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Thematics

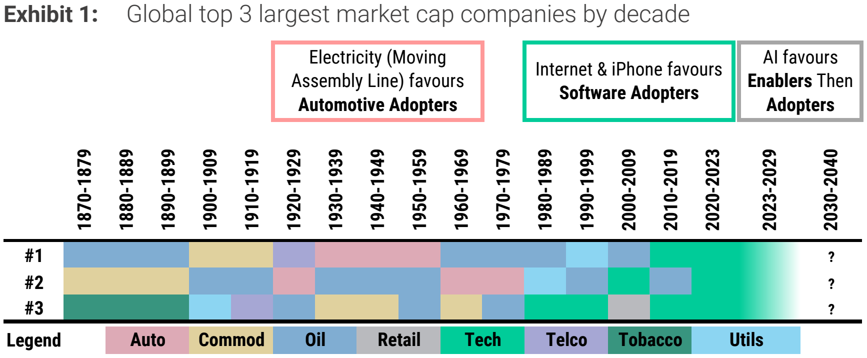
Mapping AI's Diffusion

AI has established itself as a critical theme, but we are in the early innings of its diffusion. In a bid to help investors, we have made an initial attempt to analyse AI's impact across the market. 2024 will be the year of the Adopters.

The current technology shift is progressing faster than any before it. Companies that best adopt new technology to scale their businesses while maintaining robust barriers to entry accrue most value (Exhibit 1). In this context, we draw investors and corporates to three main conclusions from our inaugural mapping exercise:

- **2024 – the year of the *Adopters*:** The *Enablers* gained >$6trillion of market cap in 2023. Our analysts see less upside for these names in the near term. In 2024, we argue that investors should focus on the *Adopters*, a group that rose only c6% in 2023. Our analysts forecast an average 27% upside for Overweight rated *Adopters* as AI ramps; something we expect to accelerate through 2024. 33% of CIOs expect their first AI/LLM projects to be in production in 2H24. Moreover, nearly one-third of CIOs stated that AI spending will be net new budget dollars. If our *Adopter* companies were to lever up to 2x Net Debt/EBITDA for incremental AI investment, they could spend >$3 trillion on the Enablers' hardware and software; 39% of the AI *Enablers*' 2024 estimated revenue. *Adopters* hold the keys to their own product ramp as well as fundamentals of the *Enablers*.
- **AI rate of change will be important for re-ratings:** In 2023, the *Enablers* where AI was considered *Moderately* important to the stock debate increased their total market cap by c28%. If this group were to continue to mix shift towards *Core To Thesis* materiality, it could add another 41% or $900bn to market caps of this group based on 2023 performance.
- **Companies enumerating AI spend or gains tend to be rewarded:** During 2023, only 15% of 316 companies over $10bn market cap gave quantified AI disclosure (i.e. dollar spend, revenue impact, percentage productivity gains). While this may not be entirely attributable to the AI impact, those that did give disclosure outperformed those that didn't (here).

Exhibit 1: Global top 3 largest market cap companies by decade



Source: Reuters, Morgan Stanley Research

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Full stock list on request: A complete list of *Adopters* and *Enablers* is available upon request, please click here if you would like to receive that detail.

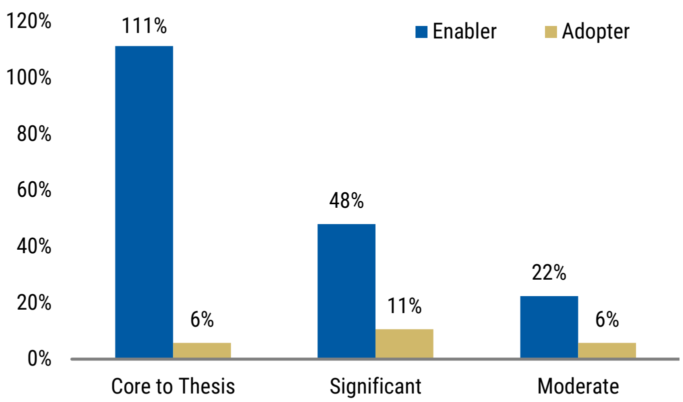
Executive Summary

A complete list of Adopters and Enablers is available upon request, please click here if you would like to receive that detail. Please see methodology for an explanation of the categories described.

Three Points for Investors

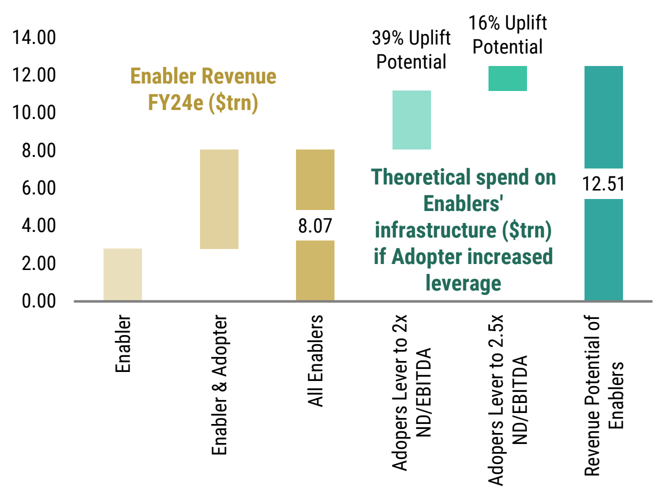
- **(1) *Adopters* now hold the key to their own success and that of the *Enablers*':** *Core to Thesis Enablers* AI stocks (Exhibit 51) are +111% in 2023. By contrast, *Adopters* – even those *Core to Thesis* – are up only 6% in 2023 (Exhibit 2). If this Adopter group (Exhibit 55) continues to experiment with and integrate AI, these stocks could begin to be priced more actively in 2024. This would likely require a step-up in capex to achieve (Exhibit 17). If the *Adopters* were to lever up to 2x Net Debt/EBITDA – using MS FY24e EBITDA forecasts for the 889 companies included – the hypothetical additional capital raised could amount to a theoretical spend of >$3 trillion on AI and broader digital transformation spend, implying a 39% uplift to the *Enablers*' revenue 2024 base (Exhibit 3). On timing, most CIOs (33% of responses) in our recent survey expect their first AI/LLM projects to be in production in 2H2024. 15% of CIOs expect projects to be in production in or after 2025 (Exhibit 17). We provide a list of Adopter stocks where our analysts' confidence in the AI investment case is highest (Exhibit 55).

Exhibit 2: 2023 performance distribution, *Enabler* & *Adopter*; equal weighted returns



Source: FactSet, Morgan Stanley Research

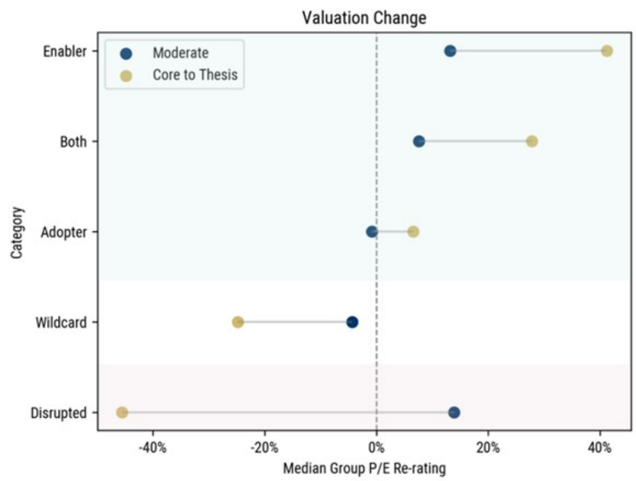
Exhibit 3: If *Adopters* were to lever up to 2x ND/EBITDA to spend on AI projects, this would imply a 39% uplift to *Enablers*' revenue



Source: FactSet, Morgan Stanley Research estimates (e)

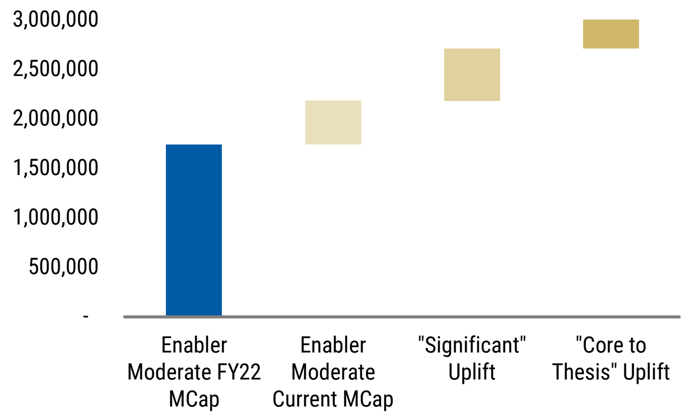
- **(2) Rate of Change (Materiality):** Thesis materiality has driven wide divergence even within individual categories (Exhibit 7). In 2023, the *Enablers* where AI is *Moderately* important to the stock debate (Exhibit 53) increased their total market cap by c28%. If this group were to continue to mix shift towards *Core to Thesis* materiality, it could add another 41% or $900bn to market caps of this group based on 2023 performance. There are fewer North America names in this list than other regions due largely to the fact that most US Enablers are considered *Core to Thesis* (see Exhibit 51).

Exhibit 4: Median P/E valuation change during 2023 by group



Source: FactSet, Morgan Stanley Research

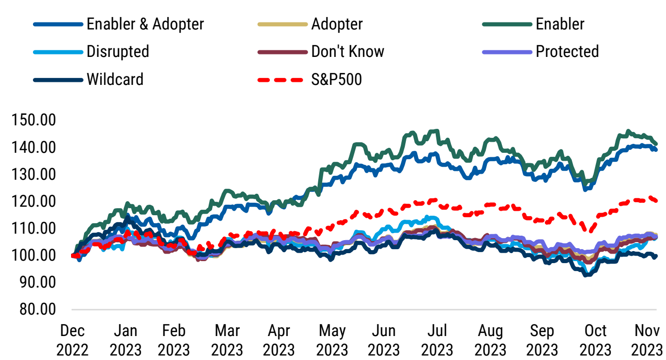
Exhibit 5: Market cap expansion potential as AI becomes more *Significant or Core to Thesis* ($m)



Source: Morgan Stanley Research

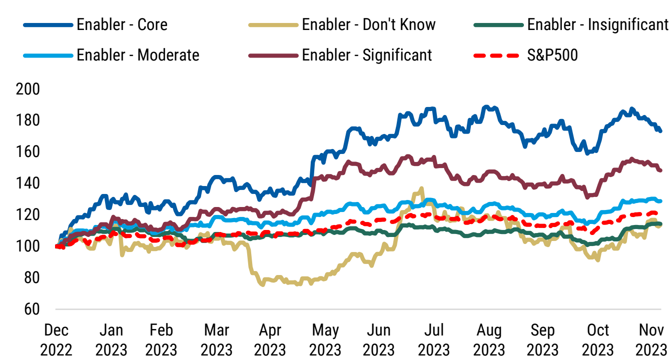
- **(3) Rate of Change (Categorisation):** While our methodology incorporated categories that included identifying the *Disrupted* or *Wildcards*, we have not provided these stocks nor the *Protected* and *Don't Know* groups. This is due to (1) how early we are in AI diffusion; and (2) the lack of breadth and conviction regarding which companies could be affected negatively (Exhibit 13). Instead, we share macro takeaways from these groups, and we focus our stock lists on *Enablers* and *Adopters* where we see the most alpha over the next 12 months.

Exhibit 6: *Enablers* of AI have driven outsized returns in 2023



Source: FactSet, Morgan Stanley Research

Exhibit 7: Thesis importance of AI is a substantial driver of returns



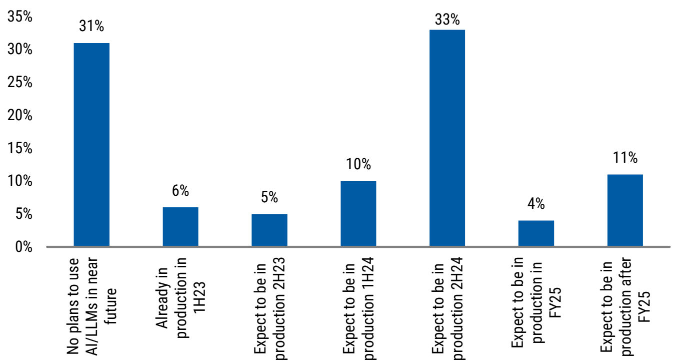
Source: FactSet, Morgan Stanley Research

Three Points for Corporates

- **(1) Most *Adopters* are aiming for 2H24 roll-out:** 33% of CIOs in our recent survey expect their first AI/LLM projects to be in production in 2H2024. This partly explains our comparison of Adopters' potential spend with Enablers' FY24e revenue forecasts. 15% of CIOs expect projects to be in production in or after 2025. However, the data also suggest that some organisations are on a more aggressive timeline regarding implementing AI/LLM technology. 11% of CIOs have either already begun producing projects in 1H23 or expect to be in production in 2H23, while 10% of CIOs expect projects to be in production in 1H24 (Exhibit 8).

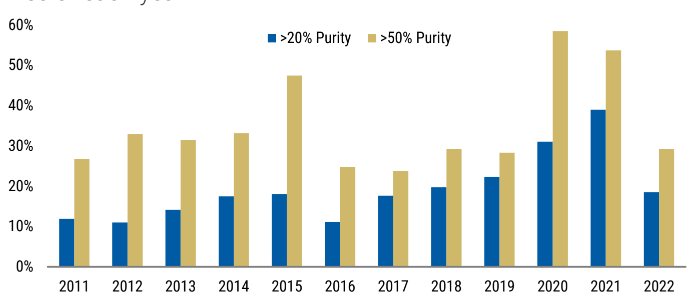
- **(2) Enumerating AI spend or gains is rewarded:** During 1H results season, only 15% of 316 companies over $10bn market cap gave quantified AI disclosure (i.e. spend, revenue impact, productivity gains). While likely not entirely attributable to the AI impact, those that did give disclosure outperformed those that didn't (here). Our Internet team's NEXT framework is a helpful guide for best practice on how companies can demonstrate their structured and unstructured data assets, which investors will likely be willing to pay for (see here).
- **(3) Thematic purity is rewarded in stock multiples:** The more a company can tie itself to a secular theme – particularly a technology-enabled one, both in its profit mix but also its quantified disclosure – the greater the re-rating that history suggests could accrue to a stock over time (Exhibit 9). As a rule of thumb, our analysis suggests that for every 1% incremental revenue exposure a company has to a theme, the stock experiences a c.1.2% re-rating (see here).

Exhibit 8: Majority of CIOs expect initial projects to be in production in 2H24 and beyond



Source: AlphaWise (October 2023), Morgan Stanley Research. n=100 (US and EU data)

Exhibit 9: Average valuation upside resulting from thematic purity >20% and >50% company revenue exposure to a theme – Average of 12-month-forward EV/Sales, EV/EBITDA, P/E on 31st Dec of each year



Source: Thomson, Morgan Stanley Research

Where we could be wrong: This was a qualitative rather than a quantitative assessment by our analysts; we deemed it too early to embark on the latter. Our survey questioned the use of machine learning broadly rather than specifically focusing on generative AI within companies. Consequently, these survey results are reliant on – and will evolve with – our analysts' knowledge of broad-ranging and fast moving AI releases and how they could be being leveraged within their coverage. For further details on the survey and its caveats see Methodology Section.

Exhibit 10: *Enabler & Enabler/Adopter Core to Thesis* Stocks

Company	Region	Analyst	Rating	Market Cap ($m)	YTD Return	Latest Price	Upside / Downside to PT	AI Classification	AI Materiality
Adobe Inc.	North America	Weiss, Keith	Overweight	272,147	77%	595.5	11%	Beneficiary (Enabler, Adopter, Both)	Core to Thesis
Advantech	Asia/Pacific	Yang, Derrick	Overweight	9,378	24%	372.0	1%	Beneficiary (Enabler, Adopter, Both)	Core to Thesis
Advantest	Japan	Yoshikawa, Kazuo	Equal-Weight	25,136	126%	4797.0	-19%	Beneficiary (Enabler, Adopter, Both)	Core to Thesis
Alchip Technologies Ltd	Asia/Pacific	Chan, Charlie	Overweight	8,072	316%	3275.0	-3%	Beneficiary - Enabler	Core to Thesis
Alibaba Group Holding	Asia/Pacific	Yu, Gary	Equal-Weight	203,856	-12%	77.2	17%	Beneficiary - Enabler	Core to Thesis
Alphabet Inc.	North America	Nowak, Brian	Overweight	1,772,669	59%	140.2	7%	Beneficiary (Enabler, Adopter, Both)	Core to Thesis
AP Memory Technology Corp	Asia/Pacific	Yen, Daniel	Overweight	2,472	184%	469.0	18%	Beneficiary - Enabler	Core to Thesis
Apple, Inc.	North America	Woodring, Erik	Overweight	3,023,242	49%	193.6	14%	Beneficiary (Enabler, Adopter, Both)	Core to Thesis
Arista Networks	North America	Marshall, Meta	Overweight	75,346	95%	237.0	1%	Beneficiary - Enabler	Core to Thesis
ASMPT Ltd	Asia/Pacific	Liu, Dylan	Overweight	3,792	34%	74.5	18%	Beneficiary - Enabler	Core to Thesis
Asustek Computer Inc.	Asia/Pacific	Kao, Howard	Overweight	11,835	82%	489.5	1%	Beneficiary - Enabler	Core to Thesis
Baidu Inc	Asia/Pacific	Yu, Gary	Overweight	42,855	3%	117.8	27%	Beneficiary - Enabler	Core to Thesis
C3.ai	North America	Singh, Sanjit	Underweight	4,374	170%	30.2	-34%	Beneficiary - Enabler	Core to Thesis
Chroma Ate Inc.	Asia/Pacific	Yang, Derrick	Overweight	2,949	18%	213.0	41%	Beneficiary - Enabler	Core to Thesis
CI&T Inc	Latin America	Medina, Cesar	Overweight	701	-18%	5.3	13%	Beneficiary (Enabler, Adopter, Both)	Core to Thesis
Darktrace PLC	Europe	Webb, George	Overweight	3,132	42%	366.6	32%	Beneficiary - Enabler	Core to Thesis
Dell Technologies Inc.	North America	Woodring, Erik	Overweight	55,981	91%	76.7	16%	Beneficiary (Enabler, Adopter, Both)	Core to Thesis
DISCO	Japan	Yoshikawa, Kazuo	Overweight	26,892	178%	34980.0	-11%	Beneficiary (Enabler, Adopter, Both)	Core to Thesis
Ennoconn Corporation	Asia/Pacific	Yang, Derrick	Overweight	805	32%	268.0	16%	Beneficiary (Enabler, Adopter, Both)	Core to Thesis
Exscientia PLC	North America	Purohit, Vikram	Equal-Weight	841	29%	6.9	2%	Beneficiary (Enabler, Adopter, Both)	Core to Thesis
Giga-Byte Technology Co. Ltd.	Asia/Pacific	Kao, Howard	Overweight	5,496	150%	266.0	20%	Beneficiary - Enabler	Core to Thesis
Global Unichip Corp	Asia/Pacific	Liu, Dylan	Equal-Weight	7,632	171%	1740.0	-14%	Beneficiary - Enabler	Core to Thesis
Globant SA	Latin America	Medina, Cesar	Overweight	10,346	43%	239.9	0%	Beneficiary (Enabler, Adopter, Both)	Core to Thesis
Gold Circuit Electronics Ltd.	Asia/Pacific	Kao, Howard	Overweight	3,666	151%	218.0	22%	Beneficiary - Enabler	Core to Thesis
Inspur Electronic Information	Asia/Pacific	Kao, Howard	Equal-Weight	6,731	54%	33.2	8%	Beneficiary - Enabler	Core to Thesis
King Yuan Electronics Co Ltd	Asia/Pacific	Liu, Dylan	Overweight	3,423	135%	84.9	18%	Beneficiary - Enabler	Core to Thesis
MediaTek	Asia/Pacific	Chan, Charlie	Overweight	51,711	62%	1015.0	10%	Beneficiary (Enabler, Adopter, Both)	Core to Thesis
Microsoft	North America	Weiss, Keith	Overweight	2,787,955	56%	375.3	11%	Beneficiary (Enabler, Adopter, Both)	Core to Thesis
Naver Corp	Asia/Pacific	Park, Seyon	Underweight	28,503	26%	224000.0	-20%	Beneficiary (Enabler, Adopter, Both)	Core to Thesis
NVIDIA Corp.	North America	Moore, Joseph	Overweight	1,248,090	239%	495.2	22%	Beneficiary - Enabler	Core to Thesis
Oracle Corporation	North America	Weiss, Keith	Equal-Weight	300,287	30%	106.3	0%	Beneficiary (Enabler, Adopter, Both)	Core to Thesis
Quanta Computer Inc.	Asia/Pacific	Kao, Howard	Overweight	28,221	211%	224.5	25%	Beneficiary - Enabler	Core to Thesis
Recursion Pharmaceuticals Inc	North America	Purohit, Vikram	Equal-Weight	1,849	38%	10.6	4%	Beneficiary (Enabler, Adopter, Both)	Core to Thesis
Salesforce.com	North America	Weiss, Keith	Overweight	261,338	100%	265.6	32%	Beneficiary (Enabler, Adopter, Both)	Core to Thesis
Tencent Holdings Ltd.	Asia/Pacific	Yu, Gary	Overweight	355,677	-7%	293.6	46%	Beneficiary - Enabler	Core to Thesis
TSMC	Asia/Pacific	Chan, Charlie	Overweight	500,490	32%	593.0	16%	Beneficiary (Enabler, Adopter, Both)	Core to Thesis
Upstart Holdings, Inc.	North America	Faucette, James	Underweight	3,727	234%	44.2	-71%	Beneficiary (Enabler, Adopter, Both)	Core to Thesis
Wistron Corporation	Asia/Pacific	Kao, Howard	Overweight	9,079	235%	98.6	47%	Beneficiary - Enabler	Core to Thesis
Wiwynn Corp	Asia/Pacific	Kao, Howard	Equal-Weight	10,063	129%	1825.0	5%	Beneficiary - Enabler	Core to Thesis
Zhongji Innolight Co Ltd	Asia/Pacific	Meng, Andy	Overweight	12,679	318%	112.9	15%	Beneficiary - Enabler	Core to Thesis

Source: FactSet, Morgan Stanley Research. Price as of December 31, 2023

Exhibit 11: *Enabler & Enabler/Adopter Significant* materiality; Overweight Rated; >$10bn Market Cap

Company	Region	Analyst	Rating	Market Cap ($m)	YTD Return	Latest Price	Upside / Downside to PT	AI Classification	AI Materiality
Accenture Plc	North America	Faucette, James	Overweight	224,851	32%	351.6	5%	Beneficiary (Enabler, Adopter, Both)	Significant
Advanced Micro Devices	North America	Moore, Joseph	Overweight	244,279	130%	148.8	-14%	Beneficiary - Enabler	Significant
Amazon.com Inc	North America	Nowak, Brian	Overweight	1,628,223	83%	153.4	14%	Beneficiary (Enabler, Adopter, Both)	Significant
BE Semiconductor Industries NV	Europe	Putten, Nigel van	Overweight	12,076	145%	138.3	8%	Beneficiary - Enabler	Significant
Datadog, Inc.	North America	Singh, Sanjit	Overweight	40,575	68%	123.3	19%	Beneficiary (Enabler, Adopter, Both)	Significant
Delta Electronics Inc.	Asia/Pacific	Shih, Sharon	Overweight	26,506	9%	313.5	21%	Beneficiary - Enabler	Significant
Foxconn Industrial Internet Co. Ltd.	Asia/Pacific	Shih, Sharon	Overweight	39,949	65%	15.1	88%	Beneficiary - Enabler	Significant
HIKVision Digital Technology	Asia/Pacific	Meng, Andy	Overweight	45,639	0%	34.7	24%	Beneficiary (Enabler, Adopter, Both)	Significant
HubSpot, Inc.	North America	Porter, Elizabeth	Overweight	31,070	104%	589.1	9%	Beneficiary (Enabler, Adopter, Both)	Significant
Intuit	North America	Weiss, Keith	Overweight	176,940	61%	628.0	-1%	Beneficiary (Enabler, Adopter, Both)	Significant
Lenovo	Asia/Pacific	Kao, Howard	Overweight	16,794	70%	10.9	-8%	Beneficiary - Enabler	Significant
Meta Platforms Inc	North America	Nowak, Brian	Overweight	1,101,324	198%	358.3	5%	Beneficiary (Enabler, Adopter, Both)	Significant
MongoDB Inc	North America	Singh, Sanjit	Overweight	34,733	112%	417.1	15%	Beneficiary (Enabler, Adopter, Both)	Significant
NetEase, Inc	Asia/Pacific	Poon, Alex	Overweight	58,039	23%	89.3	68%	Beneficiary (Enabler, Adopter, Both)	Significant
Nu Holdings Ltd.	Latin America	Kuri, Jorge	Overweight	41,808	106%	8.4	91%	Beneficiary (Enabler, Adopter, Both)	Significant
POSCO FUTURE M	Asia/Pacific	Kim, Ryan	Overweight	21,570	99%	359000.0	39%	Beneficiary - Enabler	Significant
Recruit Holdings	Japan	Tsusaka, Tetsuro	Overweight	66,701	43%	5963.0	9%	Beneficiary (Enabler, Adopter, Both)	Significant
Samsung Electronics	Asia/Pacific	Kim, Shawn	Overweight	364,349	42%	78500.0	21%	Beneficiary - Enabler	Significant
ServiceNow Inc	North America	Weiss, Keith	Overweight	144,707	81%	702.5	13%	Beneficiary (Enabler, Adopter, Both)	Significant
Shenzhen Transsion Holdings Co Ltd	Asia/Pacific	Meng, Andy	Overweight	15,598	74%	138.4	34%	Beneficiary (Enabler, Adopter, Both)	Significant
SK hynix	Asia/Pacific	Kim, Shawn	Overweight	79,902	89%	141500.0	48%	Beneficiary - Enabler	Significant
Snowflake Inc.	North America	Weiss, Keith	Overweight	72,710	40%	201.2	14%	Beneficiary (Enabler, Adopter, Both)	Significant
Tesla Inc	North America	Jonas, Adam	Overweight	884,358	106%	253.2	50%	Beneficiary (Enabler, Adopter, Both)	Significant
Trip.com Group Ltd	Asia/Pacific	Poon, Alex	Overweight	23,777	3%	35.3	42%	Beneficiary (Enabler, Adopter, Both)	Significant
Xiaomi Corp	Asia/Pacific	Meng, Andy	Overweight	50,514	43%	15.6	22%	Beneficiary (Enabler, Adopter, Both)	Significant
ZTE Corporation	Asia/Pacific	Meng, Andy	Overweight	16,048	1%	17.4	72%	Beneficiary (Enabler, Adopter, Both)	Significant

Source: FactSet, Morgan Stanley Research. Price as of December 31, 2023

Exhibit 12: *Adopter Significant* Stocks, Overweight Rated; >$10bn Market Cap

Company	Region	Analyst	Rating	Market Cap ($m)	YTD Return	Latest Price	Upside / Downside to PT	AI Classification	AI Materiality
American Express Company	North America	Graseck, Betsy	Overweight	137,104	27%	187.8	6%	Beneficiary - Adopter	Significant
Baker Hughes Co	North America	Kutz, Daniel	Overweight	34,678	16%	34.2	17%	Beneficiary - Adopter	Significant
Experian PLC	Europe	Vermeulen, Annelies	Overweight	37,523	14%	3208.0	5%	Beneficiary - Adopter	Significant
FUJIFILM Holdings	Japan	Ono, Masahiro	Overweight	24,072	28%	8473.0	22%	Beneficiary - Adopter	Significant
JPMorgan Chase & Co	North America	Graseck, Betsy	Overweight	493,111	27%	170.3	12%	Beneficiary - Adopter	Significant
Kia Corp.	Asia/Pacific	Shin, Young Suk	Overweight	31,442	69%	100000.0	-2%	Beneficiary - Adopter	Significant
Regions Financial Corp	North America	Graseck, Betsy	Overweight	18,377	-9%	19.6	7%	Beneficiary - Adopter	Significant
RELX	Europe	Webb, George	Overweight	75,785	35%	3093.0	5%	Beneficiary - Adopter	Significant
S&P Global Inc	North America	Kaplan, Toni	Overweight	140,505	32%	441.8	5%	Beneficiary - Adopter	Significant
SAP SE	Europe	Wood, Adam	Overweight	180,031	45%	139.6	7%	Beneficiary - Adopter	Significant
Schlumberger NV	North America	Kutz, Daniel	Overweight	75,277	-2%	52.2	19%	Beneficiary - Adopter	Significant
Sony Group	Japan	Ono, Masahiro	Overweight	119,727	34%	13410.0	19%	Beneficiary - Adopter	Significant
Trade Desk Inc	North America	Cost, Matthew	Overweight	36,800	64%	73.4	-5%	Beneficiary - Adopter	Significant
UnitedHealth Group Inc	North America	Wright, Erin	Overweight	477,053	-1%	524.9	18%	Beneficiary - Adopter	Significant
Wells Fargo & Co.	North America	Graseck, Betsy	Overweight	182,704	20%	49.5	9%	Beneficiary - Adopter	Significant
Wolters Kluwer	Europe	Webb, George	Overweight	33,634	31%	128.1	11%	Beneficiary - Adopter	Significant

Source: FactSet, Morgan Stanley Research. Price as of December 31, 2023

2024: The Adopter / Enabler Virtuous Cycle

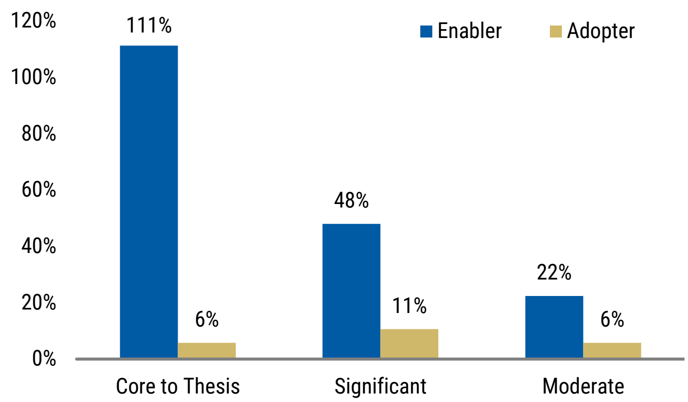
A complete list of Adopters and Enablers is available upon request, please click here if you would like to receive that detail.

The *Adopters*, as identified by our analysts (Exhibit 55), have been relatively more muted in their performance in 2023 than the *Enablers*. However, we believe 2024 will see the virtuous cycle between these two groups come into greater focus for investors. *Enablers*' consensus upgrades and valuations will depend increasingly on the enterprise IT budgets being deployed by the *Adopters* in 2024-25. The *Adopters* in turn are in a race to build both revenue-generating and productivity-enhancing tools, which various data points suggest is about to move into deployment phase in 2024.

Exhibit 13: Market cap change by category

Source: FactSet, Morgan Stanley Research

Exhibit 14: 2023 performance distribution, *Enabler* & *Adopter;* equal weighted returns



Source: FactSet, Morgan Stanley Research

What History Tells Us About Tech *Adopters*

As our global technology teams have noted a number of times, there is a clear order of value accretion in secular technology shifts:

1. **We are still at the first stage of AI investing, focused on the materials to build AI**. What was QCOM in the mobile internet era, or Intel during the arrival of the personal computer in the 1980s, is now NVDA as well as suppliers of materials or equipment for semiconductor manufacturing.
2. **Infrastructure and device makers will see the next profit wave**, similar to Apple or Samsung who benefitted from penetration in the smartphone business. We could argue that Tesla today may be an early adopter of enabling AI chips to power its autonomous driving adoption and penetration. The hyperscalers will

likely benefit from a persistent growth tailwind going forward given their capital and infrastructure in place.

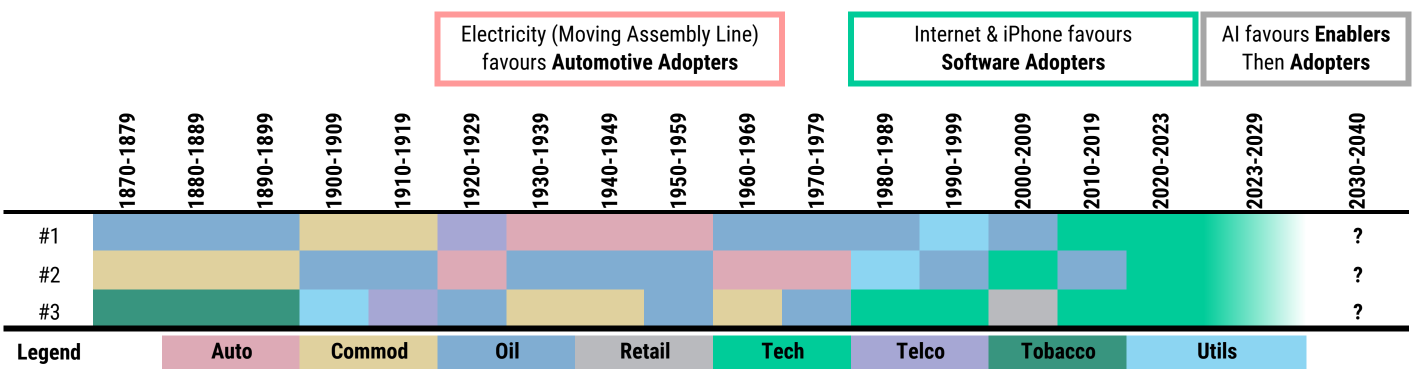
3. **The third wave will come much later from companies that can create usable applications on top of the new devices.** Once smartphones reached 4 billion users and were ubiquitous, smartphone manufacturers built attractive, engaging and effective mobile internet applications for those devices. In the current paradigm, we could see AI packaged as a service, successfully addressing specific needs and creating significant value.

As has been seen with the Hardware and Hyperscaler *Enablers* in 2023 (Exhibit 51), the market has largely determined and priced the first two layers of beneficiaries to the tune of >$6 trillion of market cap added in 2023. The *Adopters* come in the third wave, the early innings of which we believe will be in 2024 for AI.

History tells us that (1) despite enterprise adoption curves progressing slower than consumer ones, (2) this AI technology shift in aggregate is already progressing substantially faster than any before it, and (3) over the past 150 years, companies and sectors that best adopt and scale new technology – pass price declines on to their customers while maintaining high margins and barriers to entry – tend to accrue most value. These adopters, leveraging the best technology available, have tended to force consolidation in their industries.

This occurred with the moving assembly line for Ford and GM, which leveraged electricity to bring a wave of creative destruction that allowed them ultimately to dominate their market post 1913. More recently, this has occurred with software companies that have leveraged the internet but also the iPhone platform. The question for us now is at what speed and what breadth will the *Adopters* of AI grow, spend, consolidate or disrupt their competition?

Exhibit 15: Top 3 largest market cap companies by decade



Source: Reuters, Morgan Stanley Research

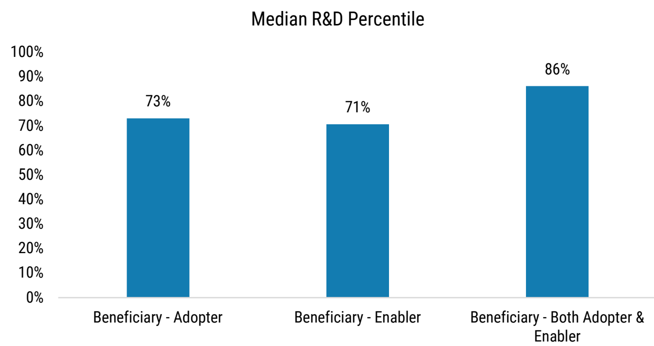
Funding the *Adopter/Enabler* Cycle

If *Adopters* are to stay ahead of disruption and start being priced by the market as leaders in their field, this will likely require greater capex and/or R&D.

- AI Beneficiaries (companies that are *Adopters*, *Enablers* or both) have invested more on both an R&D and capex basis. The highest level of investment has come from companies that are both *Enablers* and *Adopters*.

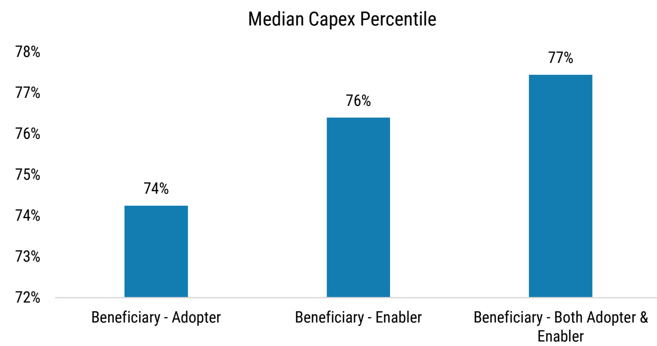
- Companies that are both AI *Adopters* and *Enablers* are in the 86th percentile of R&D spending and in the 77th percentile of capex spending vs all companies in the universe.
- At the industry group level the majority of AI beneficiaries, whether they are *Adopters*, *Enablers*, or both, have seen substantially elevated levels of investment versus peers.

Exhibit 16: Median R&D percentile - AI Beneficiaries



Source: WorldScope, Morgan Stanley Research

Exhibit 17: Median Capex percentile - AI Beneficiaries

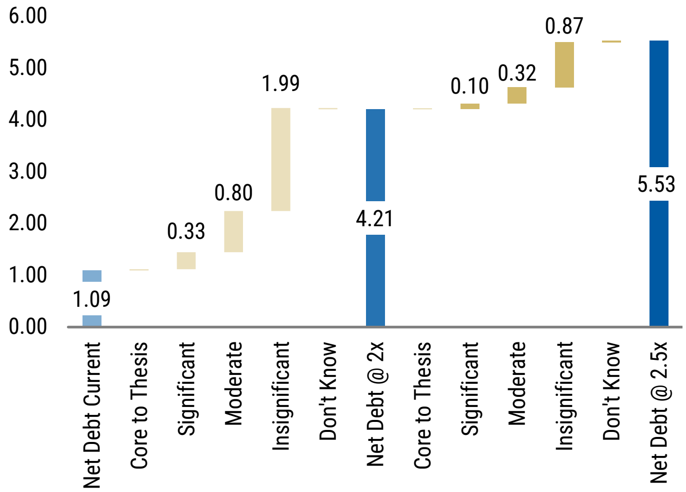


Source: WorldScope, Morgan Stanley Research

The Adopters identified by our analysts currently have just over $1 trillion of net debt. If this group were to lever up to 2x EBITDA – assuming, for the sake of argument, that the spend on AI were to be capitalised – this could amount to >$4 trillion of net debt, implying an incremental $3 trillion to spend on AI transformation. To test a 'blue sky' scenario, if this group of companies were to lever up to 2.5x EBITDA, it would imply an incremental c$4.5 trillion to spend on capex or R&D for AI or broader digital transformation. The greatest balance-sheet headroom within the Adopter group also happens to be where AI is currently less material to the investment case but where there could be a 'rate of change' story in due course as the companies choose to invest more in top- and bottom-line enhancing AI tools. The lion's share of balance sheet headroom to spend is in the companies where AI is currently either moderate or insignificant to the investment case (Exhibit 18).

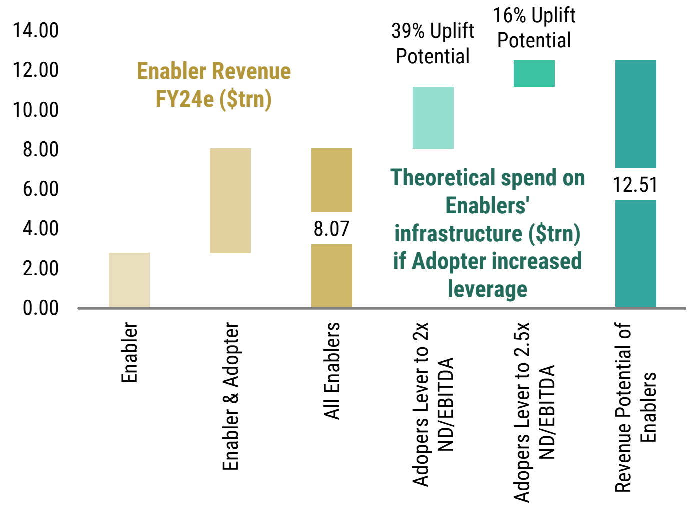
To demonstrate why there is such a critical virtuous cycle between Adopters and Enablers, we compare these potential dollar values to the Enablers' revenue bases in FY24e. We appreciate that this spend would not come through in one year – and discuss this timing point below – but it should give investors a gauge on the potential revenue or earnings impact of Adopters' spending on capex/R&D using Enablers' hardware and software to build out AI products and projects. Adopters levering to 2x would imply a 39% uplift to Enablers' FY24e revenue base if it was a one-for-one transfer from one group to the other. While oversimplified, it should nonetheless give a clear picture to investors of the potential benefits for both the *Enablers* and *Adopters* from this relationship.

Exhibit 18: *Adopter* Stocks' potential incremental headroom if they were to borrow from current leverage levels up to 2x or 2.5x Net Debt/EBITDA ($trn)



Source: FactSet, Morgan Stanley Research

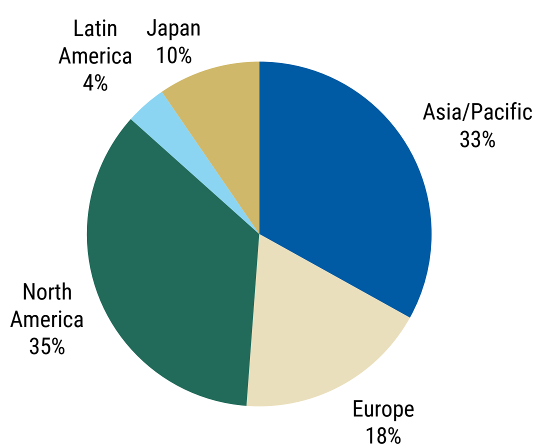
Exhibit 19: Potential uplift to *Enabler* revenue base if *Adopters* were to lever up to spend on AI infrastructure ($trn)



Source: FactSet, Morgan Stanley Research

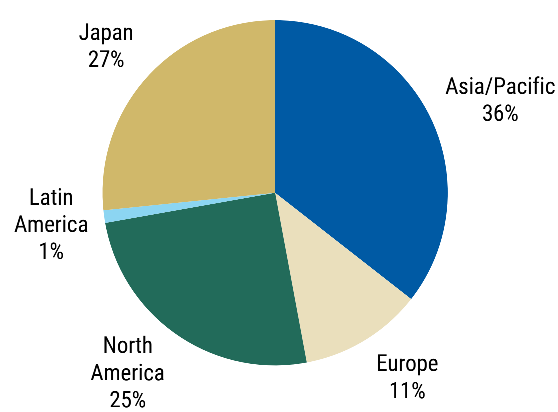
For further granularity, we juxtapose the geographic breakdown of stocks in the *Adopter* group with the amount of spend potential were these companies willing or able hypothetically to lever up to 2x in order to spend on AI integration. For example, 35% of the *Adopter* group of companies are in North America but when levered up to spend on AI this region would amount to only 25% of the available dollars to spend on *Enablers*' products. By contrast, Japan is c10% of the *Adopter* companies but when levered up to 2x, it would represent 27% of available dollars to spend on *Enablers*' hardware and software. Europe notably has the least firepower of the major regions relative to its share of *Adopter* companies due to higher existing leverage. This is another dynamic we will be watching closely in further iterations of this survey.

Exhibit 20: Stocks by region in the *Adopter* cohort



Source: FactSet, Morgan Stanley Research

Exhibit 21: Proportion of potential incremental spend by geography if *Adopters* were to lever to 2x Net Debt/EBITDA

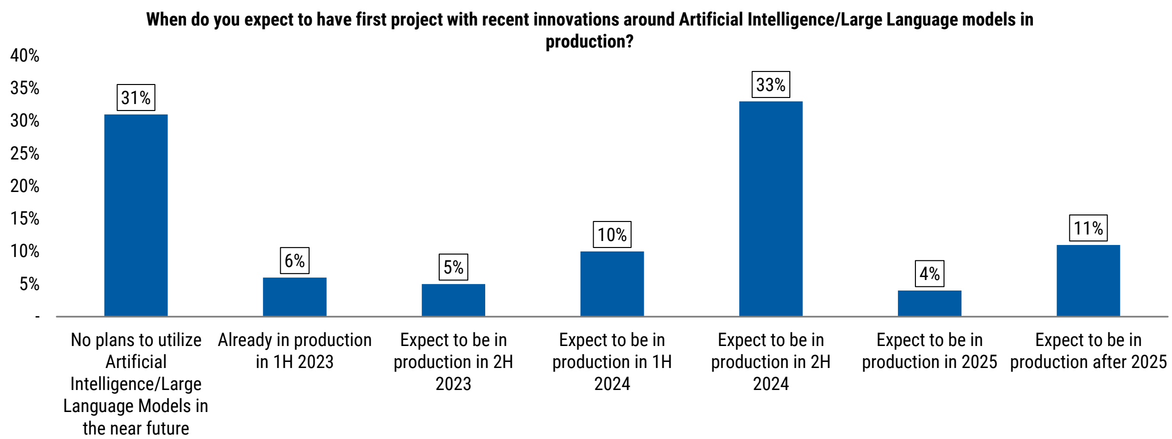


Source: FactSet, Morgan Stanley Research

Timing the *Adopter/Enabler* Cycle

On timing, most CIOs (33% of responses) in our recent survey expect their first AI/LLM projects to be in production in 2H2024. This partly explains our comparison of Adopters' potential spend with Enablers' FY24e revenue forecasts. 15% of CIOs expect projects to be in production in or after 2025. However, the data also suggest that some organisations are on a more aggressive timeline regarding implementing AI/LLM technology. 11% of CIOs have either already begun to produce projects in 1H23 or expect to be in production in 2H23, while 10% of CIOs expect projects to be in production in 1H2024. Specifically, among CIOs who responded that AI/LLMs are having some impact on their IT budgets, 37% are using hyperscalers, while 17%/16% are using data management vendors/ application vendors, respectively.

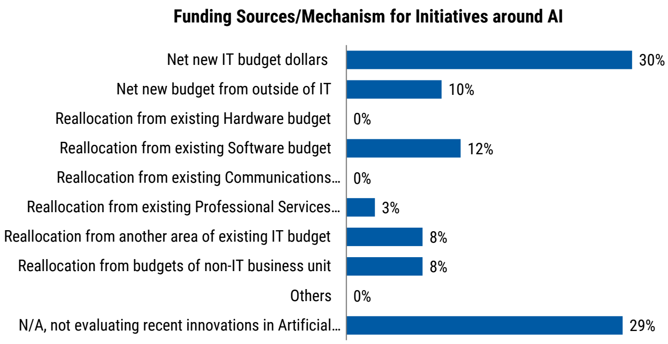
Exhibit 22: A majority of CIOs expect initial projects to be in production in 2H24 and beyond



Source: AlphaWise (October 2023), Morgan Stanley Research. n=100 (US and EU data)

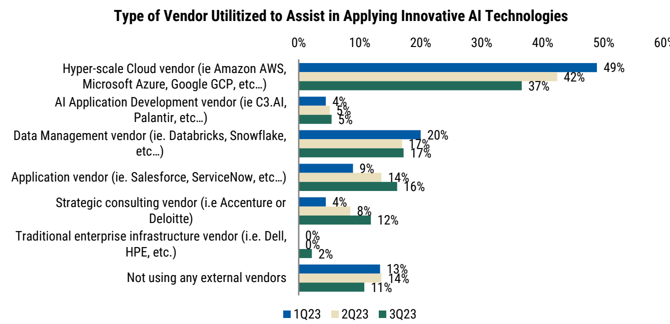
What gives us greater confidence in our analysis above, even if illustrative, is that most companies are not re-directing budget from elsewhere to fund this digital transformation push. *Adopters* will have to lever up, therefore, to some degree if they are less willing to fund this from existing budgets. Per our latest CIO survey, 30% of AI budgets are expected to be incremental IT budget dollars. Furthermore, in terms of the *Enablers* most likely to see the benefit of this *Adoper/Enabler* cycle, 37% of CIOs who are currently in the process of operationalising machine learning use public cloud vendors for assisting in applying these technologies.

Exhibit 23: Funding sources for new AI initiatives



Source: AlphaWise (October 2023), Morgan Stanley Research. n=100 (US and EU data)

Exhibit 24: Type of vendor used in applying innovative AI solutions



Source: AlphaWise (October 2023), Morgan Stanley Research. n=100 (US and EU data)

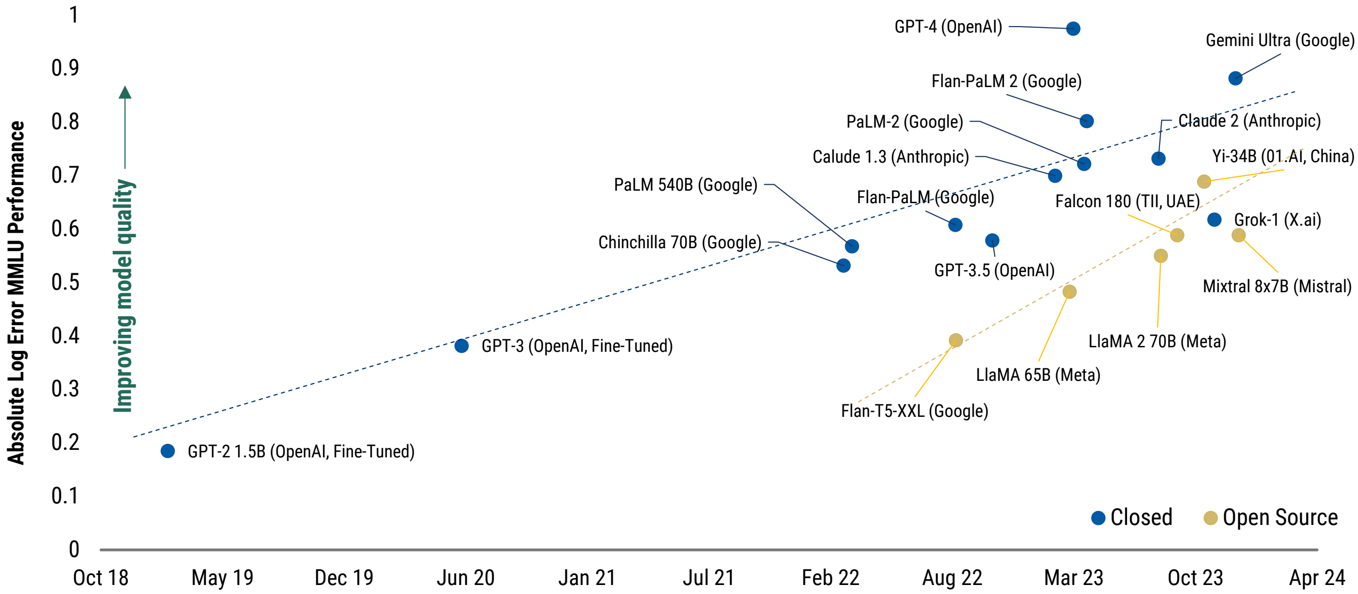
Tracking the *Enabler/Adopter* Cycle

Beyond the financial results of the Enablers themselves, we rely primarily on three other methods or data sources to track investments, successes or failures being made by the *Adopters*:

(1) Hugging Face (Quality of Models): One of the best real-time proxies for the breadth of trial-and-error with which *Adopters* are attempting to integrate LLMs and other machine learning models into their products and processes is by tracking Hugging Face statistics (an open source model repository). We can do this in two ways. The first is to track the quality of the models being used by enterprise. Here we are seeing a rapid convergence in the quality between closed and open-source models. This is coinciding with a compression in the cost of inference.

As a broad rule of thumb, closed (proprietary) models will generally be more expensive for *Adopters* to build on top of, but with generally higher quality/accuracy output than Open Source models, and vice versa. However, this dynamic is converging quickly (Exhibit 25), bringing cheaper democratisation and quality to all *Adopters* in 2024. This Closed vs Open Source model quality and inference cost is one we will be tracking closely in 2024 to determine the speed and affordability with which *Adopters* can build on top of these models. It also holds the key to understanding how the spend by *Adopters* will flow back to *Enablers*.

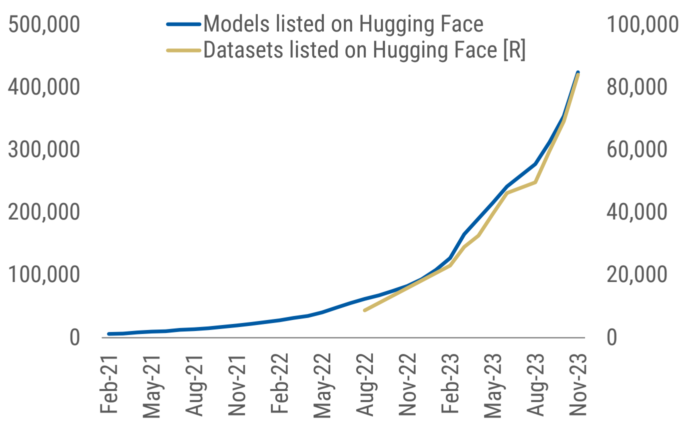
Exhibit 25: Open source model quality converging with closed models (5-shot MMLU Performance)



Source: Hugging Face, X, Ark, Morgan Stanley Research

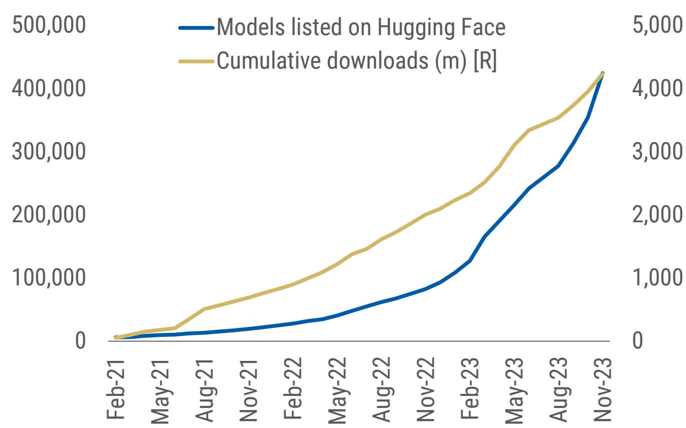
(2) Hugging Face (Quantity of Models): Model downloads in November 2023 were c5x higher YoY and 20x higher over 2 years. Datasets listed on the platform that can be used to supplement vector databases have seen an 8x increase in downloads YoY. We cannot see which industries or companies are downloading models most frequently. And, while this is only able to track open source model downloads (i.e. not the use of GPT-4, for example), it is nonetheless a live and transparent indicator of demand for models and datasets.

Exhibit 26: Hugging Face Models available and cumulative dataset downloads



Source: Hugging Face, Morgan Stanley Research

Exhibit 27: Hugging Face Models available and cumulative downloads



Source: Hugging Face, Morgan Stanley Research

(3) Analyst Determinations of Adoption: Our analysts have indexed 1165 stocks as *Adopters* across all sectors and regions. 9 of these stocks are where AI is considered to be *Core to Thesis*, 71 *Significant* and 333 *Moderate* to the debate on the name (Exhibit 55). For the 689 and 63 *Adopters* where our analysts consider the AI debate to be *Insignificant* or they *do not know* respectively, we will still be tracking the rate of change for these stocks' classifications over time to understand how the market continues to price the perceptions and fundamental realities of adopting AI into their business practices.

This group of *Adopter* companies is already seeing a growing frequency with which companies are discussing – and occasionally quantifying – the applications of AI within their businesses. As this momentum builds and these companies move from proof-of-concept to enterprise-wide adoption, we expect to see analyst and market perceptions change as the technology delivers either top-line and/or bottom-line impacts to the *Adopter* companies.

Below, we highlight the five stocks that our analysts have identified as *Adopters*, where companies have already specifically stated their involvement to-date with AI, but where our analysts have made the determination that this AI investment is unlikely to be core to the 12- to 24-month investment debate.

Exhibit 28: *Adopter* stocks where AI investment is ongoing, as stated by the company, but deemed by our analysts to be non-core to the 12- to 24-month investment debate

Company	Analyst	Rec	Mapping	Company Quote (1H23 Results)	Analyst Comment
Edison International	David Arcaro	U/W	Adopter / Insignificant	Leveraging tools such as artificial intelligence, robotic process automation and mobile solutions, SCE is ramping up its efforts around the customer experience, integrated grid planning and execution, and driving efficiencies in its support functions.	We think the financial impact will start small and benefits could be largely passed on to customers through lower utility rates.
Givaudan	Lisa De Neve	U/W	Adopter / Don't Know	Myrissi - a company we acquired - is a new way of translating scents into color patterns with the unveiling of its consumer centric artificial intelligence technology.	Givaudan has 2 digital factories (in France and China), and employs AI to (i) create solutions for customers in a more effective and efficient way (incl. offering speed to market), and (ii) expand its development capabilities and customer base
Schlumberger	Daniel Kutz	O/W	Adopter / Insignificant	We have developed more than 100 AI solutions with more than 80 customers since 2021 with AI at the edge and we currently have more than 1,400 connected assets deployed, doubling year on year.	While the company has been making progress identifying and integrating AI solutions, we think it will take additional time for AI to become a meaningful financial contributor relative to its base business.
Starbucks	Brian Harbour	E/W	Adopter / Moderate	We have terrific capabilities of digital as well as in artificial intelligence and machine learning that we're unleashing with even more agility in terms of how we strengthen and scale.	AI is already starting to have an effect, and while it's hard for us to measure discretely, it does have a tangible effect on how the business operates day to day already.
Takeda Pharma	Shinichiro Muraoka	E/W	Adopter / Insignificant	In manufacturing we are using image recognition on our manufacturing line in order to improve the efficiency of the line, [on] visual recognition that we [were] doing manually in the past.	The Japanese pharma sector is likely a late adopter but amongst the space Takeda is investing in AI more than peers.

Last close prices: Edison International $71.49, Givaudan CHF 3,484, Schlumberger $52.04, Starbucks $96.01, Takeda Pharma JPY4,054. Source: Company data, FactSet, Morgan Stanley Research

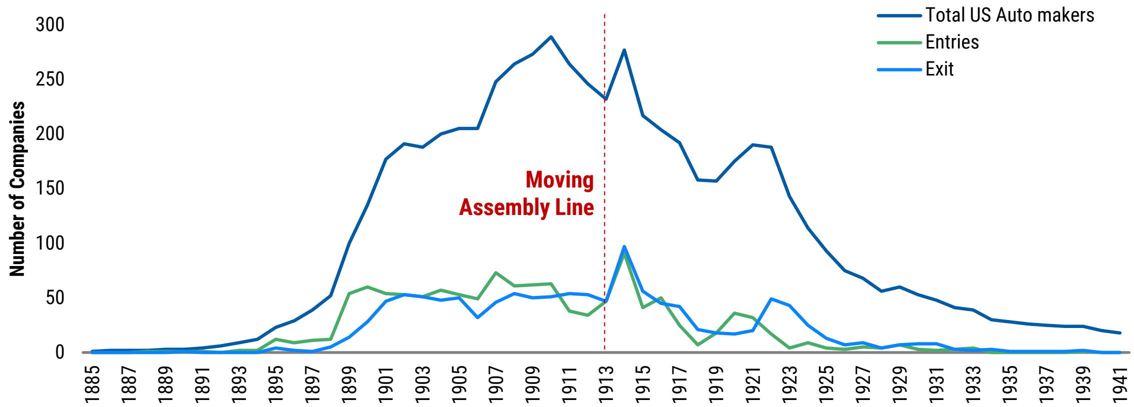
For a full list and detail on company transcript mentions of AI see here.

Adoption Can Be Double Edged

As technology continues to deflate and becomes democratised, the first-mover advantage that *Adopters* could gain can equally quickly be eroded if these *Adopter* companies do not have robust barriers to entry, strong pricing power and large amounts of proprietary data to leverage; a key concept embedded in our Internet team's NEXT framework.

Many *Adopters* can just as easily be disintermediated by the technology they are attempting to adopt; history is rife with examples of this. A 'cambrian explosion' of innovation tends to lead to a period of consolidation as the leading *Adopters* scale. GM and Ford, for example, who were able to invest in and pass on the savings of the moving assembly line from 1913, were able to take enormous market share over subsequent decades. The economics of those competitors who moved more slowly or thought the electrification technology would not be as revolutionary as it turned out to be could not match the success of the mass market *Adopters*.

Exhibit 29: Adopters of automation technology in the Automotive sector forced a consolidation in their industry to the benefit of the consumer



Source: Counterpoint Global Research, Morgan Stanley Research

This is in fact something we are seeing in live time in the Venture capital-backed AI market as *Adopter* start-ups build on top of foundational models but are at risk of those very foundations changing to the detriment of their business model. This is to be expected in a period of rapid change and experimentation.

We are not claiming this logic holds for every stock in the adopter category. However, by contrast, the companies tagged by our analysts as being *Protected* from AI – an eclectic group including names such as BP, Coca-Cola or Carnival – often benefit from brand loyalty, burdensome regulation or vast capital requirements that AI-enabled competition would struggle to compete with. These types of protection do not tend to hold true to the same degree for those companies indexed as *Adopters*. This is why monitoring the 'Rate of Change' in our analysts' indexation of stocks will be critical to watch over the coming years as *Adopter* companies more regularly and quantifiably convey to the market how they intend to leverage AI.

Measuring & Rewarding AI 'Rate of Change'

In this Rate of Change analysis, we see opportunity for investors in three separate but often overlapping segments:

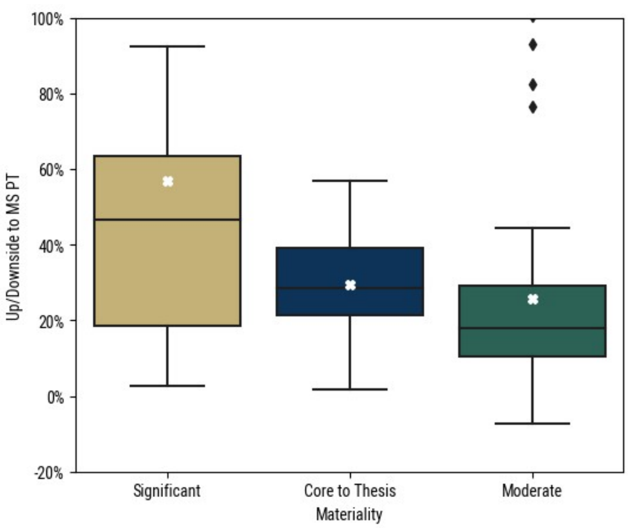
1. Materiality Rate of Change
2. Category Rate of Change
3. Valuation Rate of Change

(1) Materiality Rate of Change

As already noted, *Enablers* have been well understood and priced by the market, particularly those where AI is *Core to Thesis*. However, among our coverage, analysts have mapped close to 900 stocks as *Enablers* where AI plays either a *Significant* or *Moderate* role in the investment debate (Exhibit 53). We believe that stocks in the sub-group may represent a compelling yet-to-be priced group of AI beneficiaries in 2024 and 2025.

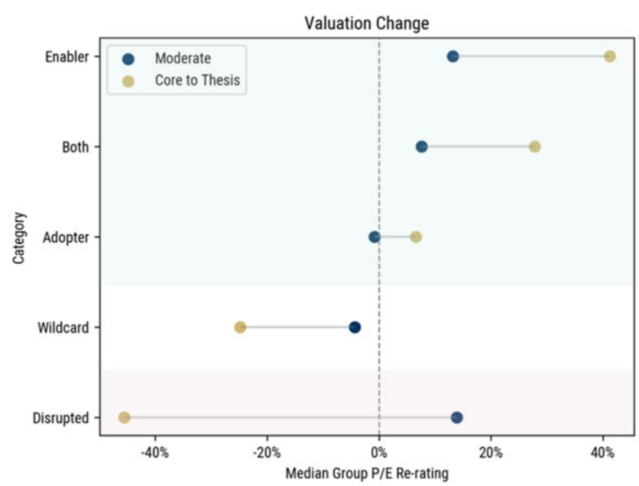
These *Significant Enablers* are not the front-line beneficiaries in semis, hyperscalers or foundational model builders, where AI is *Core to Thesis* and which now have less upside to MS target prices given strong rallies in 2023. Nor are they the *Moderately* exposed stocks, which are likely to take longer to pivot or be appreciated by the market as warranting a re-rating on the AI theme (more on this in the next section). The *Significant* AI *Enablers* currently have the largest upside to MS target prices – >40% – than either the *Core to Thesis* or *Moderate* groups of *Enabler* beneficiaries.

Exhibit 30: Stocks rated *Significant* have 27ppt of median upside over *Moderate*



Source: Morgan Stanley Research

Exhibit 31: Median P/E valuation change by group



Source: FactSet, Morgan Stanley Research. Note = Assesses only the middle 95% of values.

Relative to the previous argument around stocks seemingly having missed out on the rally in 2023 and therefore being more of a 'catch-up' trade, this section makes an argument that is likely to take longer for most companies to execute on but which could be richly rewarded by the market: Rate of Change in stocks *Moderately* exposed to AI.

We are strong advocates of the 'Rate of Change' thesis across Thematic investing, for both sustainability and disruption themes. We have analysed this in great detail and we summarise the findings in the Price of Purity & Rate of Change. The simple premise is as follows: for every 1% of incremental revenue purity to a theme, that company's stock will see a c1.2x expansion in its valuation multiples. Consequently, if capex can be allocated to driving a revenue and profit mix shift towards becoming a company where machine learning is either *Significant* or *Core to Thesis* (from *Moderate* previously), not only should this come with higher growth, but also with a disproportionately large multiple expansion.

The re-rating opportunity for *Moderate* beneficiaries: To assess this further, we look at the Beneficiary group (*Enablers* & *Adopter* companies) and juxtapose this with *Disrupted* companies, as tagged by our analysts. Our findings are summarised as follows:

- **Growth differential:** *Moderate* beneficiaries have about half the level of sales growth and around two-thirds the level of expected EPS growth relative to *Significant/Core to Thesis* beneficiaries.
- **Valuation differential:** With *Moderate* beneficiaries having less than half the EV/ Sales multiple relative to beneficiaries where AI is *Core to Thesis*, and one-third cheaper forward P/E, there is a clear discount to grow into if these companies are able to align themselves to this theme over time.
- **Balance sheet capacity to shift mix:** With a comparable leverage level at c1.5x, there is ample headroom for *Moderate* beneficiary companies to acquire or spend internally to make AI more *Core to Thesis* for the stock, which could generate higher growth and should generate an outsized re-rating.

Exhibit 32: Fundamentals and valuation medians of stock groupings - *Enablers* and *Disrupted*

		---------------- Growth & Fundamentals -------				------------ Valuation ------------				-- Balance Sheet --	
AI exposure?	Materiality in next 12 -24 months?	2019-2023 Sales CAGR	2023-2026 Sales CAGR	2019-2023 EPS CAGR	2023-2026 EPS CAGR	EV/Sales 2024	PE 2024	Free Cash Yield 2024	Divi Yield 2024	Net Debt/ EBITDA	Capex/ Sales
Beneficiary (Enabler & Adopter)	Core to Thesis	14.9%	12.0%	19.3%	10.4%	5.0x	26.7x	3.4%	1.1%	1.5x	4.1%
Beneficiary (Enabler & Adopter)	Significant	15.6%	19.0%	24.4%	28.0%	3.5x	27.0x	1.7%	0.6%	0.3x	3.6%
Beneficiary (Enabler & Adopter)	Moderate	9.4%	8.8%	14.1%	15.4%	2.3x	18.0x	4.7%	1.8%	1.4x	5.8%
Disrupted	Moderate	4.5%	1.8%	5.6%	5.5%	1.1x	16.4x	4.5%	2.4%	2.4x	5.3%
Disrupted	Significant	1.0%	-1.8%	4.7%	15.6%	0.4x	6.9x	5.4%	0.0%	0.9x	3.6%
Disrupted	Core to Thesis	13.1%	12.4%	8.6%	21.4%	1.6x	8.9x	13.1%	2.7%	1.3x	6.1%

Source: Morgan Stanley Research

Taking the above analysis one stage further, we hypothesise what it could mean in dollar terms if our *Moderate* rated *Enabler* stocks were to re-rate in line with *Core to Thesis Enabler* levels in 2023. To perform the analysis below we move to market-cap-weighted performance. We stress, however, that this would be a relatively lengthy process rather than a binary transition. After all, the market takes time to be convinced that companies have changed their strategies, stories, outward perceptions and internal fundamentals.

Exhibit 33: Market cap changes by groups impacted by AI

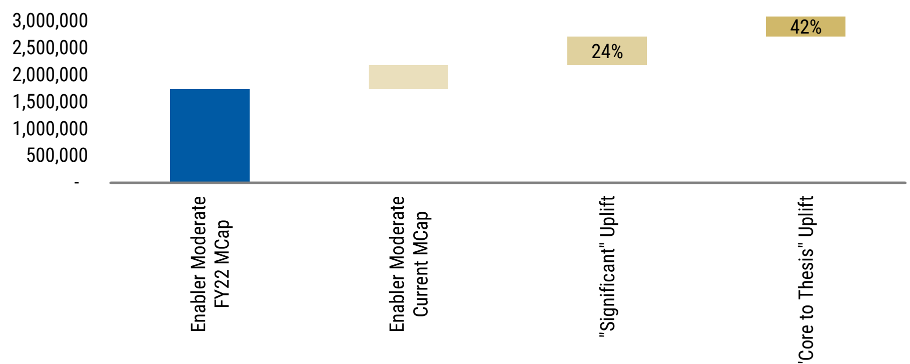
		Market Value YE'22 ($m)	Current Market Value ($m)	FY23 Delta ($m)	Average Market Cap ($m)	Percent Change in FY23
Enabler	Core to Thesis	1,126,808	1,994,412	867,604	90,655	77%
Enabler	Significant	957,238	1,490,128	532,890	38,208	56%
Enabler	Moderate	1,742,143	2,184,554	442,411	31,208	25%
Enabler	Insignificant	761,408	828,840	67,431	20,721	9%
Enabler	Don't Know	4,360	4,476	116	2,238	3%

Source: FactSet, Morgan Stanley Research

Each stock is ideosyncratic in its AI thesis materiality and thus should not be extrapolated in isolation based on its wider group's 2023 performance. However, assessing upside and downside market cap implications for whole cohorts shows the potential for further major aggregate shifts in market capitalisation globally:

- ***Moderate Enablers*** becoming more *Significant Enablers* could add another 24% or $530bn to market caps, judging by how performance was priced during 2023. *Moderate Enablers* moving to *Core to Thesis* could add another 42% or $900bn to market caps of this group based on 2023 performance.

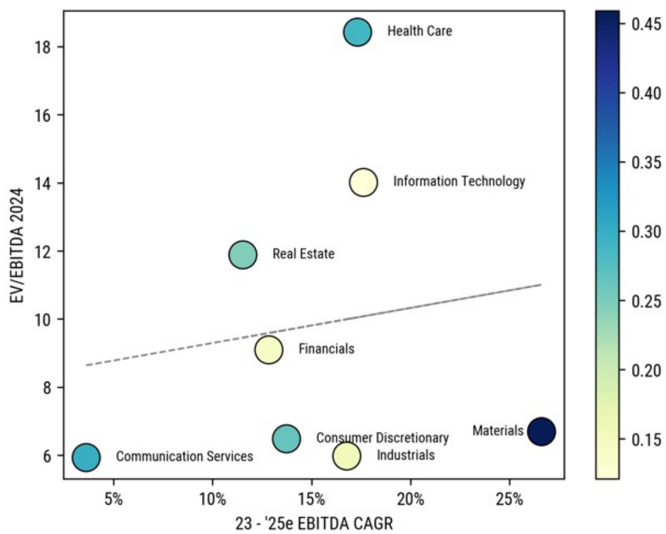
Exhibit 34: Market cap expansion potential as AI becomes more *Significant* to *Moderate Enablers*' thesis ($m)



Source: FactSet, Morgan Stanley Research

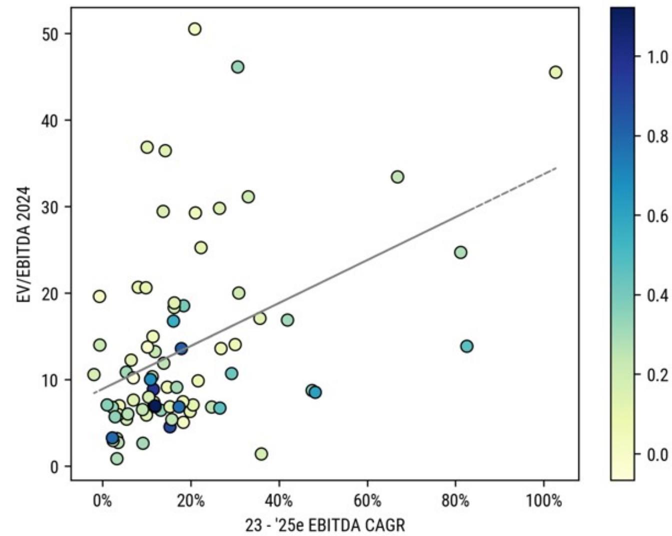
On a sector basis, where do 'Rate of Change' opportunities lie? By assessing the *Moderate* rated *Enablers*, we find that the median growth/valuation screens the cheapest for the following sectors: Materials, Industrials and Consumer Discretionary.

Exhibit 35: Sectors where AI importance is *Moderate* and Co's are *Enablers*



Source: Morgan Stanley Research. Note: Underlying companies are all classified as having AI importance as "Moderate" and are all rated Overweight. Median stock upside by sector.

Exhibit 36: Enabler companies where AI importance is *Moderate*



Source: Morgan Stanley Research. Note: Companies mentioned are all classified as having AI importance as "Moderate" and are all rated Overweight.

(2) Category Rate of Change

This type of category-changing outlook is most challenging for our analysts to have visibility on. This is because, more often than not, a change of category will be exogenous to management's control. Even if – as shown above – a company is making all the right strategic decisions and managerial strides to invest adequately into protecting or enhancing its business for the new world of accelerated machine learning applications, new product launches can quickly render these strategies and investments redundant.

The example of airlines: 'Protected' to 'Adopter' and 'Insignificant' to 'Significant'?

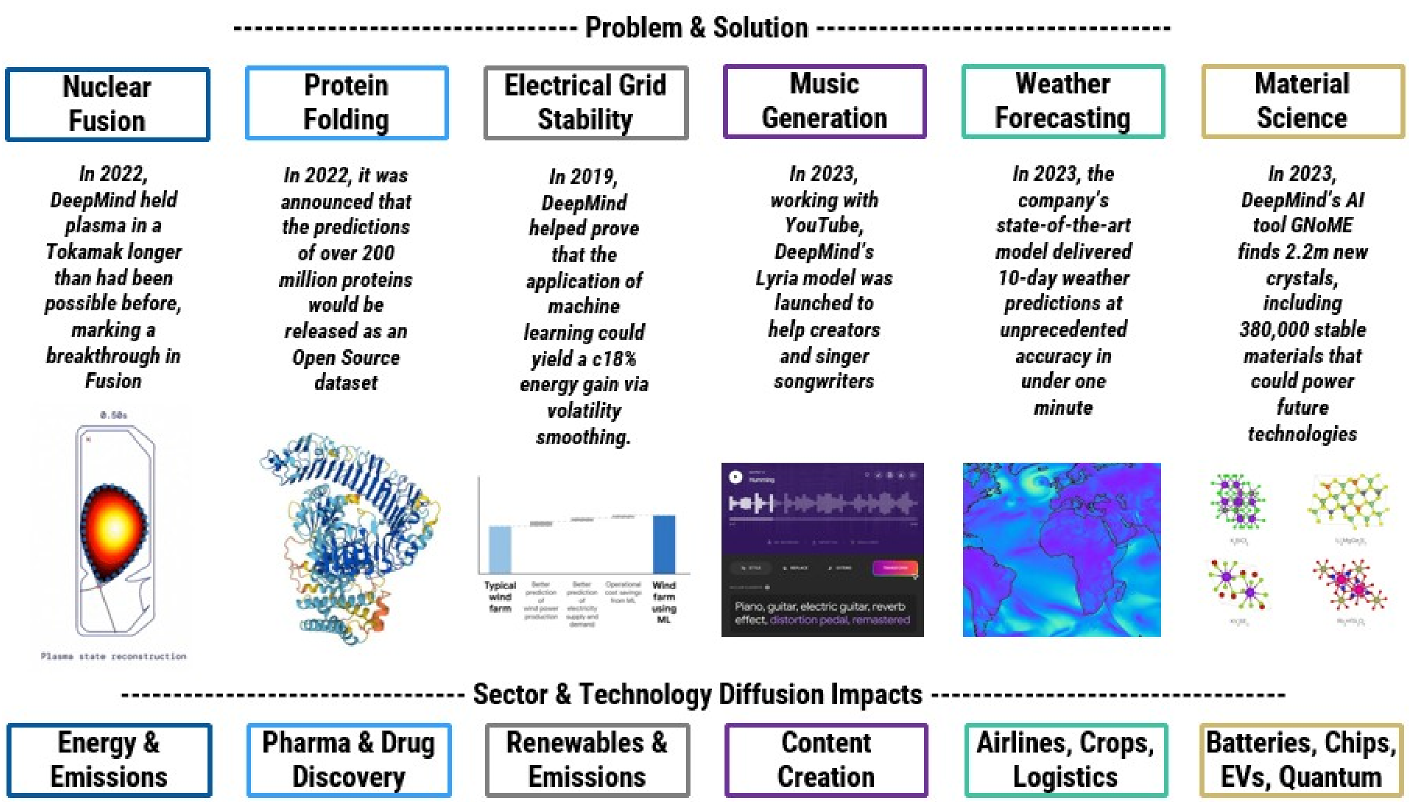
An example of this categorisation reconsideration even occurred during the process of our analysts considering their stocks in relation to the ongoing AI debate. Our Airlines analysts had generally considered their coverage to be either *Adopters* of autonomy logistics machine learning or *Protected* from any material impact on their business case over the next 12 to 24 months. In any case, 18 of 28 airlines under global coverage were labelled as AI having an *Insignificant* impact on the companies' fundamentals. Thereafter, GraphCast – a type of 10-day weather prediction giving unprecedented accuracy over segmented cell forecasting – was launched, which caused our analysts to increase their confidence that such a tool could unlock substantial savings from avoiding weather disruption and saving on fuel.

To explain the speed and scope of companies that could be susceptible to either positive or negative recategorisation in due course of the AI impact, we examine one company's product releases over the past three years: DeepMind. The academic arm of Alphabet's research into machine learning has released numerous studies, algorithms and data sets that look to solve specific problems, from plasma containment in fusion tokamaks, to creating solutions for battery chemistry in a world looking to reduce dependence on rare earth minerals.

While many of these studies and projects are some way from mass commercialisation, others are already in the field, such as AlphaFold, which is helping to accelerate the discovery of novel molecules for drug discovery purposes. Most recently, the company's GNoME tool found 2.2 million new structures that could both propel forward new materials for the energy transition but also swiftly disrupt the incumbents whose technology may be less efficient or more expensive.

Within this context of the breadth and depth of disruption posed by just one company's R&D efforts, we do not believe it is likely for only a small fraction of companies under our global equity coverage to be categorised as *Disrupted* a year from now. Consequently, we will re-run this analysis on a systematic basis over the coming quarters and years to track this evolution and how the market prices companies that move from one categorisation to another.

Exhibit 37: DeepMind advances in AI across a spectrum of industries impacted



Source: DeepMind, Morgan Stanley Research

(3) Valuation Rate of Change

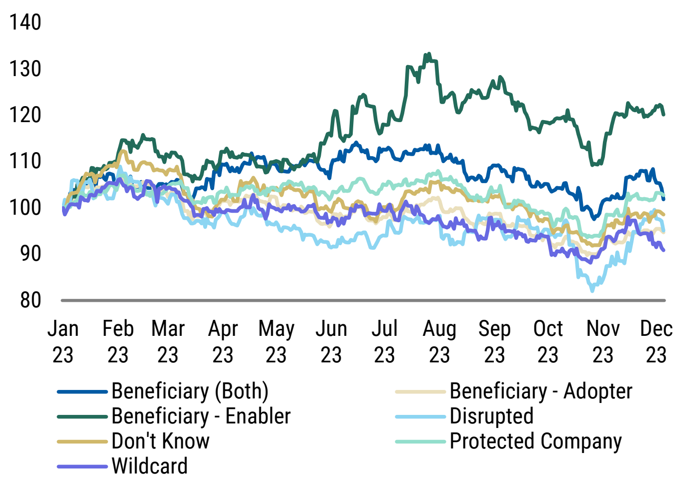
We show above (Exhibit 5) what could happen if categories of stocks were to re-rate to where other categories are valued. As caveated above, this is simply illustrative rather than a suggestion that it will happen. Perhaps more helpful is to look at how valuations for each category of stocks have progressed through 2023 on a consensus forward P/E basis (Exhibit 37).

A strong re-rating from the *Enablers* versus a >10% derating for the disrupted names has been flagged already above. However, the rebound since November from Fed rate cut anticipation and some short covering in certain sectors and themes means this *Disrupted* group has now derated less in 2023 than the *Wildcards*, for example.

Moreover, and perhaps unexpected to our readers, there are three groupings of valuations, essentially: (1) the more expensive *Enablers* and *Enabler/Adopters* (c18-20x average forward P/E); (2) The *Adopters*, *Disrupted* and *Wildcards* which started and ended the year on roughly comparable average valuations (c15x P/E); and (3) the *Protected* and *Don't Know* groups; these contain more value stocks which have generally held their valuations steady during 2023 (c13.5x average P/E), but still on balance trade at a 10% discount to the *Disrupted* group and a 7% discount to the *Wildcard* group.

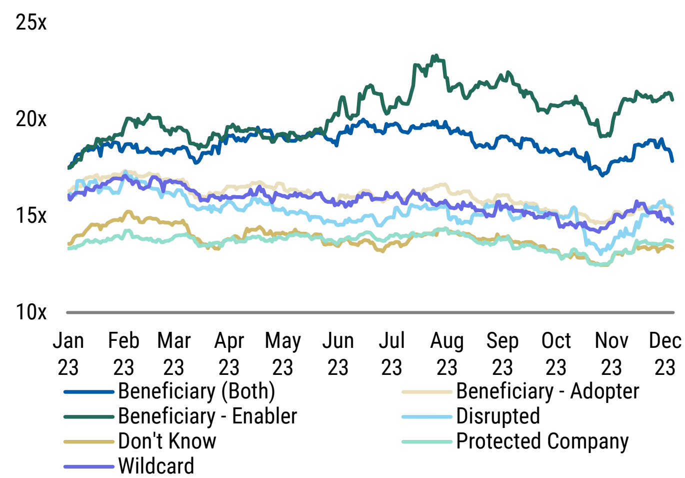
Simply put, therefore, being considered *Disrupted* does not automatically confer a de-rating, particularly if the view from analysts is that AI is not *Core to Thesis*.

Exhibit 38: 12m cons fwd P/E by categorisation (re-rating/de-rating 2023 - rebased)



Source: FactSet, Morgan Stanley Research

Exhibit 39: 12m cons fwd P/E by categorisation (re-rating/de-rating 2023 - absolute)

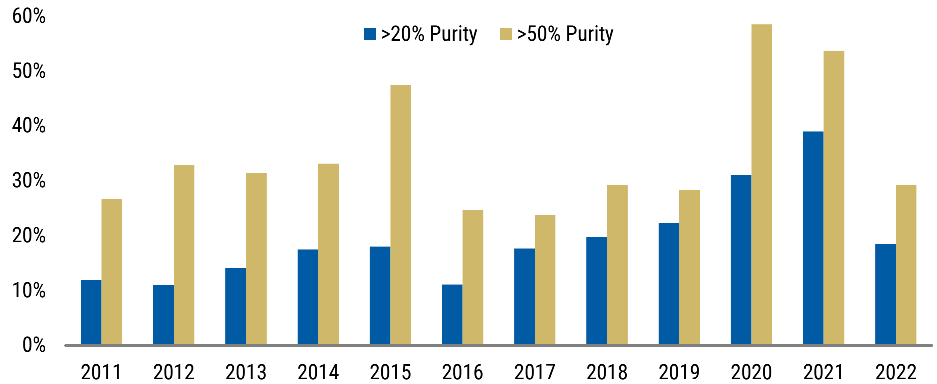


Source: FactSet, Morgan Stanley Research

In the Thematic investing world, stock 'purity' is a contentious (and costly) debate. By our maths, for every 1% incremental revenue purity, investors need to pay an incremental 1.2% valuation premium. This holds true particularly for 'growth' or tech themes such as Cybersecurity, which benefits most from thematic purity versus stocks with lower revenue exposure to the theme. Consequently, we believe AI *Adopters* will be well placed to take advantage of multiple expansion over time.

The Fed's effect on the relative valuation between thematically 'pure' and 'non-pure' stocks has been pronounced over time. As rates rose in 2015, the thematic purity valuation premium compressed from c45% to c30%. In the current rate hiking cycle, the thematic purity valuation premium has compressed from c55% to c30%, nearing the 10-year trough level.

Exhibit 40: Average valuation upside resulting from thematic purity >20% and >50% company revenue exposure to a theme – Average of 12-month-forward EV/Sales, EV/EBITDA, P/E on 31st Dec of each year



Source: Thomson, Morgan Stanley Research

Exhibit 41: Valuation upside by multiple resulting from aggregate thematic purity

		2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
20%	EV/Sales	22%	18%	22%	24%	18%	16%	20%	25%	29%	33%	37%	17%
20%	EV/EBITDA	9%	8%	11%	13%	12%	7%	16%	16%	18%	30%	40%	12%
20%	P/E	5%	8%	9%	16%	24%	11%	16%	19%	21%	30%	40%	27%
>20% Purity	**Average Premium**	**12%**	**11%**	**14%**	**17%**	**18%**	**11%**	**18%**	**20%**	**22%**	**31%**	**39%**	**19%**
50%	EV/Sales	47%	36%	41%	45%	43%	31%	30%	40%	35%	59%	56%	26%
50%	EV/EBITDA	39%	31%	32%	24%	43%	22%	23%	24%	26%	65%	54%	20%
50%	P/E	15%	31%	22%	30%	56%	21%	18%	23%	24%	51%	51%	41%
>50% Purity	**Average Premium**	**27%**	**33%**	**31%**	**33%**	**47%**	**25%**	**24%**	**29%**	**28%**	**59%**	**54%**	**29%**

Source: Thomson, Morgan Stanley Research

How Much Was Priced in 2023?

As one year has passed since ChatGPT's launch, we assess what was priced by the market during the time since, and therefore what remains to be priced into our global equity coverage from an AI perspective. We summarise our key findings on what's been priced on the AI theme in 3 ways:

1. How were returns distributed?
2. Which Enablers fell behind?
3. How much disruption was priced?

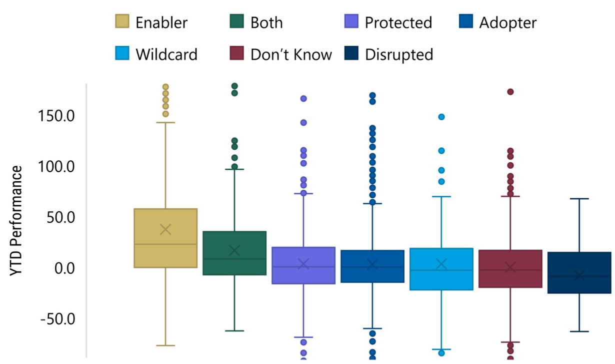
(1) How were returns distributed?

Efficiently priced AI risks and opportunities … on the surface: As can be seen below, returns have been staggered broadly as would have been expected, with beneficiary *Enablers* leading the 2023 returns of all stocks and perceived *Disrupted* names lagging. Interestingly, however, there are more outlier performers in 2023 to the upside in this beneficiary category than there are outliers to the downside. These strong re-ratings (which we go on to analyse in greater detail below) could put stocks at risk of a pull-back in 2024. Further high level thoughts on all stock classifications are as follows:

- ***Enabler* & *Disrupted* spread:** Between *Enablers* and *Disrupted* companies there is a c30ppt difference in median returns in 2023. Additionally, *Enablers* have been far more skewed to the upside, with *Enabler* outliers outperforming >100ppt versus the average *Disrupted* stock.
- ***Don't know / Wildcard = Disrupted*?:** The middle ground stocks also showed some interesting price action during 2023. Most notably that where the market *Doesn't Know* or considers the stock to be a *Wildcard* (i.e. it could be a major beneficiary or see major disruption over the medium term), they are generally being priced similarly to stocks considered to be *Disrupted*.
- ***Protected > Adopters*:** Finally, it is noteworthy that the market is treating *Protected* stocks as a better or safer bet through 2023 than stocks that our analysts consider to be *Adopters* of the technology.

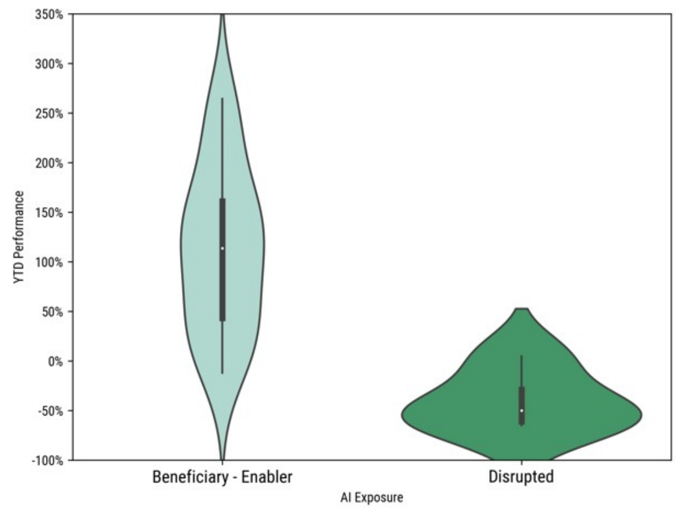
The above views summarised in Exhibit 42 are for all stocks, not taking into account materiality to the investment debate. When we look at only *Enablers* and *Disrupted* for stocks where our analysts perceive AI to be *Core to Thesis* on the stock, the spread in performance becomes more pronounced. While *Disrupted* downside is limited to 100% and *Enabler* upside is not, it is nonetheless informative that the highest performing *Disrupted* name where AI is *Core to Thesis* performed worse than the lower quartile of *Core to Thesis Enablers*.

Exhibit 42: 2023 Performance, Morgan Stanley AI Classification - All stocks



Source: Morgan Stanley Research. Note: Some outliers lie outside the Y Axis range presented.

Exhibit 43: 2023 Performance Distribution, Beneficiary *Enabler* vs *Disrupted - Core to Thesis* stocks only



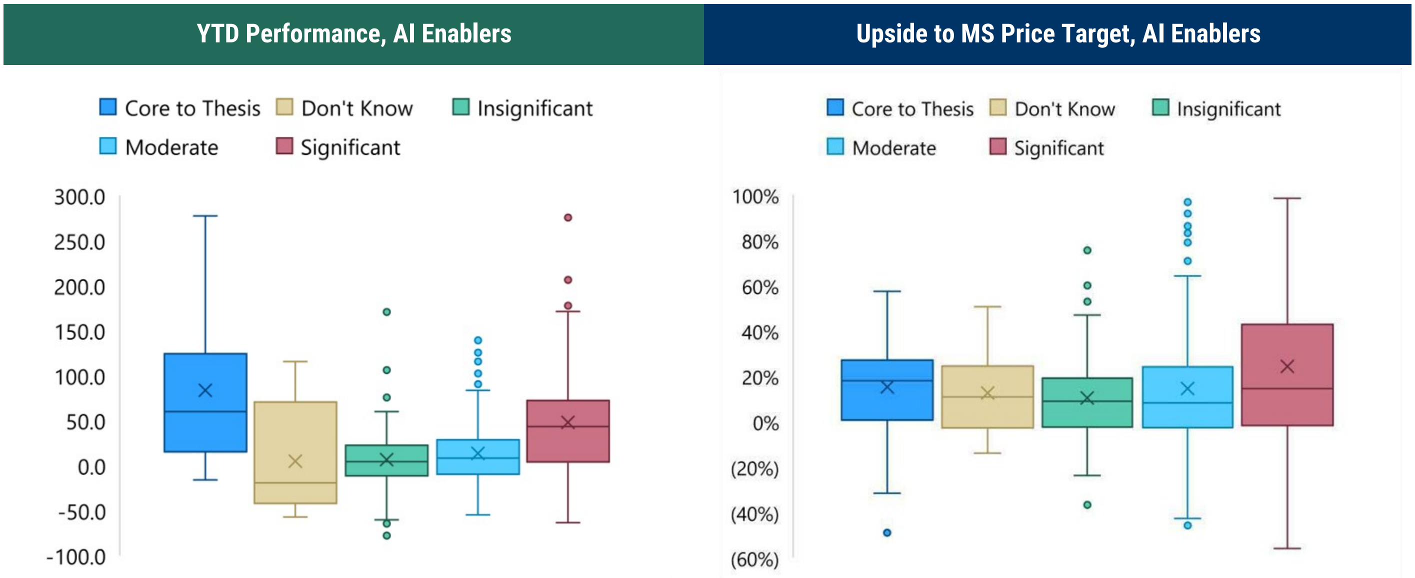
Source: Morgan Stanley Research

Using MS price targets to determine how much is still to be priced from an AI perspective is unhelpful. Our analysts' price targets are driven by fundamentals and the AI overlay for many companies is more than likely in their bull case valuations rather than base case price targets, given the challenge of quantifying it in companies' income statement forecasts.

Nonetheless, if we focus just on the group where our analysts have the highest conviction that their companies are integral to the enablement of the diffusion of AI, we see some inconsistencies in how the market is pricing these first-wave beneficiaries. Such companies include but are not limited to: Foundational model builders, Hyperscalers, Semis and Semicap, data centre construction companies, heat exchangers and capital goods vendors.

Those *Enablers* where AI is *Core to Thesis* and to a lesser degree *Significant* to the thesis have performed best on average during 2023. These are predominantly semis and hyperscaler names. Interestingly, however, the more obvious *Core to Thesis* AI *Enablers* now have comparable upside to MS price targets as the AI *Enablers* where our analysts *Don't Know* the impact to the investment debate. This could suggest therefore that the most upside remaining in this category of positive performers in 2023 now lies not in the most obvious first derivative plays but rather in the *Significant* group of AI *Enablers* (a list of which is shown in Exhibit 53).

Exhibit 44: Unpriced AI potential remains in stocks classified as "AI *Enablers*" by our analysts



Source: FactSet, Morgan Stanley Research

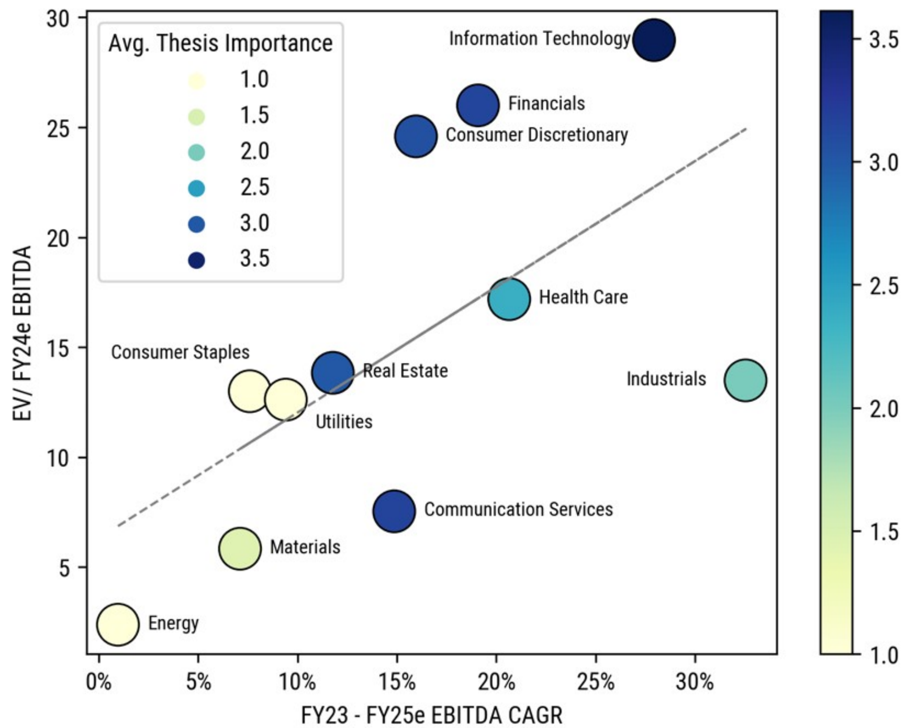
(2) Which *Enablers* Fell Behind?

Industrials and Communication Services have untapped AI *Enabler* potential: Our high-level analysis indicates that the market so far has most clearly rewarded companies that are *Enablers* of AI. In an effort to highlight stocks and sectors where our analysts see further upside to AI *Enablers*, we take our Overweight rated *Enablers* from this mapping exercise and assess their forward EBITDA multiples relative to their forward growth expectations.

After a strong year for IT, Internet and Software names, these predominantly *Core to Thesis* AI stocks have re-rated in excess of wider market trends. Counterbalancing this, Communication Services and Industrials still have relatively high average AI relevance but have yet to experience an AI driven re-rating to the same extent. With breakthroughs, for example, in the material sciences space announced by DeepMind in recent weeks (Exhibit 37), we think it is plausible if not likely that the next leg of the AI story will revolve around heavier industry *Enablers* such as warehouse automation and supply chain logistics focused companies.

For a list of these *Enablers* that are Overweight rated but have not performed as strongly as the *Core to Thesis Enabler* group (Exhibit 51) in 2023, see Exhibit 53 .

Exhibit 45: Valuation Scatter; Where has *Enablers* not been priced yet?

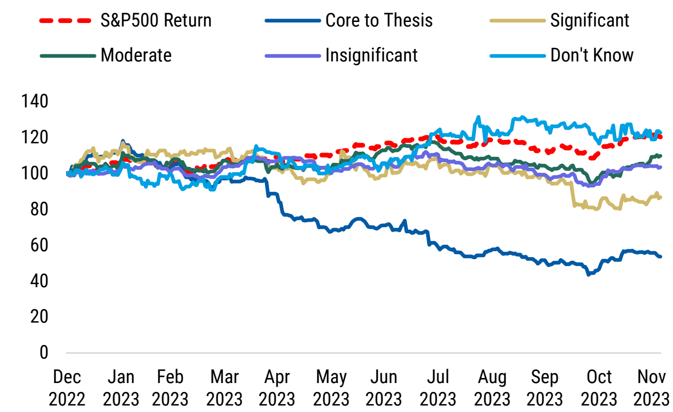


Source: Morgan Stanley Research

(3) How Much Disruption Was Priced?

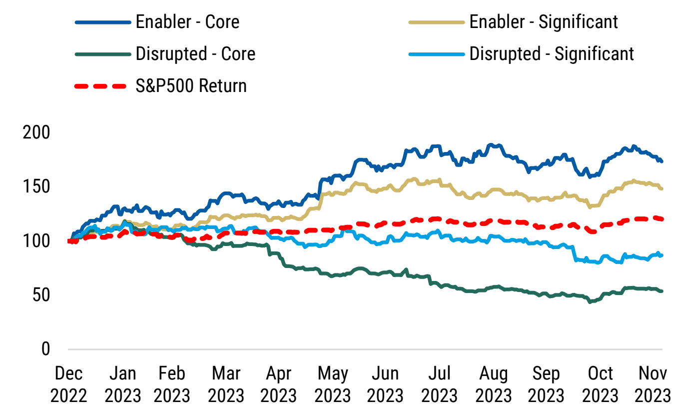
Too early to have confidence in the Disrupted cohort: It would be unfair to ascribe too much weight to AI disrupting the business models for even those businesses categorised as *Core to Thesis Disrupted.* The truth is that it takes many years for this type of disruption to come through in the earnings of stocks that are disrupted by technology regime shifts (as we explain below in Exhibit 48). In fact, returns of this grouping of companies started to underperform the market long before the first companies began to cite ChatGPT as a reason for potential weakness in their underlying fundamentals. It is also worth reminding our readers how small this group is (Exhibit 13), both in absolute and market cap terms.

Exhibit 46: Thesis materiality is important for stocks in the *Disrupted* group



Source: FactSet, Morgan Stanley Research

Exhibit 47: *Core to Thesis* materiality is a key determinant of up and downside



Source: FactSet, Morgan Stanley Research

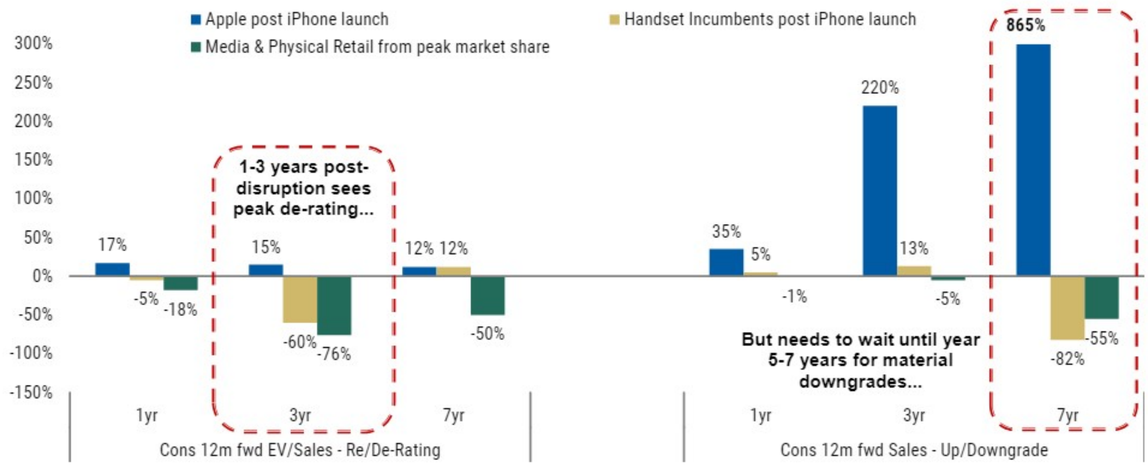
In our report 10 Lessons from 100 Years of Tech Diffusion we wrote about how disruptive events are priced into stocks. The main questions and summary findings for how new themes – and particularly potentially disruptive themes – get priced into equities were and are as follows:

- **Do we tend to see upside or downside priced first?** Across 80 structural positive and negative adoption curves over the past 50 years, downside disruption occurs sooner and twice as quickly as upside diffusion.
- **How does the downside play out?** A 'de-rate and wait' of >60% in years 1-3 is typical, with consensus sales/EBIT downgrades taking 5 to 7 years to materialise – shorter in B2C, longer in B2B.
- **How does the upside play out?** For perceived beneficiaries, upgrades need to arrive within 6 to 12 months post re-rating. However, missing the first year of upside tends to have little impact on long-term compound returns.

AI upside pricing vs previous disruption events: Below, we show a summary of how the consensus forward rating and consensus forward sales expectation of companies have behaved in the past at critical junctures. As we show in the aforementioned report, at the time of the iPhone launch, while volatile, Apple's EV/Sales was similar in years 1 and 3, seven years after the phone's launch. Each time it re-rated, it did so into a secular upgrade cycle. There are questions as to whether Nvidia and other *Core to Thesis Enablers* will behave in the same way this time. As we have shown, so far that playbook does have these same echoes with history.

AI downside pricing vs previous disruption events: When looking at disrupted media businesses, or handset incumbents at the time of the iPhone launch, or even disruption such as GLP-1 drugs now, the behaviour of perceived *Disrupted* stocks also has a relatively predictable playbook. Even if there are limited downgrades attributable specifically to the theme that the market is concerned about until years 5+, the de-rating on these stocks can be severe in the 5 years preceding these consensus downgrades. On average, stocks perceived to be disrupted by new themes or technologies tend to de-rate c15% in year 1 on average, c65-70% by year 3 and then re-rate into a relatively severe downgrade cycle by years 5 to 7. It is too early to ascertain whether AI will follow this path exactly. Moreover, the biggest challenge for investors is that these Disrupted stocks in any technology shift are only obvious in hindsight. We are still too early to make confident categorisations of these names, which may take many years yet to become apparent.

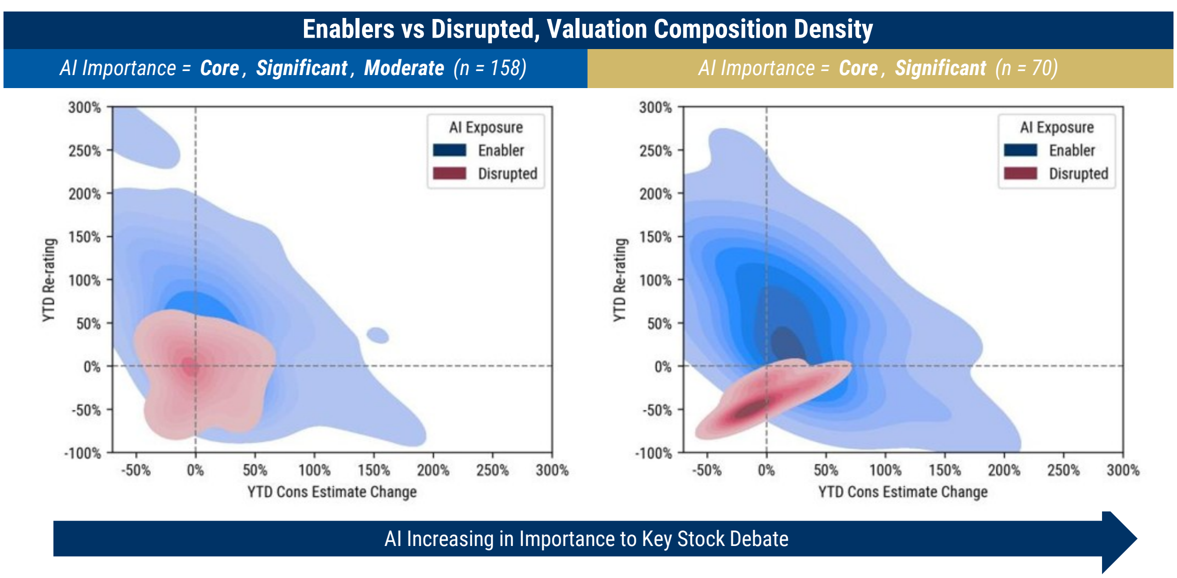
Exhibit 48: Consensus forward sales and implied forward EV/Sales from point of tech shift or market share inflection



Source: Bloomberg, Morgan Stanley Research

Displayed in the chart below is a density plot of the valuation re-rating and consensus upgrade/downgrade for companies perceived by our analysts to be *Disrupted* by AI. As the importance of AI to the stock debate increases, *Disrupted* stocks have seen a greater valuation de-rating in 2023. Now, we acknowledge that as the importance of AI increases (i.e. the right-hand *Core to Thesis* and *Significant Disrupted* companies), the sample size decreases, which is a driver of greater clustering.

Exhibit 49: As the importance of AI to the stock debate increases, multiple and re-rating effects cluster

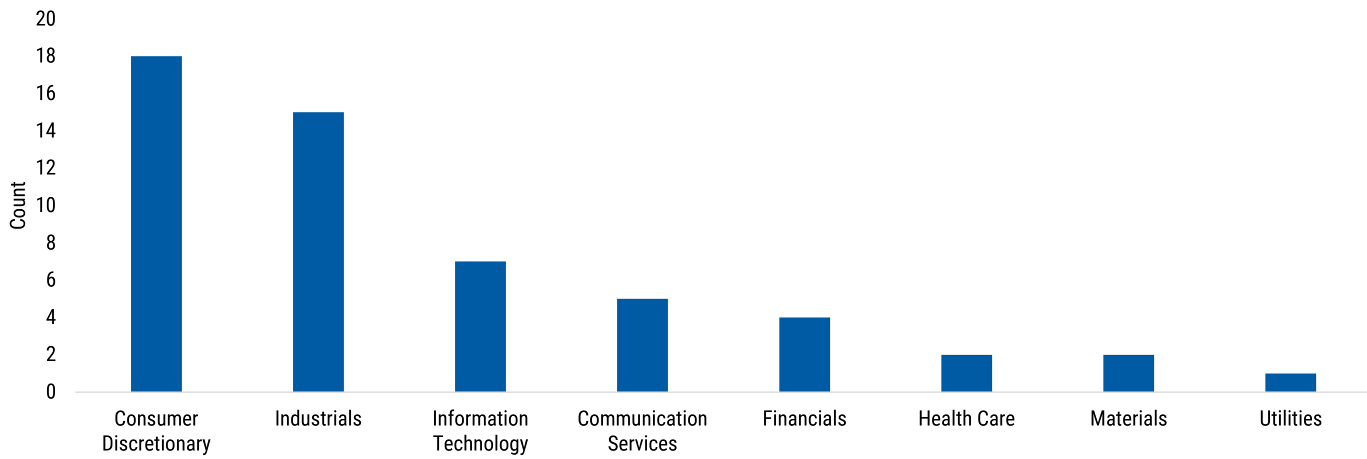


Source: FactSet, Morgan Stanley Research. Note: Some outliers lie outside the displayed X and Y axis.

When we move one level down to the sectors that our analysts have deemed could be most likely *Disrupted* by AI on a 12-24 month horizon, there is a clear skew. Consumer discretionary and Industrials amount to well over half of the companies considered potentially *Disrupted* by AI. Adding certain IT companies to this and the figure reaches nearly three quarters across just three GICS sectors.

However, when we look at the largest market cap stocks in our global coverage that our analysts have identified as *Disrupted*, a more interesting pattern emerges, particularly from within the Industrials sector. Overwhelmingly, the stocks are logistics, mobility, delivery and supply chain focused stocks, from rail and freight to postal and automotive companies.

Exhibit 50: The majority of stocks mapped as *Disrupted* are in Consumer Discretionary, Logistics, Autos or Tech



Source: Morgan Stanley Research

Enabler & Adopter Stock lists

A complete list of Adopters and Enablers is available upon request, please click here if you would like to receive that detail.

Enablers & Enabler/Adopters; *Core To Thesis* Materiality

Exhibit 51: *Enabler & Enabler/Adopter Core to Thesis* Stocks

Company	Region	Analyst	Rating	Market Cap ($m)	YTD Return	Latest Price	Upside / Downside to PT	AI Classification	AI Materiality
Adobe Inc.	North America	Weiss, Keith	Overweight	272,147	77%	595.5	11%	Beneficiary (Enabler, Adopter, Both)	Core to Thesis
Advantech	Asia/Pacific	Yang, Derrick	Overweight	9,378	24%	372.0	1%	Beneficiary (Enabler, Adopter, Both)	Core to Thesis
Advantest	Japan	Yoshikawa, Kazuo	Equal-Weight	25,136	126%	4797.0	-19%	Beneficiary (Enabler, Adopter, Both)	Core to Thesis
Alchip Technologies Ltd	Asia/Pacific	Chan, Charlie	Overweight	8,072	316%	3275.0	-3%	Beneficiary - Enabler	Core to Thesis
Alibaba Group Holding	Asia/Pacific	Yu, Gary	Equal-Weight	203,856	-12%	77.2	17%	Beneficiary - Enabler	Core to Thesis
Alphabet Inc.	North America	Nowak, Brian	Overweight	1,772,669	59%	140.2	7%	Beneficiary (Enabler, Adopter, Both)	Core to Thesis
AP Memory Technology Corp	Asia/Pacific	Yen, Daniel	Overweight	2,472	184%	469.0	18%	Beneficiary - Enabler	Core to Thesis
Apple, Inc.	North America	Woodring, Erik	Overweight	3,023,242	49%	193.6	14%	Beneficiary (Enabler, Adopter, Both)	Core to Thesis
Arista Networks	North America	Marshall, Meta	Overweight	75,346	95%	237.0	1%	Beneficiary - Enabler	Core to Thesis
ASMPT Ltd	Asia/Pacific	Liu, Dylan	Overweight	3,792	34%	74.5	18%	Beneficiary - Enabler	Core to Thesis
Asustek Computer Inc.	Asia/Pacific	Kao, Howard	Overweight	11,835	82%	489.5	1%	Beneficiary - Enabler	Core to Thesis
Baidu Inc	Asia/Pacific	Yu, Gary	Overweight	42,855	3%	117.8	27%	Beneficiary - Enabler	Core to Thesis
C3.ai	North America	Singh, Sanjit	Underweight	4,374	170%	30.2	-34%	Beneficiary - Enabler	Core to Thesis
Chroma Ate Inc.	Asia/Pacific	Yang, Derrick	Overweight	2,949	18%	213.0	41%	Beneficiary - Enabler	Core to Thesis
CI&T Inc	Latin America	Medina, Cesar	Overweight	701	-18%	5.3	13%	Beneficiary (Enabler, Adopter, Both)	Core to Thesis
Darktrace PLC	Europe	Webb, George	Overweight	3,132	42%	366.6	32%	Beneficiary - Enabler	Core to Thesis
Dell Technologies Inc.	North America	Woodring, Erik	Overweight	55,981	91%	76.7	16%	Beneficiary (Enabler, Adopter, Both)	Core to Thesis
DISCO	Japan	Yoshikawa, Kazuo	Overweight	26,892	178%	34980.0	-11%	Beneficiary (Enabler, Adopter, Both)	Core to Thesis
Ennoconn Corporation	Asia/Pacific	Yang, Derrick	Overweight	805	32%	268.0	16%	Beneficiary (Enabler, Adopter, Both)	Core to Thesis
Exscientia PLC	North America	Purohit, Vikram	Equal-Weight	841	29%	6.9	2%	Beneficiary (Enabler, Adopter, Both)	Core to Thesis
Giga-Byte Technology Co. Ltd.	Asia/Pacific	Kao, Howard	Overweight	5,496	150%	266.0	20%	Beneficiary - Enabler	Core to Thesis
Global Unichip Corp	Asia/Pacific	Liu, Dylan	Equal-Weight	7,632	171%	1740.0	-14%	Beneficiary - Enabler	Core to Thesis
Globant SA	Latin America	Medina, Cesar	Overweight	10,346	43%	239.9	0%	Beneficiary (Enabler, Adopter, Both)	Core to Thesis
Gold Circuit Electronics Ltd.	Asia/Pacific	Kao, Howard	Overweight	3,666	151%	218.0	22%	Beneficiary - Enabler	Core to Thesis
Inspur Electronic Information	Asia/Pacific	Kao, Howard	Equal-Weight	6,731	54%	33.2	8%	Beneficiary - Enabler	Core to Thesis
King Yuan Electronics Co Ltd	Asia/Pacific	Liu, Dylan	Overweight	3,423	135%	84.9	18%	Beneficiary - Enabler	Core to Thesis
MediaTek	Asia/Pacific	Chan, Charlie	Overweight	51,711	62%	1015.0	10%	Beneficiary (Enabler, Adopter, Both)	Core to Thesis
Microsoft	North America	Weiss, Keith	Overweight	2,787,955	56%	375.3	11%	Beneficiary (Enabler, Adopter, Both)	Core to Thesis
Naver Corp	Asia/Pacific	Park, Seyon	Underweight	28,503	26%	224000.0	-20%	Beneficiary (Enabler, Adopter, Both)	Core to Thesis
NVIDIA Corp.	North America	Moore, Joseph	Overweight	1,248,090	239%	495.2	22%	Beneficiary - Enabler	Core to Thesis
Oracle Corporation	North America	Weiss, Keith	Equal-Weight	300,287	30%	106.3	0%	Beneficiary (Enabler, Adopter, Both)	Core to Thesis
Quanta Computer Inc.	Asia/Pacific	Kao, Howard	Overweight	28,221	211%	224.5	25%	Beneficiary - Enabler	Core to Thesis
Recursion Pharmaceuticals Inc	North America	Purohit, Vikram	Equal-Weight	1,849	38%	10.6	4%	Beneficiary (Enabler, Adopter, Both)	Core to Thesis
Salesforce.com	North America	Weiss, Keith	Overweight	261,338	100%	265.6	32%	Beneficiary (Enabler, Adopter, Both)	Core to Thesis
Tencent Holdings Ltd.	Asia/Pacific	Yu, Gary	Overweight	355,677	-7%	293.6	46%	Beneficiary - Enabler	Core to Thesis
TSMC	Asia/Pacific	Chan, Charlie	Overweight	500,490	32%	593.0	16%	Beneficiary (Enabler, Adopter, Both)	Core to Thesis
Upstart Holdings, Inc.	North America	Faucette, James	Underweight	3,727	234%	44.2	-71%	Beneficiary (Enabler, Adopter, Both)	Core to Thesis
Wistron Corporation	Asia/Pacific	Kao, Howard	Overweight	9,079	235%	98.6	47%	Beneficiary - Enabler	Core to Thesis
Wiwynn Corp	Asia/Pacific	Kao, Howard	Equal-Weight	10,063	129%	1825.0	5%	Beneficiary - Enabler	Core to Thesis
Zhongji Innolight Co Ltd	Asia/Pacific	Meng, Andy	Overweight	12,679	318%	112.9	15%	Beneficiary - Enabler	Core to Thesis

Source: FactSet, Morgan Stanley Research. Price as of December 31, 2023

Exhibit 52: *Enabler & Enabler/Adopter Core to Thesis* Stocks - Analyst Comments

Company	Analyst Commentary
Adobe Inc.	Generative AI capabilities accelerate Creative Cloud growth as Adobe realizes incremental revenue across multiple monetization opportunities. The incremental GenAI revenue accelerates EPS growth back to mid/high-teens growth, which we believe warrants a premium multiple.
Advantech	AI helping the benefits of the IoT implementation and Advantech is one of the major hardware suppliers.
Advantest	The company manufactures SoC test equipment for HPC device makers.
Alchip Technologies Ltd	One of a few design service providers that enables custom AI chips for data center and automotive customers, such as AWS and Li Auto.
Alibaba Group Holding	Leading internet companies, including Baidu, Alibaba, and Tencent (BAT), are key enablers for AI adoption in China, with competitive advantages around cloud infra, LLMs, and commercial use cases.
Alphabet Inc.	Google's advancements laid the foundation for Gen AI, and for Google specifically, AI underpins the success of Search, YouTube, Google Cloud, and various other segments of GOOGL's business.
AP Memory Technology Corp	Its new advanced packaging technology could drive AI computing to >10x more powerful and significantly lower power consumption. AI computing could be lifted to next stage in 5 years and revenue could grow 10x.
Apple, Inc.	A leading enabler AI at the edge, with unique competitive advantages of 1.2B+ installed base of high-end devices, strict data privacy standards, and vertical integration of hardware, silicon, software/services.
Arista Networks	Arista enables high speed, efficient, Ethernet networks, enabling AI inference use cases, with 40%+ of revenue coming from clouds.
ASMPT Ltd	Leading provider for advanced packaging tools that enable 2.5D packaging and next generation high bandwidth memory (HBM).
Asustek Computer Inc.	The AI server business is still small, but we expect it to grow to double-digit revenue contribution by 2025 with growing product offerings and project wins.
Baidu Inc	Leading internet companies, including Baidu, Alibaba, and Tencent (BAT), are key enablers for AI adoption in China, with competitive advantages around cloud infra, LLMs, and commercial use cases.
C3.ai	Provides a platform to capture an organization's structured and unstructured data, store that data in appropriate analytical or operational data stores and apply ML and Gen AI analysis.
Chroma Ate Inc.	System level testing (SLT) equipment for GPUs used in AI servers.
CI&T Inc	Digital transformation specialist, helping clients embrace AI and other new technologies. Leading industry brand in Brazil with ongoing efforts for international expansion.
Darktrace PLC	AI is core to Darktrace's cybersecurity approach, and it is embedded across the company's Cyber AI loop, with solutions for threat detection, response, prevention, and remediation.
Dell Technologies Inc.	Dell is emerging as one of the leading suppliers of AI servers to T-2 CSPs and enterprises. Backlog and pipeline grew from $0 to over $5B in just the last 6 months.
DISCO	The company manufactures wafer grinding/dicing equipment, which is one of the key components for HBM (high bandwidth memory).
Ennoconn Corporation	AI helping the benefits of the IoT implementation and Ennoconn is one of the major hardware suppliers.
Exscientia PLC	Exscientia's platform embeds technology and AI comprehensively to enhance the pace and quality of drug development.
Giga-Byte Technology Co. Ltd.	The key AI server supplier to T-2/T-3 cloud/enterprise customers, and we expect its AI server business to continue to grow as AI server demand proliferates to smaller cloud and enterprise customers.
Global Unichip Corp	One of a few design service providers that enables custom AI chips for data centers, such as Microsoft.
Globant SA	Market share gains as Latam becomes more prominent in the industry; and TAM expansion as GLOB enters new geographies, services new industries and monetizes new products.
Gold Circuit Electronics Ltd.	Major PCB supplier for GPU and ASIC AI servers. Currently AI server PCB is already ~20% of total revenue, and it should continue to grow in the coming years as AI server demand increases.
Inspur Electronic Information	At ~28% share (3Q23) of China's server market, Inspur is the key beneficiary of the rising adoption of local server brands, driving demand growth, and the main beneficiary from AI servers as the key supplier for China cloud.
King Yuan Electronics Co Ltd	Key AI chip testing provider for NVIDIA's AI GPUs and custom AI chips for cloud service providers.
MediaTek	One of the key chip designers to enable AI on smartphone and cloud, which may drive >25% of revenue growth in the next 3 years.
Microsoft	Early leadership in productizing Generative AI technologies, large customers bases to upsell that technology into and continued cost discipline position Microsoft for accelerating revenue growth and expanding margins in CY24.
Naver Corp	Naver has developed their own proprietary LLM, which they plan to use to enhance their services, both on B2C and B2B.
NVIDIA Corp.	As the world's leading provider of graphics cards NVDA has seen its datacenter revenue grow from $4.2bn a quarter (60% of sales) to $14.5bn (80% of sales) in the last 9 months as AI model development surges.
Oracle Corporation	Infusing Generative AI Across the OCI Portfolio... Oracle has announced a series of new capabilities related to its Oracle Cloud Infrastructure (OCI) services.
Quanta Computer Inc.	The main AI server ODM partner for large cloud customers, and is likely to continue to see revenue and profit contribution grow in the coming years, including solutions for both GPUs and ASICs.
Recursion Pharmaceuticals Inc	Recursion applies ML and large-scale automation to help shorten drug development times and lower the probability of R&D failures.
Salesforce.com	With regard to Generative AI announcements, limited access to Unlimited tiers in Sales and Service Clouds, as well as uncertainty on access, capabilities and pricing of consumption credits.
Tencent Holdings Ltd.	Leading internet companies, including Baidu, Alibaba, and Tencent (BAT), are key enablers for AI adoption in China, with competitive advantages around cloud infra, LLMs, and commercial use cases.
TSMC	Key leading edge foundry vendor to manufacture AI chips, including AI GPUs from NVIDIA/AMD and AI ASICs from Google, Microsoft, and AWS.
Upstart Holdings, Inc.	UPST leverages its AI-powered underwriting model as a means of providing capital to borrowers whose creditworthiness is improperly represented by traditional credit metrics.
Wistron Corporation	A key supplier to Nvidia for the assembly of DGX servers and a major supplier for the assembly of HGX GPU baseboard, hence a direct beneficiary of Nvidia's leading share in the AI GPU market.
Wiwynn Corp	Wiwynn is a key AI server ODM partner for Microsoft, Meta, and Amazon, with exposure to both GPU and ASIC AI servers; ASIC servers should ramp up more meaningfully from 2024 onwards for Wiwynn.
Zhongji Innolight Co Ltd	Leading transceiver maker with high market share in 800G new product to facilitate the AI infrastructure construction.

Source: Morgan Stanley Research

Enabler & *Enabler/Adopters*; *Significant* Materiality, >$10bn Market Cap, Overweight Rated

Exhibit 53: *Enabler & Enabler/Adopter Significant* materiality; Overweight Rated; >$10bn Market Cap

Company	Region	Analyst	Rating	Market Cap ($m)	YTD Return	Latest Price	Upside / Downside to PT	AI Classification	AI Materiality
Accenture Plc	North America	Faucette, James	Overweight	224,851	32%	351.6	5%	Beneficiary (Enabler, Adopter, Both)	Significant
Advanced Micro Devices	North America	Moore, Joseph	Overweight	244,279	130%	148.8	-14%	Beneficiary - Enabler	Significant
Amazon.com Inc	North America	Nowak, Brian	Overweight	1,628,223	83%	153.4	14%	Beneficiary (Enabler, Adopter, Both)	Significant
BE Semiconductor Industries NV	Europe	Putten, Nigel van	Overweight	12,076	145%	138.3	8%	Beneficiary - Enabler	Significant
Datadog, Inc.	North America	Singh, Sanjit	Overweight	40,575	68%	123.3	19%	Beneficiary (Enabler, Adopter, Both)	Significant
Delta Electronics Inc.	Asia/Pacific	Shih, Sharon	Overweight	26,506	9%	313.5	21%	Beneficiary - Enabler	Significant
Foxconn Industrial Internet Co. Ltd.	Asia/Pacific	Shih, Sharon	Overweight	39,949	65%	15.1	88%	Beneficiary - Enabler	Significant
HIKVision Digital Technology	Asia/Pacific	Meng, Andy	Overweight	45,639	0%	34.7	24%	Beneficiary (Enabler, Adopter, Both)	Significant
HubSpot, Inc.	North America	Porter, Elizabeth	Overweight	31,070	104%	589.1	9%	Beneficiary (Enabler, Adopter, Both)	Significant
Intuit	North America	Weiss, Keith	Overweight	176,940	61%	628.0	-1%	Beneficiary (Enabler, Adopter, Both)	Significant
Lenovo	Asia/Pacific	Kao, Howard	Overweight	16,794	70%	10.9	-8%	Beneficiary - Enabler	Significant
Meta Platforms Inc	North America	Nowak, Brian	Overweight	1,101,324	198%	358.3	5%	Beneficiary (Enabler, Adopter, Both)	Significant
MongoDB Inc	North America	Singh, Sanjit	Overweight	34,733	112%	417.1	15%	Beneficiary (Enabler, Adopter, Both)	Significant
NetEase, Inc	Asia/Pacific	Poon, Alex	Overweight	58,039	23%	89.3	68%	Beneficiary (Enabler, Adopter, Both)	Significant
Nu Holdings Ltd.	Latin America	Kuri, Jorge	Overweight	41,808	106%	8.4	91%	Beneficiary (Enabler, Adopter, Both)	Significant
POSCO FUTURE M	Asia/Pacific	Kim, Ryan	Overweight	21,570	99%	359000.0	39%	Beneficiary - Enabler	Significant
Recruit Holdings	Japan	Tsusaka, Tetsuro	Overweight	66,701	43%	5963.0	9%	Beneficiary (Enabler, Adopter, Both)	Significant
Samsung Electronics	Asia/Pacific	Kim, Shawn	Overweight	364,349	42%	78500.0	21%	Beneficiary - Enabler	Significant
ServiceNow Inc	North America	Weiss, Keith	Overweight	144,707	81%	702.5	13%	Beneficiary (Enabler, Adopter, Both)	Significant
Shenzhen Transsion Holdings Co Ltd	Asia/Pacific	Meng, Andy	Overweight	15,598	74%	138.4	34%	Beneficiary (Enabler, Adopter, Both)	Significant
SK hynix	Asia/Pacific	Kim, Shawn	Overweight	79,902	89%	141500.0	48%	Beneficiary - Enabler	Significant
Snowflake Inc.	North America	Weiss, Keith	Overweight	72,710	40%	201.2	14%	Beneficiary (Enabler, Adopter, Both)	Significant
Tesla Inc	North America	Jonas, Adam	Overweight	884,358	106%	253.2	50%	Beneficiary (Enabler, Adopter, Both)	Significant
Trip.com Group Ltd	Asia/Pacific	Poon, Alex	Overweight	23,777	3%	35.3	42%	Beneficiary (Enabler, Adopter, Both)	Significant
Xiaomi Corp	Asia/Pacific	Meng, Andy	Overweight	50,514	43%	15.6	22%	Beneficiary (Enabler, Adopter, Both)	Significant
ZTE Corporation	Asia/Pacific	Meng, Andy	Overweight	16,048	1%	17.4	72%	Beneficiary (Enabler, Adopter, Both)	Significant

Source: FactSet, Morgan Stanley Research. Price as of December 31, 2023

Exhibit 54: *Enabler & Enabler/Adopter Significant* materiality; Overweight Rated; >$10bn Market Cap - Analyst Comments

Company	Analyst Commentary
Accenture Plc	As both a technology buyer and supplier, ACN is able to internally leverage AI as a lever for growth, while concurrently advising its Fortune 500 client base around strategic Gen AI initiatives.
Advanced Micro Devices	A world leader in hardware and graphics cards as AI model development surges.
Amazon.com Inc	One of the largest cloud service providers offering a full stack of Gen AI capabilities across the infrastructure, tooling and application layers.
BE Semiconductor Industries NV	Besi's tools enable chiplets used for AI chips making it a significant driver of growth for the company.
Datadog, Inc.	Datadog plays an important role in the monitoring of AI training workloads today with 2.5% of ARR as of Q3 coming from AI startups.
Delta Electronics Inc.	Major power/cooling management solution suppliers for data center.
Foxconn Industrial Internet Co. Ltd.	Major AI server ODM partners with NVDA and US/China hyperscalers.
HIKVision Digital Technology	Leading surveillance company with continuous AI investment on optical solutions as a key competitive edge.
HubSpot, Inc.	Positioned as an AI enabler with its ability to use AI for content generation, they can leverage a wide breadth of high quality customer data for new applications.
Intuit	Deep data sets between the Quickbooks, Mailchimp and Credit Karma franchises, and a solid foundation in GenOS for building new functionality make Intuit an under-appreciated GenAI winner.
Lenovo	Lenovo is a major AI server OEM partner for large enterprise customers as well as SMEs.
Meta Platforms Inc	Developing open-source AI models and has material amounts of proprietary data and compute resources. Meta is already integrating GenAI user and advertiser features into its applications.
MongoDB Inc	They automate code production driving demand for MongoDB's database services and help customers integrate proprietary operational data with foundational AI models.
NetEase, Inc	Best-in-class video games publisher in China, and has been successfully adopting AI extensively in development and operation to drive better productivity and gaming experience.
Nu Holdings Ltd.	Nubank's AI driven CRM and CR platforms represent a significant competitive advantage in the marketplace; outsized market share gains should ensue.
POSCO FUTURE M	Manufacturers high-nickel cathode materials to battery cell makers. With AI-driven autonomous driving, POSCO Future M is one of the key beneficiaries in Korea.
Recruit Holdings	AI has been used to analyze job searcher's data to provide best job matching experience and to facilitate job searcher's job application process such as optimization of resume.
Samsung Electronics	Enables AI functionality in hardware via memory and foundry business.
ServiceNow Inc	With its Pro Plus edition (which includes Gen AI capabilities such as NOW Assist) the company has already landed 4 large customers and a strong overall pipeline of growth.
Shenzhen Transsion Holdings Co Ltd	Leading smartphone player in the emerging market which will also offer new AI features to attract end users.
SK hynix	The global HBM DRAM technology leader for AI computing.
Snowflake Inc.	Generative AI further increases the value of a company's proprietary data sets, which should re-invigorate cloud-based data consolidation efforts.
Tesla Inc	Leader in machine vision and autonomous driving, which is set to be accelerated through its own in-house Dojo supercomputer system.
Trip.com Group Ltd	The largest OTA in China, and is the pioneer in the first travel LLM in China. Trip.com is also adopting AI chatbot TripGenie in its international OTA platform in collaboration with OpenAI.
Xiaomi Corp	Key beneficiary of Edge AI, which could drive the next smartphone product cycle.
ZTE Corporation	Telecom infrastructure provider, and a top 5G global solution vendor.

Source: Morgan Stanley Research

Adopters; *Significant* Materiality, >$10bn Market Cap, Overweight Rated

Exhibit 55: *Adopter Significant* Stocks, Overweight Rated; >$10bn Market Cap

Company	Region	Analyst	Rating	Market Cap ($m)	YTD Return	Latest Price	Upside / Downside to PT	AI Classification	AI Materiality
American Express Company	North America	Graseck, Betsy	Overweight	137,104	27%	187.8	6%	Beneficiary - Adopter	Significant
Baker Hughes Co	North America	Kutz, Daniel	Overweight	34,678	16%	34.2	17%	Beneficiary - Adopter	Significant
Experian PLC	Europe	Vermeulen, Annelies	Overweight	37,523	14%	3208.0	5%	Beneficiary - Adopter	Significant
FUJIFILM Holdings	Japan	Ono, Masahiro	Overweight	24,072	28%	8473.0	22%	Beneficiary - Adopter	Significant
JPMorgan Chase & Co	North America	Graseck, Betsy	Overweight	493,111	27%	170.3	12%	Beneficiary - Adopter	Significant
Kia Corp.	Asia/Pacific	Shin, Young Suk	Overweight	31,442	69%	100000.0	-2%	Beneficiary - Adopter	Significant
Regions Financial Corp	North America	Graseck, Betsy	Overweight	18,377	-9%	19.6	7%	Beneficiary - Adopter	Significant
RELX	Europe	Webb, George	Overweight	75,785	35%	3093.0	5%	Beneficiary - Adopter	Significant
S&P Global Inc	North America	Kaplan, Toni	Overweight	140,505	32%	441.8	5%	Beneficiary - Adopter	Significant
SAP SE	Europe	Wood, Adam	Overweight	180,031	45%	139.6	7%	Beneficiary - Adopter	Significant
Schlumberger NV	North America	Kutz, Daniel	Overweight	75,277	-2%	52.2	19%	Beneficiary - Adopter	Significant
Sony Group	Japan	Ono, Masahiro	Overweight	119,727	34%	13410.0	19%	Beneficiary - Adopter	Significant
Trade Desk Inc	North America	Cost, Matthew	Overweight	36,800	64%	73.4	-5%	Beneficiary - Adopter	Significant
UnitedHealth Group Inc	North America	Wright, Erin	Overweight	477,053	-1%	524.9	18%	Beneficiary - Adopter	Significant
Wells Fargo & Co.	North America	Graseck, Betsy	Overweight	182,704	20%	49.5	9%	Beneficiary - Adopter	Significant
Wolters Kluwer	Europe	Webb, George	Overweight	33,634	31%	128.1	11%	Beneficiary - Adopter	Significant

Source: FactSet, Morgan Stanley Research. Price as of December 31, 2023

Exhibit 56: *Adopter Significant* Stocks, Overweight Rated; >$10bn Market Cap - Analyst Comments

Company	Analyst Commentary
American Express Company	AXP has invested in AI and machine learning to facilitate real-time credit decisioning and improve fraud detection capabilities (supporting already best-in-class industry fraud rates).
Baker Hughes Co	Commitment to rolling out AI-based solutions in the oilfield and other industrial markets via its partnership with (and investment in) c3.ai.
Experian PLC	An early adopter of Gen AI in product integration, alongside a competitive advantage from significant and proprietary datasets, which are needed for AI to be effective.
FUJIFILM Holdings	Developed AI (artificial intelligence) technology that recognizes handwritten characters with high accuracy.
JPMorgan Chase & Co	JPM has an industry-leading $15.3 billion firm-wide tech budget, more than half of which is deployed on "change the bank" initiatives.
Kia Corp.	A key beneficiary of adopting Gen AI to expand the software defined vehicle capabilities.
Regions Financial Corp	RF is investing in AI to enhance risk management capabilities, improve the productivity of its call centers, and to reduce manual intervention in loan underwriting processes.
RELX	AI functionality/tools incorporated across RELX's product portfolio, with Lexis+ AI platform upgrade a key Legal segment revenue driver.
S&P Global Inc	Investing in AI (including its Kensho acquisition in 2018) – developing new products and will benefit from operating efficiencies.
SAP SE	Well positioned to deliver productivity benefits from generative AI given its access to large volumes of highly valuable business data.
Schlumberger NV	Partnering with major traditional tech companies such as MSFT, GOOGL, IBM, AMZN AWS, Cognite, etc. to roll out digital solutions now used by ~80% of the top global oil & gas companies.
Sony Group	Developed a platform and engineering ecosystem which allows for the rapid deployment of learning algorithms that train on video games at scale.
Trade Desk Inc	Uses AI to drive decision making on how much to bid for online ads. Their tech edge is a key differentiator and driver of results.
UnitedHealth Group Inc	Administrative simplification, data science platforms & businesses, and medical & clinical insights with a goal of driving a more efficient healthcare services ecosystem.
Wells Fargo & Co.	WFC has worked with strategic partner Google to roll out a virtual assistant based on Google Cloud's conversational AI platform and has plans to invest further in AI to drive operational efficiencies across the bank.
Wolters Kluwer	c50% of Wolters' digital revenues are from products that leverage AI.

Source: Morgan Stanley Research

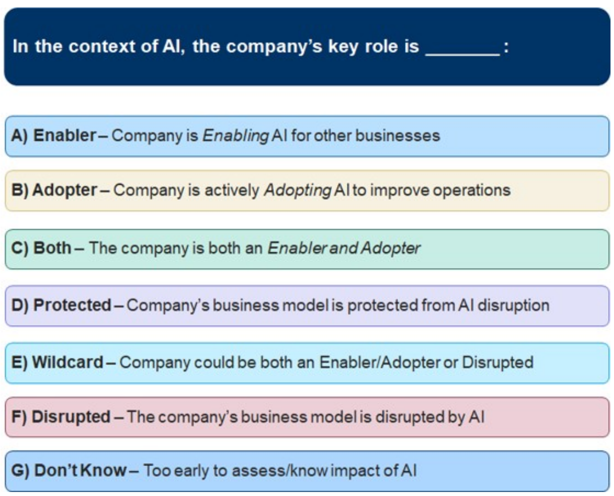
Additional last close prices: BP 466.15p, Coca-Cola $58.93, Carnival 1,313p.

Methodology & Synopsis

Between 6th October to 20th October 2023, our global Morgan Stanley Research analysts completed a simple survey of just two questions for each of their stocks under coverage. This was a broad survey, based on the analyst's view of AI's impact on their stocks over the next 12 to 24 months. Our analysts tagged their coverage stocks on two distinct criteria:

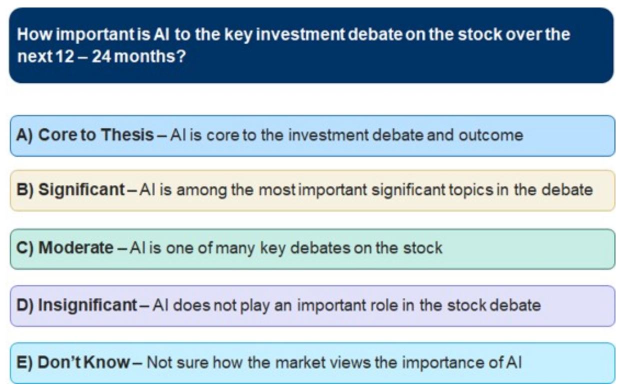
1. The company's role in, or impact from, AI (categories shown below in Exhibit 57); and
2. The speed of expected diffusion of disruption from AI to the investment debate on the stock (Exhibit 58).

Exhibit 57: Survey Question 1, Company's Key Role in the Context of AI



Source: Morgan Stanley Research

Exhibit 58: Survey Question 2, the Importance of AI to the Stock's Investment Debate



Source: Morgan Stanley Research

In doing so, we have been able to identify:

- Companies and sectors where our analysts take a **differing view on the salience and speed of AI to the investment case compared to the prevailing wisdom** in the market.
- Stocks where our analysts believe the **diffusion of AI into non-tech sectors is yet to be priced efficiently** into company valuations/narratives.
- How the global investor should think of the AI impact on **sectors and regions** across relevant markets.

Stock Mapping Considerations & Learnings

This is not the first mapping exercise of this kind that the Morgan Stanley Research team has undertaken. Our Sustainability research team – led by Stephen Byrd – leads an annual update to our Sustainable Solutions database. This thematic mapping exercise asks analysts for:

1. **Revenue exposure** to key sustainability themes.

2. **Profit exposure** to key sustainability themes.
3. **Capex exposure** to measure the company's anticipated mix shift towards the theme in question. This has been a more recent addition to the Solutions.

Investors find this process useful for two reasons, predominantly: (1) with many investors requiring minimum thresholds of thematic 'purity' before investing in a stock (most typically >20%), these mappings – even if often subjective – can be helpful; (2) for an extension of the previous reason, if investors are able to anticipate the rate of change in a stock's exposure to a theme, they can get ahead of the positioning or crowding in a certain theme.

Our latest AI stock mapping survey of our analysts will have some of the same inherent caveats for investors to consider, and some different ones:

- **Qualitative not quantitative assessment:** In the first instance we have not asked our analysts for revenue, profit nor capex exposure, and so it is not directly comparable to the sustainability mapping. This is because we considered the AI theme too early or insignificant for most analysts to estimate these figures credibly in the absence of disclosure from companies.
- **Broad ML rather than narrow Generative AI:** Many analysts – particularly those with more knowledge of the subject – asked the question: "Is this just about Generative AI, or is this about Machine Learning more broadly, which many companies have been doing for years?". The answer is that we encouraged analysts to answer with the latter in mind.
- **Company disclosure:** Similar to the difficulty of analysts being asked for revenue exposure estimates to the climate change theme, being asked for exposure to AI presents challenges. Companies – even those closely exposed to a theme - tend to avoid quantification, which leave analysts to best guess exposure levels.
- **Analyst knowledge:** Many analysts – particularly in adjacent sectors to the theme (i.e. Airlines for AI) – are estimating their coverage's exposure relative to their own perceptions of AI. Most analysts however may not be up to date on the latest developments and therefore may underestimate the scope or speed of diffusion into their sectors, both to the upside and downside. Consequently, and not entirely unexpectedly, the use of *Don't know* and *Insignificant* makes up nearly three quarters of all stock responses.
- **Wider use of Beneficiary *Enabler* than expected:** Beneficiary *Enabler* we had expected to be used primarily for semis, semicap, hyperscalers as well as builders of foundational Large Language Models (such as GPT-4 from OpenAI/Microsoft, Bard from Alphabet or Llama from Meta). What we found was a broader tagging of data centre construction companies, heat exchangers and mining companies required for critical metals in the supply chain, for example.
- **Narrower use of *Disrupted* than expected:** At both ends of the spectrum – be that known beneficiaries or perceived *Disrupted* companies – analysts tend to be more confident on their determination of its relevance to the stock's thesis. Disrupted will be an important category as we focus on the 'Rate of Change', which we will monitor through periodic updates to this analysis over the coming years.

Exhibit 59: Matrix of performance and weighting of analyst stock responses

AI Exposure	2023 Performance YTD (Average): Core to Thesis	Significant	Moderate	Insignificant	Don't Know	Proportion of stocks tagged by category: Core to Thesis	Significant	Moderate	Insignificant	Don't Know	Stocks: N=
Beneficiary - Adopter	6%	11%	6%	1%	0%	1%	6%	28%	60%	5%	1230
Beneficiary (Enabler, Adopter, Both)	46%	46%	11%	8%	0%	7%	16%	56%	16%	5%	244
Beneficiary - Enabler	111%	48%	22%	7%	41%	13%	23%	40%	23%	1%	173
Disrupted	-40%	-36%	5%	-12%	19%	7%	9%	33%	48%	2%	54
Don't Know	0%	14%	-9%	-1%	3%	0%	0%	11%	53%	36%	626
Protected Company	0%	28%	8%	2%	23%	0%	0%	1%	96%	3%	942
Wildcard	-22%	-2%	16%	-3%	8%	1%	3%	19%	61%	16%	283

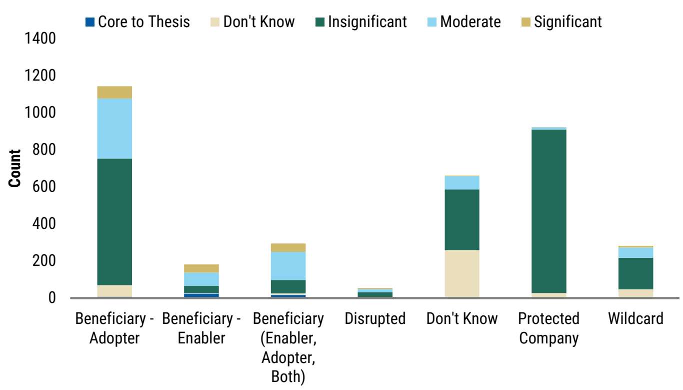
Source: Morgan Stanley Research; NB: Equal weighted performance

Exhibit 60: Morgan Stanley Research Coverage, AI Importance

GICS Sector	Core to Thesis	Don't Know	Insignificant	Moderate	Significant	Grand Total
Communication Services	10	8	116	82	14	230
Consumer Discretionary	3	84	325	100	17	529
Consumer Staples	-	20	172	25	1	218
Energy	-	7	119	17	2	145
Financials	2	72	246	93	36	449
Health Care	3	61	267	65	7	403
Industrials	4	32	285	87	14	422
Information Technology	33	28	207	160	76	504
Materials	-	55	224	8	1	288
Real Estate	-	2	169	56	-	227
Utilities	-	4	120	7	-	131
Other	-	-	4	2	-	6
Grand Total	55	373	2,254	702	168	3,552

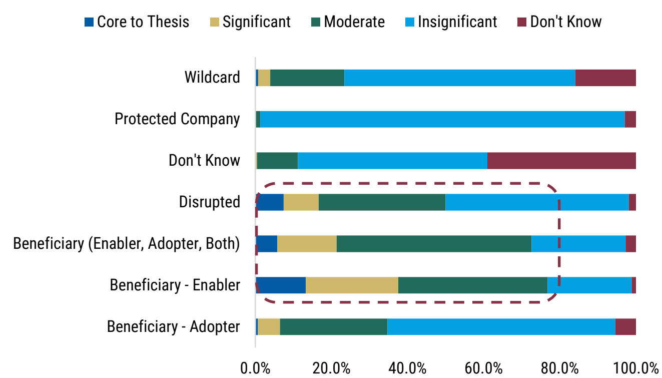
Source: Morgan Stanley Research

Exhibit 61: AI *Adopters* are the biggest group of companies globally in our coverage, followed by *Protected* company



Source: Morgan Stanley Research

Exhibit 62: AI is far more important to the stock debate for *Disrupted* or AI *Enablers* than the remainder

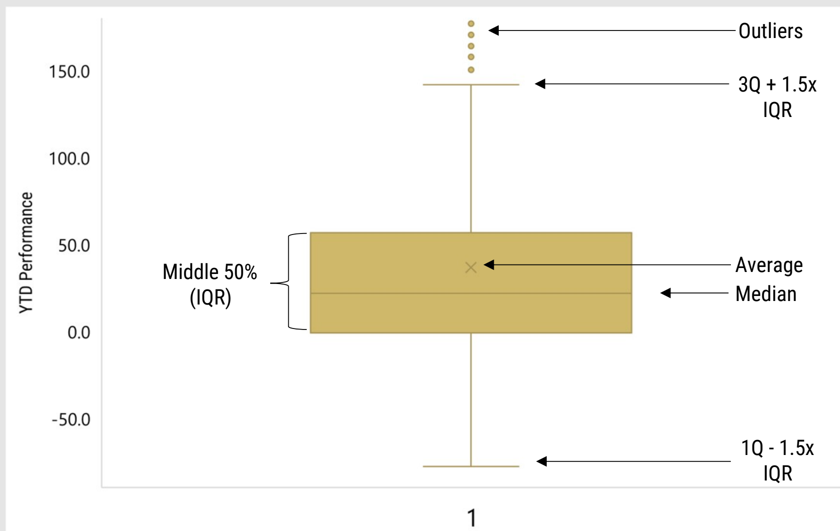


Source: Morgan Stanley Research

A Refresher on Box Plot Charts

Much of the AI debate in 2023 focused around fewer than 10 leading global megacap companies. These can relatively easily be benchmarked against themselves and against the market through the course of 2023. However, when we try to map the diffusion effects of AI into all sectors and stocks, we find one of the easier ways to depict and digest this information is to use box plot distribution charts. These capture not only averages, but also ranges and importantly the number and extremity of outliers in each category. Below, we provide a refresher to readers who may be less familiar with what the components of the charts show:

Exhibit 63: Box & Whisker Plot, Cheat Sheet



Source: Morgan Stanley Research

Box and Whisker Plot, Quick Refresher

Boxplots shows the *spread* and distribution of data. The rectangular 'box' represents the **interquartile range (IQR)** - the middle 50% of the data, sitting between the 25th and 75th percentiles. The **median** is marked by a line inside and the **average** is marked by the 'x'. Each **whisker** sits 1.5x the IQR away from each end of the box, marking a general view of the **spread** within the data. **Outliers**, data points materially different from the remainder of the data points, are plotted as dots outside the end of each whisker.

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Global Stock Ratings Distribution

(as of December 31, 2023)

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For disclosure purposes only (in accordance with FINRA requirements), we include the category headings of Buy, Hold, and Sell alongside our ratings of Overweight, Equal-weight, Not-Rated and Underweight. Morgan Stanley does not assign ratings of Buy, Hold or Sell to the stocks we cover. Overweight, Equal-weight, Not-Rated and Underweight are not the equivalent of buy, hold, and sell but represent recommended relative weightings (see definitions below). To satisfy regulatory requirements, we correspond Overweight, our most positive stock rating, with a buy recommendation; we correspond Equal-weight and Not-Rated to hold and Underweight to sell recommendations, respectively.

	Coverage Universe		Investment Banking Clients (IBC)			Other Material Investment Services Clients (MISC)	
Stock Rating Category	Count	% of Total	Count	% of Total IBC	% of Rating Category	Count	% of Total Other MISC
Overweight/Buy	1346	37%	266	41%	20%	605	39%
Equal-weight/Hold	1668	46%	317	49%	19%	717	46%
Not-Rated/Hold	3	0%	0	0%	0%	1	0%
Underweight/Sell	598	17%	61	9%	10%	224	14%
Total	3,615		644			1547	

Data include common stock and ADRs currently assigned ratings. Investment Banking Clients are companies from whom Morgan Stanley received investment banking compensation in the last 12 months. Due to rounding off of decimals, the percentages provided in the "% of total" column may not add up to exactly 100 percent.

Analyst Stock Ratings

Overweight (O or Over) - The stock's total return is expected to exceed the total return of the relevant country MSCI Index or the average total return of the analyst's industry (or industry team's) coverage universe, on a risk-adjusted basis over the next 12-18 months.

Equal-weight (E or Equal) - The stock's total return is expected to be in line with the total return of the relevant country MSCI Index or the average total return of the analyst's industry (or industry team's) coverage universe, on a risk-adjusted basis over the next 12-18 months.

Not-Rated (NR) - Currently the analyst does not have adequate conviction about the stock's total return relative to the relevant country MSCI Index or the average total return of the analyst's industry (or industry team's) coverage universe, on a risk-adjusted basis, over the next 12-18 months.

Underweight (U or Under) - The stock's total return is expected to be below the total return of the relevant country MSCI Index or the average total return of the analyst's industry (or industry team's) coverage universe, on a risk-adjusted basis, over the next 12-18 months.

Unless otherwise specified, the time frame for price targets included in Morgan Stanley Research is 12 to 18 months.

Analyst Industry Views

Attractive (A): The analyst expects the performance of his or her industry coverage universe over the next 12-18 months to be attractive vs. the relevant broad market benchmark, as indicated below.

In-Line (I): The analyst expects the performance of his or her industry coverage universe over the next 12-18 months to be in line with the relevant broad market benchmark, as indicated below.

Cautious (C): The analyst views the performance of his or her industry coverage universe over the next 12-18 months with caution vs. the relevant broad market benchmark, as indicated below.

Benchmarks for each region are as follows: North America - S&P 500; Latin America - relevant MSCI country index or MSCI Latin America Index; Europe - MSCI Europe; Japan - TOPIX; Asia - relevant MSCI country index or MSCI sub-regional index or MSCI AC Asia Pacific ex Japan Index.

Stock Price, Price Target and Rating History (See Rating Definitions)

Stock Rating History: 1/1/19 : NA/C; 7/30/19 : NA/I; 11/18/19 : NA/A; 7/19/21 : NA/I; 8/12/21 : NA/C; 10/4/22 : NA/A; 10/3/23 : O/A; 11/9/23 : E/A

Price Target History: 10/3/23 : 53000; 11/9/23 : 35000

Source: Morgan Stanley Research   Date Format : MM/DD/YY   Price Target   No Price Target Assigned (NA)
Stock Price (Not Covered by Current Analyst)   Stock Price (Covered by Current Analyst)
Stock and Industry Ratings (abbreviations below) appear as ◆ Stock Rating/Industry View
Stock Ratings: Overweight (O) Equal-weight (E) Underweight (U) Not-Rated (NR) No Rating Available (NA)
Industry View: Attractive (A) In-line (I) Cautious (C) No Rating (NR)

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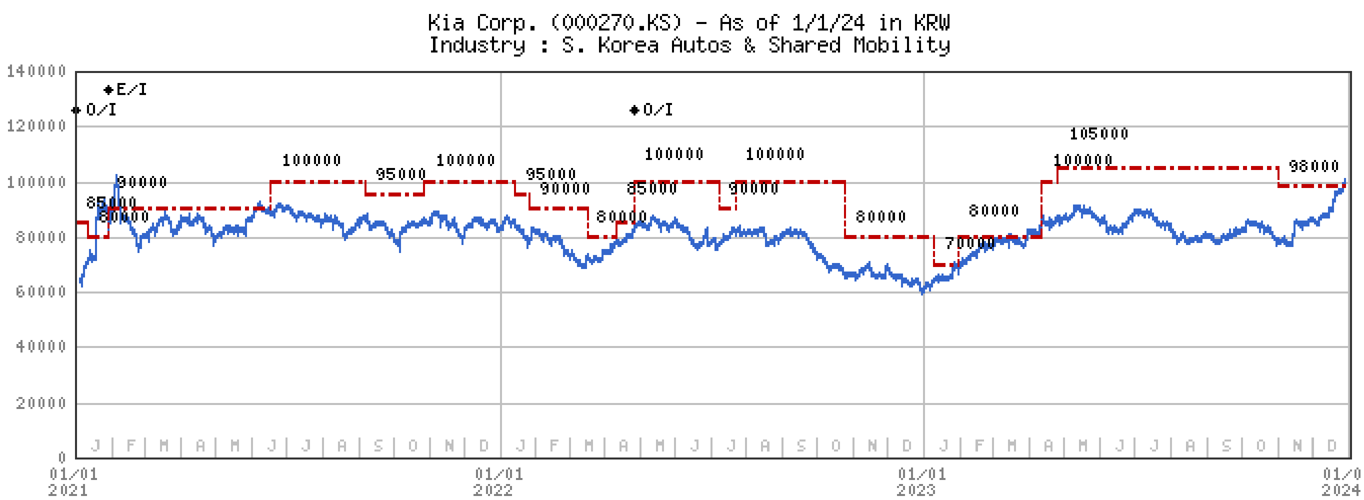


Stock Rating History: 1/1/19 : E/I; 1/9/20 : U/I; 3/26/20 : E/I; 6/2/20 : O/I; 1/28/21 : E/I; 4/26/22 : O/I

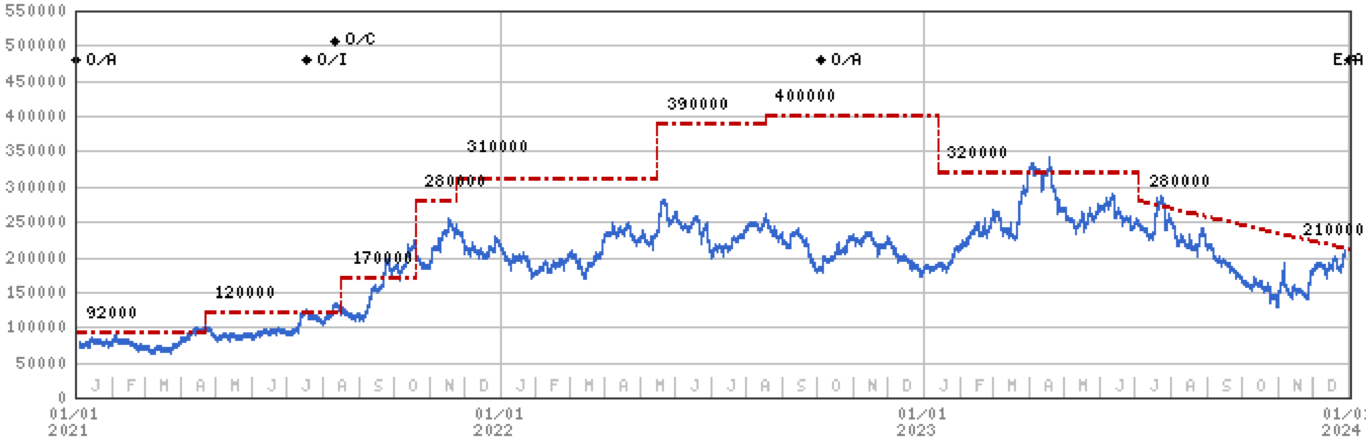
Price Target History: 10/26/18 : 31000; 1/9/19 : 34000; 4/9/19 : 37000; 4/25/19 : 40000; 10/24/19 : 45000; 1/9/20 : 34000; 3/9/20 : 32000; 3/26/20 : 29000; 4/8/20 : 28000; 6/2/20 : 40000; 7/24/20 : 45000; 8/24/20 : 52000; 9/14/20 : 64000; 10/27/20 : 85000; 1/12/21 : 80000; 1/28/21 : 90000; 6/18/21 : 100000; 9/7/21 : 95000; 10/28/21 : 100000; 1/14/22 : 95000; 1/26/22 : 90000; 3/17/22 : 80000; 4/11/22 : 85000; 4/26/22 : 100000; 7/8/22 : 90000; 7/22/22 : 100000; 10/25/22 : 80000; 1/10/23 : 70000; 1/30/23 : 80000; 4/12/23 : 100000; 4/26/23 : 105000; 11/2/23 : 98000

Source: Morgan Stanley Research   Date Format : MM/DD/YY   Price Target   No Price Target Assigned (NA)
Stock Price (Not Covered by Current Analyst)   Stock Price (Covered by Current Analyst)
Stock and Industry Ratings (abbreviations below) appear as ◆ Stock Rating/Industry View
Stock Ratings: Overweight (O) Equal-weight (E) Underweight (U) Not-Rated (NR) No Rating Available (NA)
Industry View: Attractive (A) In-line (I) Cautious (C) No Rating (NR)

Effective January 13, 2014, the stocks covered by Morgan Stanley Asia Pacific will be rated relative to the analyst's industry (or industry team's) coverage.

Effective January 13, 2014, the industry view benchmarks for Morgan Stanley Asia Pacific are as follows: relevant MSCI country index or MSCI sub-regional index or MSCI AC Asia Pacific ex Japan Index.

L&F Co Ltd (066970.KQ) - As of 1/1/24 in KRW
Industry : S. Korea Technology



Stock Rating History: 1/1/19 : /C; 2/21/19 : U/C; 7/30/19 : U/I; 11/18/19 : U/A; 8/5/20 : E/A; 12/17/20 : O/A; 7/19/21 : O/I; 8/12/21 : O/C; 10/4/22 : O/A; 1/2/24 : E/A

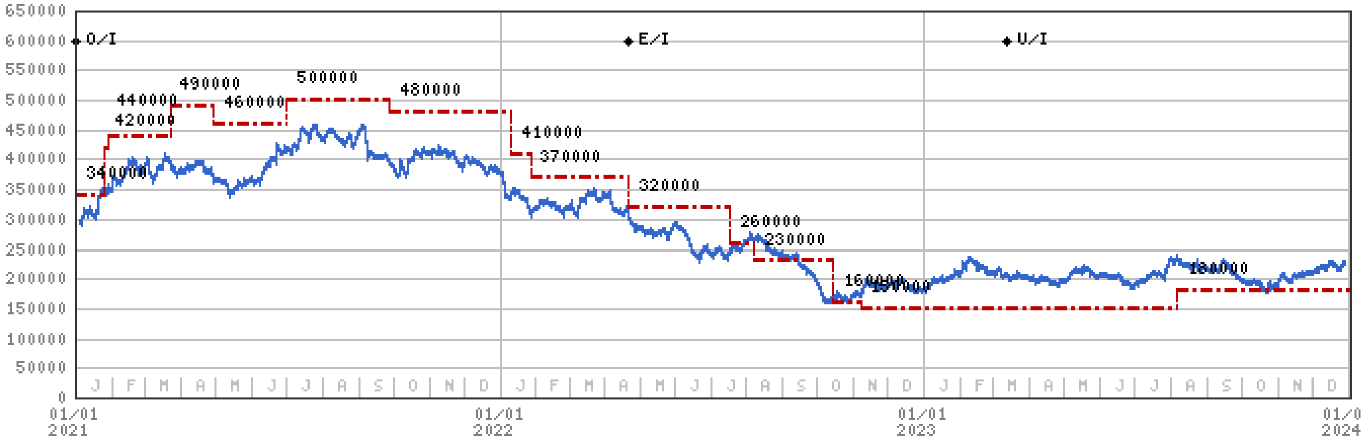
Price Target History: 2/21/19 : 26991.69; 4/10/19 : 22171.75; 7/4/19 : 21207.76; 1/17/20 : 19279.78; 4/6/20 : 14459.83; 6/10/20 : 19000; 8/5/20 : 41000; 10/16/20 : 37000; 12/17/20 : 92000; 4/22/21 : 120000; 8/17/21 : 170000; 10/20/21 : 280000; 11/24/21 : 310000; 5/16/22 : 390000; 8/17/22 : 400000; 1/12/23 : 320000; 7/5/23 : 280000; 1/2/24 : 210000

Source: Morgan Stanley Research   Date Format : MM/DD/YY   Price Target -•   No Price Target Assigned (NA)
Stock Price (Not Covered by Current Analyst)   Stock Price (Covered by Current Analyst)
Stock and Industry Ratings (abbreviations below) appear as ♦ Stock Rating/Industry View
Stock Ratings: Overweight (O) Equal-weight (E) Underweight (U) Not-Rated (NR) No Rating Available (NA)
Industry View: Attractive (A) In-line (I) Cautious (C) No Rating (NR)

Effective January 13, 2014, the stocks covered by Morgan Stanley Asia Pacific will be rated relative to the analyst's industry (or industry team's) coverage.

Effective January 13, 2014, the industry view benchmarks for Morgan Stanley Asia Pacific are as follows: relevant MSCI country index or MSCI sub-regional index or MSCI AC Asia Pacific ex Japan Index.

Naver Corp (035420.KS) - As of 1/1/24 in KRW
Industry : S. Korea Telecoms, Media & Internet



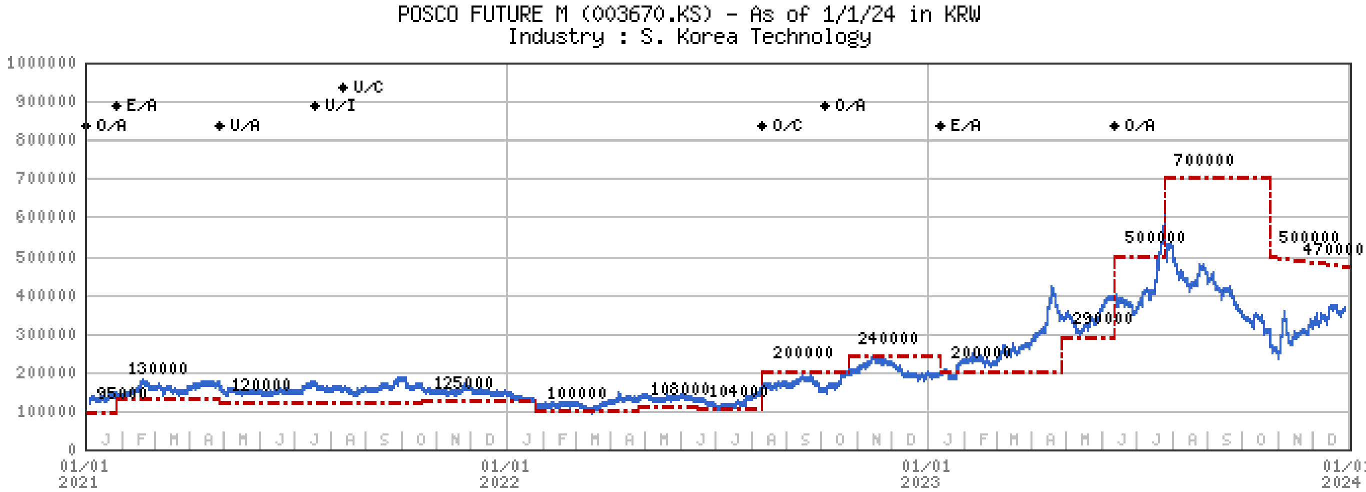
Stock Rating History: 1/1/19 : E/I; 7/26/19 : O/I; 11/17/19 : NA/I; 2/13/20 : NA/I; 3/17/20 : NA/I; 8/3/20 : NA/I; 11/23/20 : O/I; 4/22/22 : E/I; 3/13/23 : U/I

Price Target History: 10/31/18 : 130000; 4/25/19 : 140000; 7/26/19 : 160000; 8/6/19 : 170000; 10/31/19 : 190000; 11/17/19 : NA; 2/13/20 : NA; 3/17/20 : NA; 8/3/20 : NA; 11/23/20 : 340000; 1/25/21 : 420000; 1/28/21 : 440000; 3/23/21 : 490000; 4/29/21 : 460000; 7/1/21 : 500000; 9/28/21 : 480000; 1/10/22 : 410000; 1/27/22 : 370000; 4/22/22 : 320000; 7/18/22 : 260000; 8/8/22 : 230000; 10/14/22 : 160000; 11/7/22 : 150000; 8/7/23 : 180000

Source: Morgan Stanley Research   Date Format : MM/DD/YY   Price Target   No Price Target Assigned (NA)
Stock Price (Not Covered by Current Analyst)   Stock Price (Covered by Current Analyst)
Stock and Industry Ratings (abbreviations below) appear as ◆ Stock Rating/Industry View
Stock Ratings: Overweight (O) Equal-weight (E) Underweight (U) Not-Rated (NR) No Rating Available (NA)
Industry View: Attractive (A) In-line (I) Cautious (C) No Rating (NR)

Effective January 13, 2014, the stocks covered by Morgan Stanley Asia Pacific will be rated relative to the analyst's industry (or industry team's) coverage.

Effective January 13, 2014, the industry view benchmarks for Morgan Stanley Asia Pacific are as follows: relevant MSCI country index or MSCI sub-regional index or MSCI AC Asia Pacific ex Japan Index.



Stock Rating History: 1/1/19 : /C; 2/21/19 : O/C; 7/30/19 : O/I; 11/18/19 : O/A; 4/6/20 : E/A; 10/16/20 : O/A; 1/28/21 : E/A; 4/27/21 : U/A; 7/19/21 : U/I; 8/12/21 : U/C; 8/10/22 : O/C; 10/4/22 : O/A; 1/12/23 : E/A; 6/12/23 : O/A

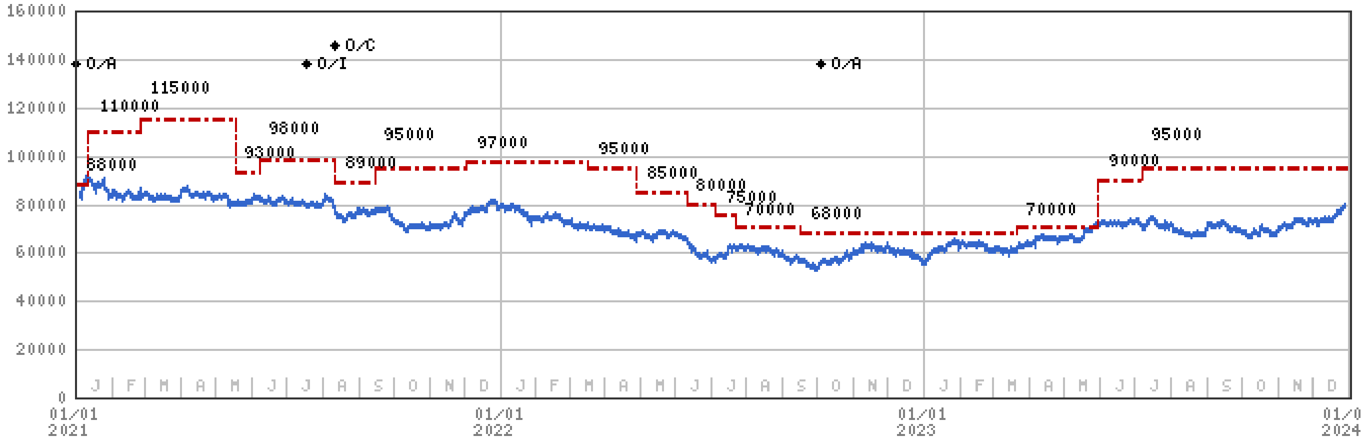
Price Target History: 2/21/19 : 95000; 4/10/19 : 76000; 7/4/19 : 66000; 4/6/20 : 48000; 6/10/20 : 53000; 7/21/20 : 62000; 8/14/20 : 82000.01; 10/16/20 : 95000; 1/28/21 : 130000; 4/27/21 : 120000; 10/20/21 : 125000; 1/26/22 : 100000; 4/25/22 : 108000; 6/15/22 : 104000; 8/10/22 : 200000; 10/24/22 : 240000; 1/12/23 : 200000; 4/27/23 : 290000; 6/12/23 : 500000; 7/25/23 : 700000; 10/24/23 : 500000; 1/2/24 : 470000

Source: Morgan Stanley Research Date Format : MM/DD/YY Price Target -- No Price Target Assigned (NA)
Stock Price (Not Covered by Current Analyst) Stock Price (Covered by Current Analyst)
Stock and Industry Ratings (abbreviations below) appear as ◆ Stock Rating/Industry View
Stock Ratings: Overweight (O) Equal-weight (E) Underweight (U) Not-Rated (NR) No Rating Available (NA)
Industry View: Attractive (A) In-line (I) Cautious (C) No Rating (NR)

Effective January 13, 2014, the stocks covered by Morgan Stanley Asia Pacific will be rated relative to the analyst's industry (or industry team's) coverage.

Effective January 13, 2014, the industry view benchmarks for Morgan Stanley Asia Pacific are as follows: relevant MSCI country index or MSCI sub-regional index or MSCI AC Asia Pacific ex Japan Index.

Samsung Electronics (005930.KS) - As of 1/1/24 in KRW
Industry : S. Korea Technology



Stock Rating History: 1/1/19 : E/C; 7/30/19 : E/I; 11/18/19 : O/A; 7/19/21 : O/I; 8/12/21 : O/C; 10/4/22 : O/A

Price Target History: 12/14/18 : 42000; 1/15/19 : 40000; 7/30/19 : 53000; 8/16/19 : 48000; 9/10/19 : 50000; 11/18/19 : 60000; 1/14/20 : 72000; 2/26/20 : 75000; 3/19/20 : 68000; 4/29/20 : 65000; 7/12/20 : 70000; 9/11/20 : 73000; 11/27/20 : 88000; 1/12/21 : 110000; 2/25/21 : 115000; 5/18/21 : 93000; 6/8/21 : 98000; 8/12/21 : 89000; 9/15/21 : 95000; 12/3/21 : 97000; 3/18/22 : 95000; 4/28/22 : 85000; 6/10/22 : 80000; 7/5/22 : 75000; 7/22/22 : 70000; 9/17/22 : 68000; 3/21/23 : 70000; 5/30/23 : 90000; 7/7/23 : 95000

Source: Morgan Stanley Research Date Format : MM/DD/YY Price Target -- No Price Target Assigned (NA)
Stock Price (Not Covered by Current Analyst) Stock Price (Covered by Current Analyst)
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Industry View: Attractive (A) In-line (I) Cautious (C) No Rating (NR)

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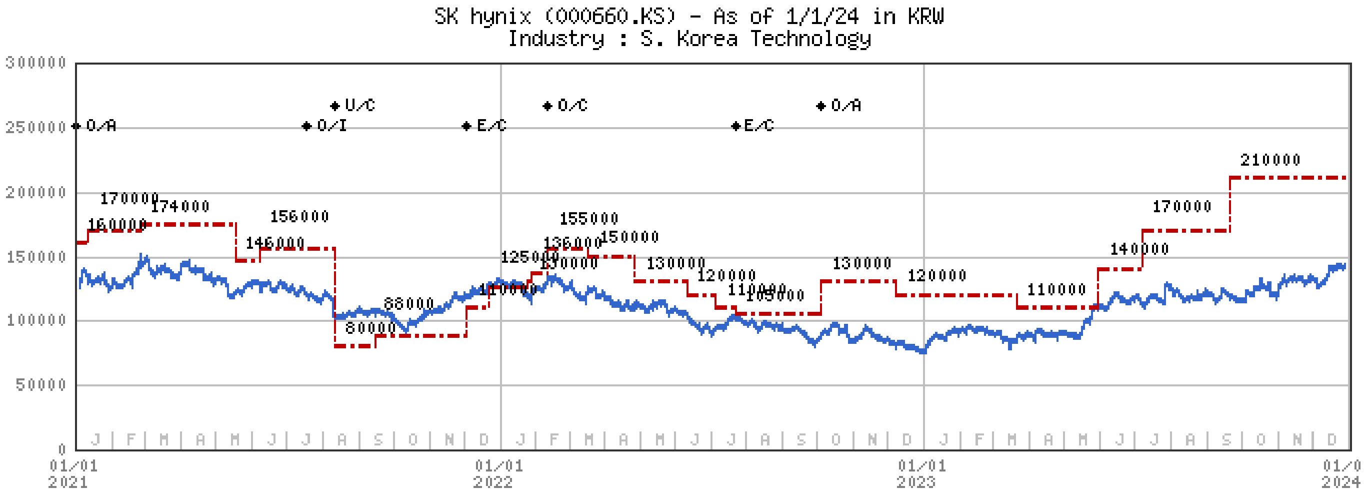


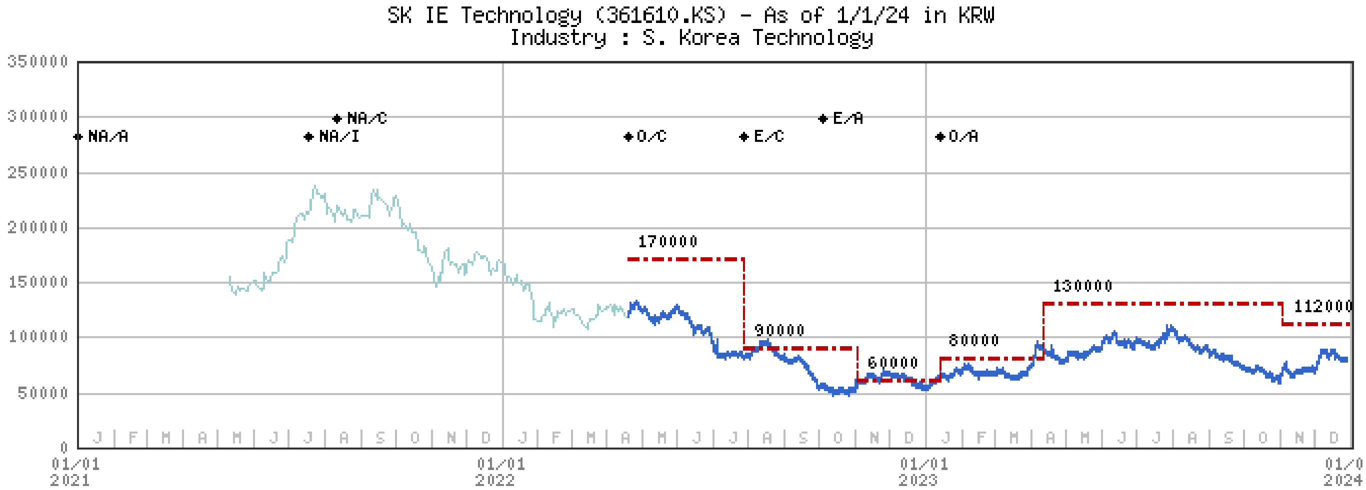
Stock Rating History: 1/1/19 : U/C; 7/30/19 : E/I; 11/18/19 : O/A; 7/19/21 : O/I; 8/12/21 : U/C; 12/3/21 : E/C; 2/11/22 : O/C; 7/22/22 : E/C; 10/4/22 : O/A

Price Target History: 12/14/18 : 63000; 1/15/19 : 61000; 1/25/19 : 63000; 3/3/19 : 60000; 4/25/19 : 70000; 6/4/19 : 61000; 7/25/19 : 70000; 7/30/19 : 85000; 8/16/19 : 80000; 9/10/19 : 81000; 11/18/19 : 95000; 1/14/20 : 115000; 2/26/20 : 120000; 3/19/20 : 110000; 8/21/20 : 93000; 10/23/20 : 100000; 12/2/20 : 160000; 1/12/21 : 170000; 2/25/21 : 174000; 5/18/21 : 146000; 6/8/21 : 156000; 8/12/21 : 80000; 9/15/21 : 88000; 12/3/21 : 110000; 12/23/21 : 125000; 1/24/22 : 130000; 1/28/22 : 136000; 2/11/22 : 155000; 3/18/22 : 150000; 4/27/22 : 130000; 6/10/22 : 120000; 7/5/22 : 110000; 7/22/22 : 105000; 10/4/22 : 130000; 12/7/22 : 120000; 3/21/23 : 110000; 5/30/23 : 140000; 7/7/23 : 170000; 9/21/23 : 210000

Source: Morgan Stanley Research Date Format : MM/DD/YY Price Target -- No Price Target Assigned (NA)
Stock Price (Not Covered by Current Analyst) Stock Price (Covered by Current Analyst)
Stock and Industry Ratings (abbreviations below) appear as ◆ Stock Rating/Industry View
Stock Ratings: Overweight (O) Equal-weight (E) Underweight (U) Not-Rated (NR) No Rating Available (NA)
Industry View: Attractive (A) In-line (I) Cautious (C) No Rating (NR)

Effective January 13, 2014, the stocks covered by Morgan Stanley Asia Pacific will be rated relative to the analyst's industry (or industry team's) coverage.

Effective January 13, 2014, the industry view benchmarks for Morgan Stanley Asia Pacific are as follows: relevant MSCI country index or MSCI sub-regional index or MSCI AC Asia Pacific ex Japan Index.



Stock Rating History: 1/1/19 : NA/C; 7/30/19 : NA/I; 11/18/19 : NA/A; 7/19/21 : NA/I; 8/12/21 : NA/C; 4/19/22 : O/C; 7/28/22 : E/C; 10/4/22 : E/A; 1/12/23 : O/A

Price Target History: 4/19/22 : 170000; 7/28/22 : 90000; 11/2/22 : 60000; 1/12/23 : 80000; 4/11/23 : 130000; 11/3/23 : 112000

Source: Morgan Stanley Research Date Format : MM/DD/YY Price Target -- No Price Target Assigned (NA)

Stock Price (Not Covered by Current Analyst) Stock Price (Covered by Current Analyst)

Stock and Industry Ratings (abbreviations below) appear as ♦ Stock Rating/Industry View

Stock Ratings: Overweight (O) Equal-weight (E) Underweight (U) Not-Rated (NR) No Rating Available (NA)

Industry View: Attractive (A) In-line (I) Cautious (C) No Rating (NR)

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