PGIM QUANTITATIVE SOLUTIONS

WHY QUANT FOR THE FUTURE

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Executive Summary

In the 1990s PGIM was among the earliest to explore quantitative investment techniques in response to our own clients' shifting needs. Thirty years and many market cycles later, quants continue to leverage their unique strengths to help investors navigate their complex financial challenges.

- With the rapid expansion of available company data over the past 15 years, a quant's ability to quickly and efficiently synthesize data is of paramount importance in identifying both opportunities and risks.

- As investors balance their need for alpha with low-risk, low-cost strategies, a quant's focus on delivering attractive risk-adjusted alpha at a lower fee can be an appealing solution.

- The combination of a broad view of the investment universe and a flexible approach to portfolio construction allows quants to build custom portfolios that can address investor challenges without sacrificing alpha or significantly deviating from tracking error targets.

SYSTEMATICALLY ADAPTING TO A CHANGING WORLD

For more than 30 years, investors have looked to quant equity managers to help them tackle complex financial challenges. Taking a rules-based approach, quants have leveraged their ability to efficiently evaluate large volumes of data to provide diversified portfolios that are easily adaptable to investors' needs, and they have done so while implementing sophisticated risk management techniques. Since their launch, quant equity strategies have certainly weathered storms, such as the recent "Quant Winter," but today they are thriving with several years of strong performance. The investment landscape continues to evolve as do investors' needs, and I believe quant equity strategies are in a unique position to address their concerns and to help them meet their multi-faceted goals.

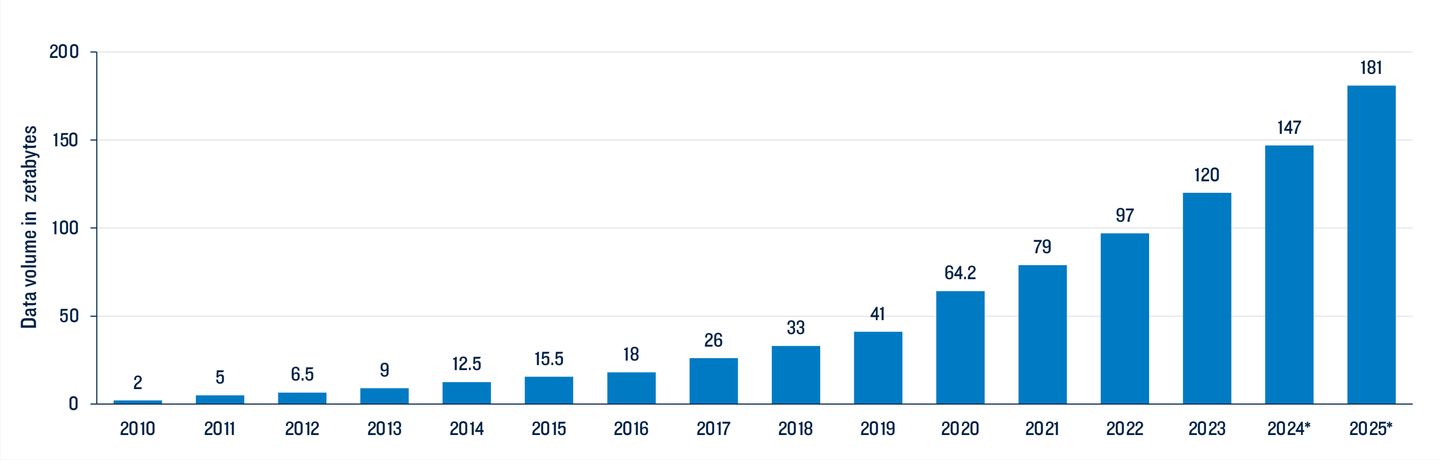
The exponential growth of available company and industry data (Figure 1) combined with the rapid evolution of tools to systematically evaluate both numerical and textual information, has been undeniably valuable for identifying investment opportunities. However, research has shown that there's a limit to how much information humans can effectively incorporate into their decision-making process, with too much information often leading to confirmation bias. This is why many managers now leverage quantitative tools in their processes – they're finally catching on to what quants have been doing for decades. A quant's ability to synthesize large amounts of data from hundreds of sources across broad equity universes allows for fresh opinions on tens of thousands of stocks across the globe. This point bears repeating because it is one of quantitative investing's key advantages.

While the breadth of investment opportunities that arise from a quant's ability to efficiently process data is important, the precision with which quants apply that data to construct portfolios and manage risk is what sets them apart. Expertise in portfolio construction allows quants to build diversified portfolios that aim to deliver on alpha promises while avoiding uncompensated risk. This precision may serve clients in several capacities, from adding consistent alpha in the most inefficient illiquid markets, to offering a predictable core position that provides solid beta exposure with the ability to add value in most market environments. The consistent application of the investment strategy enables quants to avoid style drift, and their flexible approach to portfolio construction makes it easier to customize for modern institutional investor needs, including being adapted for tax efficiency.

DISCIPLINE, DATA, DIVERSIFICATION

As the concept of investment bias took hold in the 1970s and 1980s, many investors began to question how to avoid overconfidence, loss aversion, and confirmation bias, to name a few, from disrupting sensible investment decisions. In response, quantitative investors built simple models that took advantage of these biases and applied their models dispassionately through bubbles and dips. As the first quant equity funds launched, simple measures of valuation, quality, momentum, and earnings trends delivered consistent alpha. The concept of "risk-adjusted returns" was not yet appreciated, and investors were drawn to concentrated, high-conviction portfolios where portfolio managers could tell compelling stories about each company. In contrast, listening to a quant drone on about capturing market inefficiencies was enough to put investors to sleep.

Figure 1 – The Exponential Growth of Big Data



Source: Statistica, data as of 12/31/23

Today, those simple models have evolved to incorporate vast amounts of newly available data, paired with new analytical techniques such as natural language processing (NLP) and machine learning. In this more data-intensive, technology-driven world, I believe quants can more effectively deliver on their traditional strategies while also expanding into custom solutions that cater to nuanced client preferences. Below I've outlined three ways in which quants can deliver for investors.

CRACKING THE CODE OF INEFFICIENT MARKETS

The most inefficient markets in the world have great alpha potential and often face greater investment challenges. For example, illiquidity is a potential risk when investing in areas like emerging markets, small, or micro caps. When confronted with liquidity challenges, a quant's ability to measure alpha potential and model trading costs to produce "net alpha" expectations is critical. A portfolio with many small positions is both easier and cheaper to trade than a more concentrated strategy with larger blocks of buys and sells. Thus, a systematic small-cap emerging markets strategy typically has a higher capacity limit than its more concentrated counterparts.

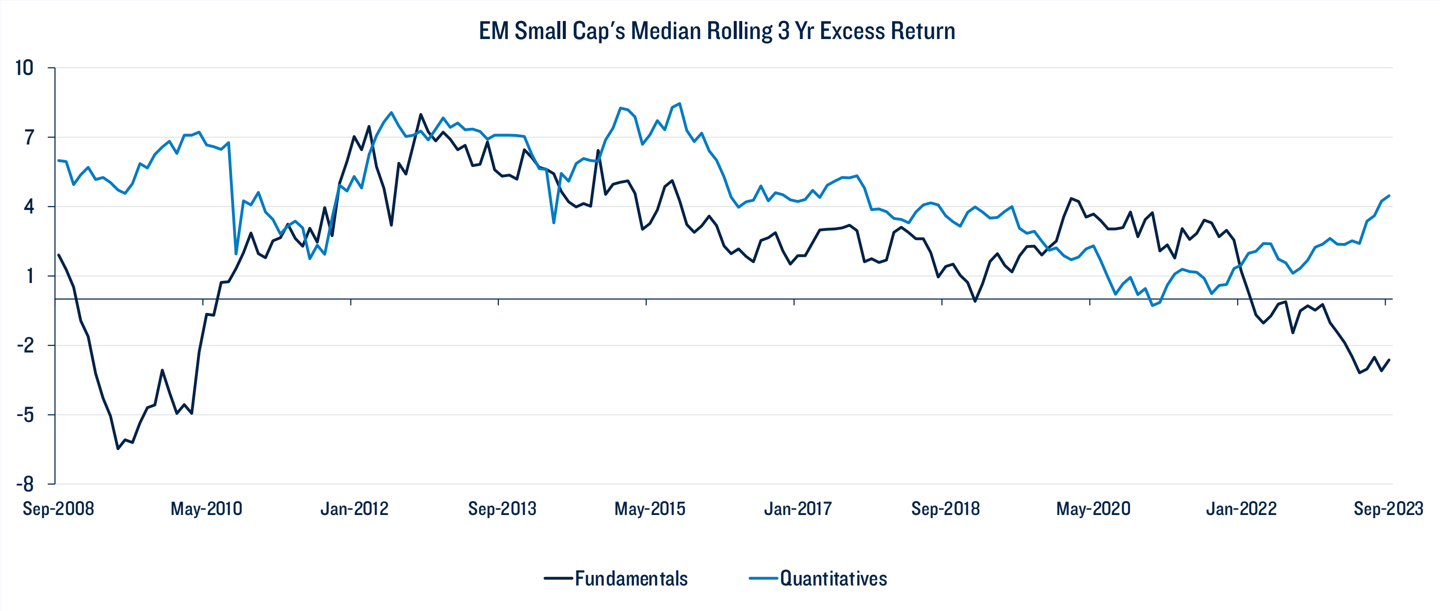
But inefficient markets also include a vast amount of data: tens of thousands of companies multiplied by their underlying data points – often messy, inconsistent, or missing. This presents the challenge of both verifying the reliability and relevance of the data and determining whether the company shows investment potential.

Here is where my earlier point about data synthesis comes in: neither excessive nor dirty data poses a challenge for quants because they have a long history of leveraging tools to process data in opaque markets. As a result, quants can bring valuable insights to these less efficient markets, allowing them to build diversified portfolios with more focused risk/return tradeoffs and, as shown in (Figure 2), that can deliver more consistent alpha.

Style drift, both intentional and unintentional, is often faced by traditional managers who may chase trends or let portfolios drift unchecked. Divergence from the portfolio guidelines may not only impact a client's risk-return profile, but it can also lead to unpleasant surprises when the market inevitably shifts. A systematic process consistently keeps the portfolio true to its style. Traditional strategies may also take bigger positions at the country/sector level. These bets may sometimes lead to alpha, but certainly always lead to higher risk. On the other hand, quant strategies typically maintain tighter portfolio limits (Figure 3) and, therefore, derive their alpha from stock selection as opposed to country or sector bets.

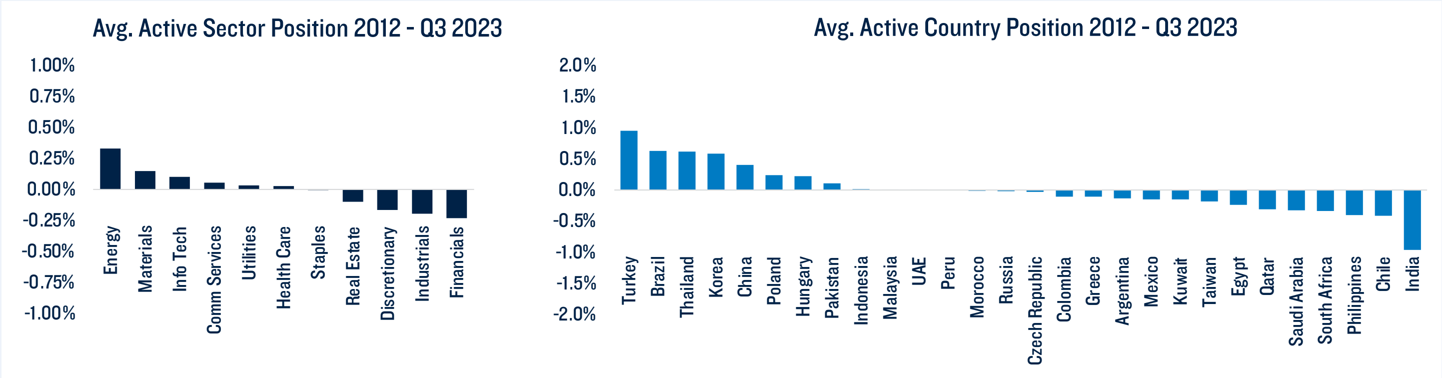
Adding value without taking large country/sector bets is advantageous in a world where geopolitical and macro risks are ever present. With a comprehensive perspective across an inefficient market, a quant can capitalize on alpha opportunities in a cost-effective manner that also limits concentration risk.

Figure 2 – Quant vs Fundamental: Median Rolling 3-Year Excess Returns in Emerging Markets Small Cap



Source: eVestment, data as of 12/31/23

Figure 3 – Average PGIM Quant portfolio over/underweights relative to the MSCI Emerging Markets Small Cap Index



Source: PGIM Quant, FactSet, MSCI, data as of 12/31/23

PROVIDING THE RELIABILITY FOR CORE PORTFOLIOS

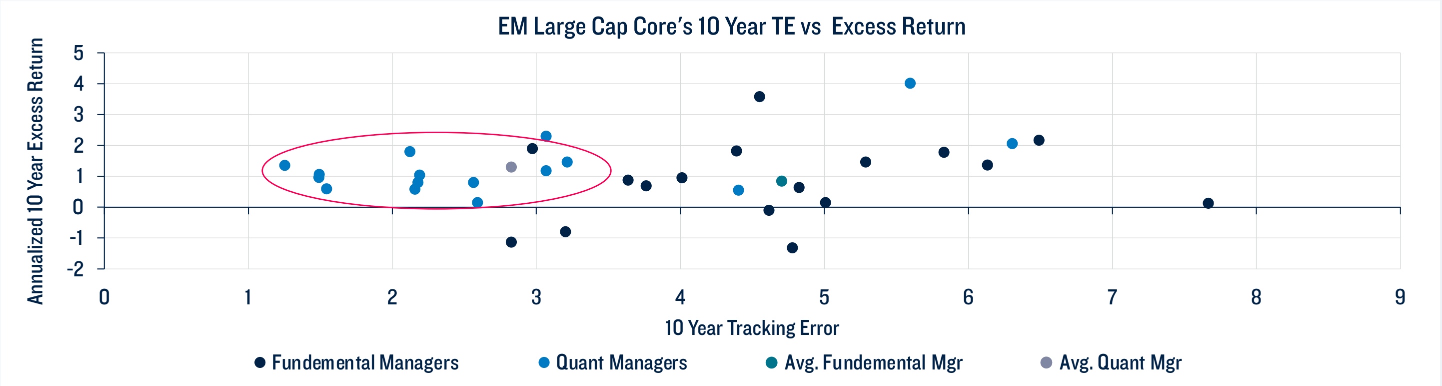
While transaction costs are less of a headwind in developed markets, there are intrinsic benefits to a systematic, repeatable investment process that may lead to consistent outcomes in more efficient markets. Asset managers are under tremendous pressure to simultaneously meet their fiduciary duties and deliver strong returns in line with their clients' investment policy statements. Therefore, the need to balance the desire for alpha with downside risk, while keeping costs low, is paramount. Because quant strategies focus on delivering attractive risk-adjusted alpha at a lower fee – a sweet spot in public equity markets – they can provide a solution to this challenge. (Figure 4) shows that additional risk beyond 2-3% tracking error – where quants typically fall in emerging markets – has not paid off over the last 10 years.

By allocating higher risk and fee budgets to areas where a fundamental approach will be rewarded, such as private equity or private credit, investors can focus their public equity segments to highly efficient quant strategies that can provide a diversified, customizable, lower-fee, style-pure solution.

CREATING CUSTOM EXPOSURES THAT MEET RISK/RETURN GOALS

Investor needs have become more nuanced, and so the need for active solutions that are nimble, customized, and diversified has grown. University endowments are facing calls from student government associations to divest from fossil fuels. Family offices need to balance portfolio diversification with tax impact in order to manage capital gains. Institutions of all types are trying to navigate the impact, both current and potential, of one global macro event after another. Take China for example. There are varying options on how to approach an investment in the world's second largest economy. Do investors continue to invest in traditional emerging markets strategies to gain exposure to China? Do they invest in a China-only strategy? Do they eliminate an allocation to China altogether? A systematic manager can build completion portfolios around an existing China strategy, allow for custom country weights, or eliminate China exposure altogether without losing alpha potential in an emerging markets allocation.

Figure 4 – In the sweet spot: More risk doesn't get you more return.



CASE STUDY PARTNERING TO SOLVE CHALLENGES

OVERVIEW

A US-based family office wanted an emerging markets strategy that met risk and return targets, while excluding particular regions and any state-owned enterprises (SOEs). They wanted to establish two funds, one of which would be tax efficient.

CHALLENGE

Limiting the investment universe can affect return opportunities, and the avoidance of SOEs eliminates an especially resilient component of the universe in challenging markets due to their government backing. Special attention needed to be given to balance risk and returns, but not just in a theoretical way. In real-world markets, both capitalizing on tax opportunities and forced turnover due to regional exclusion changes could cause liquidity issues or unacceptably high transaction costs.

APPROACH

Working closely with the family office to understand its needs as well as the needs of its clients, we set out to determine the best way to implement the necessary exclusions. Our investment team analyzed data from multiple sources to agree on a credible list of SOE companies with the client. We presented the client with a range of risk/return profiles for the Broad MSCI EM All Cap Universe, including SEO exclusions and initial regional exclusions. We discussed portfolio liquidity and transactions cost projections for potential future evolutions of the strategy.

SOLUTION

We partnered with the family office to design tax-managed and non-tax managed versions of our EM All Cap portfolios in line with their clients' needs. Since launching these portfolios, we have successfully managed to the stated risk goals and return targets for both, while accommodating regional exclusions and achieving tax efficiency where needed.

Once again, a quants' advantages in data analysis come into play here. With such a broad view of the universe, quants are able to partner with investors to build custom portfolios that solve for a wide array of challenges without sacrificing alpha or blowing up tracking error targets.

LOOKING TO THE FUTURE

The investment landscape has become increasingly complex as markets have expanded and the demands on investors have evolved. However, the desire for alpha remains constant. The use of quantitative tools to exploit the exponential growth of information needs to be part of a well thought out investment solution. In my view, this environment is ripe for quantitative strategies to not only continue to deliver favorable long-term investment results, but also to provide more targeted solutions to help investors reach their goals.

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