



Whitepaper ⌚ 10 Minutes

Originally Published September 2021

Republished November 2023

A detailed black and white photograph of mechanical gears and shafts, serving as a background for the title box.

The TD Epoch Core Model: An Evolving Tool

Overview

The TD Epoch Core Model (ECM) is a systematic, rules-based expression of our investment philosophy. In our paper, [The TD Epoch Core Model: Our Proprietary Stock Model](#), we provide a detailed description of the Core Model, including its structure and component parts.

Since its development in the mid-2000s, we have continued to evolve our model. In late 2017, we implemented substantial changes to the model in order to:

- use a more comprehensive set of measures to represent different aspects of our investment philosophy,
- allow peer groups within certain industries to be “global” rather than “local,”
- incorporate accounting adjustments to address three key sources of distortion.¹

These enhancements were developed in consultation with our broader investment team and resulted in a model which is more representative of our investment philosophy and of reality.

We have also created three industry-specific versions of the standard ECM. Working in collaboration with our financials sector analysts, we created a version for banks (introduced in 2017), insurance companies (rolled out in 2019) and REITs (also 2019). These industries have business models and regulatory environments that are materially different from other types of companies, and thus we have strived to capture these nuances in our versions.

Additionally, we have made numerous enhancements to the ECM, including using higher frequency reporting data (from annual to quarterly or semi-annual), reclassifying certain sub-industries within the financials sector to use the Standard version of the Model, and responding to new accounting See Exhibit 1 on page 3 for a timeline showing the evolution of the ECM since 2017.

¹ We capitalize Research & Development expenditures as well as Operating Leases; and reflect under-funded pension liabilities in debt. For more details on our methodology, please refer to [The TD Epoch Core Model: Our Proprietary Stock Model](#).

Model Enhancements for 2021

This year, we plan to introduce three major enhancements to the Epoch Core Model:

First, we have developed a suite of machine learning-driven versions of the ECM.

We strongly believe that models should be as transparent and interpretable as possible, and as such, we have designed the Standard (and industry-specific versions) of our Core Model to be easily understood and vetted by our entire investment team. E.g., model weights are fixed and the relationship between factors and future stock returns is assumed to be linear, for the most part. However, we recognize that more complex and dynamic versions of our model can complement the forecasts from our Standard model.

Machine learning-driven models can exploit non-linear relationships between factors and stock returns. These models are also dynamic and can better adapt to changes in market regimes than the existing ECM. We use these alternative models in two ways. One, we look for areas of agreement and disagreement between the predictions of the standard ECM and those of the alternative models to better prioritize our research ideas and to inform position sizing for stocks held in our portfolios. Two, we combine the predictions of the various models using an ensemble approach to create stock return forecasts which are more accurate and robust.

Second, we will add a new measure which is derived from activity in the securities lending market. The measure will complement the sell-side analyst-based measures in the Investor Behavior component of the ECM.

Third, we will update model weights to accommodate the new measure and to reflect more recent data which have become available since our last model update.

Our research efforts will continue to be done collaboratively, bringing together experts in quantitative research, data science, and fundamental analysis. In this way, we ensure that variants of our ECM—the standard, the industry-specific, and the machine learning-driven models—reflect our core fundamental beliefs while leveraging a rigorous quantitative approach and modern science techniques.

Our Future Research Agenda

Our research agenda for the ECM over the next three years involves exploring additional alpha signals, improvements to existing signals, as well as more sophisticated modeling techniques.

In our continuing search for additional alpha signals, we believe the most promising areas include extracting signals from the options markets, taking advantage of short- and long-term price pressures created by ETF flows, and quantifying the ability and track record of corporate management teams.

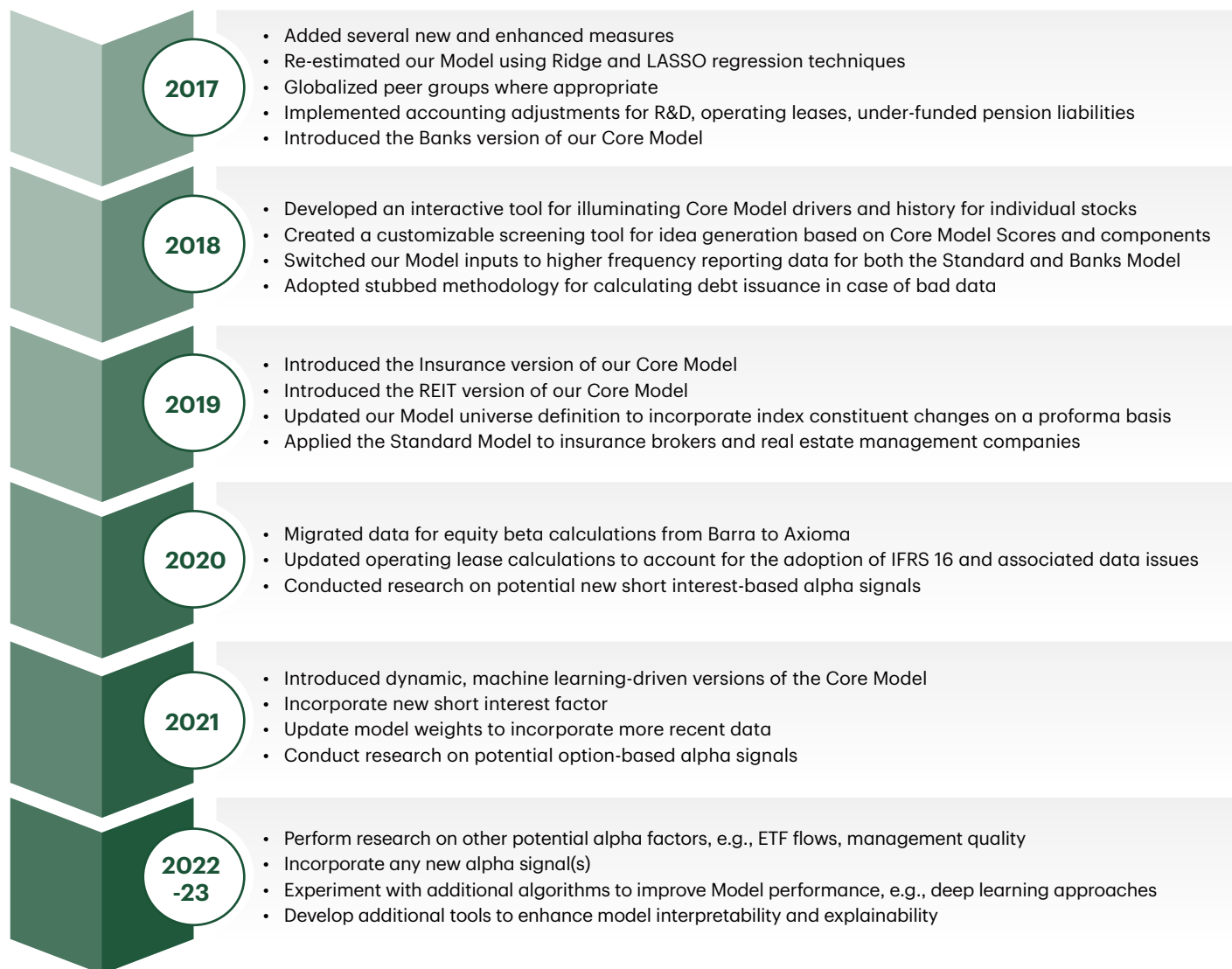
By developing data-driven measures of management ability, we may also be able to create more nuanced versions of the measures used in the Capital Allocation component of the ECM. Another promising line of research is using a combination of sophisticated accounting adjustments and machine learning methods to better forecast cash flows and potentially other model inputs. We could then use more accurate forecasts of Model inputs to improve the accuracy of our Model overall.

In addition to the suite of machine learning-driven versions of our ECM we have already developed, we will continue to explore additional algorithms to improve model performance, e.g., boosting and deep learning approaches. While these models can be complex, they are rooted in fundamental investing principles, and we plan to use an expanding set of tools to make all versions of the ECM explainable to our investment team.

The ECM is a key investment tool at Epoch, and thus a central focus of our innovation efforts. Our ambitious research agenda for the next three years aims to ensure that our Model continues to deliver alpha in increasingly competitive capital markets, can adapt to changes in the investment environment, and becomes more powerful and robust over time.

Exhibit 1

We Are Constantly Improving Our Core Model and Creating Customized Tools to Make It Accessible to Our Investment Team





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