Morgan Stanley | RESEARCH

FOUNDATION

September 14, 2021 04:01 AM GMT

AlphaWise

Our Experience Generating New Fundamental Insights with Big Data

Morgan Stanley's AlphaWise quant team harnesses the scale and power of data to provide our analysts and strategists with a competitive edge. In this report, we illustrate how over the last four years we have generated important fundamental insights and outline best practices that have served our teams well. We believe our approaches may be useful to our clients.

alphawise α

Contributors

MORGAN STANLEY & CO. LLC

Qingyi Huang

Equity Strategist

+1 212 296-4837

Qingyi.Huang@morganstanley.com

MORGAN STANLEY & CO. LLC

Jasper Lin

Equity Strategist

+1 212 761-0837

Jasper.Lin@morganstanley.com

MORGAN STANLEY & CO. LLC

Lei Lian

Equity Strategist

+1-212-761-4395

Lei.Lian@morganstanley.com

MORGAN STANLEY & CO. LLC

Bas R Jaspers

Equity Strategist

+1-212-761-0268

Bas.Jaspers@morganstanley.com

MORGAN STANLEY & CO. LLC

Eric Fu

Equity Strategist

+1-212-761-0252

Eric.Fu1@morganstanley.com

Contents

Our Experience Generating New Fundamental Insights with Big Data

Big Data is changing fundamental investing. Traditionally, fundamental PMs have relied on in-depth analysis of company fundamentals, coupled with sound judgment and experience, to form their views and pick stocks. Now the evolution of Big Data is changing the playing field dramatically. Public companies can be evaluated not just through financial statements but also via many non-traditional data sets such as store or internet traffic, their supply chain network, and the specific language used on earnings calls. What's more, machine learning and computer algorithms have created opportunities to (1) extract signals from enormous data sets systematically and efficiently and (2) make predictions more accurately and frequently.

We use data-driven techniques to try to gain an edge. Collaborating with our analysts and strategists on a daily basis, we combine their fundamental expertise with our quantitative skills. Where analysts observe correlations at the company and industry levels, we have tools to quantify them. Our techniques extract hidden information from unexpected sources, e.g., generating alpha from the language analysts use in their own reports. When data is unintelligible because it's vast or confusing, we develop models to extract signals. For example, we created a real-time indicator of US GDP using a wide array of macro data. Sometimes we connect apparently unrelated dots, e.g., air pollution in China and Apple iPhone production.

Our quant process is informed by two core practices: deep analysis of data and building models in a both statistically and fundamentally sound way. Applying quantitative methodologies to gain fundamental insights presents a unique set of challenges. Compared to the market data used in factor analysis, company data is often reported less frequently, has a shorter history, and may be restated after its initial release. We spend significant time analyzing the data and strongly believe that comprehensive data analysis lays the foundation for developing the right models. We combine analysts' domain expertise with cross-validation, backtesting, and out-of-sample error tracking in building our models. A simpler and more robust model that paints an intuitive picture often wins out over a highly complicated black box despite a little sacrifice on statistical performance.

In this review of our research, we broadly segment examples of our approach into three use cases: (1) Deepening fundamental analysis with quant, **(2)** cutting-edge methodologies, and **(3)** coming up with innovative solutions in rapidly changing environments. We distill the analysis in selected reports published over the four years since we launched our quant effort within Equity Research.

Executive Summary

How Morgan Stanley Combines Big Data + Quant with Fundamental Analysis

We are a centralized quant team within AlphaWise at Morgan Stanley Research. Our team members come from different backgrounds, including quant trading, finance, data science, and financial engineering. What links us is the ability to analyze large data sets.

Over time, we have built up a technical infrastructure that conforms to our data and modeling process. Our main tech deck incorporates Python and Q/kdb, with Python as the workhorse for data analysis and Q/kdb being used to process large-scale data sets. Our centralized database combines proprietary Morgan Stanley data with third-party vendor data and web-harvested data, interlinking them where necessary. On top of that, we have created an interactive web-based dashboard with automated data processes at the back end. We test new ideas and models in our development environment. Once we establish the "best" model, we automate and deploy it into production. We restrict access to minimize unintended interruptions. Monitoring processes and fallback logic further enhance the robustness of models in production. It takes effort to maintain and gradually expand this infrastructure, but it frees us from manual work, and enables us to quickly customize and prototype when we embark on new projects.

We collaborate continuously with our analysts to generate new insights by harnessing the scale and power of data. In this process, our analysts:

- Focus on key investment debates and suggest ideas for impactful company- and industry-level research.
- Provide sector knowledge as we identify data sources and design potential factors from data. This reduces the risk of overfitting, where a statistical model fits the historical data perfectly but cannot generalize based on new data and make forecasts.
- Review and interpret model results, providing fundamental context when a model does not work well and on how to improve it.

As quants we:

- Collect, clean, and combine vast amounts of data in real time, which allows analysts to see the big picture in a time-efficient way.
- Systematically run backtests to shortlist research ideas from hundreds of possibilities and help prioritize analysts' work.
- Develop quantitative models to extract patterns from data, make forecasts on key company metrics, and identify drivers of stock performance.

This iterative effort enables us to generate differentiated research.

The Guiding Principles of Our Quant Process

While quantitative methodologies may be inherently complex, applying them to gain fundamental insights presents distinct challenges. Most company data is reported less frequently than market data (quarterly, semi-annually or annually), has less history, and may undergo restatement.

- To improve our models, we first invest significant time in understanding and analyzing the data – dealing with irregularities, studying correlations among variables, and visualizing data with more granularity.
- When building a model, we identify key drivers that are both statistically significant and make economic sense. We use cross-validation, back-testing, and out-of-sample error tracking to compare different models, besides leveraging our sector analysts' domain expertise. A simpler and more robust model that paints an intuitive picture often wins out over a highly complicated black box despite a little sacrifice on statistical performance.

Putting Them into Practice

To show how we combine Big Data, quant, and fundamental analysis, we distill three distinct use cases from our published work: Adding new dimensions to fundamental research, leveraging cutting-edge methodologies to generate alpha, and innovating amidst fast-changing conditions.

First, collaborating with analysts, we harness data to deepen fundamental analysis. We can improve company and industry KPI predictions, gain a better understanding of industry drivers, analyze cyclical industry trends and stock performance, and quantify or test analysts' hypotheses.

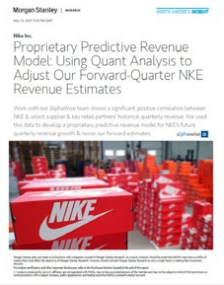
Second, using leading-edge methodologies including using Deep Learning and Natural Language Processing (NLP), we generated the Morgan Stanley Research Analyst Sentiment score, and got a real-time read on US GDP by applying dynamic factor models and Kalman filtering[1] to asynchronous releases of a wide range of macroeconomic data.

Finally, we show examples of solutions we developed in rapidly changing market conditions, specifically the COVID-19 pandemic. We used alternative data sources such as air quality in China to track the resumption of industrial production, accounted for external shocks in forecasting airline demand, and tracked the impact of hospitalization and COVID-19 cases on managed care providers in real time.

1 Dynamic Factor Model: A model for co-moving data series that are driven by a set of unobserved factors. The factor weightings are dynamic to account for regime changes in historical data. Kalman Filter: A recursive, mathematical technique to estimate the current state of unobserved factors based on a series of measurements observed over time.

How to access and use our work? The table below summarizes the examples of our work that we review in this report with methodologies and outcomes. These reports can provide a starting point for incorporating the techniques we use into the investment process. This selection is not exhaustive. We encourage interested readers to reach out to us and to explore other AlphaWise and QuantWise branded reports for further examples of how we use alternative data and detailed quantitative analysis in our research.

Using Quant to Deepen Fundamental Analysis



Proprietary Predictive Revenue Model: Using Quant Analysis to Adjust Our Forward-Quarter NKE Revenue Estimates

What Drives Flows? Fresh Insights from Machine Learning

Quant Meets Cap Goods - a new China Machine Tool model predicts ~30% YoY growth rates by midyear

Industry	Softlines/Apparel/Footwear	Asset Managers & Brokers	Capital Goods
Research Question	Can we predict Nike's revenue using supply chain information?	What drives equity fund flows?	Can we forecast China machine tool orders, a leading indicator for China's factory production?
Data	Supply chain relationships, revenues, consensus forecasts	Equity fund flows, ratings, fees, returns	China machine tool orders, macro variables, Auto and Semi industry metrics
Methods	Principal Component Analysis (PCA), linear regression	Random forest, logistic regression, stepwise linear regression	Pairwise correlation, random forest
Conclusion and Impact	Predicted 88% YoY revenue growth for Nike for fiscal Q4 2021 vs. 96% reported and 75% consensus	Fund flow predictions led to multiple rating changes by analyst team	Predicted 30% YoY growth rates for machine tool orders by midyear 2020 and showed stock price implications

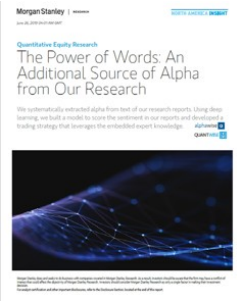
DRAM - Navigating Complexity

Seagate Technology: Better Positioned for the Data Era; Upgrade to OW

1Q19 Review: What Drives Alpha in Large Cap Bank Stocks?

Industry	Semiconductors	Technology Hardware	Large-cap Banking
Research Question	Where are we in the current memory cycle, and how does this relate to stock prices?	Does Seagate inventory level impact stock performance?	What factors drive large cap bank stock outperformance?
Data	DRAM prices, stock returns	Production and shipment data, stock returns	Bank earnings data, equity factors, stock returns
Methods	Time-series analysis, cobweb model, Moore's Law	Correlation, linear regression	Linear regression
Conclusion and Impact	Identified semiconductor cycles, entry and exit points in the market	Showed significant correlation between inventory and Seagate next-quarter stock returns; analyst rating upgrade	Beating consensus estimate of expense control drove outperformance, while EPS miss led to underperformance

Using Cutting-edge Methodologies To Enhance Alpha Generation



	The Power of Words: An Additional Source of Alpha from Our Research	***The Morgan Stanley Nowcast: Taking the Pulse of the US Economy***
Industry	All industries covered by Morgan Stanley Research	Macro & Econ
Research Question	Can we use machine learning to extract alpha from Morgan Stanley Research reports?	Can we estimate the US GDP growth in real time?
Data	Morgan Stanley Research reports, consensus forecasts, stock returns	Macroeconomic time series and surveys
Methods	Deep learning, Natural Language Processing (NLP)	Dynamic factor models, Kalman filter
Conclusion and Impact	Developed a systematic trading strategy using sentiment scores extracted from analyst reports, with 1.2 Sharpe ratio	Aggregated the macroeconomic data releases into a single estimate of US GDP growth; updating in real time

Responding to a Rapidly Changing Environment

	Weekly Data Tracker: Printer Supplies a Concern and PC Lead Times Remain Extended	***Into the Distance, A Ribbon of Black: Initiating Coverage With An Attractive View***	***Tracking Managed Care's Medicare Advantage Exposure to COVID-19***
Industry	Technology Hardware	Airlines	Healthcare Services
Research Question	Can we track the recovery of industrial production in China after factory closures due to COVID-19?	Can we predict airline demand and estimate how it will recover from the COVID-19 shock?	Can we estimate managed care organizations' (MCOs') cost exposure to COVID-19?
Data	Air quality and weather data in China	Macroeconomic, air traffic data	COVID-19 infection cases, hospitalization and ICU data, health plan enrollment
Methods	Linear regression	Time-series decomposition, linear regression	Real-time data loading, mapping and consolidating
Conclusion and Impact	iPhone/iPad production recovered post COVID-19 shutdowns and ran above historical seasonal levels	6-month forward forecast of airline demand; predicted ~60% recovery vs. normal levels by the end of 2020	Dashboard with real-time information, EPS headwind prediction for MCOs during COVID period

What We Have Learned

Our role as a centralized quant team working with analysts gives us a unique perspective on the opportunities and challenges of applying quant methods within a fundamental investment process. Over the course of the last four years, we have learned several lessons:

- **Open-minded thinking is crucial:** We embed ourselves within analyst teams, having access to their data and work folders and attending their regular team meetings. When building models, we leverage our analysts' fundamental knowledge. At the same time, our work allows analysts to access additional sources of information and analyze data in a different way. The analyst's willingness to incorporate these novel approaches in their investment framework is crucial to generate meaningful insights.
- **Data availability determines what we can do:** Our ability to use quantitative methods is limited by the quantity and quality of the data available. Data sets with (1) lower frequency, (2) a large number of missing values and/or (3) a short history are challenging to work with. Sometimes we quickly conclude that it will be hard to quantitatively test a research hypothesis after assessing the data.
- **Our models do not always work:** It is possible that time spent developing a model does not produce any conclusive outcomes. It is important to acknowledge that no statistically significant relationships may be present in the data, and we try to avoid over-fitting the model to reach an expected or desired conclusion. Overall, we find that 60%~70% of our projects lead to meaningful results, but the absence of interesting results is more prevalent here than in traditional fundamental analysis.
- **It takes time to develop good models:** It is not uncommon to spend several weeks or months working on a single model, depending on the complexity of the data and methodology used. On average, we estimate that projects focusing on specific company or industry KPIs take a couple of weeks, while the development of complex models can require more than 6 months.
- **Effective communication leads to actionable insights:** While we spend the majority of our time working on models, an equally important skill is the ability to translate model results into actionable insights. First, we need to explain technical jargon in non-technical terms to the analyst team, to enable a constructive dialogue. Second, focusing on applications and use-cases for the model outputs, rather than on methodological details, helps explain results and come up with actionable ideas.

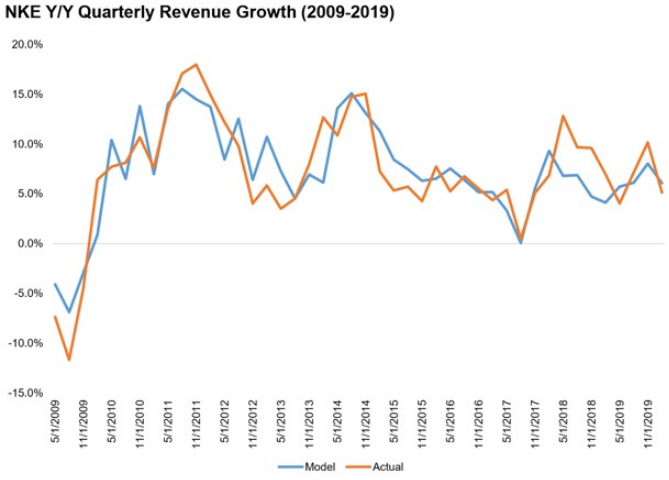
A) Using Quant to Deepen Fundamental Analysis

The fundamental investing ecosystem has changed, relying more on big data, machine learning and artificial intelligence. This makes quantitative analysis increasingly important in fundamental research. While quants try to find return patterns among hundreds of thousands of stocks, we use quantitative methods differently — leveraging alternative data and studying single-company and industry KPIs, in addition to stock performance.

In this section, we summarize use-cases where a quant approach can be incorporated into the fundamental stock-picking process. We illustrate how we can generate in-depth insights by analyzing data in a systematic and robust way. We explain best practices that may be useful to investors.

(1) Predicting company or industry KPIs using Machine Learning methods: At the company level, quantitative analysis focuses on understanding and predicting the evolution of key drivers. For example, in Proprietary Predictive Revenue Model: Using Quant Analysis to Adjust Our Forward-Quarter NKE Revenue Estimates, we distilled supply chain information into a small set of factors to forecast next-quarter Nike revenue. Working with supply chain data can be complex for several reasons. Most notably, as a group, Nike's suppliers and retailers show strong correlation among themselves because they are impacted by the same market conditions, which leads to more noise in the estimation process. Moreover, the companies' sales are reported with different lag times and at different intervals. This makes it harder to accurately estimate the impact on Nike's revenue. We explored various quant techniques to address these data challenges, including Lasso regression, Ridge regression and Principal Component Analysis (PCA). [1] Our final model exhibited strong performance, predicting 88% revenue growth (after adjusting for COVID) for fiscal Q4 2021 results, where Nike's reported revenue was up 96% YoY vs. the 75% consensus forecast.

Exhibit 1: Our Nike predictive revenue model with supplier chain data has a 0.753 R-squared value



Source: Company data, FactSet, Morgan Stanley Research

(2) Analyzing granular details from big data in depth, then aggregating them to generate company-level insights: Using machine learning methods, we were able to identify the drivers of equity fund flows for money managers and forecast future flows more systematically (What Drives Flows? Fresh Insights from Machine Learning). To fully utilize the breadth and depth of 30+ years of data covering more than 2,500 domestic equity mutual funds, we (a) constructed a normalized flow metric to make it comparable across different funds and time; (b) used feature importance (the impact of a variable on the metric we want to predict) to shortlist a few key drivers as model inputs; and (c) built a flow forecast model at the individual fund level. Finally, by aggregating fund flow predictions, we were able to predict near-term trends at the asset manager level and redraw the competitive landscape across the industry. This analysis gave our Brokers & Asset Managers sector team higher conviction in their views and drove multiple rating changes.

2 Lasso regression: A variant of regression capable of automatic variable selection. Ridge regression: A variant of regression that pushes model coefficients toward zero to deal with multicollinearity (correlations between the variables used in the model) and reduce overfitting. PCA: A data transformation technique that decomposes a set of correlated variables into a set of uncorrelated factors. The first few factors will summarize the most important information.

Exhibit 2: Equity fund flows Predictive Trends Model 4Q19 predictions

US Active Equity MFs

= Same, + Better, - Worse

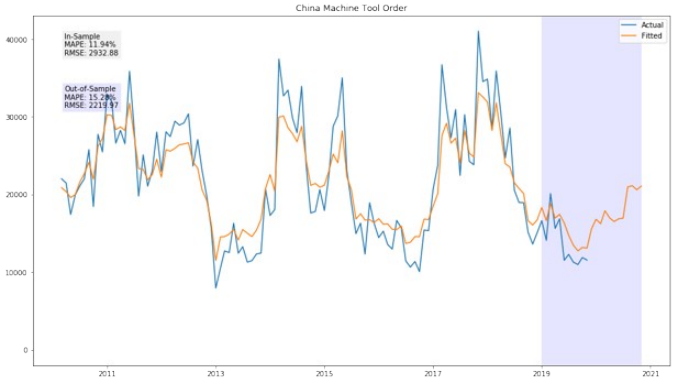
1 = Top Performers .... 4 = Bottom Performers

Manager	AUM ($MM)	% of Firmwide AUM	# of Funds	Organic Growth Rate %			Weighted Average Return Quartiles					
				Prior Qtr	Q/Q Trend	Predicted Next Qtr	trailing-3mo	trailing-6mo	trailing-9mo	trailing-1yr	trailing-3yr	trailing-5yr
T. Rowe Price	324,652	30%	22	-1.7%	Better	-0.8%	2.9	2.4	2.3	1.8	1.6	1.6
Victory	34,128	27%	11	-1.8%	Better	-1.4%	2.2	2.2	2.7	2.7	2.7	2.2
BlackRock	34,790	1%	8	-2.6%	Better	1.1%	2.1	1.6	2.6	2.0	2.9	2.9
Affiliated Managers Group	23,561	3%	8	-4.2%	Better	-2.4%	4.9	3.4	3.7	3.0	3.6	3.8
Invesco	93,497	9%	23	-3.2%	Same	-3.4%	2.3	2.0	2.4	2.4	3.1	3.1
Janus Henderson Group	81,511	23%	10	-0.5%	Same	-0.4%	2.2	1.6	1.4	1.6	1.7	1.4
Franklin Resources	61,199	9%	9	-0.4%	Same	-0.4%	2.2	1.8	1.2	1.6	1.7	1.6
Waddell and Reed Financial	18,272	29%	6	-2.8%	Same	-2.6%	2.1	1.9	1.9	1.8	1.8	1.8
Artisan Partners	9,169	9%	3	-4.3%	Same	-4.6%	3.8	1.6	1.5	1.7	2.3	2.3
Legg Mason	54,808	8%	16	-1.3%	Worse	-1.9%	2.6	2.4	2.5	2.2	2.3	2.3
Eaton Vance	31,324	7%	7	-0.1%	Worse	-0.6%	1.4	1.5	1.9	1.4	1.6	1.6
Federated Investments	26,856	17%	8	0.0%	Worse	-0.5%	2.6	3.3	2.5	1.5	2.5	2.4
AllianceBernstein	20,696	4%	7	1.5%	Worse	0.5%	2.7	2.9	2.5	2.4	1.7	1.9
Virtus Investment Partners	11,218	14%	4	1.7%	Worse	-2.7%	2.3	1.4	1.1	1.1	1.8	1.8

Source: Morningstar, Simfund, Morgan Stanley Research; firmwide AUM % as of Jun 30, 2019

(3) Leveraging analysts' domain knowledge in feature engineering[2] to build better predictive models: This methodology underpins Quant Meets Cap Goods – a new China Machine Tool model predicts ~30% YoY growth rates by midyear. In order to make 12-month forward forecasts of the China machine tool orders reported by JMTBA (Japan Machine Tool Builders' Association), a key metric for the industrial sector in China, we initially curated a list of potential variables using fundamental insights from our analysts. From this starting point, we ran pairwise correlations and cross-validation to finalize our list of variables. We then used a random forest model. This machine-learning method automatically selects different variables at each step based on how well the model is able to fit historical data and allows us to model non-linear relationships. Our model predicted 30% YoY growth rates by midyear 2020, and we showed the implications for various companies' stock prices.

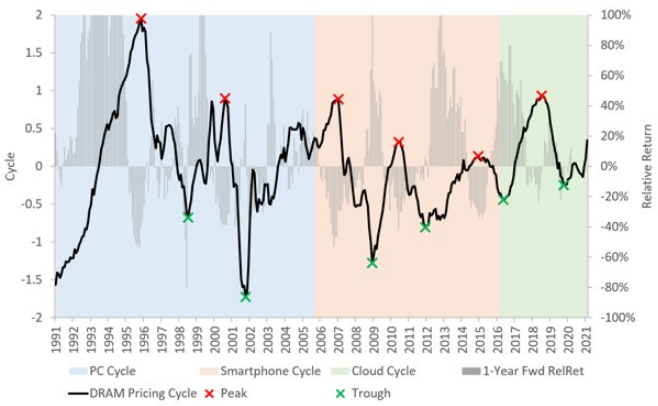
Exhibit 3: China machine tool quant model predicted orders growth of ~30% by June 2020



Source: Datastream, JMTBA, SIA, Worldscope, China NBS, Morgan Stanley Research

(4) Capturing cyclical trends and deriving insights from time series: Information embedded in historical data can be invaluable in interpreting and forecasting long-term industry trends, cycles, or inflection points. Using the proper techniques to analyze time series, coupled with other statistical and mathematical techniques, we can uncover these patterns and provide insights to help investors better position themselves in the market. In DRAM – Navigating Complexity, we identified several semiconductor industry cycles using deviations from equilibrium DRAM prices, which were modeled based on Moore's law and calibrated using market data. We further showed how the cycles historically correlated with long-term forward stock returns. In Asia Primer: Asia Technology: Playbook for a Semi Cycle Downturn (13 Jul 2021), we used a similar framework to uncover semiconductor industry cycles. This supported our analyst's call for a cyclical downturn.

Exhibit 4: We extracted components of the DRAM cycle from pricing data and showed how to monetize cycle insights



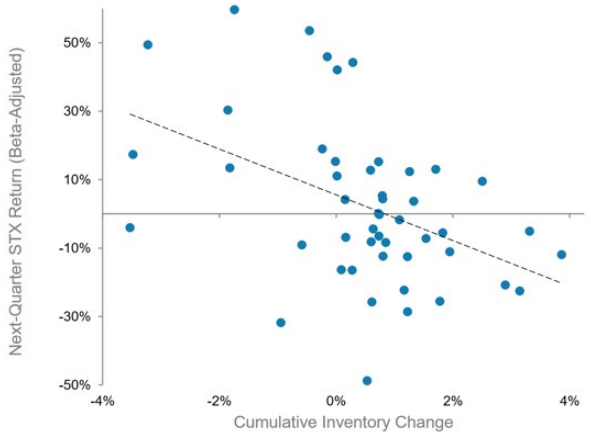
Source: Refinitiv, Bloomberg, Morgan Stanley Research

3 Feature engineering: The process of transforming raw data into features to increase model fit and predictive accuracy.

(5) Formulating and quantifying fundamental views: Our ability to quantify and test analysts' hypotheses further demonstrates the power of combining fundamental views with data-driven analysis. We offer two examples:

First, based on the analyst's observation that lower inventory levels historically created upward pressure on Seagate's gross margins, we were able to go one step further. We constructed an inventory factor using third-party vendor data, then showed a statistically significant correlation between inventory changes and next-quarter market-adjusted stock returns. This increased the analyst's conviction and provided additional information on potential entry points for investors (Better Positioned for the Data Era; Upgrade to OW).

Exhibit 5: We found a statistically significant correlation between changes in inventory levels and next-quarter stock returns for Seagate



Source: IDC, TSR, Morgan Stanley Research

Second, we showed that expense management is the most important driver of outperformance for large cap bank stocks (1Q19 Review: What Drives Alpha in Large Cap Bank Stocks?). This phenomenon had been observed by our analysts but had not been quantitatively tested. By first regressing returns of banking stocks on several known factors, including market returns, size, and momentum, we were able to extract the unexplained return of bank stocks. We then explored the relationship between this excess return and six predictors, including EPS, expense control, and revenues. We found that while beating the consensus estimate of expense control drives outperformance in large cap banks, an EPS miss is a strong indicator for underperformance.

Exhibit 6: Expense beat is the most important Source of alpha...

Source: SNL, Thomson Reuters, Company Data, Morgan Stanley Research Estimates

Exhibit 7: ...While an EPS miss is a strong indicator for underperformance

Source: SNL, Thomson Reuters, Company Data, Morgan Stanley Research Estimates

The Guiding Principles of Our Quant Process

While quantitative methodologies may be inherently complex, applying them to gain fundamental insights presents its own unique challenges. Here we explain our modelling process and the guiding principles we use to build a "good" model.

Data form the underpinning of quantitative analysis. We have built the technology, tools and processes to source, clean and visualize our data, leveraging a set of open source programs that includes Python/R, TensorFlow, Git, and AngularJS. We spend significant time on (1) identifying missing values/outliers; (2) studying the lead/lag correlations among variables; and (3) slicing and dicing across different dimensions of the data and plotting them in different ways. We strongly believe that comprehensive data analysis deepens our understanding of the data and paves the way for a suitable model.

Model building naturally follows. As we are dealing with massive amounts of data, we try to reduce the dimension and identify key drivers that are both statistically significant and make economic sense. We experiment with models ranging from simple to sophisticated, from linear to non-linear. We use cross-validation, back-testing, and out-of-sample error tracking to compare these models. Model performance measured by purely statistical metrics is not all that we aim for. In the model exploration process, we regularly touch base with fundamental analysts, soliciting insights and feedback as we explain the model and results to them. Their domain expertise greatly reduces the risk of overfitting, where a statistical model fits perfectly with historical data but is unable to generalize based on new data and make forecasts. As a result, a simpler and more robust model that paints an intuitive picture will very likely win out over a black-box model despite a little sacrifice on performance (how well the model fits historical data).

There are a few pitfalls in the modeling process that we try to avoid:

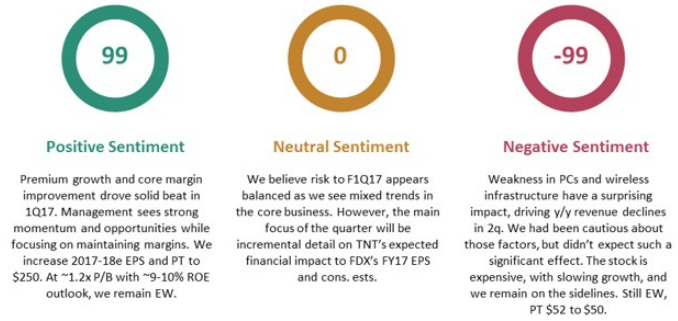
- ***Blindly throwing the entire data set into a "fancy" machine-learning model without understanding the data.*** **This rarely yields the best results. Even if it does, an unnecessarily complex relationship between model input and output makes it harder to interpret the model's results and drastically reduces its credibility.**
- ***Fine tuning model parameters or hyper-parameters toward a presumptive conclusion.*** **Frequently the data available do not substantiate the thesis proposed by the analyst.**

B) Using Cutting-Edge Methodologies to Enhance Alpha Generation

Over time, the financial literature has evolved and more sophisticated models have been developed. These methods allow for the incorporation of new unstructured data while improving predictive frequency and accuracy. Although interpreting the output from these methodologies may be highly complex, we have identified opportunities to derive new insights and generate alpha using these cutting-edge techniques.

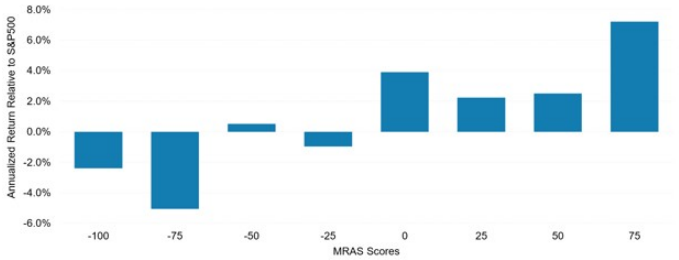
Textual analysis leads to systematic alpha. While numeric data forms the basis of most quantitative models, recent advances in the space allow for the inclusion of textual information as well. Given the difficulty of analyzing this unstructured data quantitatively, it can provide significant alpha-generating opportunities. In our differentiated report on The Power of Words: An Additional Source of Alpha from our Research, we employed Natural language processing (NLP) alongside Deep Learning techniques to generate a Machine Read Analyst Sentiment (MRAS) score for each of our US research reports. We then developed a systematic trading strategy that achieved a 1.2 Sharpe ratio in our backtesting period after taking financing and trading costs into account.

Exhibit 8: Sentiment score examples



Source: Morgan Stanley Research

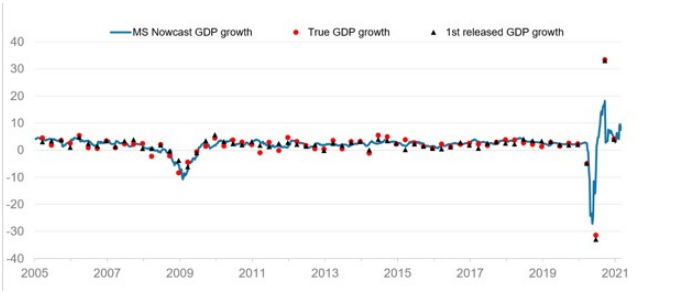
Exhibit 9: Annualized returns relative to the S&P 500 based on Morgan Stanley US Reports Sentiment Scores (2013-16)



Notes: Reports associated with price target revisions are used. Annualized return is calculated as 40-day return multiplied by 4 to reflect earning seasons. Source: Morgan Stanley Research, Thomson Reuters

Advanced modeling techniques enable real-time tracking of the economy. Besides being able to incorporate new types of data, these techniques can also provide more timely estimates of the state of the economy. GDP, a key economic indicator, is only released quarterly and with a substantial, one month, delay. At the same time, a wide range of macroeconomic data is asynchronously released on a daily basis, which provides more real-time information on the current quarter's GDP but can send conflicting signals. Using big data and advanced modeling techniques, including Kalman Filtering and Dynamic Factor Models, our Morgan Stanley Nowcast aggregates these data releases into a single real-time measure of US economic activity (see The Morgan Stanley Nowcast: Taking the Pulse of the US Economy). We can also distinguish the impact of a data release on our Nowcast, allowing for better understanding of how news will impact our reading of current GDP.

Exhibit 10: Time series of Nowcast and official GDP Releases (1/7/2005 - 3/19/2021)



Note: Realized GDP is reported at the end of each quarter. Source: Morgan Stanley Research

C) Responding to a Rapidly Changing Environment

Our approach to quantitative analysis is flexible, allowing for a wide variety of different applications. While some analyses focus on clearly identifiable metrics and well-followed data sources, in other cases we need to develop innovative solutions to tackle challenges in data analysis and modeling. The COVID-19 pandemic demonstrates how our methodology can be applied in rapidly changing market conditions.

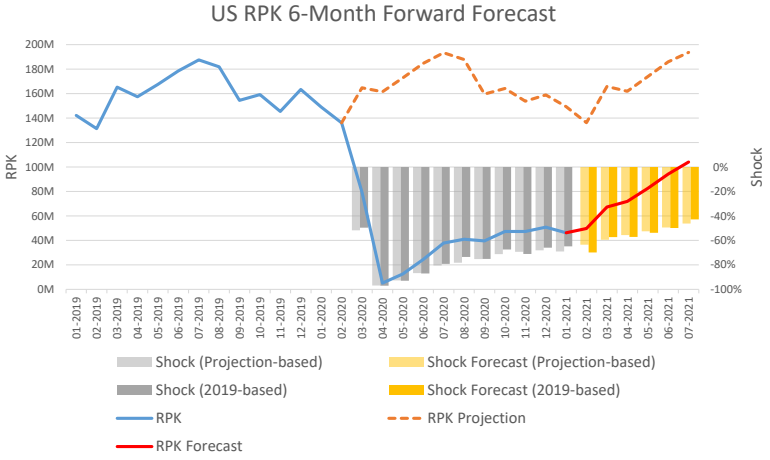
Tracking production recovery with unconventional data: During the initial stages of the outbreak, fundamental and macroeconomic data did not yet reflect the dramatic changes in the market environment. Looking for alternative information to estimate the initial impact of COVID-19 on Apple's supply chain, we used air quality data as it is (1) available on a daily basis, allowing us to keep pace with changing conditions; (2) publicly available, allowing for immediate use without negotiating contracts with private data vendors; and (3) a good proxy for tracking industrial production levels. We looked at air quality numbers in several major iPhone/ipad manufacturing cities in China. By comparing current to historical pollutions levels, while accounting for Chinese New Year and weather-related impacts, we were able to determine when production resumed after the initial outbreak and factory closures (Weekly Data Tracker: Printer Supplies a Concern and PC Lead Times Remain Extended).

Reconciling textbook models with reality: Outlier periods are difficult to predict, especially for quantitative models, which assume that future data will follow a pattern similar to what was observed historically. At the same time, insights during these unique time periods are often very valuable. By making adjustments to airline industry models to account for exogenous shocks, we were able to make meaningful predictions even during COVID-19. In Into the Distance, a Ribbon of Black: Initiating Coverage with an Attractive View, we built a model to predict near-term airline demand with a two-layer design. One layer is used for prediction in normal periods which takes into account different time-series characteristics such as seasonality, as well as some correlated predictors. On top of that we added another layer to forecast how the airline industry would recover from the pandemic shock. We use this second layer to adjust the estimated demand during normal periods to incorporate the impact from COVID-19.

Exhibit 11: Use air quality data in Chinese manufacturing cities to track the resumption of production after the COVID-19 outbreak

Source: Morgan Stanley Research, openaq.org, aqistudy.cn, Iowa State University, Iowa Environmental Mesonet

Exhibit 12: Use a two-layer model to predict near-term airline demand



Source: Morgan Stanley Research

Sourcing and integrating information in real time: With the vast amount of data available from different sources, and rapidly changing market conditions, the ability to get a quick read of the data is critical. Easy access to clean, curated, combined data provides significant advantages by allowing analysts to see the bigger picture in a time-efficient way. One example is our tracker to measure the managed care providers' exposure to COVID-19 (Tracking Managed Care's Medicare Advantage Exposure to COVID-19). We were able to estimate the cost associated with COVID-19 cases by combining (1) county-level data on COVID-cases, (2) health plan enrollment data, and (3) hospitalization and ICU data, broken down by age and reported at multiple levels and regions. With this framework, we determined the potential EPS headwinds for managed care providers over the course of the outbreak.

Exhibit 13: Combine county-level information for both MA enrollment and COVID cases helped estimate managed care providers' cost exposure to COVID-19

Region	Cumulative % of COVID-19 Cases	Regional Market Share						
		United Health	Humana	CVS	Anthem	Centene	Cigna	Molina
New York-Jersey City-White Plains, NY-NJ	35%	33%	3%	7%	7%	7%	0%	0%
Nassau County-Suffolk County, NY	43%	17%	16%	19%	16%	5%	0%	0%
Chicago-Naperville-Arlington Heights, IL	46%	15%	38%	12%	0%	11%	6%	0%
Newark, NJ-PA	48%	51%	2%	15%	4%	4%	0%	0%
Detroit-Dearborn-Livonia, MI	50%	0%	15%	7%	0%	11%	0%	14%
New Orleans-Metairie, LA	52%	41%	49%	2%	0%	3%	0%	0%
Seattle-Bellevue-Everett, WA	54%	40%	13%	11%	1%	0%	0%	2%
Los Angeles-Long Beach-Glendale, CA	56%	11%	4%	1%	7%	11%	0%	0%
Warren-Troy-Farmington Hills, MI	57%	0%	14%	6%	0%	5%	0%	4%
Boston, MA	59%	22%	0%	4%	0%	0%	0%	0%
Atlanta-Sandy Springs-Roswell, GA	60%	20%	30%	21%	3%	12%	6%	0%
Cambridge-Newton-Framingham, MA	61%	22%	0%	3%	0%	0%	0%	0%
Miami-Miami Beach-Kendall, FL	62%	25%	23%	5%	23%	2%	12%	0%
Bridgeport-Stamford-Norwalk, CT	63%	43%	0%	27%	12%	6%	0%	0%
Philadelphia, PA	64%	3%	7%	9%	0%	1%	29%	0%
Washington-Arlington-Alexandria, DC-VA-MD-WV	64%	27%	14%	7%	4%	0%	2%	0%
Denver-Aurora-Lakewood, CO	65%	49%	10%	2%	1%	0%	0%	0%
Indianapolis-Carmel-Anderson, IN	66%	43%	29%	2%	18%	0%	0%	0%
Fort Lauderdale-Pompano Beach-Deerfield Beach, FL	67%	18%	48%	11%	7%	1%	0%	0%
Houston-The Woodlands-Sugar Land, TX	67%	23%	14%	10%	10%	18%	12%	0%
Dallas-Plano-Irving, TX	68%	54%	23%	7%	3%	6%	2%	2%
Montgomery County-Bucks County-Chester County, PA	68%	6%	11%	19%	0%	0%	10%	0%
St. Louis, MO-IL	69%	41%	9%	20%	4%	1%	0%	0%
Nashville-Davidson--Murfreesboro--Franklin, TN	69%	14%	12%	4%	6%	1%	36%	0%
San Jose-Sunnyvale-Santa Clara, CA	70%	6%	0%	1%	9%	0%	0%	0%

Source: ,USA Facts, Morgan Stanley Research

Disclosure Section

The information and opinions in Morgan Stanley Research were prepared by Morgan Stanley & Co. LLC, and/or Morgan Stanley C.T.V.M. S.A., and/or Morgan Stanley Mexico, Casa de Bolsa, S.A. de C.V., and/or Morgan Stanley Canada Limited. As used in this disclosure section, "Morgan Stanley" includes Morgan Stanley & Co. LLC, Morgan Stanley C.T.V.M. S.A., Morgan Stanley Mexico, Casa de Bolsa, S.A. de C.V., Morgan Stanley Canada Limited and their affiliates as necessary.

For important disclosures, stock price charts and equity rating histories regarding companies that are the subject of this report, please see the Morgan Stanley Research Disclosure Website at www.morganstanley.com/researchdisclosures, or contact your investment representative or Morgan Stanley Research at 1585 Broadway, (Attention: Research Management), New York, NY, 10036 USA.

For valuation methodology and risks associated with any recommendation, rating or price target referenced in this research report, please contact the Client Support Team as follows: US/Canada +1 800 303-2495; Hong Kong +852 2848-5999; Latin America +1 718 754-5444 (U.S.); London +44 (0)20-7425-8169; Singapore +65 6834-6860; Sydney +61 (0)2-9770-1505; Tokyo +81 (0)3-6836-9000. Alternatively you may contact your investment representative or Morgan Stanley Research at 1585 Broadway, (Attention: Research Management), New York, NY 10036 USA.

Analyst Certification

The following analysts hereby certify that their views about the companies and their securities discussed in this report are accurately expressed and that they have not received and will not receive direct or indirect compensation in exchange for expressing specific recommendations or views in this report: Eric Fu; Qingyi Huang; Bas R Jaspers; Lei Lian; Jasper Lin.

.

Global Research Conflict Management Policy

Morgan Stanley Research has been published in accordance with our conflict management policy, which is available at www.morganstanley.com/institutional/research/conflictpolicies. A Portuguese version of the policy can be found at www.morganstanley.com.br

Important Regulatory Disclosures on Subject Companies

The equity research analysts or strategists principally responsible for the preparation of Morgan Stanley Research have received compensation based upon various factors, including quality of research, investor client feedback, stock picking, competitive factors, firm revenues and overall investment banking revenues. Equity Research analysts' or strategists' compensation is not linked to investment banking or capital markets transactions performed by Morgan Stanley or the profitability or revenues of particular trading desks.

Morgan Stanley and its affiliates do business that relates to companies/instruments covered in Morgan Stanley Research, including market making, providing liquidity, fund management, commercial banking, extension of credit, investment services and investment banking. Morgan Stanley sells to and buys from customers the securities/instruments of companies covered in Morgan Stanley Research on a principal basis. Morgan Stanley may have a position in the debt of the Company or instruments discussed in this report. Morgan Stanley trades or may trade as principal in the debt securities (or in related derivatives) that are the subject of the debt research report.

Certain disclosures listed above are also for compliance with applicable regulations in non-US jurisdictions.

STOCK RATINGS

Morgan Stanley uses a relative rating system using terms such as Overweight, Equal-weight, Not-Rated or Underweight (see definitions below). 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. Investors should carefully read the definitions of all ratings used in Morgan Stanley Research. In addition, since Morgan Stanley Research contains more complete information concerning the analyst's views, investors should carefully read Morgan Stanley Research, in its entirety, and not infer the contents from the rating alone. In any case, ratings (or research) should not be used or relied upon as investment advice. An investor's decision to buy or sell a stock should depend on individual circumstances (such as the investor's existing holdings) and other considerations.

Global Stock Ratings Distribution

(as of August 31, 2021)

The Stock Ratings described below apply to Morgan Stanley's Fundamental Equity Research and do not apply to Debt Research produced by the Firm.

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	1500	43%	414	48%	28%	666	44%
Equal-weight/Hold	1492	43%	376	43%	25%	670	44%
Not-Rated/Hold	1	0%	0	0%	0%	0	0%
Underweight/Sell	513	15%	80	9%	16%	191	13%
Total	3,506		870			1527	

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). The stock's total return is expected to exceed 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). The stock's total return is expected to be in line with 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 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). The stock's total return is expected to be below 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.

Important Disclosures for Morgan Stanley Smith Barney LLC & E*TRADE Securities LLC Customers

Important disclosures regarding the relationship between the companies that are the subject of Morgan Stanley Research and Morgan Stanley Smith Barney LLC or Morgan Stanley or any of their affiliates, are available on the Morgan Stanley Wealth Management disclosure website at www.morganstanley.com/online/researchdisclosures. For Morgan Stanley specific disclosures, you may refer to www.morganstanley.com/researchdisclosures.

Each Morgan Stanley research report is reviewed and approved on behalf of Morgan Stanley Smith Barney LLC and E*TRADE Securities LLC. This review and approval is conducted by the same person who reviews the research report on behalf of Morgan Stanley. This could create a conflict of interest.

Other Important Disclosures

Morgan Stanley Research policy is to update research reports as and when the Research Analyst and Research Management deem appropriate, based on developments with the issuer, the sector, or the market that may have a material impact on the research views or opinions stated therein. In addition, certain Research publications are intended to be updated on a regular periodic basis (weekly/monthly/quarterly/annual) and will ordinarily be updated with that frequency, unless the Research Analyst and Research Management determine that a different publication schedule is appropriate based on current conditions.

Morgan Stanley is not acting as a municipal advisor and the opinions or views contained herein are not intended to be, and do not constitute, advice within the meaning of Section 975 of the Dodd-Frank Wall Street Reform and Consumer Protection Act.

Morgan Stanley produces an equity research product called a "Tactical Idea." Views contained in a "Tactical Idea" on a particular stock may be contrary to the recommendations or views expressed in research on the same stock. This may be the result of differing time horizons, methodologies, market events, or other factors. For all research available on a particular stock, please contact your sales representative or go to Matrix at http://www.morganstanley.com/matrix.

Morgan Stanley Research is provided to our clients through our proprietary research portal on Matrix and also distributed electronically by Morgan Stanley to clients. Certain, but not all, Morgan Stanley Research products are also made available to clients through third-party vendors or redistributed to clients through alternate electronic means as a convenience. For access to all available Morgan Stanley Research, please contact your sales representative or go to Matrix at http://www.morganstanley.com/matrix.

Any access and/or use of Morgan Stanley Research is subject to Morgan Stanley's Terms of Use (http://www.morganstanley.com/terms.html). By accessing and/or using Morgan Stanley Research, you are indicating that you have read and agree to be bound by our Terms of Use (http://www.morganstanley.com/terms.html). In addition you consent to Morgan Stanley processing your personal data and using cookies in accordance with our Privacy Policy and our Global Cookies Policy (http://www.morganstanley.com/privacy_pledge.html), including for the purposes of setting your preferences and to collect readership data so that we can deliver better and more personalized service and products to you. To find out more information about how Morgan Stanley processes personal data, how we use cookies and how to reject cookies see our Privacy Policy and our Global Cookies Policy (http://www.morganstanley.com/privacy_pledge.html).

If you do not agree to our Terms of Use and/or if you do not wish to provide your consent to Morgan Stanley processing your personal data or using cookies please do not access our research.

Morgan Stanley Research does not provide individually tailored investment advice. Morgan Stanley Research has been prepared without regard to the circumstances and objectives of those who receive it. Morgan Stanley recommends that investors independently evaluate particular investments and strategies, and encourages investors to seek the advice of a financial adviser. The appropriateness of an investment or strategy will depend on an investor's circumstances and objectives. The securities, instruments, or strategies discussed in Morgan Stanley Research may not be suitable for all investors, and certain investors may not be eligible to purchase or participate in some or all of them. Morgan Stanley Research is not an offer to buy or sell or the

solicitation of an offer to buy or sell any security/instrument or to participate in any particular trading strategy. The value of and income from your investments may vary because of changes in interest rates, foreign exchange rates, default rates, prepayment rates, securities/instruments prices, market indexes, operational or financial conditions of companies or other factors. There may be time limitations on the exercise of options or other rights in securities/instruments transactions. Past performance is not necessarily a guide to future performance. Estimates of future performance are based on assumptions that may not be realized. If provided, and unless otherwise stated, the closing price on the cover page is that of the primary exchange for the subject company's securities/instruments.

The fixed income research analysts, strategists or economists principally responsible for the preparation of Morgan Stanley Research have received compensation based upon various factors, including quality, accuracy and value of research, firm profitability or revenues (which include fixed income trading and capital markets profitability or revenues), client feedback and competitive factors. Fixed Income Research analysts', strategists' or economists' compensation is not linked to investment banking or capital markets transactions performed by Morgan Stanley or the profitability or revenues of particular trading desks.

The "Important Regulatory Disclosures on Subject Companies" section in Morgan Stanley Research lists all companies mentioned where Morgan Stanley owns 1% or more of a class of common equity securities of the companies. For all other companies mentioned in Morgan Stanley Research, Morgan Stanley may have an investment of less than 1% in securities/instruments or derivatives of securities/instruments of companies and may trade them in ways different from those discussed in Morgan Stanley Research. Employees of Morgan Stanley not involved in the preparation of Morgan Stanley Research may have investments in securities/instruments or derivatives of securities/instruments of companies mentioned and may trade them in ways different from those discussed in Morgan Stanley Research. Derivatives may be issued by Morgan Stanley or associated persons.

With the exception of information regarding Morgan Stanley, Morgan Stanley Research is based on public information. Morgan Stanley makes every effort to use reliable, comprehensive information, but we make no representation that it is accurate or complete. We have no obligation to tell you when opinions or information in Morgan Stanley Research change apart from when we intend to discontinue equity research coverage of a subject company. Facts and views presented in Morgan Stanley Research have not been reviewed by, and may not reflect information known to, professionals in other Morgan Stanley business areas, including investment banking personnel.

Morgan Stanley Research personnel may participate in company events such as site visits and are generally prohibited from accepting payment by the company of associated expenses unless pre-approved by authorized members of Research management.

Morgan Stanley may make investment decisions that are inconsistent with the recommendations or views in this report.

To our readers based in Taiwan or trading in Taiwan securities/instruments: Information on securities/instruments that trade in Taiwan is distributed by Morgan Stanley Taiwan Limited ("MSTL"). Such information is for your reference only. The reader should independently evaluate the investment risks and is solely responsible for their investment decisions. Morgan Stanley Research may not be distributed to the public media or quoted or used by the public media without the express written consent of Morgan Stanley. Any non-customer reader within the scope of Article 7-1 of the Taiwan Stock Exchange Recommendation Regulations accessing and/or receiving Morgan Stanley Research is not permitted to provide Morgan Stanley Research to any third party (including but not limited to related parties, affiliated companies and any other third parties) or engage in any activities regarding Morgan Stanley Research which may create or give the appearance of creating a conflict of interest. Information on securities/instruments that do not trade in Taiwan is for informational purposes only and is not to be construed as a recommendation or a solicitation to trade in such securities/instruments. MSTL may not execute transactions for clients in these securities/instruments.

Morgan Stanley is not incorporated under PRC law and the research in relation to this report is conducted outside the PRC. Morgan Stanley Research does not constitute an offer to sell or the solicitation of an offer to buy any securities in the PRC. PRC investors shall have the relevant qualifications to invest in such securities and shall be responsible for obtaining all relevant approvals, licenses, verifications and/or registrations from the relevant governmental authorities themselves. Neither this report nor any part of it is intended as, or shall constitute, provision of any consultancy or advisory service of securities investment as defined under PRC law. Such information is provided for your reference only.

Morgan Stanley Research is disseminated in Brazil by Morgan Stanley C.T.V.M. S.A. located at Av. Brigadeiro Faria Lima, 3600, 6th floor, São Paulo - SP, Brazil; and is regulated by the Comissão de Valores Mobiliários; in Mexico by Morgan Stanley México, Casa de Bolsa, S.A. de C.V which is regulated by Comision Nacional Bancaria y de Valores. Paseo de los Tamarindos 90, Torre 1, Col. Bosques de las Lomas Floor 29, 05120 Mexico City; in Japan by Morgan Stanley MUFG Securities Co., Ltd. and, for Commodities related research reports only, Morgan Stanley Capital Group Japan Co., Ltd; in Hong Kong by Morgan Stanley Asia Limited (which accepts responsibility for its contents) and by Morgan Stanley Asia International Limited, Hong Kong Branch; in Singapore by Morgan Stanley Asia (Singapore) Pte. (Registration number 199206298Z) and/or Morgan Stanley Asia (Singapore) Securities Pte Ltd (Registration number 200008434H), regulated by the Monetary Authority of Singapore (which accepts legal responsibility for its contents and should be contacted with respect to any matters arising from, or in connection with, Morgan Stanley Research) and by Morgan Stanley Asia International Limited, Singapore Branch (Registration number T11FC0207F); in Australia to "wholesale clients" within the meaning of the Australian Corporations Act by Morgan Stanley Australia Limited A.B.N. 67 003 734 576, holder of Australian financial services license No. 233742, which accepts responsibility for its contents; in Australia to "wholesale clients" and "retail clients" within the meaning of the Australian Corporations Act by Morgan Stanley Wealth Management Australia Pty Ltd (A.B.N. 19 009 145 555, holder of Australian financial services license No. 240813, which accepts responsibility for its contents; in Korea by Morgan Stanley & Co International plc, Seoul Branch; in India by Morgan Stanley India Company Private Limited; in Canada by Morgan Stanley Canada Limited, which has approved of and takes responsibility for its contents in Canada; in Germany and the European Economic Area where required by Morgan Stanley Europe S.E., authorised and regulated by Bundesanstalt fuer Finanzdienstleistungsaufsicht (BaFin) under the reference number 149169; in the US by Morgan Stanley & Co. LLC, which accepts responsibility for its contents. Morgan Stanley & Co. International plc, authorized by the Prudential Regulatory Authority and regulated by the Financial Conduct Authority and the Prudential Regulatory Authority, disseminates in the UK research that it has prepared, and approves solely for the purposes of section 21 of the Financial Services and Markets Act 2000, research which has been prepared by any of its affiliates. RMB Morgan Stanley Proprietary Limited is a member of the JSE Limited and A2X (Pty) Ltd. RMB Morgan Stanley Proprietary Limited is a joint venture owned equally by Morgan Stanley International Holdings Inc. and RMB Investment Advisory (Proprietary) Limited, which is wholly owned by FirstRand Limited. The information in Morgan Stanley Research is being disseminated by Morgan Stanley Saudi Arabia, regulated by the Capital Market Authority in the Kingdom of Saudi Arabia , and is directed at Sophisticated investors only.

The information in Morgan Stanley Research is being communicated by Morgan Stanley & Co. International plc (DIFC Branch), regulated by the Dubai Financial Services Authority (the DFSA), and is directed at Professional Clients only, as defined by the DFSA. The financial products or financial services to which this research relates will only be made available to a customer who we are satisfied meets the regulatory criteria to be a Professional Client.

The information in Morgan Stanley Research is being communicated by Morgan Stanley & Co. International plc (QFC Branch), regulated by the Qatar Financial Centre Regulatory Authority (the QFCRA), and is directed at business customers and market counterparties only and is not intended for Retail Customers as defined by the QFCRA.

As required by the Capital Markets Board of Turkey, investment information, comments and recommendations stated here, are not within the scope of investment advisory activity. Investment advisory service is provided exclusively to persons based on their risk and income preferences by the authorized firms. Comments and recommendations stated here are general in nature. These opinions may not fit to your financial status, risk and return preferences. For this reason, to make an investment decision by relying solely to this information stated here may not bring about outcomes that fit your expectations.

Indicators and trackers referenced in Morgan Stanley Research may not be used as, or treated as, a benchmark under Regulation EU 2016/1011, or any other similar framework.

Morgan Stanley

The Americas
1585 Broadway
New York, NY 10036-8293
United States
Tel: +1 (1) 212 761 4000

Europe
20 Bank Street, Canary Wharf
London E14 4AD
United Kingdom
Tel: +44 (0) 20 7 425 8000

Japan
1-9-7 Otemachi, Chiyoda-ku
Tokyo 100-8104
Japan
Tel: +81 (0) 3 6836 5000

Asia/Pacific
1 Austin Road West
Kowloon
Hong Kong
Tel: +852 2848 5200