The problem with financial forecasting

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Our fixation with predictions is present in most areas of our lives. That is the case with weather forecasts, the stock market, sports games, business decisions and even everyday life decisions such as life insurance or when to cross the street. But how can we ensure that our forecasts are more accurate?

The short answer is a framework, based on probabilistic thinking, which is corrected and realigned with each new information and later analyzed and improved. We will skip the quantum and Bayesian concepts underpinning this framework, but highlight the fact, that this framework is very much at work in the unconscious part of the human brain, making probability adjusted decisions in many everyday situations like catching a ball or driving a car.

The problem is that the part of the brain that we use for predicting the stock market, the economy, business decisions etc. is NOT based on this kind of thinking.

Our rational mind is flawed with bias and ego. People are over-confident about their predictions, and they do not want to be wrong. These problems can sabotage objective rationalization, disregard relevant metrics and generate misinterpretations about the future.

The good news is that the right framework for predicting can be taught and the advent of complex machine learning models can greatly assist the human brain in robust decision making.

The future is unknown

We make forecasts all the time, either mapping our next career steps or choosing investments. Overall, our forecasts reflect our expectations about how the future will be.

Despite this, the predictions are limited since unknown events can lead to unintended consequences. Uncertainty arises since the future can have many outcomes a priori but only one realized state. By viewing the world through probabilities one can determine the most probable future state of the world, the path of least resistance, and scale one's decisions in accordance with the probability of a specific state materializing.

This approach increases the chance of being right, but never eliminates the risk of being wrong!

We live in a complex world in which even a seemingly small happenings can instigate great events. Again, we will skip the theoretical underpinnings of why it is so difficult to predict this kind of event, but a classic example of chaos theory called 'the butterfly effect' have some explanatory merit:

American meteorologist Edward Lorenz discovered that in non-linear systems like Earth's atmosphere, even tiny changes can have a considerable impact. If the wind trajectory changes by a small fraction, the long-term climate patterns can change drastically. Explaining more dramatically:

'If a butterfly flaps its wings in Brazil, it can cause a hurricane in Texas.'

Forecasts need to be assessed with rigor

Despite the limitations, we should not rule out or ignore the importance of predictions. Let's think about meteorology for example. Weather forecasts are relatively reliable when made a few days earlier. That is because meteorologists analyze the accuracy of

their predictions after the event. By comparing their forecasts with real-time weather, they can better understand how the weather works.

The problem is that people in other areas usually do not measure the accuracy of their predictions.

So, to improve our predictions, we need to work on precision and seriously compare what we think would happen, with what happened and that means compromising the metrics.

For example, until the mid-20th century, the medical field was filled with experts who relied on their years of experience and believed in their many different types of therapies and treatments.

But many of them proved incorrect, and some caused more harm than good.

The emergence of an evidence-based medicine proved challenging for those doctors who relied on their experiences.

They were exceptionally resistant to the tests since they considered them unethical.

The problem here is that feeling right is not the same as being right. So relying on data and metrics is a useful way to do away with any information bias we have as humans.

Percentages and accuracy in forecasts

Measuring forecasts is not as easy as it sounds. In addition to collecting forecasts, judging accuracies and making calculations, there are a number of factors to consider.

To ensure the accuracy of a forecast, you must first understand the meaning of the original forecast and the associated realization horizon.

For example, in April, 2007, media outlets reported that Microsoft's CEO, Steve Ballmer, had made a prediction: the iPhone would fail to win a significant market share. Considering Apple's size, Ballmer's forecast seemed ridiculous, and people

literally laughed at him. Others highlighted the fact that Apple controlled 42 percent of the US smartphone market, an undeniably significant number.

But let's take a look at what he actually said.

He said that, indeed, the iPhone might generate a lot of money; however, it would never gain a significant market share in the *global* cell-phone market (his prediction: between two and three percent). Rather, the software from his company, Microsoft, would come to dominate. And this prediction was, more or less, correct within a reasonable horizon from the date of the prediction.

According to Garner IT data, iPhone's global share of mobile phone sales during the third quarter of 2013 sat at around six percent, which is clearly higher than what Ballmer predicted – but it's not way off. Meanwhile, Microsoft's software was being used in the majority of cell phones sold worldwide.

Predictions should also avoid vague language and need to use numbers to increase accuracy.

Vague words such as "could", "maybe" or "probably" are common in predictions, but surveys show that people attribute different meanings to words like these.

Therefore, those who make the predictions need to speak in the most accurate way possible using percentages for example.

Consider how American intelligence organizations like the NSA and the CIA claimed that Saddam Hussein was hiding weapons of mass destruction – a claim that proved utterly untrue.

If these intelligence agencies had accurately calculated and used percentages, the United States might not have invaded Iraq.

If there was a 60% chance of Iraq having WMDs, there would still be a 40% counter-chance – an absurd justification for starting a war.

Good forecasters always have a base rate

Because each situation is unique, you need to avoid rushing judgment in a case. The best way to approach any question is to adopt an outlook. It means discovering the initial probability of an event.

For example, imagine an Italian family living in a modest home in the United States. The father works as a librarian and the mother has a part-time job in a daycare center. They live with their children and their grandmother.

If you were asked what the chances are that this Italian family owns a pet, you could try to answer the question by thinking about the details of their life situation. But if you think so, you can skip some important things!

Rather than looking at the details first, you should start by researching the percentage of American households that own a pet. In a few seconds, thanks to Google, you will find that this figure is 62%. That is your outward vision.

By doing so, you can now take an inner view. It will give you the details to adjust your percentage correctly.

In this example of the Italian family, starting with the outside view gives you an initial estimate: There's about 62% chance that this family will own a pet. Then you can be more specific and adjust this value. For example, you can check the rate of Italian families living in the United States who own pets.

The reason behind this outward vision comes from a concept called 'anchoring'. An anchor is an initial value, before any adjustment. If instead, you start with deeper details, your prediction will probably be far from any anchor or precise value.

The characteristics of good forecasts

- The predictions should be clear; it should be easy for any observer to agree or disagree with you.
- They need to have a concrete date for accomplishment. Predictions like 'unemployment will decrease with stimuli' do not make it clear when this will happen.

- They must be probabilistic. For predictions to be used as a basis for decisions, it is important to know their level of confidence and to gauge confidence when necessary.
- They should use numbers specific to the probabilities.
- Many mistakes can happen when different people assign different meanings to phrases like 'there is a great possibility that this will happen …' with interpretations ranging from 20% to 80% chance.
- Making multiple predictions is important. Considering partial knowledge and probabilistic events, there is no way to judge whether your prediction of '70% chance of rain' was wrong or you were unlucky. With large amounts of similar predictions, we can begin to judge the accuracy of the predictions.

Expert knowledge and discretionary predictions

One of the most extensive studies of human decision making was done by Philip Tetlock, a professor in applied psychology and political science. He conducted an extensive forecasting experiment between 1984 and 2003. Each year he invited experts from a variety of fields including finance and asked them to forecast a number of variables associated with their respective scientific field. The experiment solicited roughly 28,000 predictions about the future and found the forecasters were on average not better than random guessing and usually worse than basic extrapolation algorithms. This conclusion is interesting but in itself not very useful. However, the study also looked at the combination of the discretionary expert predictions and algorithmic anchor-models. The experts were provided with a base view from the data model and asked to predict "on top" of this base rate model. The result was that the value of expert forecasts significantly improved, as anchoring reduced both bias and (over)confidence in expert forecasts.

We can make a difference

Even the best investment analysis concluding that a particular growth company with great quality characteristics and a long term moat is a good investment, is of little use unless it quantifies the probability of its own analysis. What is the probability that an

investment, based on this analysis, will result in a future return, how large is the expected return and over what horizon should it materialize?

Most investors can give only a vague answer to these questions and we see this as one of the biggest problems with active investing today.

At AI Alpha Lab we have developed an AI based model routed in probabilistic thinking. The model takes in prior knowledge, evaluates the problem at hand, combine and update.

Our AI model is constantly making probability weighted predictions of future returns on financial assets and invests on the basis of these exact predictions. We can measure this systematic process month after month or even day after day, in order to have a sample size that can justify our belief in the model. Contrary to most investors, we can measure and quantify every action or investment forecast made by the model, sum them together and meaningfully talk about having a quantitative edge within investing.

AI Alpha Lab strives to be the base model, the uncorrelated outside view for investors, giving them a robust probability based foundation for making robust investment decisions. We are building models that, even before our clients have applied their work, is providing positive future return expectations. Investors has for too long searched for the right answer to the wrong problem, relied on over-parameterized models, resulting in statistical only truths, and compromised the scientific principles in model building. Today, we can do better. We have the knowledge and the computer power to build probabilistic models that adheres to the physical reality in which we live and are able to find causal structures in complex datasets, ultimately enabling investors to do optimal decision-making under uncertainty.

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