Intelligent Forecasting

USING MACHINE LEARNING AND EXTERNAL DATA TO SEE WHAT LIES AHEAD FOR YOUR BUSINESS

prevedere

TABLE OF CONTENTS

The Certainty of Uncertainty

You pour a cup of coffee and pull up *The Wall Street Journal* on your phone. Scrolling down, you see that stocks fell sharply. A Fed official is urging Congress to plan for a recession. Consumer sentiment is holding steady, but housing starts have begun to slide. E-commerce sales have reached their highest level ever. And there are rumors of a new trade war.

What does all this mean for your business? And do you need to reevaluate your forecast?

Fortunately, recent technological advances make it possible to predict how economic, industry, and consumer trends will impact future business outcomes.

It's an approach called *Intelligent Forecasting*, and it's already changing how companies forecast performance and strengthen outcomes.

Read on to learn about:

1. The blind spot in traditional forecasting methods
2. The value of tapping into the leading signals in economic and other external data
3. How predictive econometric models can improve forecast accuracy and timeliness
4. How companies are using intelligent forecasting to strengthen business outcomes

The Trouble with Traditional Forecasting Methods

Many companies struggle with forecasting. Traditional approaches take too long, require tedious manual work, and, most problematically, don't yield correct findings. KPMG reports that the average company forecast is off by 13%. Some of the biggest shortcomings of old-school forecasting methods include:

ASSUMING STABILITY

A common forecasting practice is to apply this year's growth rate to next year's forecast. But, as any financial advisor will tell you, "Past performance is no guarantee of future results." This approach works only if the market is stable. That's a risky assumption given the volatility of today's business environment.

GUESSES AND GAMES

Some forecasts draw more on fiction than fact. People often rely on their own biases and pet theories or the overly optimistic projections of channel partners or customers. Sandbagging, hockey-sticking, and kingdom-building are common forecasting challenges. Bottoms-up processes only compound the errors they create.

INTERNAL VIEW ONLY

Many forecasts are built on historical company data and account only for internal levers like product, pricing, promotions, and distribution. External factors, when considered, are generally broad economic measures like GDP or interest rates. And they're included in PowerPoint presentations, not systematically in the forecasting process.

The High Cost of a Bad Forecast

Faulty forecasts are damaging to any business.

▶▶ **Forecast too high** and you risk higher costs that eat into profits. Discounting to boost sales, money tied up in excess inventory, facilities that are over-staffed and under-utilized all put pressure on the bottom line.

▶▶ **Forecast too low** and you leave money on the table. Stockouts mean you lose not just the initial purchase but add-on sales as well. Competitors can gain market share at your expense. And you may incur extra costs to ramp up production or expedite shipping.

▶▶ **Missing a forecast** also shakes shareholder confidence. Every earnings season double-digit drops in stock value underscore the dangers of falling short of expectations.

Every 1% error in forecast results in $30 million in lost profits per year for the average Fortune 2000 company, according to the Institute of Business Forecasting.

The Big Blind Spot

Internal data and internal factors are important in forecasting. But they don't provide a complete picture of what's driving business outcomes.

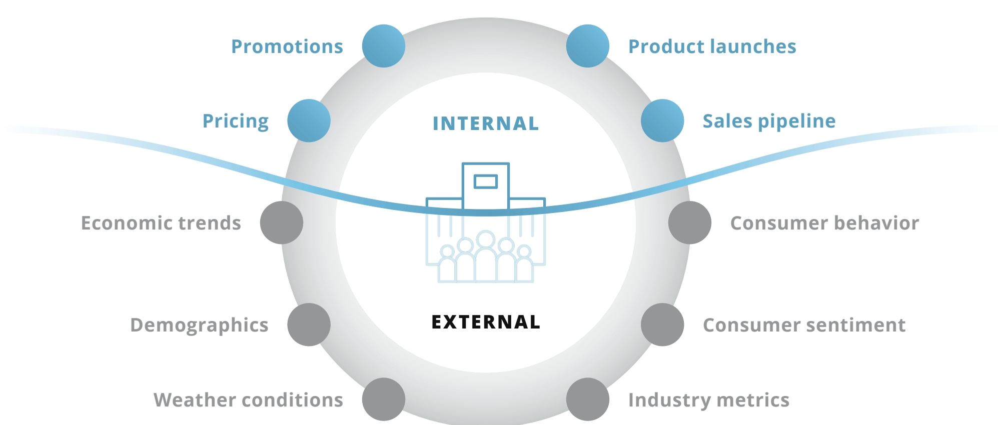
External factors matter, too.

Macroeconomic trends, changing consumer behaviors, demographic shifts, a disruption in the supply chain, the rise and fall of the stock market. Any of these external dynamics can drive revenue up or down.

In fact, the external market environment can influence business outcomes even more than internal drivers.

For large companies, external factors can influence up to 85% of business performance, according to Harvard Business Review. This may be why "unexpected changes in capital markets and economic conditions" is the most frequently cited risk factor in 10-K reports.

Forecasts have a major blind spot when they don't account for external factors, which influence up to 85% of business performance.



Tapping into External Data

A study by Prevedere found that 66% of C-level executives believe that incorporating external data will significantly improve financial forecasting. And yet 69% say most of their planning and forecasting processes fail to incorporate external data.

What's the holdup?

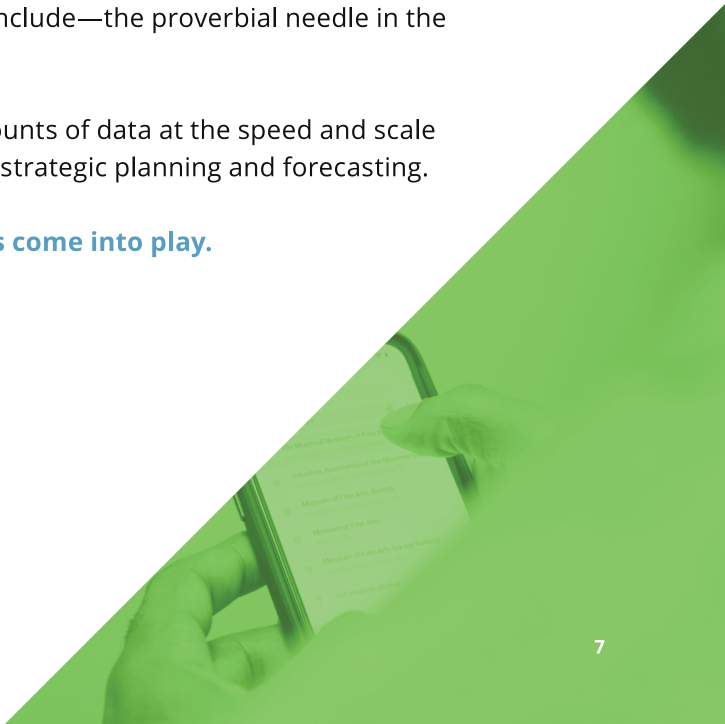
Twenty years ago, the difficulty was lack of data.

Today, the opposite is true. As of right now, in 2020, there are about 40 trillion gigabytes of data. Tomorrow, another 2.5 quintillion bytes of data will be generated and by 2025 this figure will increase five-fold.

For companies that want to account for external factors in their forecasts the challenge is finding the RIGHT external data to include—the proverbial needle in the haystack.

This requires being able to analyze massive amounts of data at the speed and scale needed to deliver timely, actionable insights for strategic planning and forecasting.

That's where intelligent forecasting solutions come into play.



Intelligent Forecasting with External Data

If intelligent forecasting is the future, then the future is already here.

Advances like machine learning, advanced algorithms, cloud computing, and Big Data have made intelligent forecasting a reality.

Intelligent forecasting solutions give you the ability to systematically identify and quantify the influence of economic and other external factors on future business outcomes.

It's a breakthrough that increases the accuracy, efficiency, and timeliness of planning and forecasting. And its impact is being felt across the enterprise, from the Senior Executive team to FP&A and the Office of the CFO to Operations, Marketing, and Sales.

Accounting for the influence of external factors in the forecasting and planning process involves four basic steps:

1. Identify relevant leading indicators
2. Establish the economic baseline
3. Inform the forecasting process
4. Refresh forecasts to monitor risk

TRADITIONAL FORECASTING	INTELLIGENT FORECASTING
Manual	Automated
Internal Data	External and Internal Data
Time Consuming	Objective
Static	Constantly Updating
One-Offs	Repeatable at Scale

STEP 1

Identify Leading Indicators

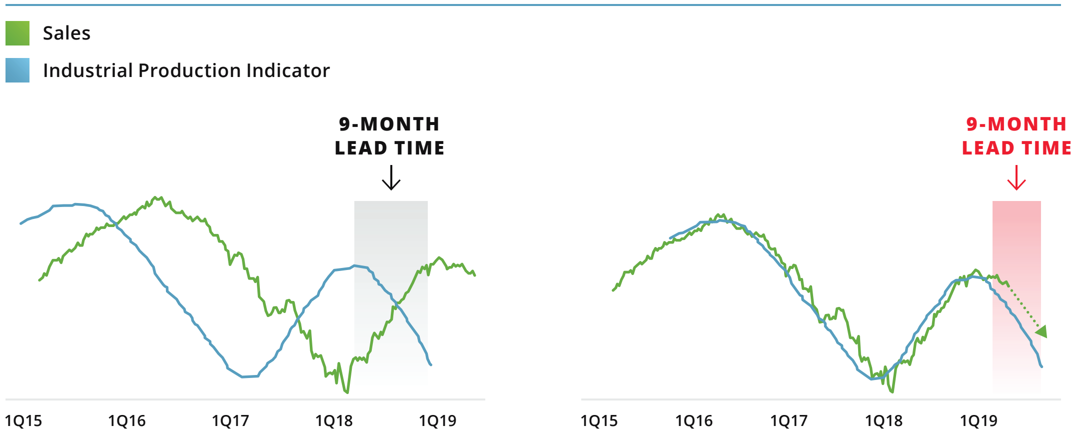
Within a world of external data are a handful of indicators that your business can use to effectively predict future performance. They are tightly correlated with your business cycles, either positively or negatively, and generally have a lead time of one to 12 months.

Leading indicators provide valuable clues to changing economic and market conditions that will push future sales up or down. For example, a sudden downturn in an indicator that leads your business by nine months is a sign of likely headwinds three quarters from now.

Identifying your unique leading indicators significantly improves the ability to plan and forecast. First, you will have a new understanding of the external factors driving business performance. Second, these leading indicators are inputs to predictive econometric models that forecast what lies ahead for your business.

Modern intelligent forecasting solutions can isolate the right leading indicators for your business in minutes using the power of cloud computing and advanced correlation analysis.

Leading indicators signal what lies ahead for your business and are a key input to an intelligent forecast.



Examples of Leading Indicators

Each company, each brand, each product has a unique set of leading indicators which are events that most consistently happen in advance of the company's own change in performance. Wages typically increase before consumers are willing to make significant purchases of durable goods. Drivers travel significant distances before they purchase new tires. And warehouse inventories typically fall before companies increase their production levels.

By identifying the unique leading indicators for a given company or product, Prevedere can accurately and consistently forecast future changes in business performance.

Examples of leading indicators for two very different businesses

MANUFACTURER OF PROPANE TANKS

Sample Indicator	*Lead Time (in Months)*	
Employment in Garden Supply Stores →	3	Increased overall spending on yard and garden supplies demonstrated an increased desire and willingness to spend on outdoor activities, including new grills and replacement tanks.
Number of Employees: Bars, Taverns and Nightclubs →	6	While the nightclubs may not be purchasing propane tanks directly, employment in this sector suggests increased spending on all recreation, leisure, and personal consumption items including those associated with propane tanks.
Number of Employees: Recreational and Vacation Camps →	6	Camp hiring and spending is more directly related to the purchase of propane tanks as both are directly driven in part by outdoor recreation activities.
Propane Sales by Firms that Produce, Import or Transport Propane →	9	Again, a relatively direct relationship between increased sales of propane, resulting in a drop in established inventories of propane tanks, reflecting the nine-month delay in the production and purchases of new tanks.

AUTOMOTIVE GOODS RETAILER

Leading Indicator	*Lead Time (in Months) and Relevance*	
Total Private Construction Spending →	6	Construction Spending reflects the overall strength of an economy. Retail spending is higher in stronger economies and lower in weaker times. Using as a leading indicator of retail spending on automotive parts may be especially effective as there is often a direct relationship between the construction industry and do-it-yourself automotive repairs.
Vehicle Miles Traveled →	9	There is an obvious and direct relationship between the amount people drive and their future need for automotive goods. Tracking miles driven, as reported by the Census Bureau, is a very effective signal for future sales of these goods.
Total Weather Events: Heavy Snow →	1 & 5	In specific geographies significant winter weather events result in the need for driving assistance supplies including tire chains. This urgent need will bring large numbers of people into the store to purchase the chains, then a slightly smaller number of people will return four months later to return the subsequently unused chains. Both visits will include significant add on purchases, contributing to the overall revenue numbers.

”

Companies with leading indicators achieve 2.95% higher Return on Assets and 4.15% higher Return on Equity.

WHARTON SCHOOL OF BUSINESS
AT THE UNIVERSITY OF PENNSYLVANIA

STEP 2

Establish Economic Baseline

Econometric modeling takes the signals from leading indicators to predict what lies ahead for your business.

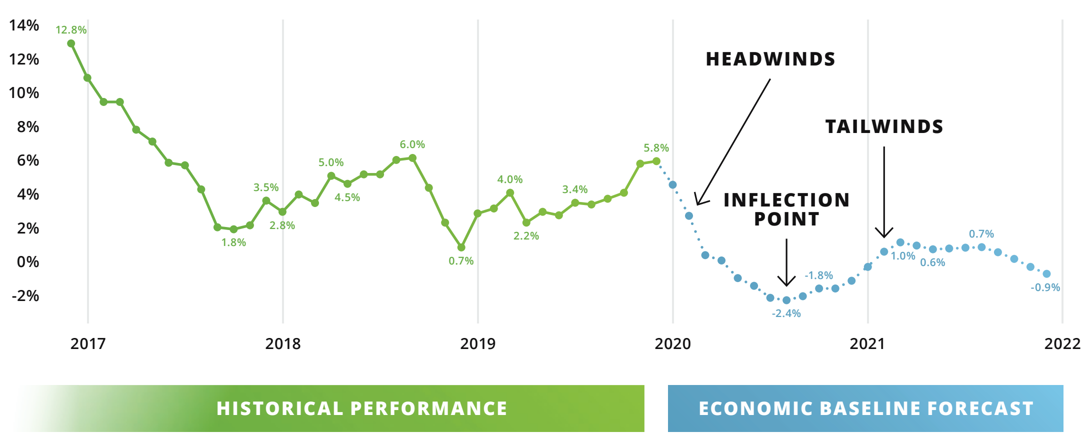
The resulting forecasts, called economic baseline forecasts, quantify the combined impact of your top external drivers. They offer an objective view of future business outcomes (for example, sales by dollar or volume) based on current economic, industry, and consumer trends.

As a result, you can anticipate market swings with a precision and lead time never before possible. You can predict when tailwinds will lift the business, when headwinds will dampen demand, and the inflection point between the two.

Models can look 12 to 18 months out to support next fiscal year's forecast and operating budget. Or, they can provide a 3-year CAGR projection to inform strategic planning and target setting.

See future headwinds and tailwinds with an intelligent forecast based on economic and other market data.

THREE PERIOD YEAR / YEAR FORECAST



”

We have found that having a machine learning forecast solution as a guardrail to our business has improved our forecast accuracy and our ability to better guide resources.

VICTOR CASALINO
CFO, Microsoft Americas

STEP 3

Inform the Forecasting Process

An economic baseline forecast is a barometer of where external factors are driving your business. It is not a replacement for internally developed forecasts. Nor will it ever be 100 percent precise. But it is a valuable input to the business planning and forecasting process for these reasons.

▶▶ **Driven by Data:** An objective economic outlook is a valuable complement—and at times counterweight—to forecasts built on biases, guesswork or overly rosy inputs from customers. As one CFO puts it, "a fact-based baseline takes a lot of the smoke out of the planning process." It also encourages smarter discussions and negotiations about "the right numbers." The result is a tighter forecast that people have more confidence in.

▶▶ **No More Blind Spots:** Business leaders have a deeper, more complete view of underlying business drivers, both internal *and* external. They can forecast more accurately when guided by a performance baseline that incorporates market and economic conditions and combines the internal view with the external view. This kind of performance baseline paints a better near-term picture while providing clearer visibility into the mid to longer term, which results in a more accurate consensus forecast.

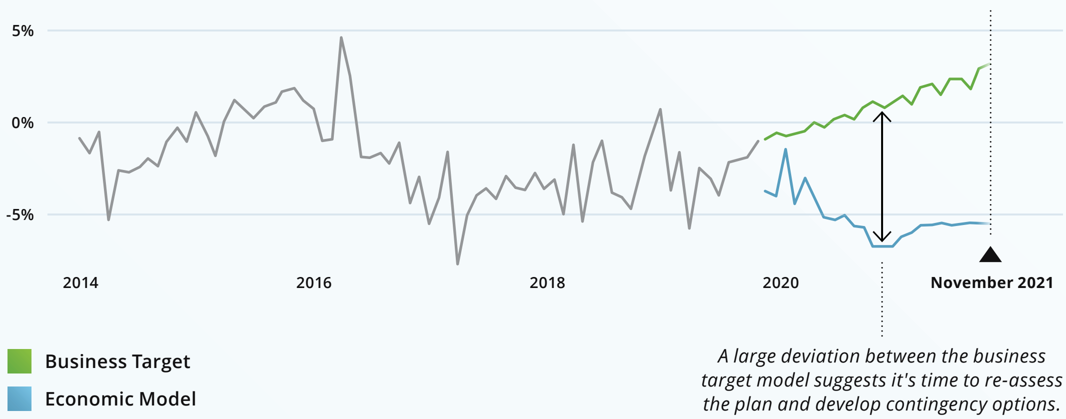
▶▶ **Course Corrections:** The economic baseline is an effective tool for verifying or adjusting growth plans. You can identify areas of risk by comparing a business target with the economic model. Is the target too aggressive? Or not ambitious enough? What actions can the business take now to mitigate risk? Companies can get a real performance lift by responding proactively to upcoming threats and opportunities.

The most accurate forecasts combine internal and external inputs for a more complete view of the future.

Solving for the Future

PROJECTION SCENARIOS

How does my plan compare to the economic model?



You can be more proactive than competitors and deliver more predictable results when you have a clearer view of what lies ahead.

Headwinds Coming?

Take steps to protect profitability, for example:

- Use pricing and promotions to bolster sales
- Optimize supply chain and reduce inventory
- Incent channel partners

Tailwinds Ahead?

Invest to capitalize on growth opportunities, for example:

- Increase marketing spend to capture share
- Ramp up production to meet demand
- Get channel partners ready

STEP 4

Refresh to Monitor Risk

The value of an econometric model compounds over time.

Traditional forecasts—built manually and based on human assumptions—can quickly grow stale in today's dynamic business environment. And if conditions change? You have to start all over.

In contrast, an econometric model lives on for months, even years. What's more, the model automatically gets better over time as it's updated with new data and machine learning kicks in.

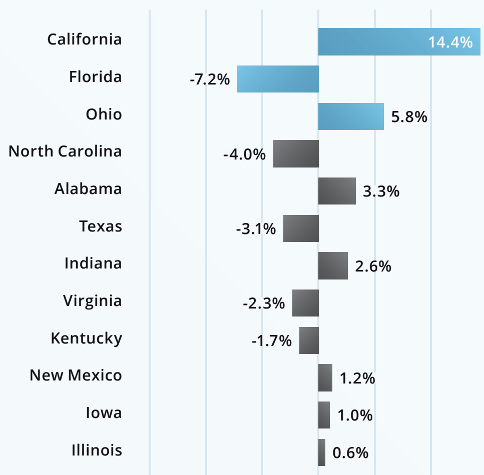
Economic baseline forecasts can be refreshed in sync with your planning and forecasting cycle, whether it be monthly, quarterly, or annually. This lets you test planning assumptions and stay alert to the early signs of shifting market conditions.

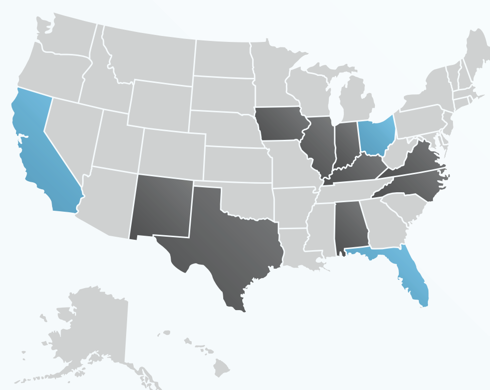
For more immediate and ongoing insights, executive dashboards display economic forecasts that automatically refresh as new indicator data is released. This gives business leaders a real-time view of emerging risks and opportunities and their potential impact on future financial performance.

Real-time risk monitoring helps business leaders allocate resources in response to changing economic conditions.

RISK BY AREA

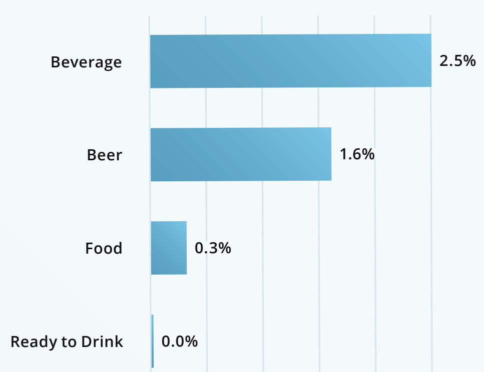
What are the geographies that have the highest delta between my business target and the economic model?





RISK BY CATEGORY

What are the segments that have the highest delta between my business target and the economic model?



RISK BY AREA & CATEGORY

Area	*At Risk*	*Category*	*Risk*	*Business Impact*
CA	●	Beverage	21.2%	$4,441.8M
FL	●	Beer	-7.2%	($79.5M)
OH	●	Food	5.8%	$3.0M
IA		Food	4.8%	$20.6M
NC		Beer	-4.2%	($9.6M)
TX		Beer	-3.9%	($5.9M)
NC		Food	-3.8%	($8.1M)
VA		Beer	-3.5%	($189.3M)
AL		Beverage	3.3%	$7.6M

Opportunities for Intelligent Forecasting

There are many opportunities for intelligent economic-based forecasts to increase value and precision in business planning and forecasting processes. These are the most common applications.

EXECUTIVE TEAM	**Strategic Planning**	Set smarter 3- to 5-year growth targets and better allocate resources across a diverse business portfolio
FINANCE	**Planning and Forecasting**	Forecast with greater accuracy, efficiency, and timeliness and sharpen capital allocation decisions
OPERATIONS	**Demand Planning**	Anticipate swings in end-market demand to optimize the supply chain and reduce costs
MARKETING	**Marketing Planning**	Identify the products, markets, and quarters that need additional marketing investment
SALES	**Sales Forecasting**	Build more realistic sales forecasts and align sales resources to maximize growth opportunities
INVESTOR RELATIONS	**Guidance**	Set expectations for future performance with more credibility and confidence

Prevedere's Solution for Intelligent Forecasting

Prevedere is at the forefront of enabling intelligent forecasting with external data. The Prevedere platform applies the power of advanced algorithms, machine learning, and cloud computing to derive predictive insights from the best of the world's economic, consumer, and industry indicators.

MILLIONS OF INDICATORS

In our massive repository of external data, we've collected over 3.5 million indicators from more than 250 trusted sources around the world. They cover just about any external factor that might influence your business, from macroeconomic trends to online activity to consumer behavior. We clean and tag all data series so they're model-ready and update them continuously so forecasts always reflect the latest market realities.

ECONOMETRIC MODELING IN THE CLOUD

The Prevedere platform features two major innovations that make it possible to deliver business-specific forecasts fast and at scale.
First, our correlation engine quickly identifies relevant indicators from among millions of data series using the computing power of the cloud.
Second, a patented genetic algorithm generates the optimal forecast model for your business in less than 30 minutes—even with testing and scoring thousands of combinations of indicators to determine the best one.

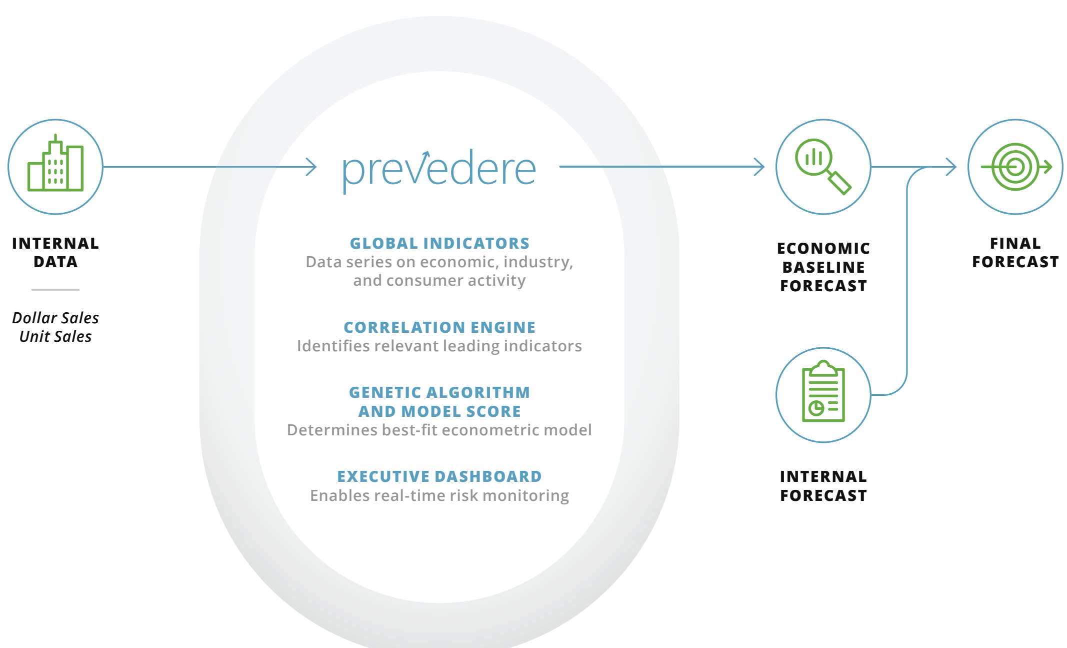
PREVEDERE'S SOLUTION FOR INTELLIGENT FORECASTING

EXECUTIVE DASHBOARDS

Always on, self-monitoring dashboards deliver insights to executives so the benefits of intelligent forecasting can be realized enterprise wide. The dashboards are all about real-time risk monitoring. Business targets are compared with economic forecasts and areas of risk are highlighted and quantified. Insights and forecasts from Prevedere can also be integrated into popular analytics tools and functional planning systems.

ECONOMISTS AND DATA SCIENTISTS

Our team of senior economists and data scientists help companies build their intelligent forecasting capabilities. They are experts in econometric modeling and can develop, review, interpret, and maintain custom forecasts. Our economists will deliver detailed reviews of the impact of global economic trends on an industry or business. For many customers, these PEIRs (Prevedere Economic Intelligence Reviews) are a regular part of their quarterly planning cycle.



Prevedere's models have predicted actual sales with an accuracy of 98%+ when backtested.

Succeeding in a Volatile Environment

The Prevedere solution has delivered the benefits of economic insights and intelligent forecasting to companies in a wide range of industries, including consumer products, retail, and manufacturing.

HERE ARE JUST A FEW EXAMPLES:

HEDGING AGAINST A SLOWDOWN AT A SPECIALTY RETAILER

How long can a product line keep growing at 20%? That was the question facing executives at a leading specialty retailer. Turns out, the product line was targeted at 18- to 24-year old women and leading indicators signaled that these consumers were getting squeezed. Prevedere's economic model projected a lower 8% growth rate, which represented a $300 million revenue miss. With this market risk exposed, the executive team put contingency plans in place for pricing and promotions and a stronger focus on online sales.

TAKEAWAY →
It can be politically tough to adjust a growth rate downwards. An objective, market-driven forecast can help leadership land on a realistic target. And if the forecast projects an unexpected softening in the market, people can take steps to protect profitability during the downturn.

> “Market indicators give us a much better directional sense of where the business is going.”
>
> — DIVISION CFO

PREDICTING MARKET SWINGS AT AN INDUSTRIAL MANUFACTURER

When the energy market took a dive in 2016, this manufacturer was caught off-guard. Demand dropped dramatically and the company was left with a sizable investment in unsold inventory. Now the manufacturer uses Prevedere to predict and prepare for market swings. Demand outlooks for the company's primary end markets (Energy, Automotive, and Commercial Construction) increase forecast accuracy. And supply chain executives have better information to manage inventory, production levels, and logistics.

TAKEAWAY →

Forecasting is tricky for manufacturers because they're often several steps removed from their end markets. Econometric models help manufacturers get a handle on what's driving end-market demand and when that demand is likely to increase or decrease over the next 12 to 24 months.

> The risk of having too much inventory is reduced, which has a positive impact on our use of working capital.
>
> — VICE PRESIDENT, CORPORATE STRATEGY & INVESTOR RELATIONS

PREDICTIONS COME TRUE AT A GLOBAL BEVERAGE COMPANY

In 2016, a world leader in premium beverages experienced a significant slowdown in sales despite a strong economy. Why? For answers, the North America CFO turned to Prevedere to determine the external factors driving beverage sales. Since then, Prevedere's econometric models accurately predicted a softening in the market in 2017 and a turnaround in 2018. The company has adopted Prevedere in its European and Asian operations and uses insights into future headwinds and tailwinds to optimize production, pricing, and marketing spend.

TAKEAWAY →

A strong economy doesn't always mean smooth sailing ahead. Business performance can be influenced by less obvious underlying drivers that may not be in sync with macroeconomic trends. Forecasts based on your unique leading indicators are a better predictor of future sales.

> I am able to maximize opportunities where the forecast is upbeat and minimize the impact where it isn't.
>
> — NORTH AMERICA CFO

Are You Ready for Intelligent Forecasting?

Econometric modeling is a game-changer when systematically embedded in forecasting processes and made available as an always-on tool for strategic decision making. Your business will be able to see what lies ahead, solve for future external risks and opportunities, and succeed in an ever-changing world.

READY TO GIVE IT A TRY?

Here are some questions to get you thinking:

1. Has your business ever been caught off-guard by a sudden market swing?
2. Are you missing forecasts and it's not clear why?
3. Do you worry about sandbagging in sales forecasts?
4. Are faulty forecasts causing costly inventory stockouts or stockpiles?
5. How confident are you in next year's forecast?

Getting Started

A Prevedere ***Proof of Value*** can demonstrate the power of intelligent forecasting with economic and other external data.

Working closely with your leadership team, we identify a discrete business problem that would benefit from better forecasting.

A good starting point is a model that predicts top-line performance for your largest business unit, product category, or geographic market. You will get actionable insights quickly and a chance to see what lies ahead for your business.

We would love to talk with you.

888.686.7746 or **inquiries@prevedere.com**

SEE

how economic activity
impacts performance

SOLVE

for upcoming risks
and opportunity

SUCCEED

with stronger, more
predictable results

prevedere