single digits Y/Y



Source: Sensor Tower, BofA analysis of 500 top gaming apps on Android & iOS respectively

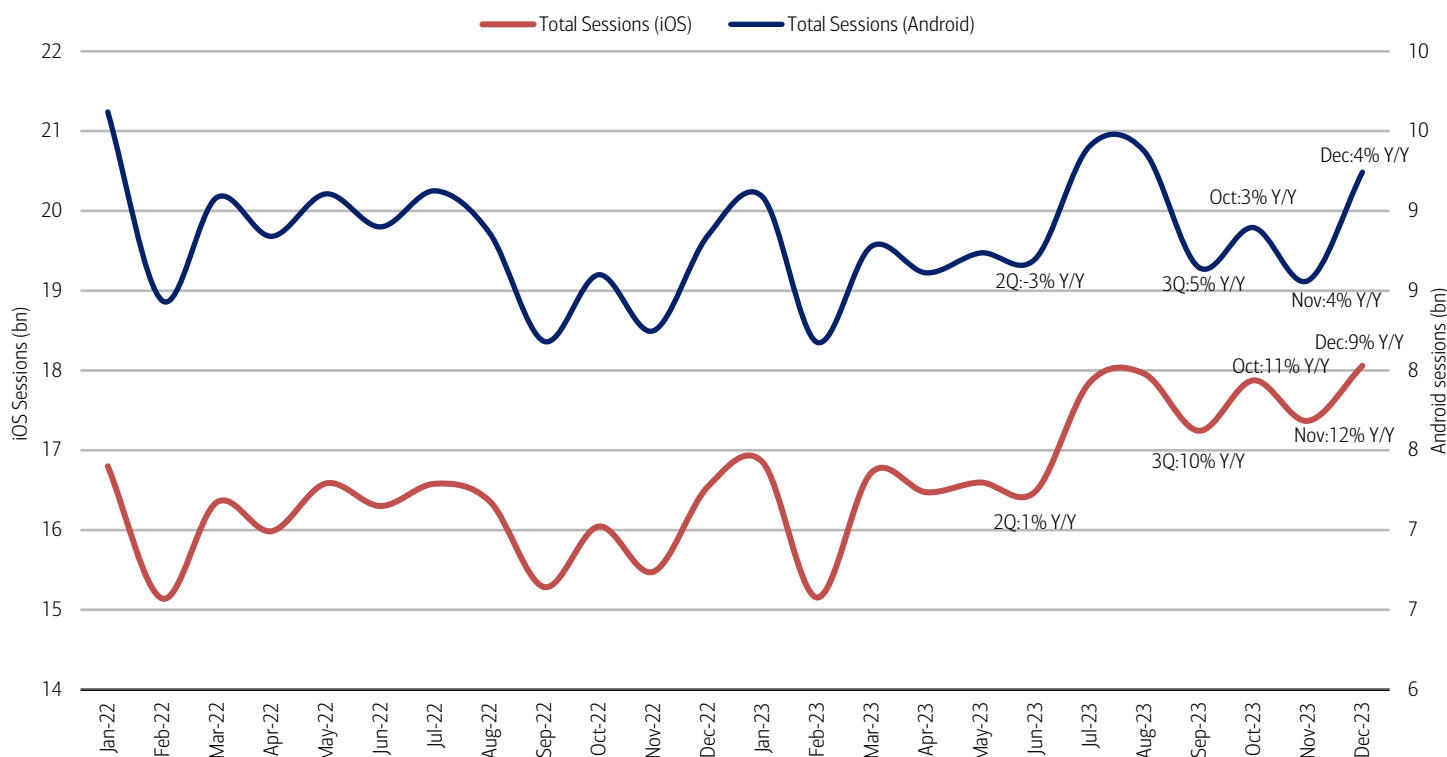
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Engagement: positive Y/Y since July, iOS trending up

Engagement with mobile games (total times an app is opened) is an important indicator of the supply of impressions available for ad networks to serve ads to. According to 3P estimates, player engagement on top iOS games seems to have slowly trended upwards since July 2023. On Android, aggregate player engagement appears stable since 2022. In December, player engagement ticked up M/M on seasonal strength. Y/Y comps have inflected to positive since July, up mid-single-digits/low-teens Y/Y on Android/iOS. Overall, 4Q seasonality did not deviate with that in 2022.

Exhibit 13: Monthly Aggregate Engagement with Top US Mobile Games

Overall player engagement ticked up M/M in December on seasonal strength, Y/Y comps were roughly stable sequentially; overall engagement were flat sequentially in 4Q



Source: Sensor Tower, BofA analysis of 500 top gaming apps on Android and iOS

Note: Aggregate engagement based on total player sessions on top 500 iOS & Android gaming apps

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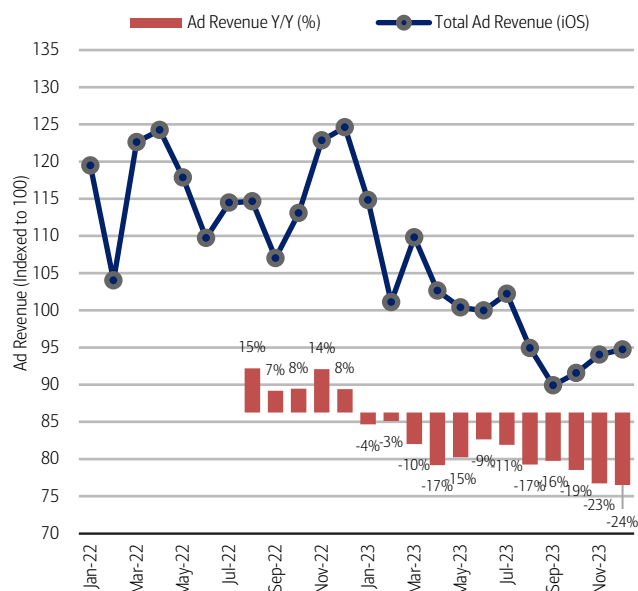
In-game ads: Not showing secular growth

In-game advertising is still very small (BofA est. of \$10-\$15bn) as compared to the ~\$100bn in-app spending within mobile games. But some AdTech firms have pointed to in-game mobile advertising as a secular growth opportunity; with IAP under pressure, publishers should attempt to monetize the > 95% of mobile gamers that do not spend in game.

3P data does not suggest that in-game mobile ad revenue is experiencing secular growth (see Exhibits 5 and 6). Moreover, hypercasual games, which make up the most significant part of the in-game advertising have been hurt by the downward trend in CPMs since 1Q22.

Exhibit 14: Total Ad Revenue (Indexed) of Top 1500 Ad Monetizing Games (iOS, US Only)

Total ad revenue across top iOS games grew 1% M/M in December, but still 24% lower Y/Y



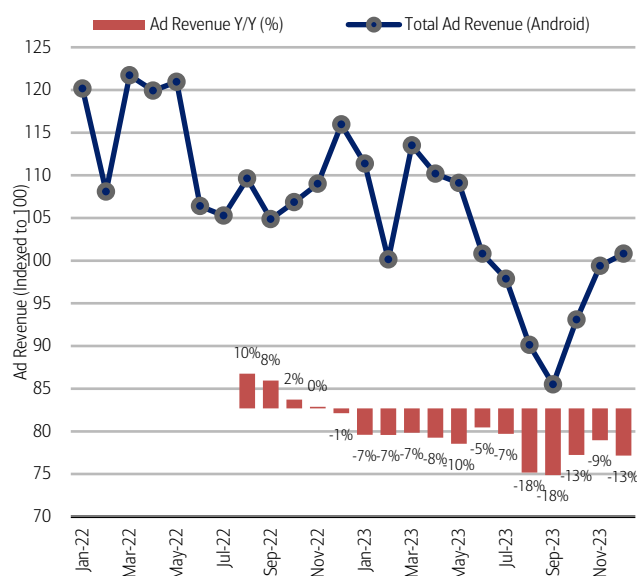
Source: data.ai

Note: Ad revenue includes a subset of ad networks and excludes social media and OTT. Included networks are: AdColony, AdMob, AppLovin, ironSource, UnityAds, Vungle

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Exhibit 15: Total Ad Revenue (Indexed) of Top 1500 Ad Monetizing Games (Android, US Only)

Total ad revenue across top Android games has rebounded since October, up 1% M/M in December, but still down 13% Y/Y



Source: data.ai

Note: Ad revenue includes a subset of ad networks and excludes social media and OTT. Included networks are: AdColony, AdMob, AppLovin, ironSource, UnityAds, Vungle

BofA GLOBAL RESEARCH

Exhibit 16: Stocks mentioned
Prices and ratings for stocks mentioned in the report

| BofA Ticker | Bloomberg ticker | Company name | Price | Rating |
|-------------|------------------|-----------------|------------|--------|
| APP | APP US | AppLovin | US\$ 41.14 | C-1-9 |
| APPS | APPS US | Digital Turbine | US\$ 5.35 | C-2-9 |
| U | U US | Unity | US\$ 33.14 | C-1-9 |

Source: BofA Global Research

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Price objective basis & risk

AppLovin (APP)

Our \$57 PO is based on our SOTP framework valuing APP's Software segment at \$55 and the Gaming Segment, including both in-game advertising and in-game consumer spend, at \$2/share. Our Software valuation is 12x FY24 EBITDA, 2x higher than META, which we see as the most important barometer of the overall health of the mobile ad ecosystem and an important valuation anchor. Our Gaming segment valuation is based on an enterprise value that is 7x FY24 Gaming Segment EBITDA, slightly higher than Mobile Game Publisher peers.

Upside risks to our PO are new dovish monetary policy and regulation that would reduce Apple's or Google's control over their own mobile ecosystems. Downside risks to our PO include a recession, and a tightening of financial conditions brought about by the Fed. Policies by Google and Apple, pertaining to their mobile platforms, that would debase broker ad networks' value proposition are also downside risks, and a major resurgence of Facebook on iOS would also negatively affect APP stock.

Digital Turbine, Inc (APPS)

Our \$7 PO is based on 8.5x valuation multiple on the average of FY24E & FY25E EBITDA, below that of AppLovin, but roughly inline with other smaller adtech players (not mobile focused). Upside risks to our PO include faster-than-expected ramp in SingleTap and Hubs business, as well as a re-acceleration in the AGP business. Downside risks to our PO include: 1) adverse macroeconomic conditions that could lead to a decline in ad dollars, 2) consolidation of ad channels, which could disproportionately hurt tier 2 ad platforms, 3) longer-than-expected enterprise sales cycle (due to adverse macro) that could lead to delayed product uptake and monetization, and 4) significant churn of business as related to platform integrations (Fyber and AdColony)

Unity (U)

Our \$55 PO is based on a 11.1x 2024E EV/Revenue multiple (0.8x growth adjusted). Our growth adjusted multiple is a discount to the design software peer group. We believe a discount multiple is warranted based on lower revenue visibility and profitability, partially offset by Unity's entrenched competitive position and various levers for growth.

Downside risks to our PO are slower than expected recovery in Unity's monetization tool, increased competition, greater than expected churn rate, and greater than expected pull back in ad spend and mobile gaming usage.

Analyst Certification

I, Omar Dessouky, CFA, hereby certify that the views expressed in this research report accurately reflect my personal views about the subject securities and issuers. I also certify that no part of my compensation was, is, or will be, directly or indirectly, related to the specific recommendations or view expressed in this research report.

US - Enterprise Software Coverage Cluster

| Investment rating | Company | BofA Ticker | Bloomberg symbol | Analyst |
|---------------------|----------------------------|-------------|------------------|-----------------|
| BUY | | | | |
| | 8x8 | EGHT | EGHT US | Michael J. Funk |
| | Adobe | ADBE | ADBE US | Brad Sills |
| | Alarm.com | ALRM | ALRM US | Michael J. Funk |
| | Amplitude, Inc. | AMPL | AMPL US | Koji Ikeda, CFA |
| | BILL | BILL | BILL US | Brad Sills |
| | CCC Intelligent Solutions | CCCS | CCCS US | Michael J. Funk |
| | Dropbox | DBX | DBX US | Michael J. Funk |
| | Dynatrace | DT | DT US | Koji Ikeda, CFA |
| | Elastic NV | ESTC | ESTC US | Koji Ikeda, CFA |
| | GitLab Inc. | GTLB | GTLB US | Koji Ikeda, CFA |
| | Global-e Online Ltd. | GLBE | GLBE US | Koji Ikeda, CFA |
| | HubSpot | HUBS | HUBS US | Brad Sills |
| | Informatica Inc. | INFA | INFA US | Koji Ikeda, CFA |
| | Intapp Inc. | INTA | INTA US | Koji Ikeda, CFA |
| | Intuit | INTU | INTU US | Brad Sills |
| | JFrog Ltd | FROG | FROG US | Koji Ikeda, CFA |
| | MeridianLink, Inc. | MLNK | MLNK US | Koji Ikeda, CFA |
| | Microsoft Corporation | MSFT | MSFT US | Brad Sills |
| | MongoDB Inc | MDB | MDB US | Brad Sills |
| | nCino, Inc. | NCNO | NCNO US | Adam Bergere |
| | NICE Ltd. | NICE | NICE US | Michael J. Funk |
| | NICE Ltd. | NCSYF | NICE IT | Michael J. Funk |
| | PagerDuty | PD | PD US | Koji Ikeda, CFA |
| | PowerSchool Holdings, Inc. | PWSC | PWSC US | Koji Ikeda, CFA |
| | RingCentral | RNG | RNG US | Michael J. Funk |
| | Salesforce.com | CRM | CRM US | Brad Sills |
| | ServiceNow | NOW | NOW US | Brad Sills |
| | UiPath | PATH | PATH US | Brad Sills |
| | Unity | U | U US | Michael J. Funk |
| | Weave | WEAV | WEAV US | Michael J. Funk |
| | Workday Inc. | WDAY | WDAY US | Brad Sills |
| | Zeta Global | ZETA | ZETA US | Koji Ikeda, CFA |
| NEUTRAL | | | | |
| | Autodesk | ADSK | ADSK US | Michael J. Funk |
| | Bentley Systems | BSY | BSY US | Michael J. Funk |
| | BigCommerce Holdings, Inc. | BIGC | BIGC US | Koji Ikeda, CFA |
| | Coveo | YCVO | CVO CN | Koji Ikeda, CFA |
| | Datadog Inc | DDOG | DDOG US | Koji Ikeda, CFA |
| | DocuSign | DOCU | DOCU US | Brad Sills |
| | Freshworks, Inc. | FRSH | FRSH US | Adam Bergere |
| | HashiCorp | HCP | HCP US | Brad Sills |
| | Jamf | JAMF | JAMF US | Koji Ikeda, CFA |
| | Lightspeed Commerce Inc. | LSPD | LSPD US | Koji Ikeda, CFA |
| | Lightspeed Commerce Inc. | YLSPD | LSPD CN | Koji Ikeda, CFA |
| | Oracle Corporation | ORCL | ORCL US | Brad Sills |
| | Paycom | PAYC | PAYC US | Adam Bergere |
| | Paylocity | PCTY | PCTY US | Adam Bergere |
| | Shopify, Inc. | SHOP | SHOP US | Brad Sills |
| | Snowflake | SNOW | SNOW US | Brad Sills |
| | Veeva Systems, Inc. | VEEV | VEEV US | Brad Sills |
| | Zoom Video Communications | ZM | ZM US | Michael J. Funk |
| | ZoomInfo | ZI | ZI US | Koji Ikeda, CFA |
| UNDERPERFORM | | | | |
| | AvidXchange, Inc. | AVDX | AVDX US | Brad Sills |
| | Blackbaud, Inc. | BLKB | BLKB US | Koji Ikeda, CFA |
| | BlackLine, Inc. | BL | BL US | Koji Ikeda, CFA |
| | C3.ai | AI | AI US | Brad Sills |
| | Confluent | CFLT | CFLT US | Brad Sills |
| | CS Disco, Inc. | LAW | LAW US | Koji Ikeda, CFA |
| | Enfusion, Inc. | ENFN | ENFN US | Koji Ikeda, CFA |
| | Everbridge | EVBG | EVBG US | Koji Ikeda, CFA |
| | Five9 | FIVN | FIVN US | Michael J. Funk |
| | Guidewire Software, Inc. | GWRE | GWRE US | Michael J. Funk |



US - Enterprise Software Coverage Cluster

| Investment rating | Company | BofA Ticker | Bloomberg symbol | Analyst |
|-------------------|--------------|-------------|------------------|-----------------|
| | Twilio | TWLO | TWLO US | Michael J. Funk |
| | Vertex, Inc. | VERX | VERX US | Brad Sills |
| RSTR | | | | |
| | Splunk | SPLK | SPLK US | Brad Sills |

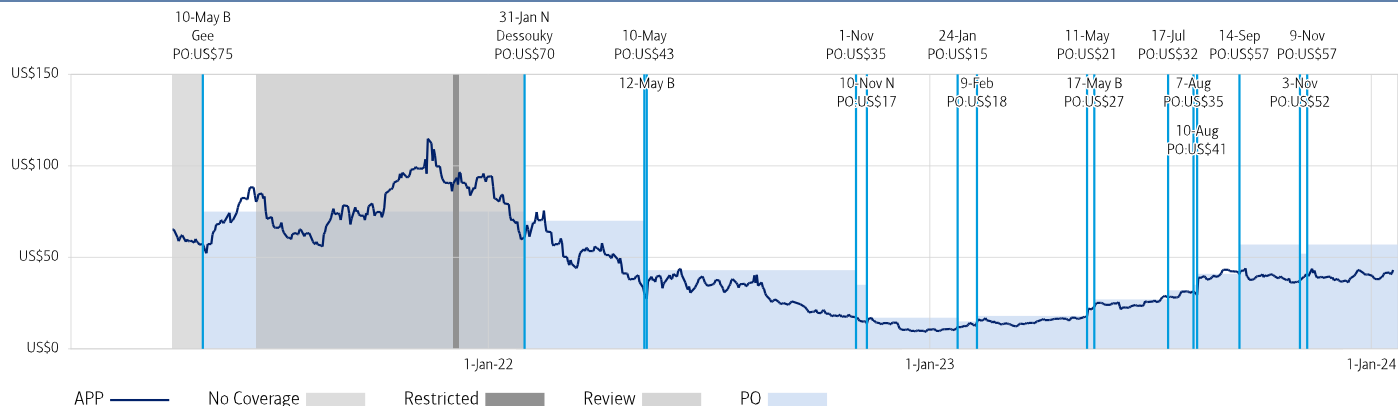
US - Internet Coverage Cluster

| Investment rating | Company | BofA Ticker | Bloomberg symbol | Analyst |
|---------------------|-----------------------------------|-------------|------------------|--------------------|
| BUY | | | | |
| | Alphabet | GOOGL | GOOGL US | Justin Post |
| | Alphabet | GOOG | GOOG US | Justin Post |
| | Amazon.com | AMZN | AMZN US | Justin Post |
| | AppLovin | APP | APP US | Omar Dessouky, CFA |
| | DoorDash | DASH | DASH US | Michael McGovern |
| | DoubleVerify Holdings, Inc. | DV | DV US | Omar Dessouky, CFA |
| | Electronic Arts | EA | EA US | Omar Dessouky, CFA |
| | Expedia | EXPE | EXPE US | Justin Post |
| | Integral Ad Science Holding Corp. | IAS | IAS US | Omar Dessouky, CFA |
| | LegalZoom | LZ | LZ US | Michael McGovern |
| | Match Group | MTCH | MTCH US | Curtis Nagle, CFA |
| | Meta Platforms Inc | META | META US | Justin Post |
| | Pinterest | PINS | PINS US | Justin Post |
| | RH | RH | RH US | Curtis Nagle, CFA |
| | Roblox Corp. Class A | RBLX | RBLX US | Omar Dessouky, CFA |
| | Squarespace, Inc. | SQSP | SQSP US | Michael McGovern |
| | Uber | UBER | UBER US | Justin Post |
| | Udemy Inc | UDMY | UDMY US | Curtis Nagle, CFA |
| | Vivid Seats | SEAT | SEAT US | Curtis Nagle, CFA |
| | Wayfair | W | W US | Curtis Nagle, CFA |
| | Wix.com | WIX | WIX US | Michael McGovern |
| NEUTRAL | | | | |
| | ACV Auctions | ACVA | ACVA US | Curtis Nagle, CFA |
| | Airbnb | ABNB | ABNB US | Justin Post |
| | Beyond Inc | BYON | BYON US | Curtis Nagle, CFA |
| | Booking Holdings Inc | BKNG | BKNG US | Justin Post |
| | Bumble | BMBL | BMBL US | Curtis Nagle, CFA |
| | Digital Turbine, Inc | APPS | APPS US | Omar Dessouky, CFA |
| | Duolingo | DUOL | DUOL US | Curtis Nagle, CFA |
| | eBay | EBAY | EBAY US | Justin Post |
| | Etsy, Inc. | ETSY | ETSY US | Curtis Nagle, CFA |
| | Instacart | CART | CART US | Justin Post |
| | Magnite, Inc. | MGNI | MGNI US | Omar Dessouky, CFA |
| | Snap | SNAP | SNAP US | Justin Post |
| | Take-Two Interactive | TTWO | TTWO US | Omar Dessouky, CFA |
| | Zillow | ZG | ZG US | Curtis Nagle, CFA |
| | Zillow | Z | Z US | Curtis Nagle, CFA |
| UNDERPERFORM | | | | |
| | Chewy Inc | CHWY | CHWY US | Curtis Nagle, CFA |
| | Lyft, Inc. | LYFT | LYFT US | Michael McGovern |
| | Opendoor Technologies | OPEN | OPEN US | Curtis Nagle, CFA |
| | Peloton | PTON | PTON US | Curtis Nagle, CFA |
| | Playtika | PLTK | PLTK US | Omar Dessouky, CFA |
| | Redfin Corp | RDFN | RDFN US | Curtis Nagle, CFA |
| | Shutterstock | SSTK | SSTK US | Curtis Nagle, CFA |

Disclosures

Important Disclosures

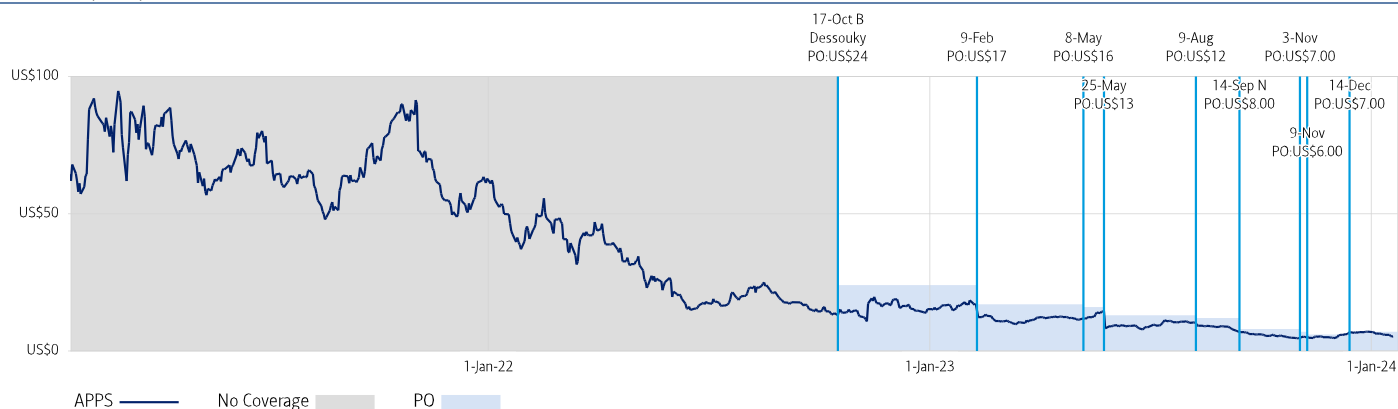
AppLovin (APP) Price Chart



B: Buy, N: Neutral, U: Underperform, PO: Price Objective, NA: No longer valid, NR: No Rating

The Investment Opinion System is contained at the end of the report under the heading "Fundamental Equity Opinion Key". Dark grey shading indicates the security is restricted with the opinion suspended. Medium grey shading indicates the security is under review with the opinion withdrawn. Light grey shading indicates the security is not covered. Chart is current as of a date no more than one trading day prior to the date of the report.

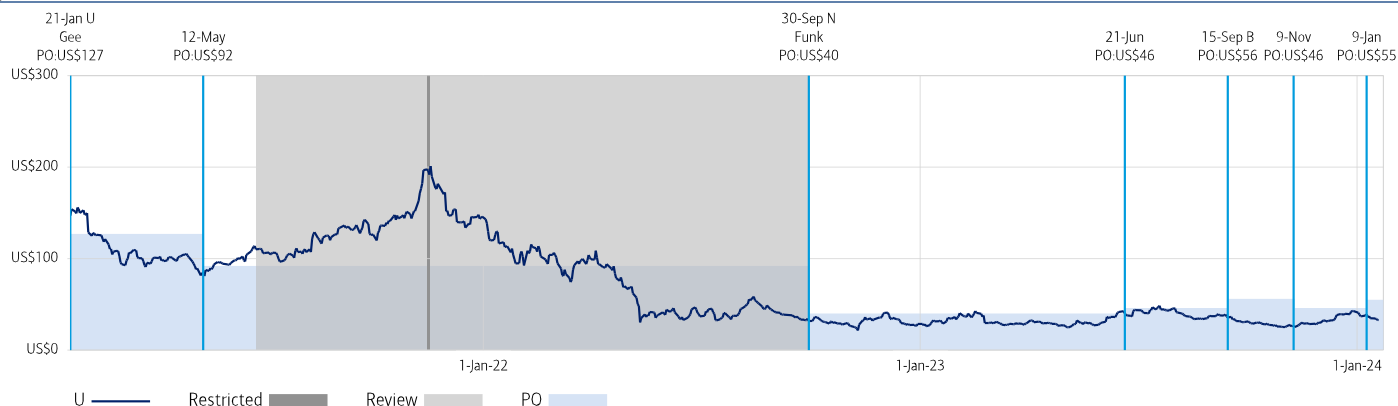
Digital Turbine (APPS) Price Chart



B: Buy, N: Neutral, U: Underperform, PO: Price Objective, NA: No longer valid, NR: No Rating

The Investment Opinion System is contained at the end of the report under the heading "Fundamental Equity Opinion Key". Dark grey shading indicates the security is restricted with the opinion suspended. Medium grey shading indicates the security is under review with the opinion withdrawn. Light grey shading indicates the security is not covered. Chart is current as of a date no more than one trading day prior to the date of the report.

Unity (U) Price Chart



B: Buy, N: Neutral, U: Underperform, PO: Price Objective, NA: No longer valid, NR: No Rating

The Investment Opinion System is contained at the end of the report under the heading "Fundamental Equity Opinion Key". Dark grey shading indicates the security is restricted with the opinion suspended. Medium grey shading indicates the security is under review with the opinion withdrawn. Light grey shading indicates the security is not covered. Chart is current as of a date no more than one trading day prior to the date of the report.

Equity Investment Rating Distribution: Media & Entertainment Group (as of 31 Dec 2023)

| Coverage Universe | Count | Percent | Inv. Banking Relationships ^{R1} | Count | Percent |
|-------------------|-------|---------|--|-------|---------|
| Buy | 35 | 53.85% | Buy | 15 | 42.86% |
| Hold | 15 | 23.08% | Hold | 8 | 53.33% |
| Sell | 15 | 23.08% | Sell | 7 | 46.67% |

Equity Investment Rating Distribution: Technology Group (as of 31 Dec 2023)

| Coverage Universe | Count | Percent | Inv. Banking Relationships ^{R1} | Count | Percent |
|-------------------|-------|---------|--|-------|---------|
| Buy | 215 | 53.09% | Buy | 111 | 51.63% |
| Hold | 97 | 23.95% | Hold | 45 | 46.39% |
| Sell | 93 | 22.96% | Sell | 24 | 25.81% |

Equity Investment Rating Distribution: Global Group (as of 31 Dec 2023)

| Coverage Universe | Count | Percent | Inv. Banking Relationships ^{R1} | Count | Percent |
|-------------------|-------|---------|--|-------|---------|
| Buy | 1895 | 53.62% | Buy | 1083 | 57.15% |
| Hold | 832 | 23.54% | Hold | 454 | 54.57% |
| Sell | 807 | 22.84% | Sell | 383 | 47.46% |

^{R1} Issuers that were investment banking clients of BofA Securities or one of its affiliates within the past 12 months. For purposes of this Investment Rating Distribution, the coverage universe includes only stocks. A stock rated Neutral is included as a Hold, and a stock rated Underperform is included as a Sell.

FUNDAMENTAL EQUITY OPINION KEY: Opinions include a Volatility Risk Rating, an Investment Rating and an Income Rating. **VOLATILITY RISK RATINGS**, indicators of potential price fluctuation, are: A - Low, B - Medium and C - High. **INVESTMENT RATINGS** reflect the analyst's assessment of both a stock's absolute total return potential as well as its attractiveness for investment relative to other stocks within its Coverage Cluster (defined below). Our investment ratings are: 1 - Buy stocks are expected to have a total return of at least 10% and are the most attractive stocks in the coverage cluster; 2 - Neutral stocks are expected to remain flat or increase in value and are less attractive than Buy rated stocks and 3 - Underperform stocks are the least attractive stocks in a coverage cluster. An investment rating of 6 (No Rating) indicates that a stock is no longer trading on the basis of fundamentals. Analysts assign investment ratings considering, among other things, the 0-12 month total return expectation for a stock and the firm's guidelines for ratings dispersions (shown in the table below). The current price objective for a stock should be referenced to better understand the total return expectation at any given time. The price objective reflects the analyst's view of the potential price appreciation (depreciation).

| Investment rating | Total return expectation (within 12-month period of date of initial rating) | Ratings dispersion guidelines for coverage cluster ^{R2} |
|-------------------|---|--|
| Buy | ≥ 10% | ≤ 70% |
| Neutral | ≥ 0% | ≤ 30% |
| Underperform | N/A | ≥ 20% |

^{R2} Ratings dispersions may vary from time to time where BofA Global Research believes it better reflects the investment prospects of stocks in a Coverage Cluster.

INCOME RATINGS, indicators of potential cash dividends, are: 7 - same/higher (dividend considered to be secure), 8 - same/lower (dividend not considered to be secure) and 9 - pays no cash dividend. **Coverage Cluster** is comprised of stocks covered by a single analyst or two or more analysts sharing a common industry, sector, region or other classification(s). A stock's coverage cluster is included in the most recent BofA Global Research report referencing the stock.

Price Charts for the securities referenced in this research report are available on the [Price Charts website](#), or call 1-800-MERRILL to have them mailed.

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