The science of index investing

Key questions to ask your fund manager

Paul Jakubowski
Vanguard's European Head of Investments and Head of Global Bond Indexing

Vanguard®

PURPOSE

1

Explore the **science of managing** index funds

2

Outline **some important questions** to ask your index fund manager

3

To help you **select an index manager** for your clients

Vanguard’s indexing credentials

Vanguard: global leader in indexing

One of the

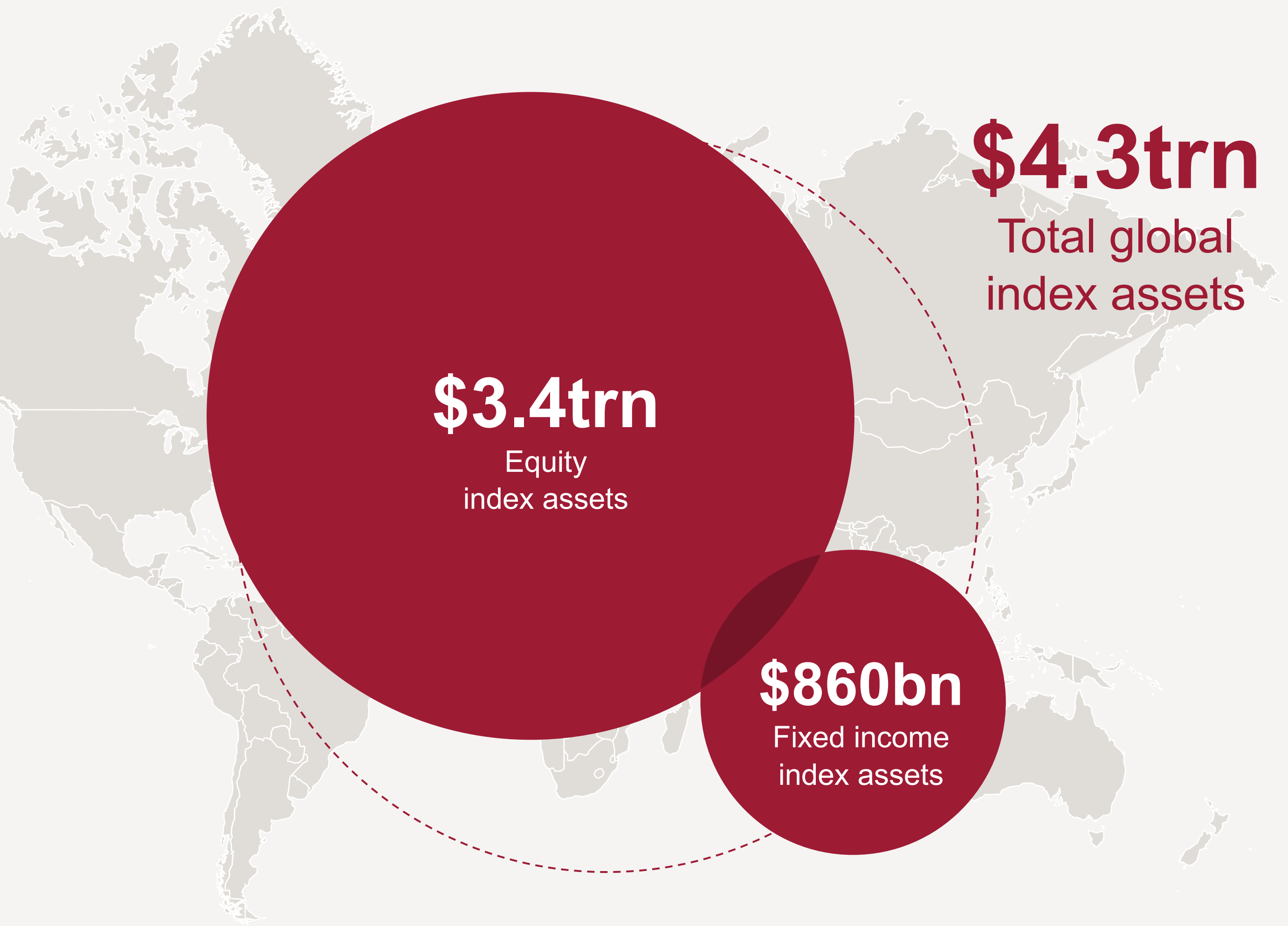
world's biggest

index fund

managers

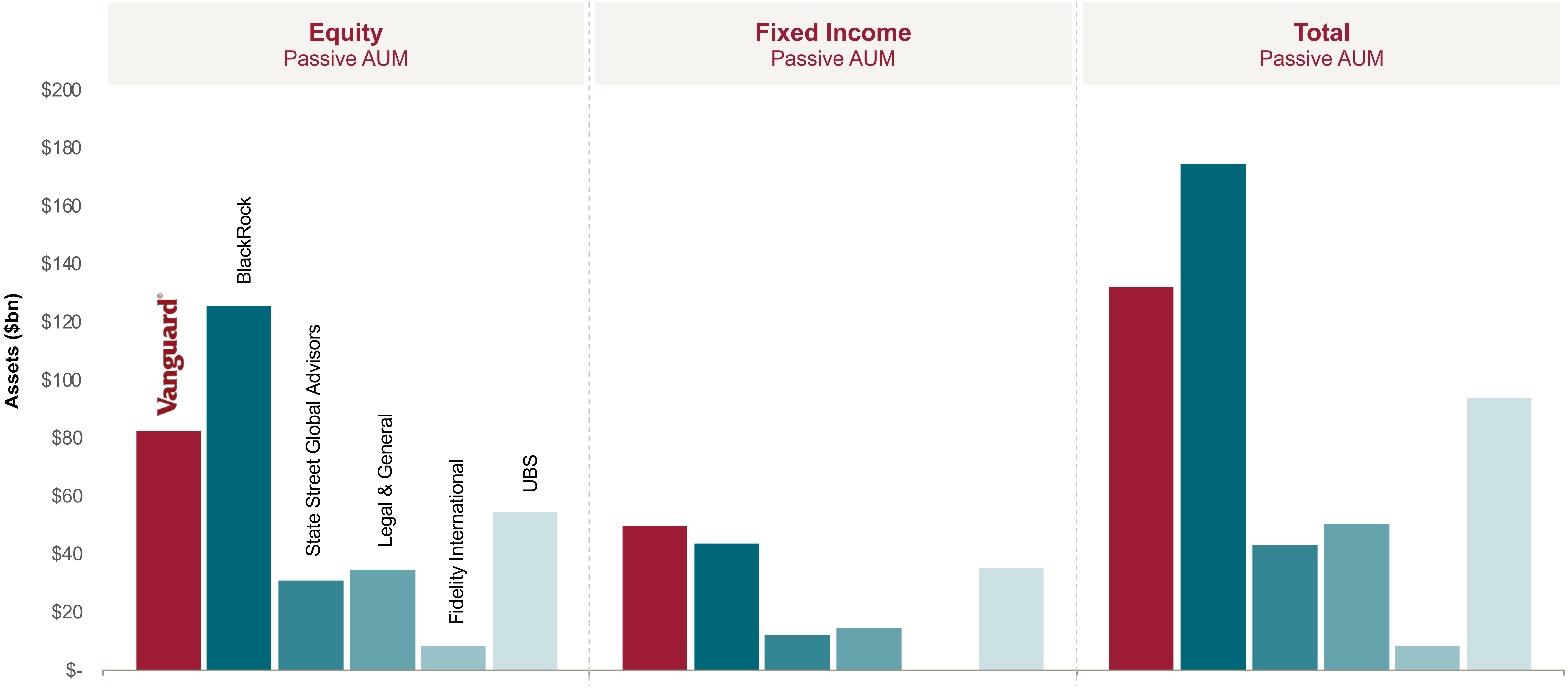
(by assets under

management)



Source: Vanguard as at 30 June 2019.

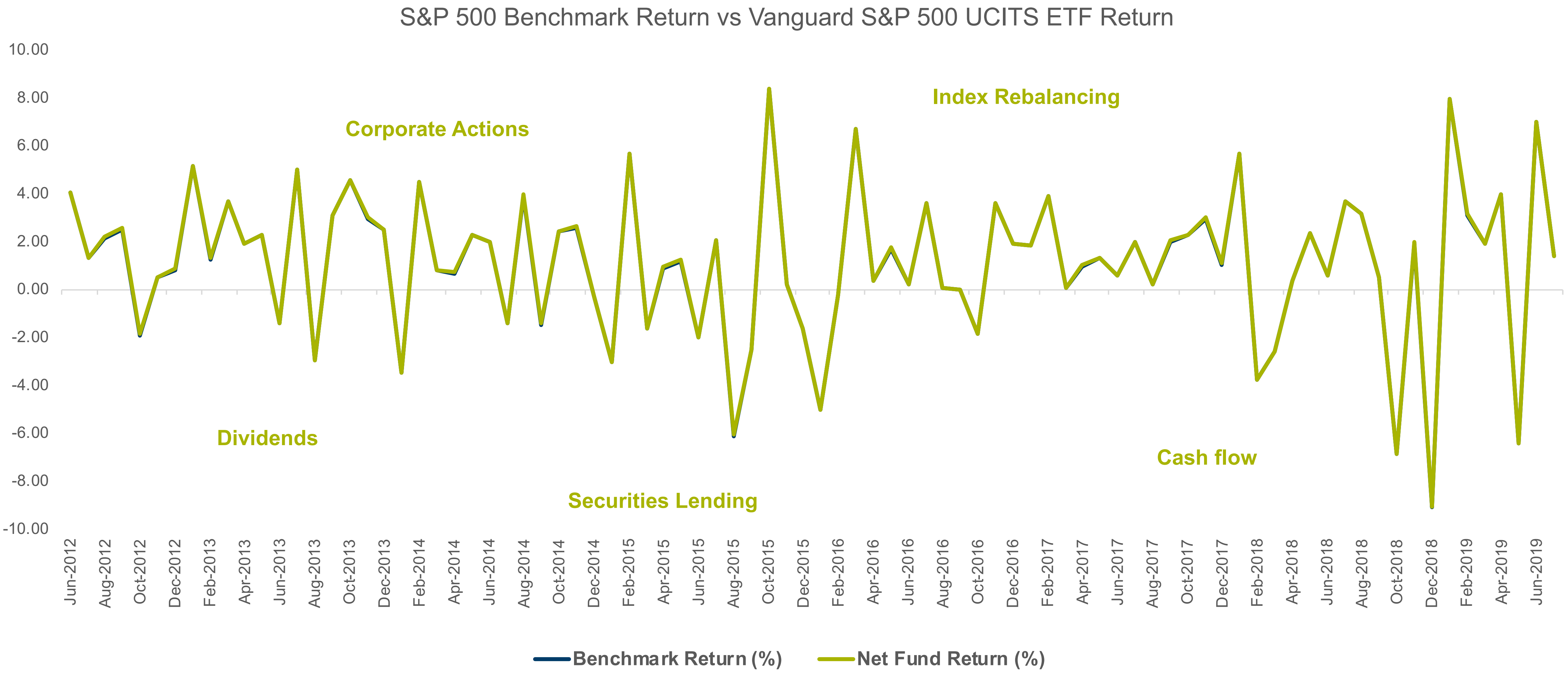
Vanguard European index assets vs competitors in Europe



Source: Morningstar as at June 2019.

The Science of Index Investing

Indexing is anything but passive

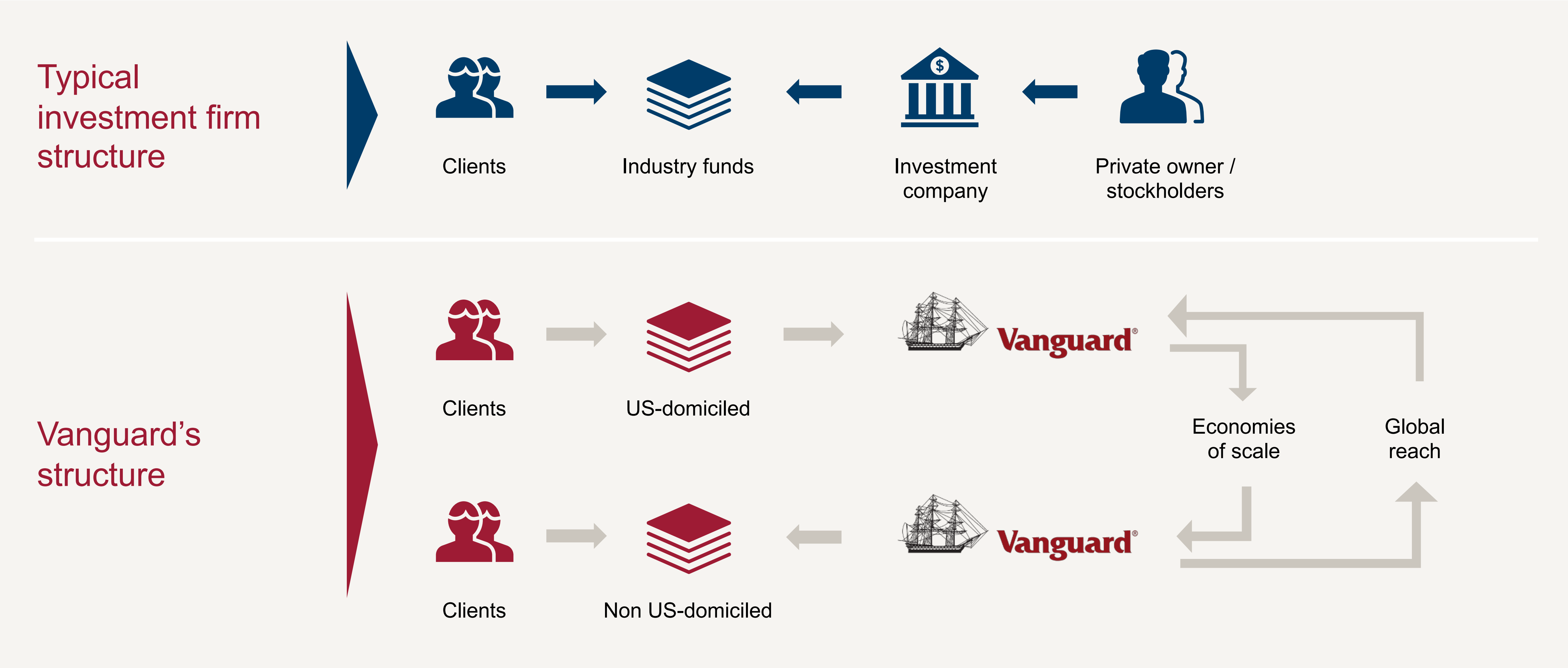


Past performance is not a reliable indicator of future results.
Source: Vanguard as at 30 June 2019. Performance is on a NAV to NAV basis with gross income reinvested. Performance is in USD and is net of fees.

Key Questions for your Index Fund Manager

1. Are your fund manager’s incentives aligned to your goals?

Structured to put clients first



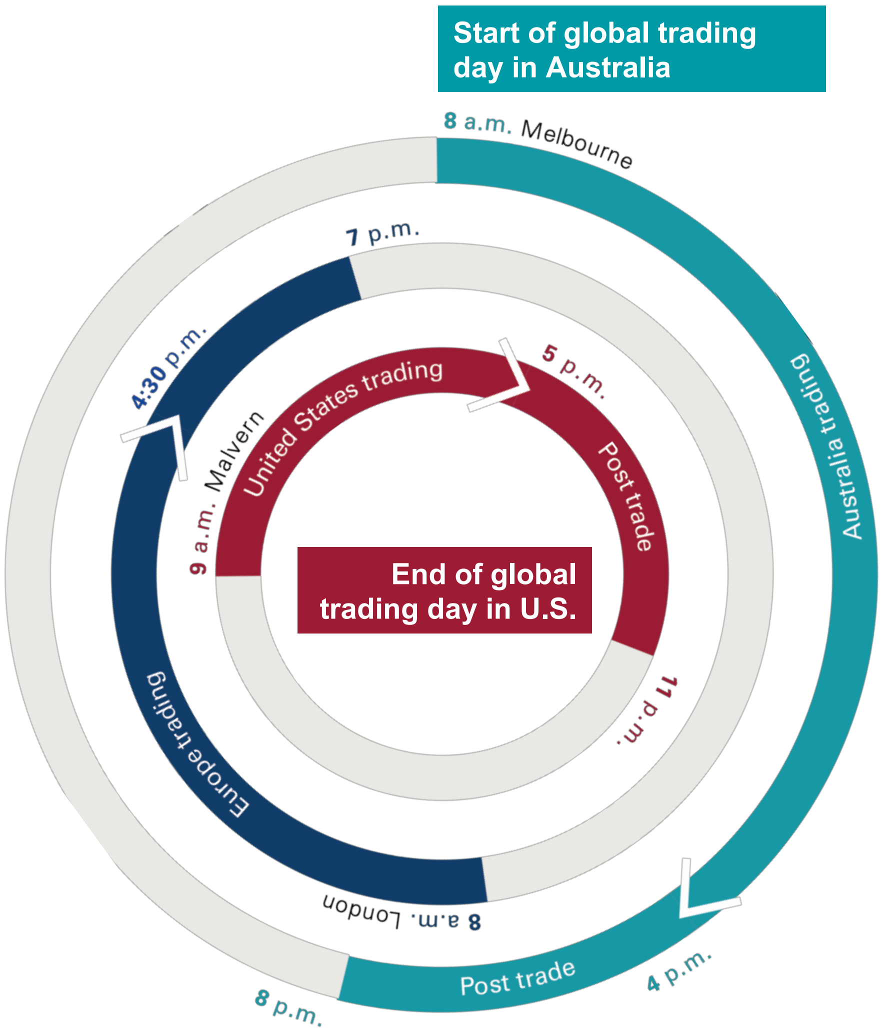
2. How committed to indexing is your fund manager?

History of indexing at Vanguard

1975	The Vanguard Group, Inc. begins with 9 actively managed funds
1976	**The Vanguard Group, Inc. introduces first index mutual fund for individual investors in the US**
1982	DC-pension investments and education
1986	**Vanguard launches the world's first bond index fund for retail investors in the US**
1990	**Vanguard launches non-US domiciled index funds**
1996	Vanguard opens its first international business, Vanguard Investments Australia
1998	Vanguard Investments Europe opens for business
2004	Amsterdam office opens
2005	Paris office opens
2006	AUM managed for clients surpasses USD 1 trillion worldwide
2008	Zurich office opens
2009	Vanguard Investments UK opens for business
2011	Vanguard Investments Canada Inc. opens for business
2012	**Launch of ETFs in Europe**
2013	**ETFs listed in Switzerland, France and Netherlands**
2015	Vanguard celebrates 40th anniversary Vanguard Europe launches 4 factor ETFs
2017	**ETFs listed in Germany** **Personal investor service launched in UK**
2018	Frankfurt office opens
2019	**ETFs listed in Italy** **Dublin office open**

3. Is your fund manager truly global?

24-hour trading coverage from three investment centres



- ✓ We trade from the **United States, Europe and Asia Pacific**
- ✓ We can **"pass the book" globally** as needed, so local experts can make timely decisions
- ✓ **FX/cash management managed daily** by each region
- ✓ This enables Vanguard to **manage portfolios across timezones**

4. How broad is your fund manager's expertise?

Vanguard's global fund footprint

US-based mutual funds and ETFs*

- Institutions in qualified jurisdictions and local retail
- Index and active

Ireland-domiciled UCITS portfolios and ETFs

- Institutions worldwide, ex-US
- Index and active

Australian-domiciled pooled portfolios and ETFs*

- Local institutions and retail
- Index

UK-domiciled OEICs**

- Independent financial advisers
- Personal investors
- Index and active

Separately managed accounts

- Institutions worldwide, ex-US
- Index and customised index

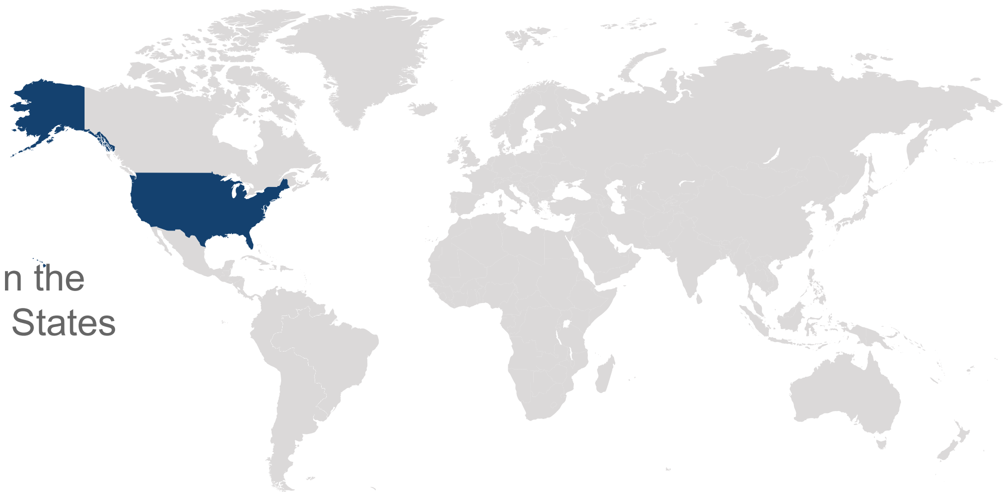
Canada-domiciled ETFs*

- Local institutions and retail
- Index

Hong Kong-domiciled ETFs*

- Retail & intermediaries
- Index

191
funds in the United States



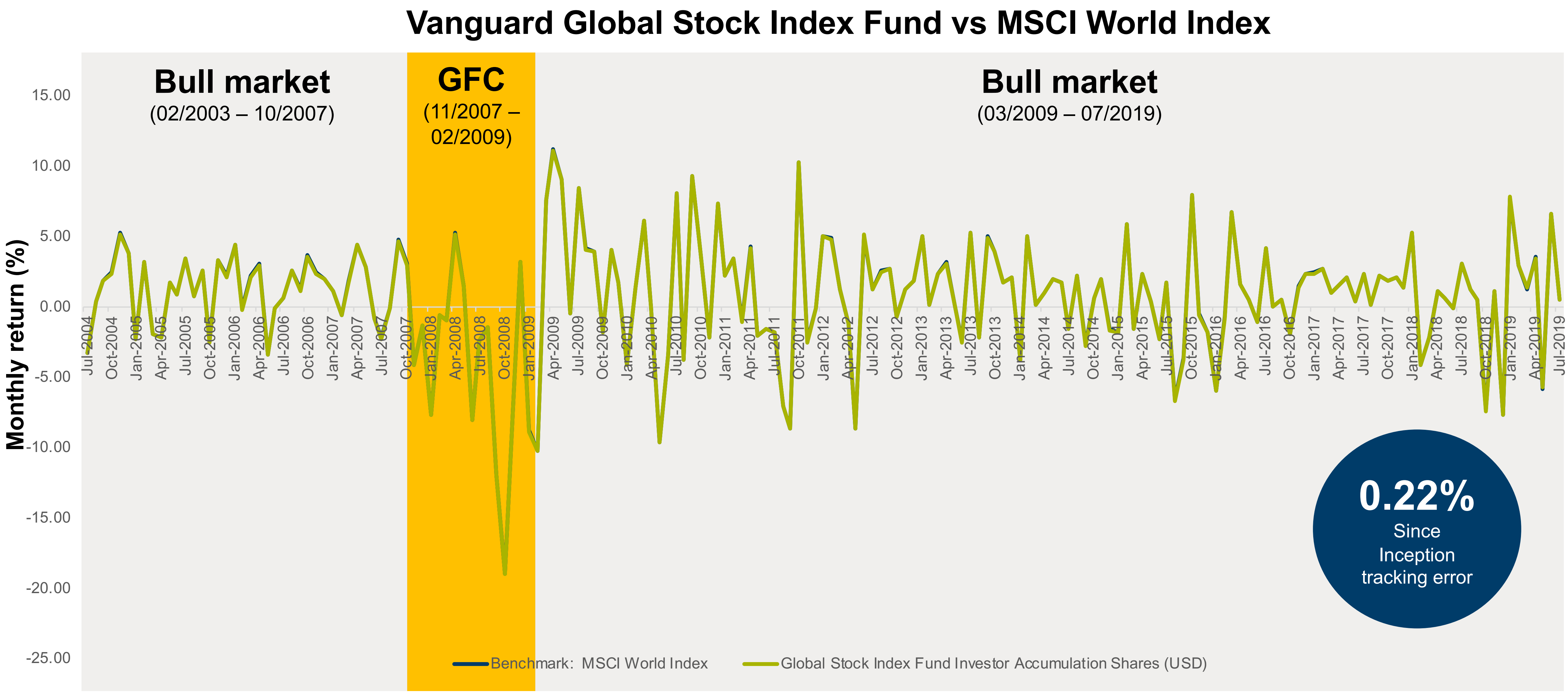
226
funds in global markets

417 funds worldwide

Source: Vanguard as at 30 June 2019.
* These products are not registered for public distribution in Europe.
** These products are only available for public distribution in the UK.

5. How does your fund manager perform across market cycles?

How does your fund manager perform across market cycles?

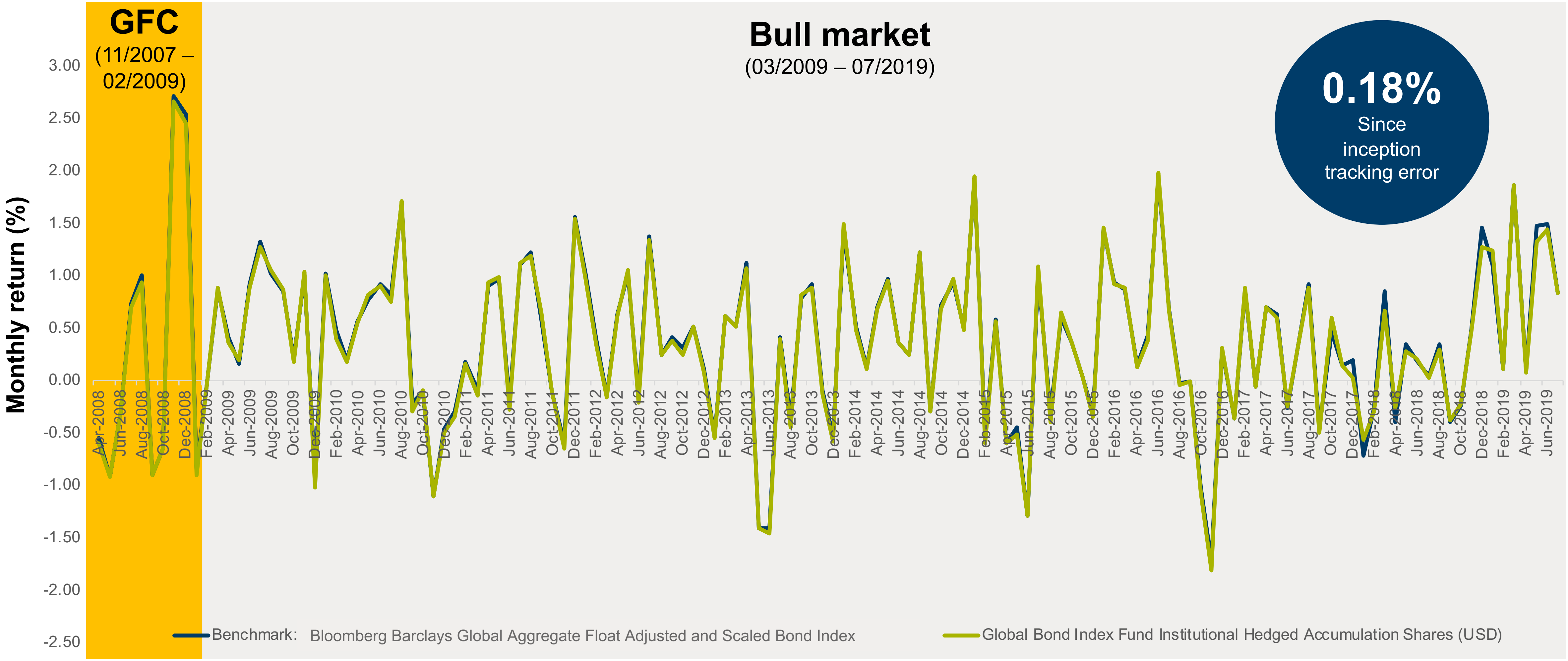


Past performance is not a reliable indicator of future results.
Source: Vanguard as at 31 July 2019. Performance is on a NAV to NAV basis with gross income reinvested. Performance is in USD and is net of fees.

why do we show a different time range than for the previous slide?

Ho[...] manager perform across market cycles?

Vanguard Global Bond Index Fund vs Global Aggregate Benchmark



Past performance is not a reliable indicator of future results.
Source: Vanguard as at 31 July 2019. Performance is on a NAV to NAV basis with gross income reinvested. Performance is in USD and is net of fees.

6. How is risk management integrated into the investment process?

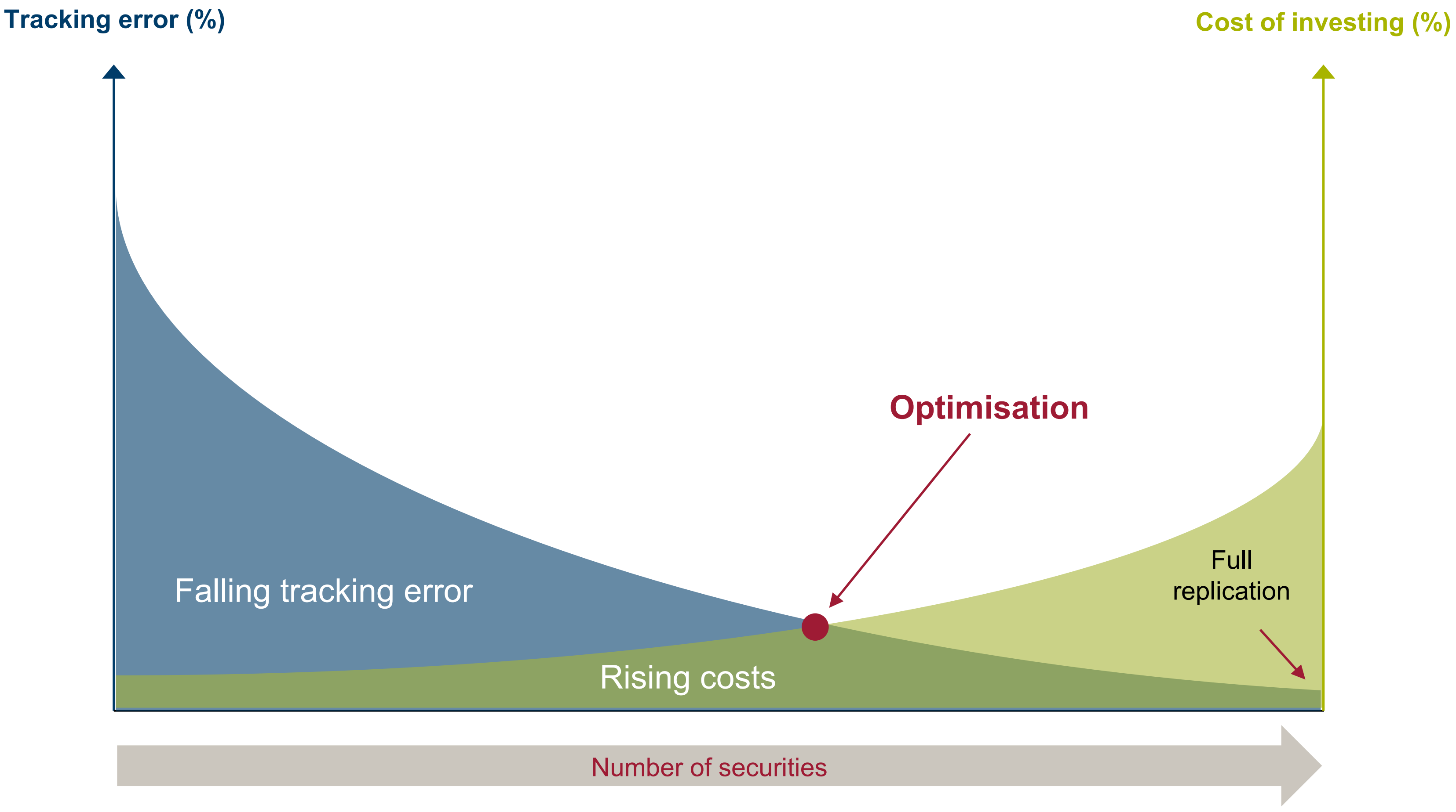
Our approach to risk management

1. **Daily risk monitoring**, oversight and reporting
2. Leading edge **analytical tools and reporting capabilities**
   - ✓ Independent systems, data and models
3. **An integrated part** of the investment management process
   - ✓ Physically located on the trading floor
4. Significant involvement in **product development and portfolio construction**
   - ✓ End-to-end integration
5. Ongoing commitment to **team development**

A truly global approach

7. How does your fund manager think about replication?

Optimisation versus full replication



8. Does your fixed income indexing manager utilise a credit research team?

In fixed income, active decisions are crucial to effective index management

Fixed Income Indexing Team
39 people across **3** regions

Credit Research Team
50+ people across **3** regions

OBJECTIVE: MATCH THE KEY RISKS OF THE BENCHMARK

— *This does not involve buying every bond within the index* —

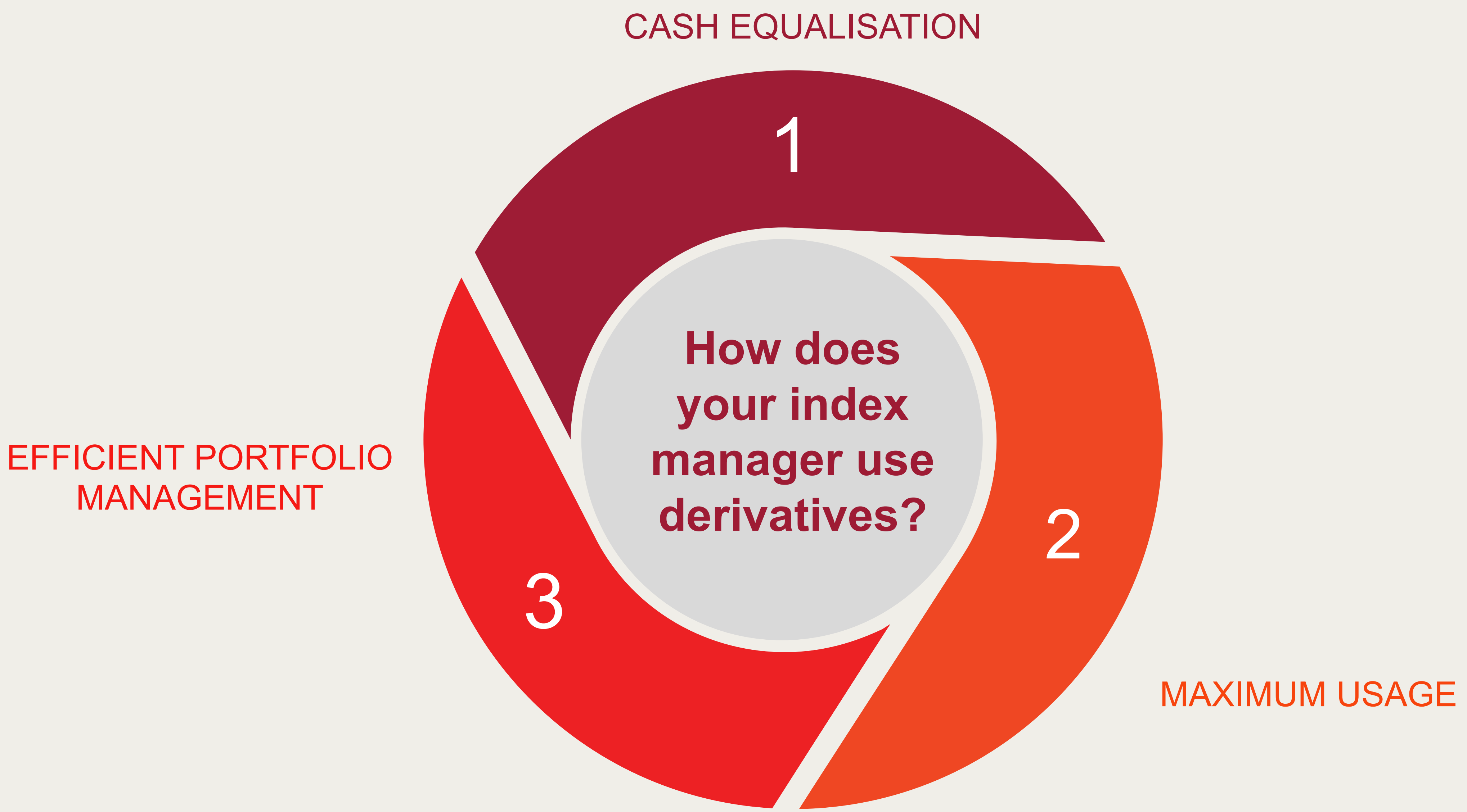
Case study	VW had **46 bonds** in the Global Aggregate Bond Index	Vanguard Global Bond Index Fund owned **28 VW bonds**

Our credit analyst team and PM/traders will evaluate:

- ✓ Corporate Fundamentals
- ✓ Liquidity
- ✓ Pricing/relative value
- ✓ Market expectation

Source: Vanguard as at 30 June 2019.
(1) As at April 2019, the Vanguard Global Bond Index Fund has now tracks the Bloomberg Barclays Global Aggregate Float Adjusted and Scaled Index

9. Is your fund manager transparent about all the strategies they are using?


CASH EQUALISATION
1
How does your index manager use derivatives?
2
MAXIMUM USAGE
3
EFFICIENT PORTFOLIO MANAGEMENT

Vanguard engages in **value-based** lending

Maximise **shareholder value**

Disciplined, structured, and controlled approach to lending

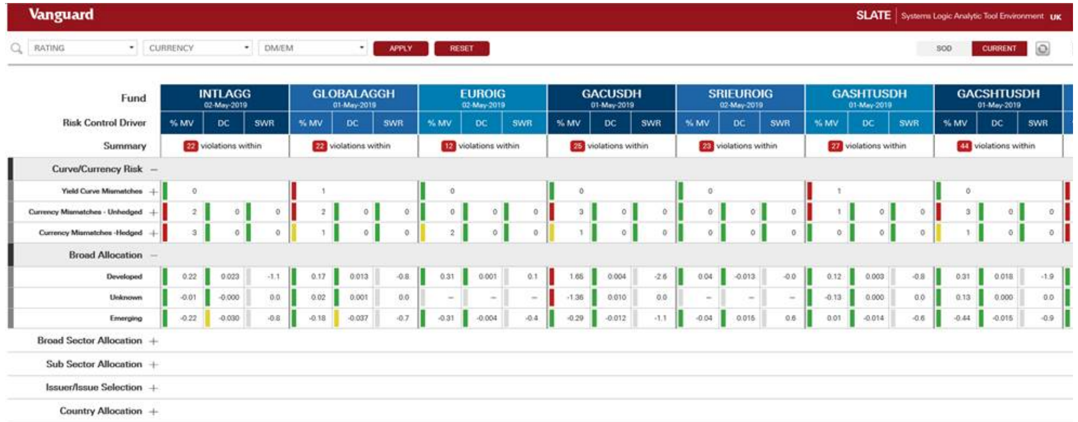
RISK MITIGATION

- ✓ **Daily, weekly and monthly** reporting
- ✓ Strict operational **guidelines and policies**
- ✓ Strong **management oversight**
- ✓ **Leverage Vanguard's tax and legal teams**, as well as industry partners
- ✓ **Ensure we are up to date** on the evolving regulatory and tax environment
- ✓ Conservative collateral schedule
- ✓ Reinvestment risk is mitigated by accepting **non-cash collateral**
- ✓ Require **105% collateral for all loans**
- ✓ The Credit Research team approves **only the highest quality borrowing brokers**, and their corresponding credit limits.

10. How has your fund manager invested in new technologies?

Vanguard continually invests in new technologies to drive trading efficiencies

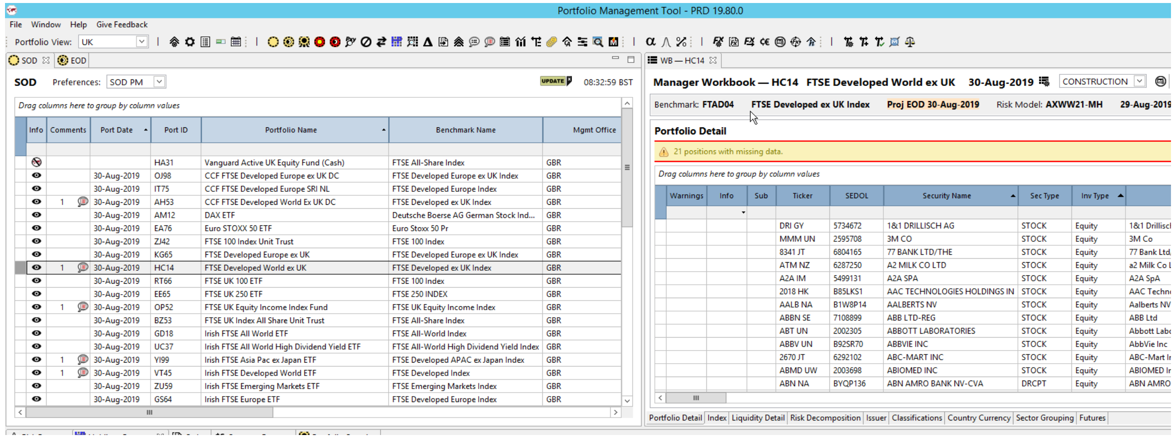
SLATE Internally Developed Fixed Income Risk Tool



- ✓ Flexible analytics
- ✓ Centralized management
- ✓ Process efficiency and automation of trades

GEMINI Internally Developed Equity PM Tool (1)

- ✓ Enhanced Risk Framework
- ✓ Global consistency
- ✓ Scalable platform to manage increasingly complex portfolios



(1) For illustrative purposes only. Funds listed in the example are not all registered in all regions.

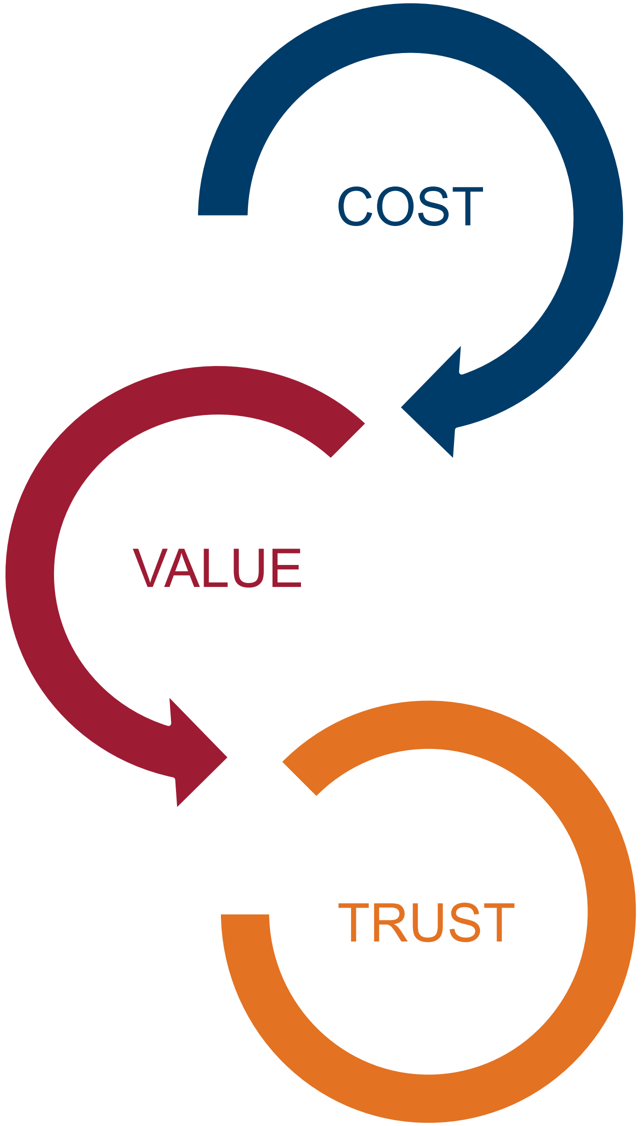
11. How influential is your index manager in the industry?

Is it for the good of ALL Investors?

Industry Leadership

Engaging to provide better outcomes for clients around the world

Summary



Is index investment actively hurting the investment ecosystem?

Q&A

Paul Jakubowski
Vanguard's European Head of Investments and Head of Global Bond Indexing

Ben Burton
Business Development Manager

PURPOSE

1

Explore **passive investments efficacy** within capital markets

2

Ascertain if active management **can still be successful**

3

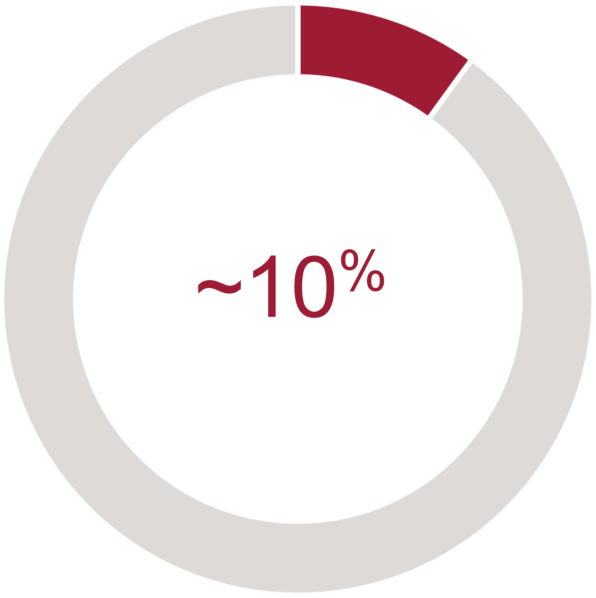
Discuss the validity of **claims that indexing has an adverse impact** on capital markets

How popular is indexing?

Indexing is a small part of the global market

~30% Percentage of total **registered fund assets** in index strategies

- **~40%** equity funds
- **~20%** bond funds



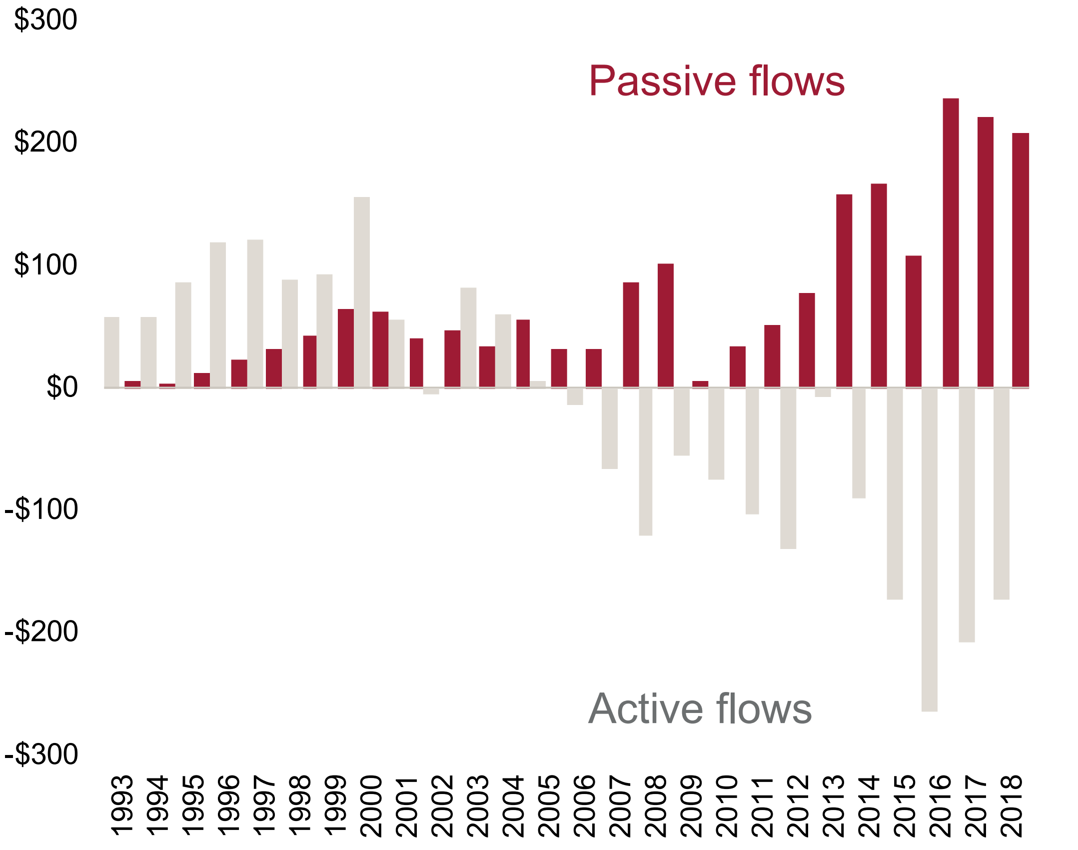
Percentage of value of all **global investable securities** that are owned by registered index funds

- **~15%** equities
- **~5%** fixed income

Notes: All data are as of December 31, 2018. Global registered fund assets are represented by Morningstar, excluding funds of funds, feeder funds, and money market funds. Global equity fund market share is represented by Morningstar global broad category group equity mutual funds and ETFs. Global equity market-cap is represented by the FTSE Global All Cap index. Global fixed income market-cap is represented by the Bloomberg Barclays Multiverse Index. Global fixed income fund market share is represented by Morningstar global broad category group fixed income mutual funds and ETFs. Ownership share of outstanding securities is best estimate based on available data.
Source: Vanguard calculations, based on data from Morningstar, Inc., and Factset.

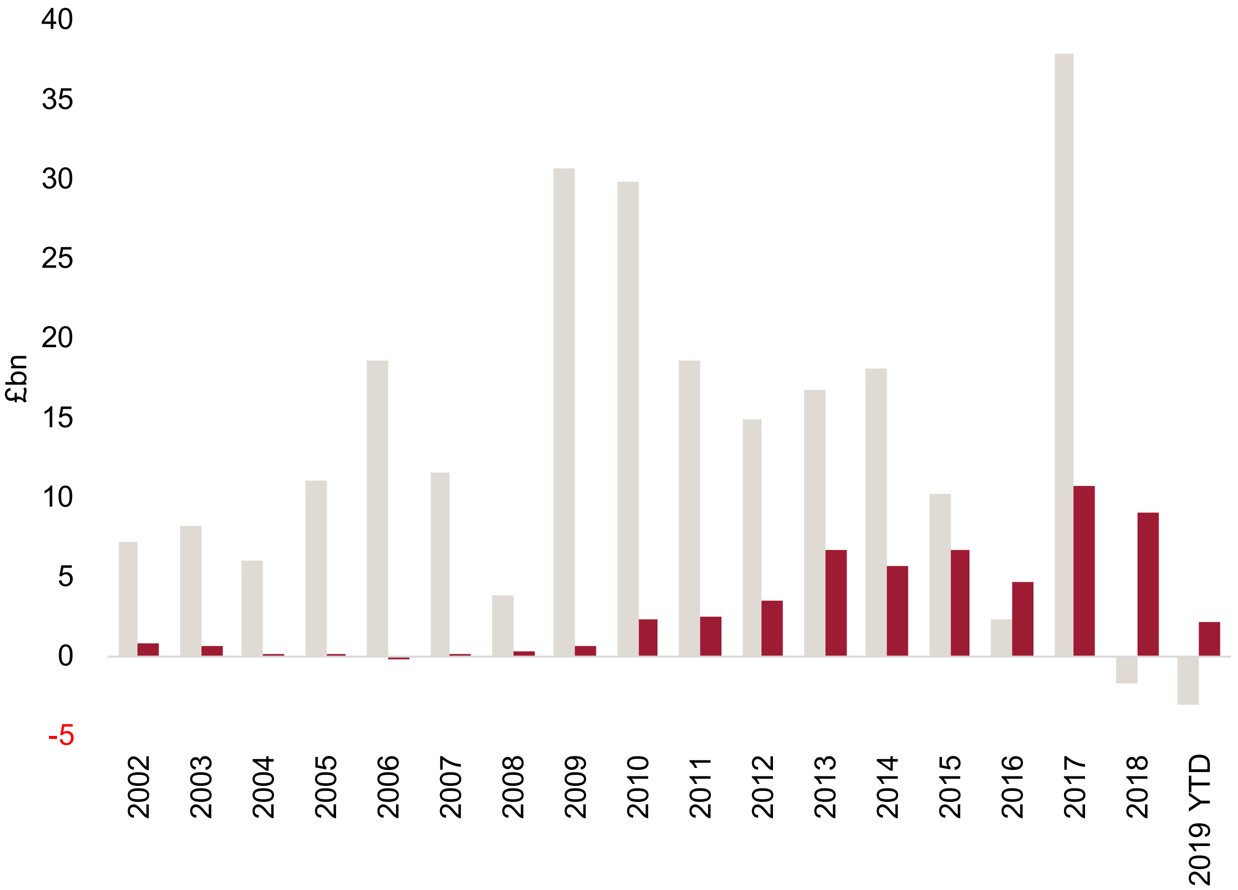
The rise of index investing

Net flows of US equity mutual funds and ETFs, 1993 through December 2018 (USD billions)



Source: Morningstar, Inc. Data as of 31 December 2018.

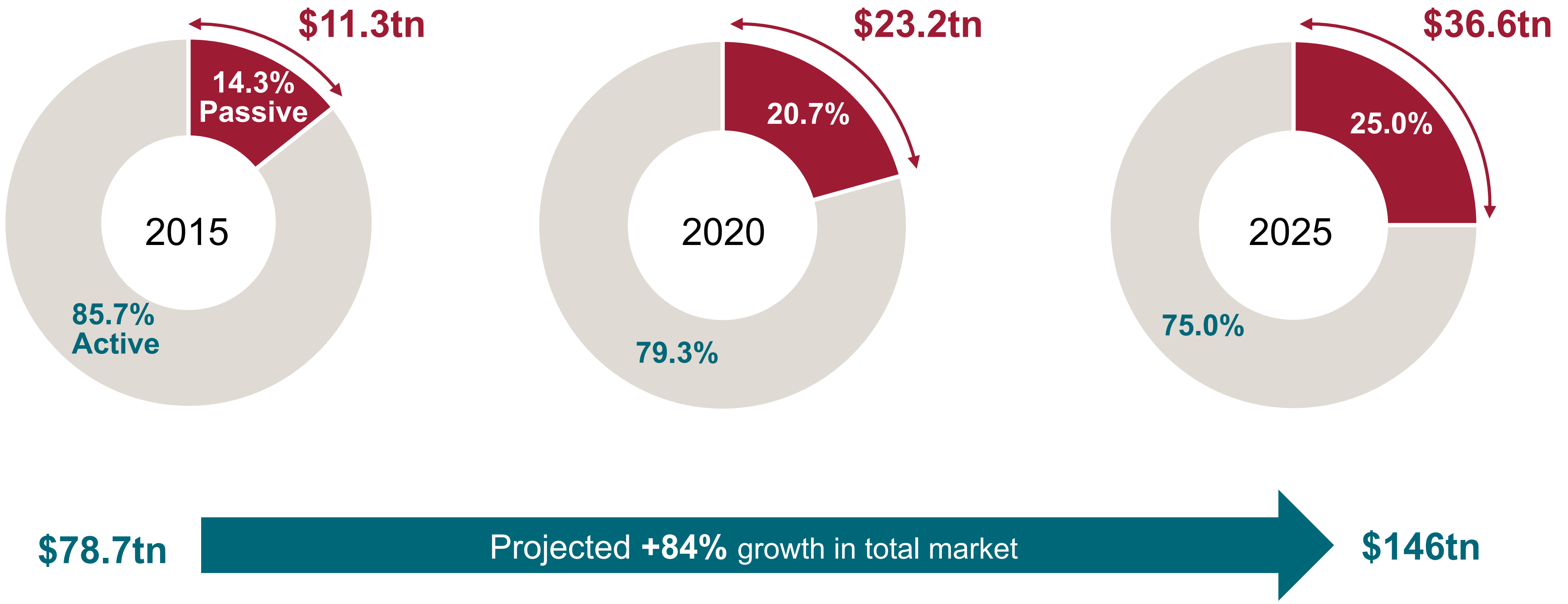
Net retail fund sales in the UK (GBP billions)



Source: Morningstar, Inc. Data as of 31 December 2018.

“You don’t need to be a weatherman to know which way the wind is blowing” – Bob Dylan

Passive expected to triple in assets



Source: PWC Asset & Wealth Management Revolution: Embracing Exponential Change, October 2017.

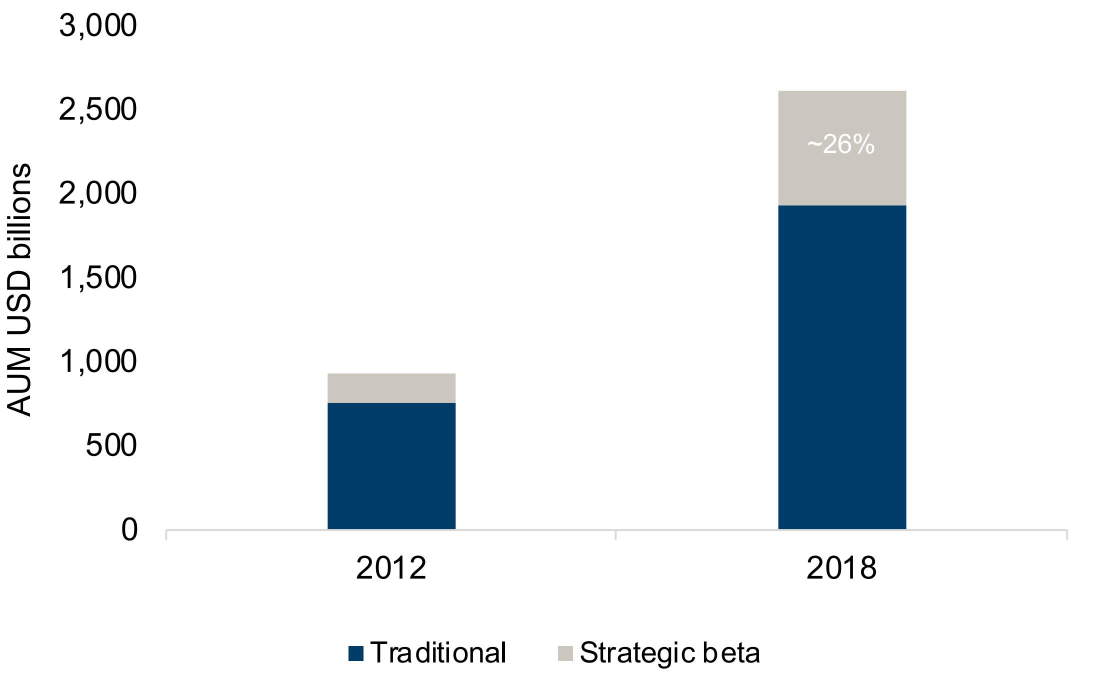
Can indexing get too big?

Is all index investing truly indexing?

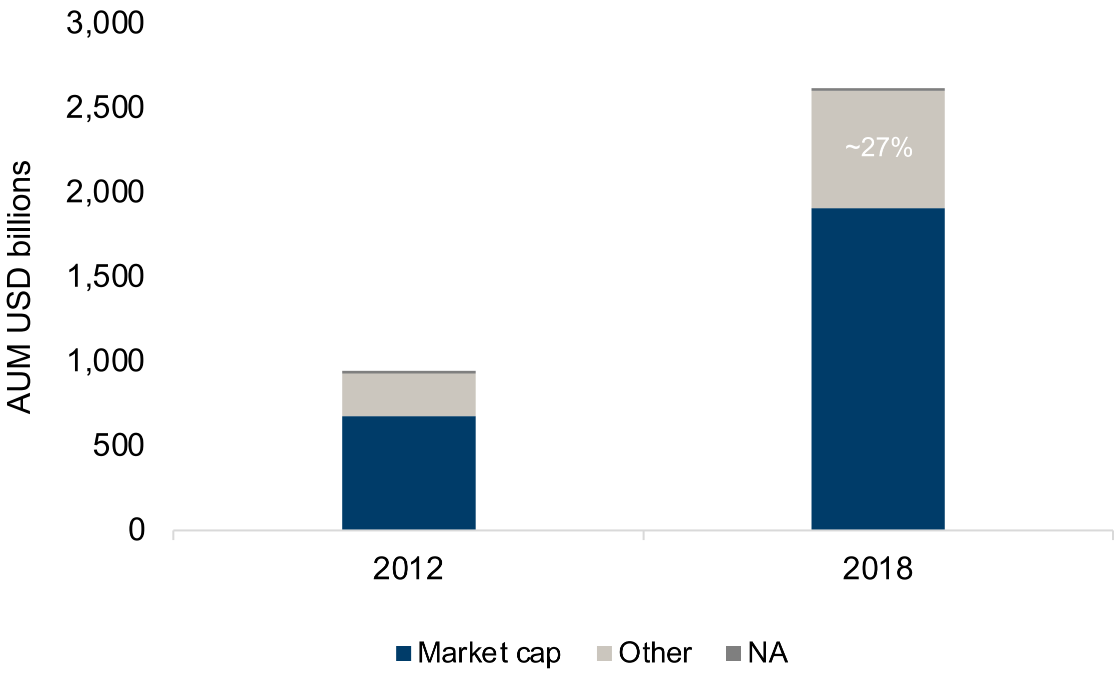
Some index assets are in fact active

AUM by ETF category

AUM by strategy



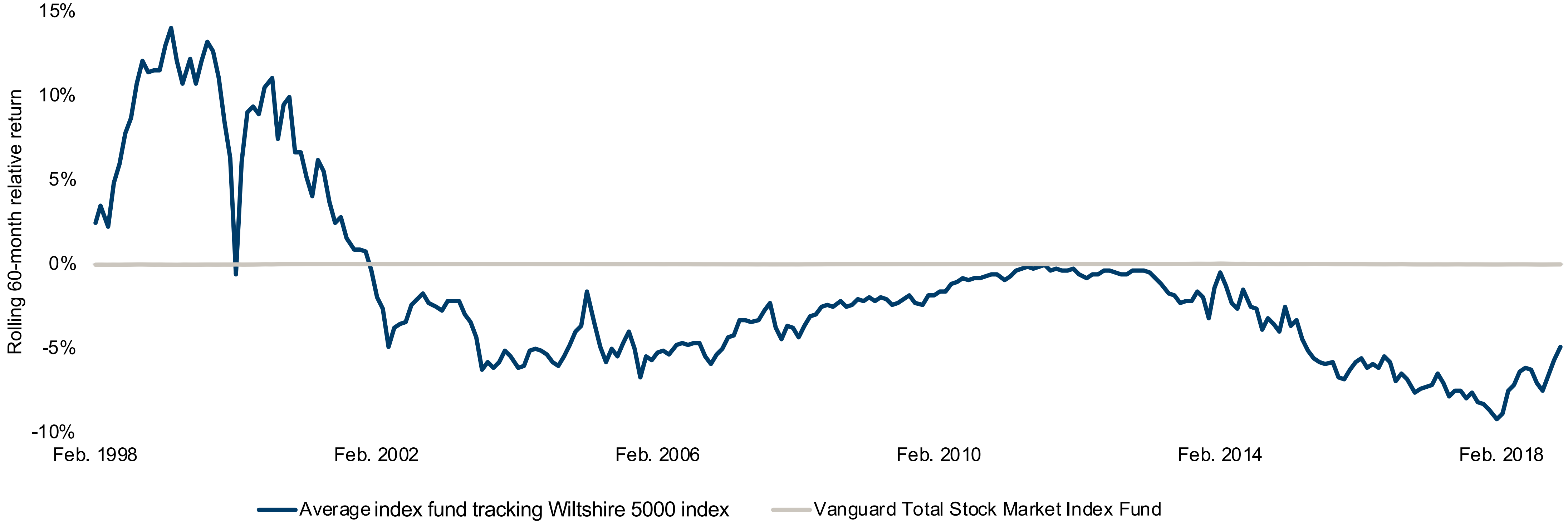
AUM by weighting methodology



Note: Data represent equity ETFs available for sales in the US. Strategic beta funds are those that fall into the Morningstar strategic beta category. 'Traditional' are all other ETFs. 'Other' refers to all funds not weighted by Market Cap (apart from where no weighting methodology is available). 'NA' refers to funds where no weighting methodology is available.
Data as of December 31 2012 and December 31 2018. Source: Vanguard calculations, based on data from Morningstar, Inc.

Index fund investors haven't necessarily tracked the market

Investors use index funds, but build active portfolios



Past performance is not a reliable indicator of future results.
Notes: Average index fund includes U.S.-domiciled index mutual funds and ETFs in the U.S. equity and sector equity categories, and its returns are asset-weighted. Average index fund returns and Vanguard Total Stock Market Index Fund returns are relative to a total market index represented by the Wilshire 5000 Index. Data are from 1998 to 2018.
Source: Vanguard calculations, based on data from Morningstar, Inc.

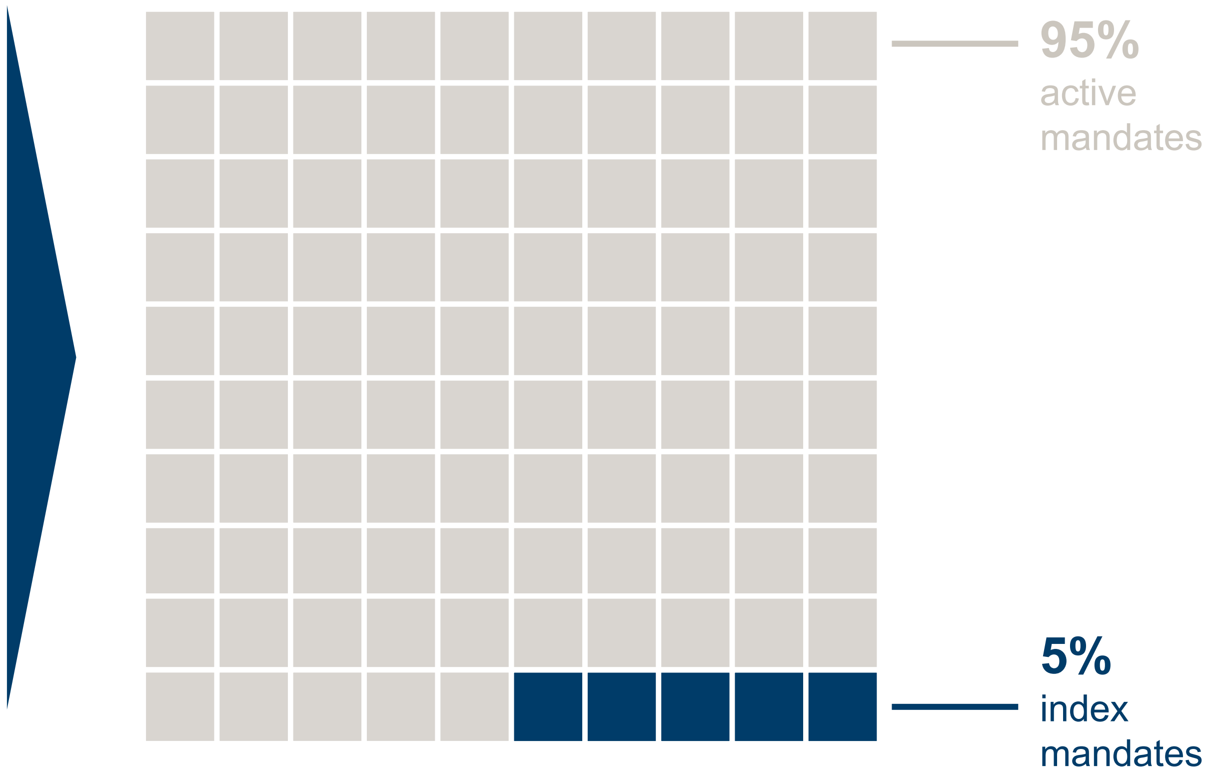
Are there areas of the market or market conditions that do not suit index mandates?

Does indexing make price discovery more challenging for active managers?

Indexing accounts for just a fraction of trading activity

Price discovery is driven by active participants

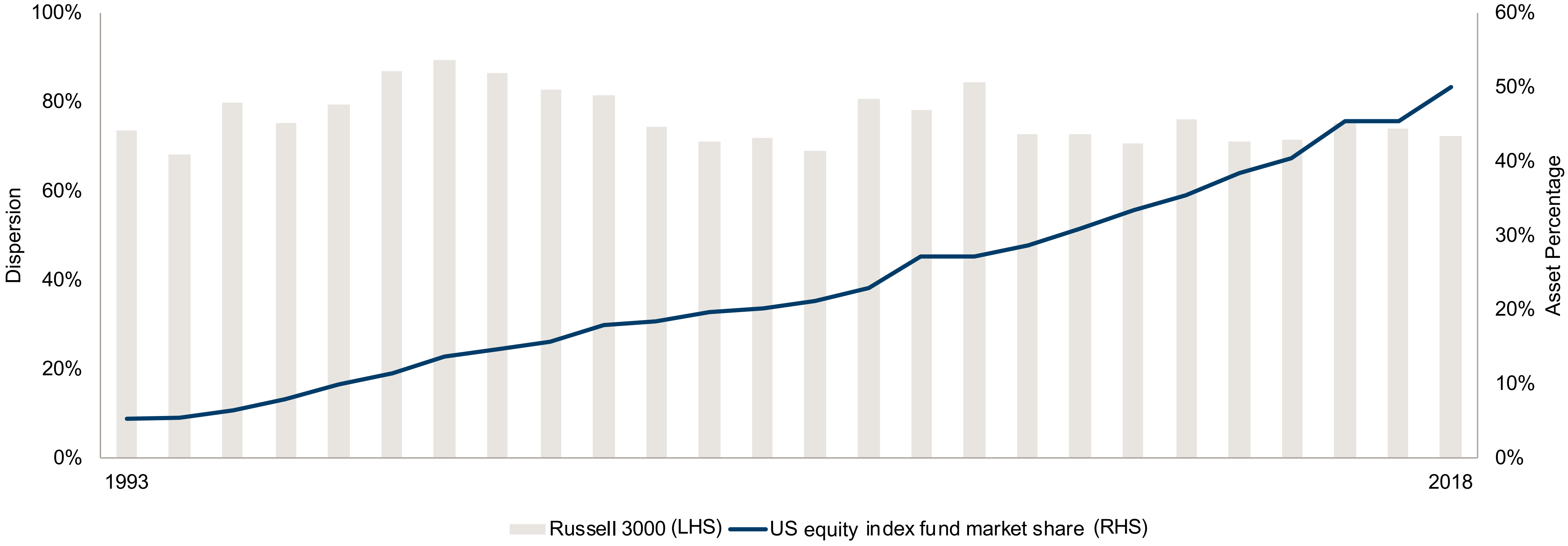
Portfolio management activity of index strategies makes up a **minimal amount of trading volume** on US exchanges



Sources: Vanguard and Bloomberg.

Indexing's growth and price dispersion: no connection found

No more, no less challenging for active

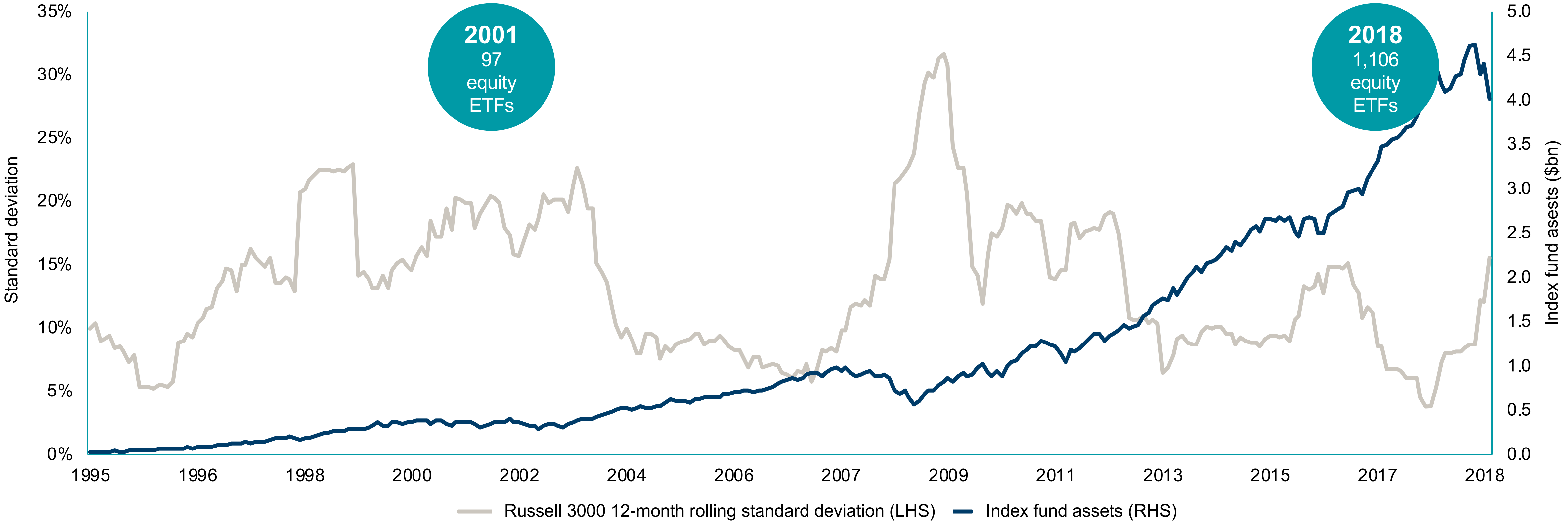


Note: Dispersion is defined as the percentage of stocks in the Russell 3000 Index that have either outperformed or underperformed the index by at least 10 percentage points. Index fund asset percentage is the percentage of assets in U.S.-domiciled equity funds invested in index funds. Sector funds are included.
Source: Vanguard calculations, using data provided by FactSet and Morningstar, Inc as at 31 December 2018.

Does indexing cause greater market volatility?

Indexing’s growth and market volatility: no connection found

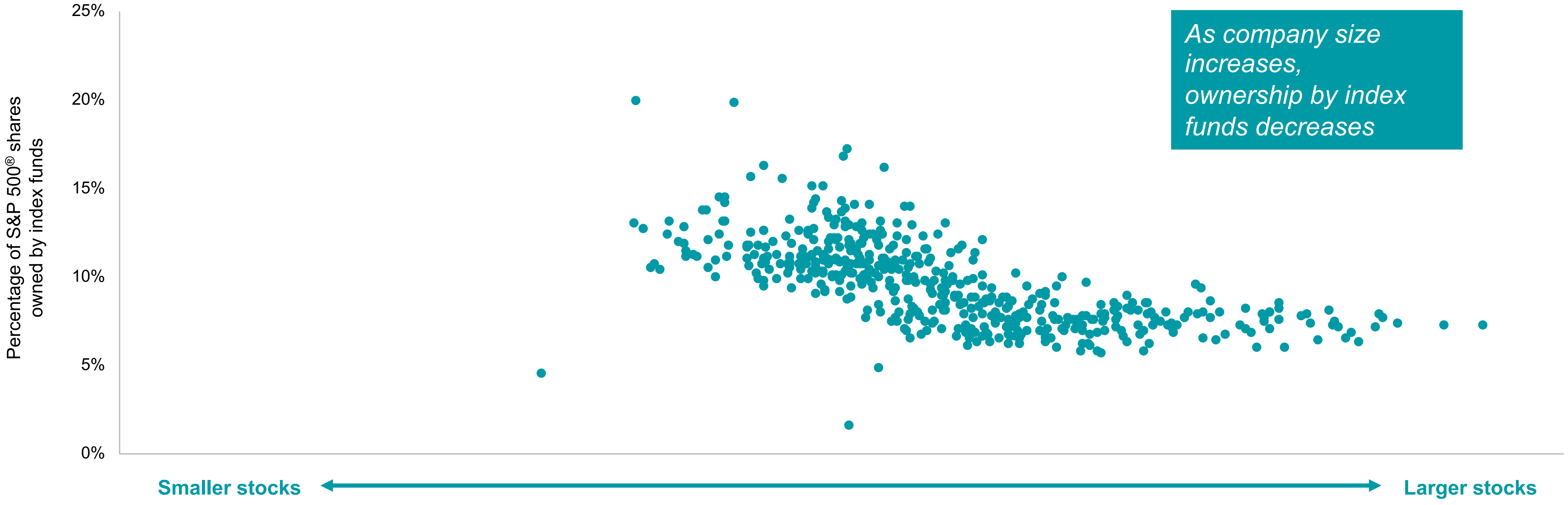
Passive asset percentage and market volatility



Past performance is no guarantee of future results.
Notes: Passive market share is the percent of assets in US-domiciled US equity funds invested in index funds. Sector funds are included.
Source: Vanguard calculations, using data from FactSet and Morningstar, Inc as at 31 December 2018.

Proportional ownership of individual stocks is misunderstood

Larger companies actually have lower index fund ownership



Notes: Stock size is measured by market capitalisation in logarithmic scale. Data are as at 31 December 2015.
Source: Vanguard calculations, based on data from Morningstar, Inc., and FactSet.

Degree of concentration of public equities in the investible market has no noticeable trend

Notes: The Gini coefficient is a statistical measure of the degree of variation in a set of values and represents wealth distribution. HHI is the sum of square of the market of each firm in the Russell 3000 Index. All levels were assumed to be 100 in 1984.
Source: Vanguard calculations, based on data from FactSet.

Does indexing expand capital markets?

Summary

Indexing has not had an adverse effect on capital markets

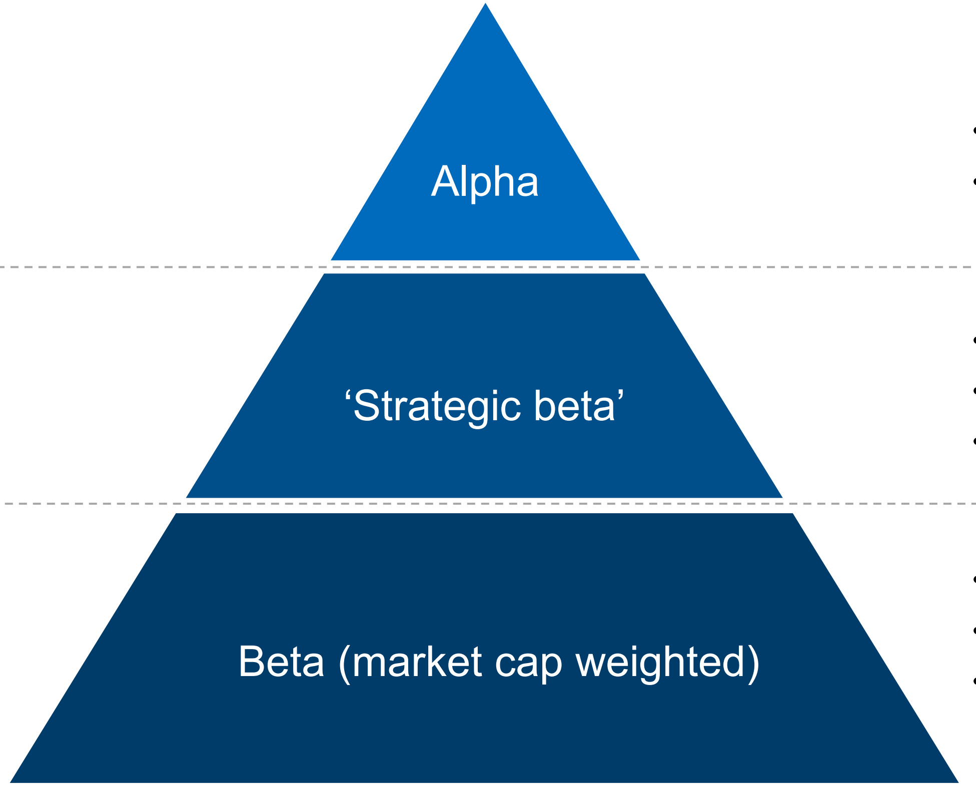
Many passive investments are used with active strategies

There is still a place for active management

Appendix

Source of returns: stylised representation

Behaviour relative to market	Could be replicated by index?
Active	No
Active	Yes
Passive	Yes



- Active in the traditional sense (i.e. not rules based)
- Typically based on stock selection and market timing

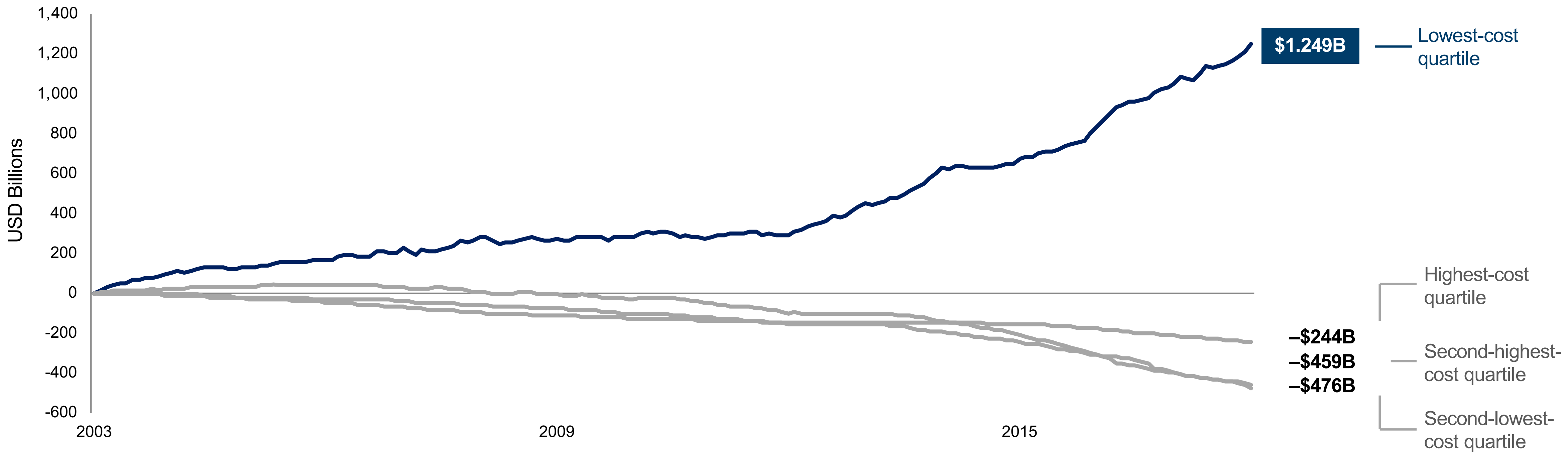
- Can deviate from market-cap weighting
- Typically rules based
- Often with aim to capture factor returns

- Traditional indexing
- Passive (i.e. captures entire market(s))
- Broadly diversified

Investors recognise the benefits of low costs

High-cost funds are under pressure

Cumulative equity fund net cash flows by cost quartiles

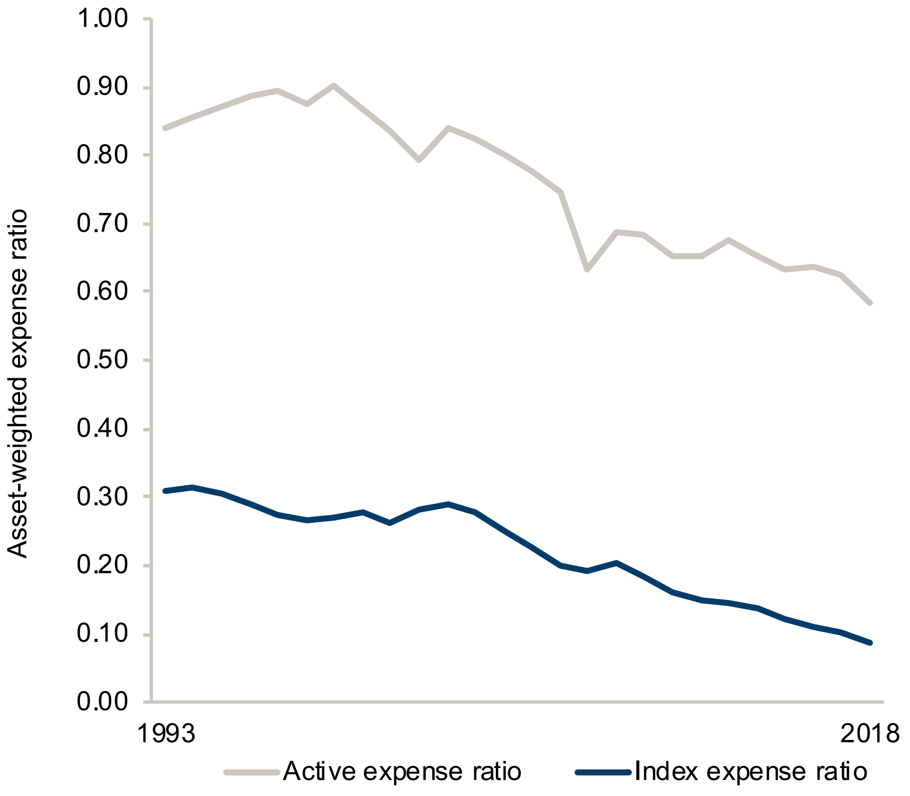


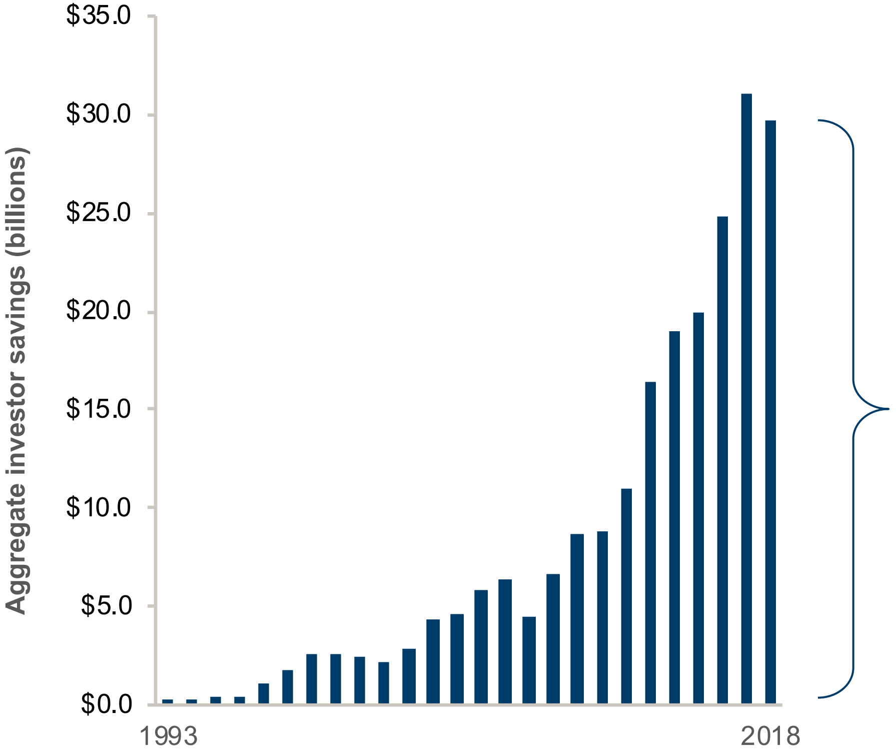
Notes: Expense-ratio quartiles were calculated annually. Equity funds represented by Morningstar U.S. equity category. Each quartile represents asset-weighted average expense ratios, determined by multiplying annual expense ratios by year-end assets under management and dividing by the aggregate assets in each quartile. Data are as of December 31, 2018.

Source: Vanguard calculations, based on data from Morningstar, Inc.

Indexing has helped investors to keep more of their money

In aggregate, indexing has driven down the cost of investing





$218bn

Estimated cumulative investor savings since 1990s

Notes: In this hypothetical example, data assumes index investors would have invested in active funds had index funds not existed. Data reflects the difference between the cumulative expense ratio fees paid by investors owning open-end funds versus what they would have paid if index funds did not exist. Investor savings are calculated as: (asset-weighted expense ratio of actively managed funds x industry assets) – (industry asset-weighted expense ratio x industry assets).
Source: Vanguard calculations, based on data from Morningstar, Inc. as at 31 December 2018.

Investment risk information

The value of investments, and the income from them, may fall or rise and investors may get back less than they invested. Past performance is not a reliable indicator of future results.

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Some funds invest in emerging markets which can be more volatile than more established markets. As a result the value of your investment may rise or fall.

Investments in smaller companies may be more volatile than investments in well-established blue chip companies.

Some funds invest in securities which are denominated in different currencies. Movements in currency exchange rates can affect the return of investments. These performance figures are calculated in US dollars and the return may increase or decrease as a result of currency fluctuations.

Funds may invest in financial derivative instruments that could increase or reduce exposure to underlying assets and result in greater fluctuations of the fund's Net Asset Value. Some derivatives give rise to increased potential for loss where the fund's counterparty defaults in meeting its payment obligations.

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Funds investing in fixed interest securities carry the risk of default on repayment and erosion of the capital value of your investment and the level of income may fluctuate. Movements in interest rates are likely to affect the capital value of fixed interest securities. Corporate bonds may provide higher yields but as such may carry greater credit risk increasing the risk of default on repayment and erosion of the capital value of your investment. The level of income may fluctuate and movements in interest rates are likely to affect the capital value of bonds.

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