

# Under the Surface

Inside the systems and processes that drive Dimensional's funds

October 2015

## OVERVIEW

Complex interactions and processes can lie underneath the most simple and superficial action.

Think of what happens when you move a finger. The motor cortex of your brain generates neural impulses that travel down your spine through a bundle of nerve tissues. These in turn trigger muscle fibers in your hand.

Most of us *don't* think about these complex processes. We take them for granted.

Likewise, a share in a Dimensional fund appears simple on the surface. On one level, it looks just like a share in a company. But this piece of paper is much more than that. The fact it is held actually represents a dynamic investment strategy.

Just as the trivial act of moving a finger requires the enormous underlying complexity of our neural system, a simple share is underpinned by an investment in sophisticated systems and highly skilled people working with great efficiency and precision.

## EFFICIENT APPROACH

When advisors invest your money in several Dimensional funds, they give you access to thousands of equity and fixed income securities in more than 40 countries, a level of diversification that is extremely difficult for individuals to obtain on their own.

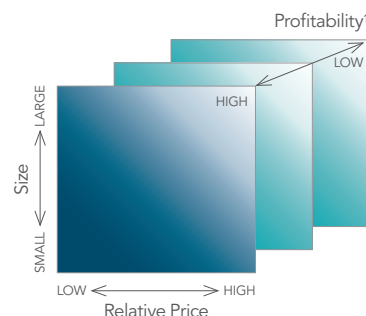
In this way, mutual funds are an efficient and effective way to participate in capital markets by pooling the money of many different investors in a single structure.

More importantly, the holdings underpinning these strategies are not static. They are changing all the time as the investment team continually buys and sells the underlying securities to get as close as possible to the premiums they are seeking to capture. These premiums vary according to the individual strategy but may include those related to the equity market itself, to small capitalization stocks, to low relative price stocks, or to high profitability stocks. In fixed income, the premiums may relate to credit and maturity.

**Exhibit 1: World Core Equity Portfolio  
As of September 30, 2015**

|  |        |
|--|--------|
| Number of Securities                   | 11,713 |
| Weighted Average Market Cap (millions) | 56,851 |
| Aggregate Price-to-Book <sup>2</sup>   | 1.67   |
| Weighted Average Profitability         | 0.35   |

1. Profitability is measured as operating income before depreciation and amortization minus interest expense scaled by book. Holdings are subject to change.
2. Price-to-Book ratio is a company's capitalization divided by its book value.



**Exhibit 1**, using the World Core Equity Portfolio as an example, illustrates how fund shares represent exposure to many securities and an investment process.

In this way, the day-to-day running of client portfolios is a steady, disciplined, methodical process. Huge amounts of data—on companies and securities—feed into complex and detailed systems and processes that each day balance the need to target the desired premiums with the actual cost of accessing them.

As Dimensional trades thousands of securities in hundreds of individual portfolios, the need for efficiency is paramount. That's because the returns to investors can

easily be eroded by real-world frictions like turnover and trading fees.

Financial markets are very large and highly competitive. Millions of participants are striving for an edge. This makes practical issues in implementation paramount.

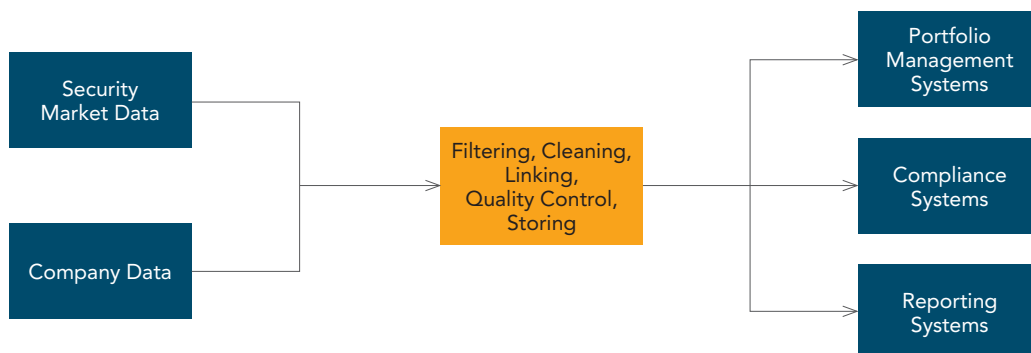
To put some perspective around this, here are some statistics on the size and scale of global markets in stocks and bonds.

**GLOBAL MARKETS BY THE NUMBERS**

- The total capitalization of stock markets tracked by the World Federation of Exchanges (WEF) was more than \$66 trillion as of July 2015.<sup>1</sup>
- More than 40,000 entities were listed on WEF member exchanges with total electronic turnover year-to-date at \$68 trillion from 14 trillion trades.
- The bond market is even bigger than the equity market. According to the Bank for International Settlements, there was \$81 trillion in debt securities on issue by governments, financial, and non-financial corporations as of December 2014.<sup>2</sup>
- The global foreign exchange market is the biggest of them all. Average daily turnover in currency transactions has increased from \$518 billion in 2001 to \$2.5 trillion in 2013.<sup>3</sup>
- Keep in mind that these numbers do not include financial instruments called derivatives that trade via dealer networks. According to the BIS, the notional (or theoretical) value of outstanding contracts was \$630 trillion as of December 2014, although that sum of money does not actually change hands.

1. World Federation of Exchanges Monthly Statistics, July 2015.
2. BIS Debt Securities Statistics, June 8, 2015.
3. BIS Triennial Central Bank Survey of FX and derivatives market activity.

**Exhibit 2: Disciplined Processes**



**DATA, SYSTEMS, PROCESSES, AND PEOPLE**

The sheer size of global capital markets, the speed of information flows, the number of market participants and the intensity of competition between them generate huge amounts of data.

But while these numbers are mind-boggling, we still need to organize them in a way that makes sense.

So Dimensional collects the security and company data several times a day to capture closing prices and corporate actions in different time zones. Sydney is the first major market to trade; then Tokyo, Singapore, and Hong Kong; then westward to Europe, the UK, and North America. Twenty-four hours later, the process starts all over again.

All in all, news and live prices are monitored in more than 40 markets around the globe by an integrated team of portfolio managers and traders working seamlessly across time zones, all following the same process.

Once collected, the data is filtered, cleansed, linked, and stored in an authoritative source that feeds into portfolio management, compliance, and reporting systems. This

matters because in order to deliver good results to clients, we need effective data management and systems.

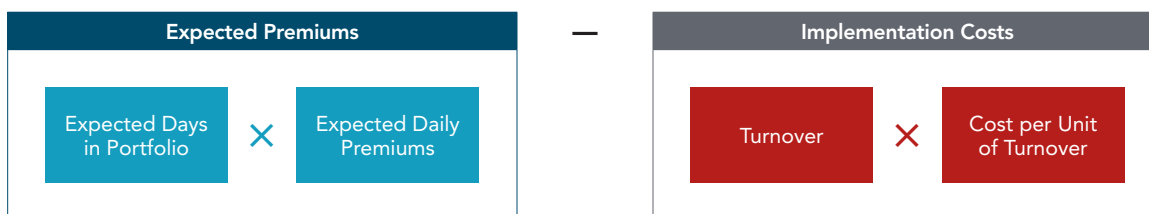
Minding these details from day to day in a disciplined way is critical because the annual premiums we are targeting are just an accumulation of very small premiums that may or may not be present and positive on any given day.

We don't know when the premiums will show up, so we can't afford to treat any day differently. The same care over small details has to apply every day.

**Exhibit 3** highlights how targeting these expected premiums must be constantly balanced against the cost of implementation. Otherwise, the premiums can quickly be eroded.

Keep in mind that our portfolios cannot operate in an imaginary environment of no trading frictions, costs, or taxes. We must account for the need to manage turnover and cost per trade without sacrificing sufficient diversification or expected return potential.

**Exhibit 3: Premiums and Practicalities**



By investing in sophisticated systems and research and by integrating portfolio management and trading, we can focus on getting this balance right.

Because we generally do not closely track indices or seek to exploit perceived mispricing, we can avoid seeking immediacy in our trades. That in turn allows us to be patient and flexible in an effort to obtain more favorable prices than someone who feels compelled to trade a particular security at a particular time.

This process is helped along by our global approach, with each of our trading offices in Austin, Santa Monica, London, Tokyo, Singapore, and Sydney having access to the same systems that allow us to trade every portfolio in all time zones.

#### SUMMARY

Beneath every share in Dimensional's portfolios are huge amounts of data, detailed management systems, complex processes, and highly skilled professionals that together form a sophisticated investment strategy.

Data on its own is not enough. We must also continue to invest in sophisticated management systems and the skills of our people to pay attention to little details that can make a big difference to outcomes.

This is important because the premiums we are targeting across our strategies are not uniformly distributed. We must constantly balance the possibility of premiums and the cost of implementation.

Having access to relevant market data allows us to be efficient, learn and improve what we do, and seek to add value.

Those decisions are made each and every day by our investment and research teams around the world, all with the same aim—to deliver great investment solutions to our clients at competitive fees.

Just as with the wonders of the human body, the simplicity of the surface hides a complex and connected world underneath.

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