

# Megatrends: The future of work

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Financial Advisor Services



# Economic and market overview

## Global growth

Historic fall in output as a result of containment measures; longer term hinges on health care developments

## Policy and interest rates

Expect policies to remain in unprecedented territory for the foreseeable future

## Global asset returns

Recent market performance has moderately raised portfolio expected returns

## Our economic outlook hinges on our virus outlook

- The COVID-19 pandemic, and the rapidly expanding efforts to contain it, has generated a massive economic shock
- Depth and length of the global recession will be determined by (1) the policy response and (2) duration and success of global containment
- **We anticipate worse quarterly growth in Q2 than at any point during the GFC**
- **We must avoid second-order macro effects of shock that increase solvency risk**

# Economic and market overview



1

## Will stimulus measures be sufficient?

The measures enacted have been unprecedented. The key question remains if they will be enough to bind employees to their jobs and keep solvency measures for households and businesses high.

## Expect rolling reopen of the global economy.

We expect a gradual and rolling reopening of global supply commencing in the May time frame as regions move beyond peak infections.



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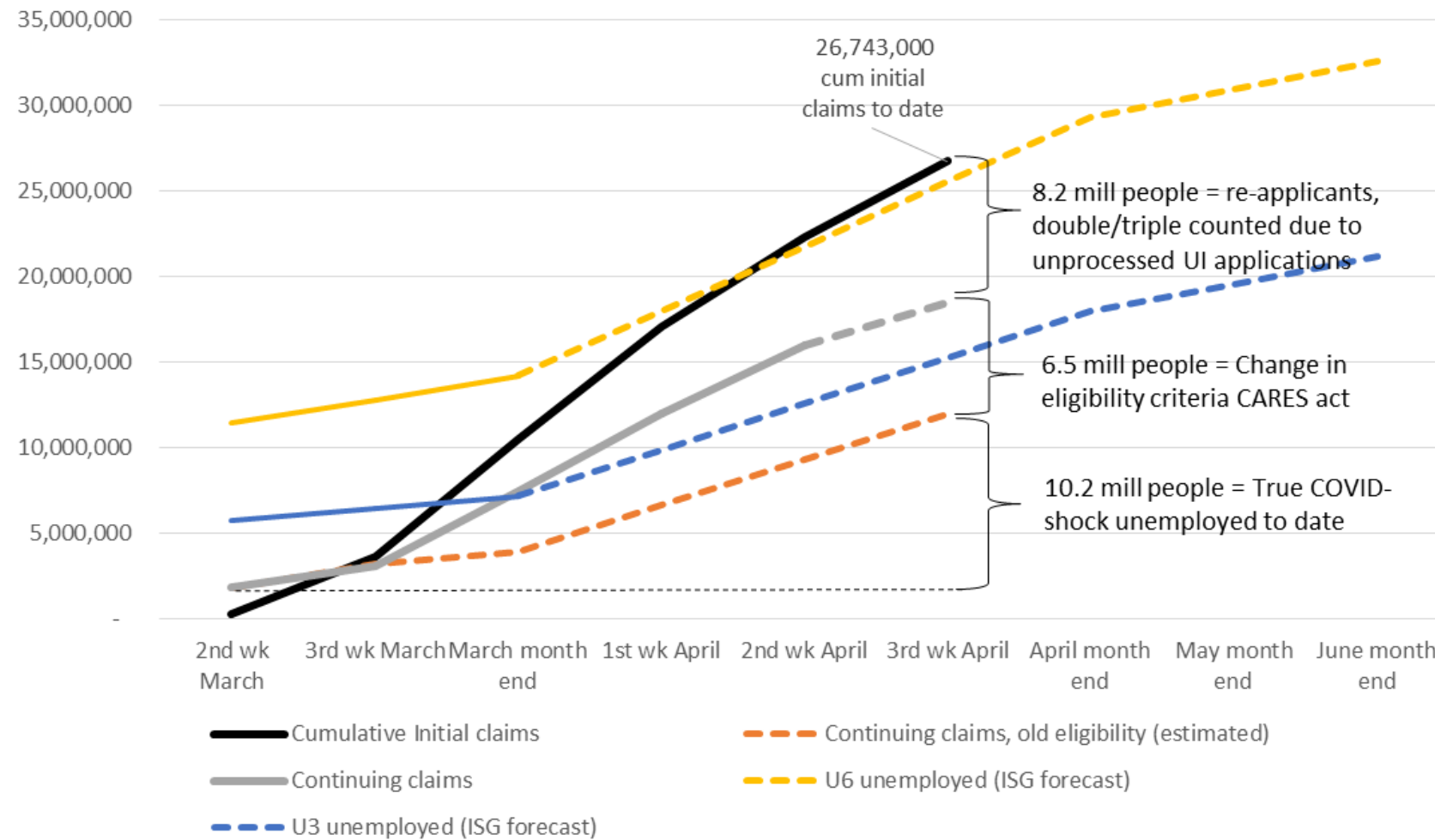


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## Health care solution is ultimately paramount.

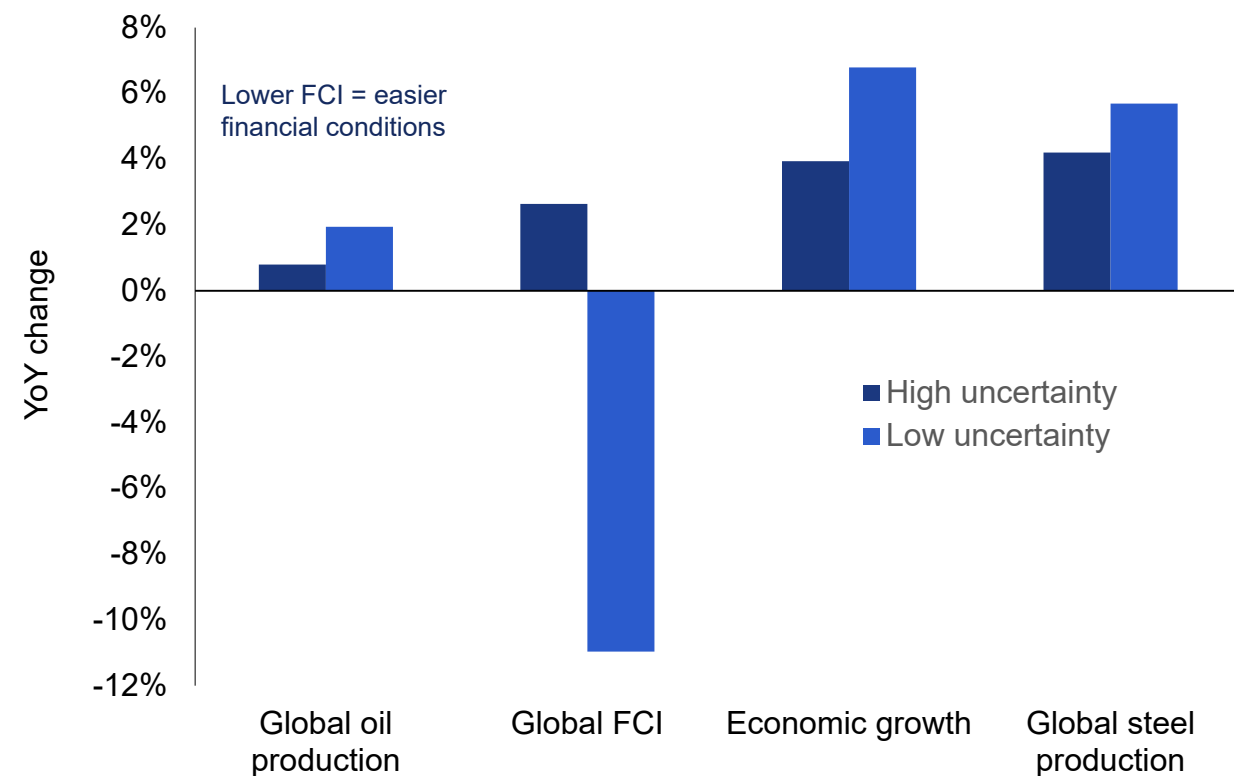
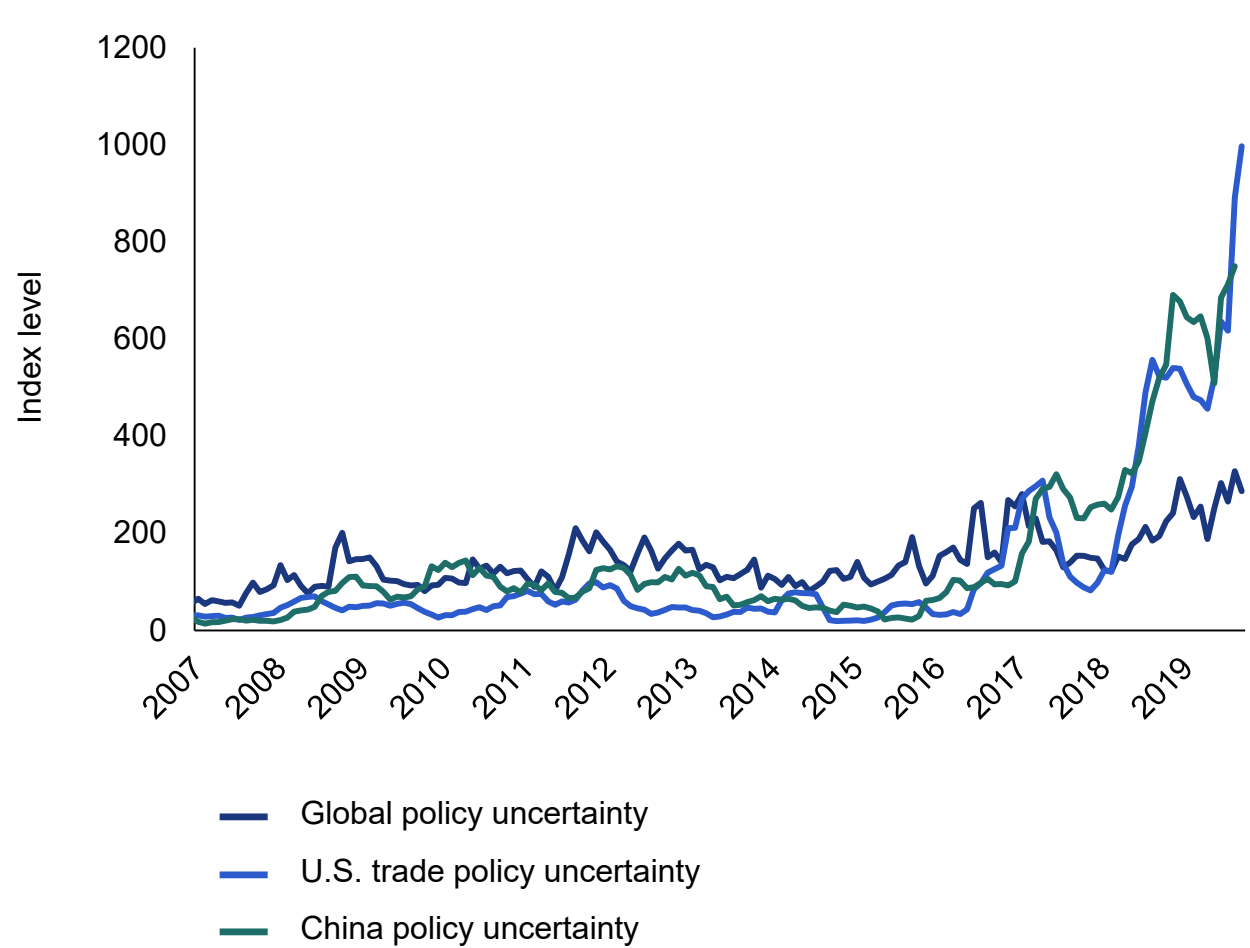
The speed and shape of a demand rebound is critically tied to the degree of confidence consumers and governments find in future health care solutions.

# How to read initial unemployment claims



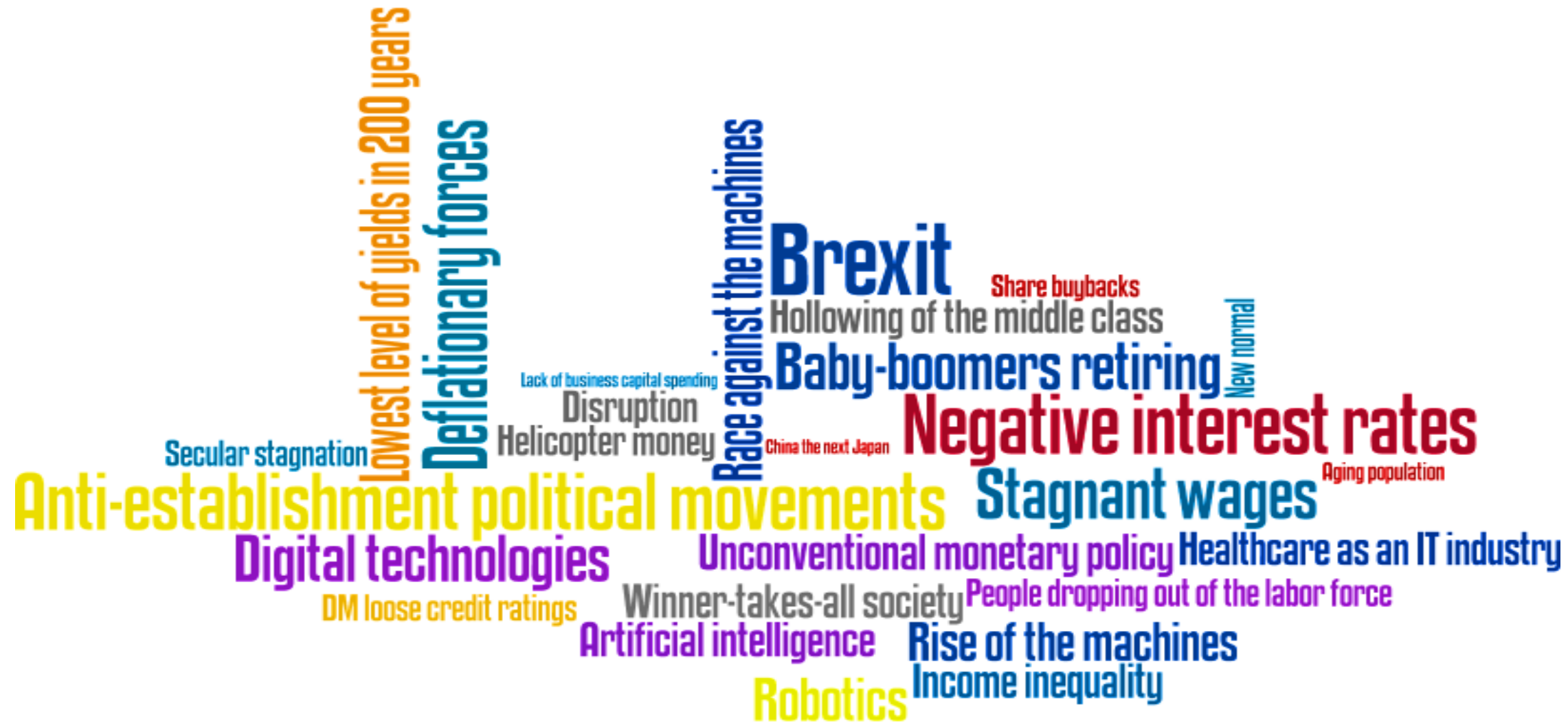
Source: Vanguard calculations based on data from the US Bureau of Labor Statistics and US Department of Labor, 2020.

# Erratic and elevated policy uncertainty a drag on growth

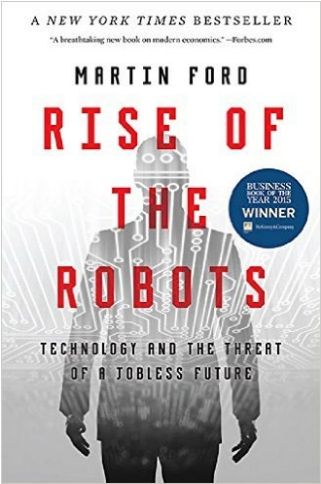
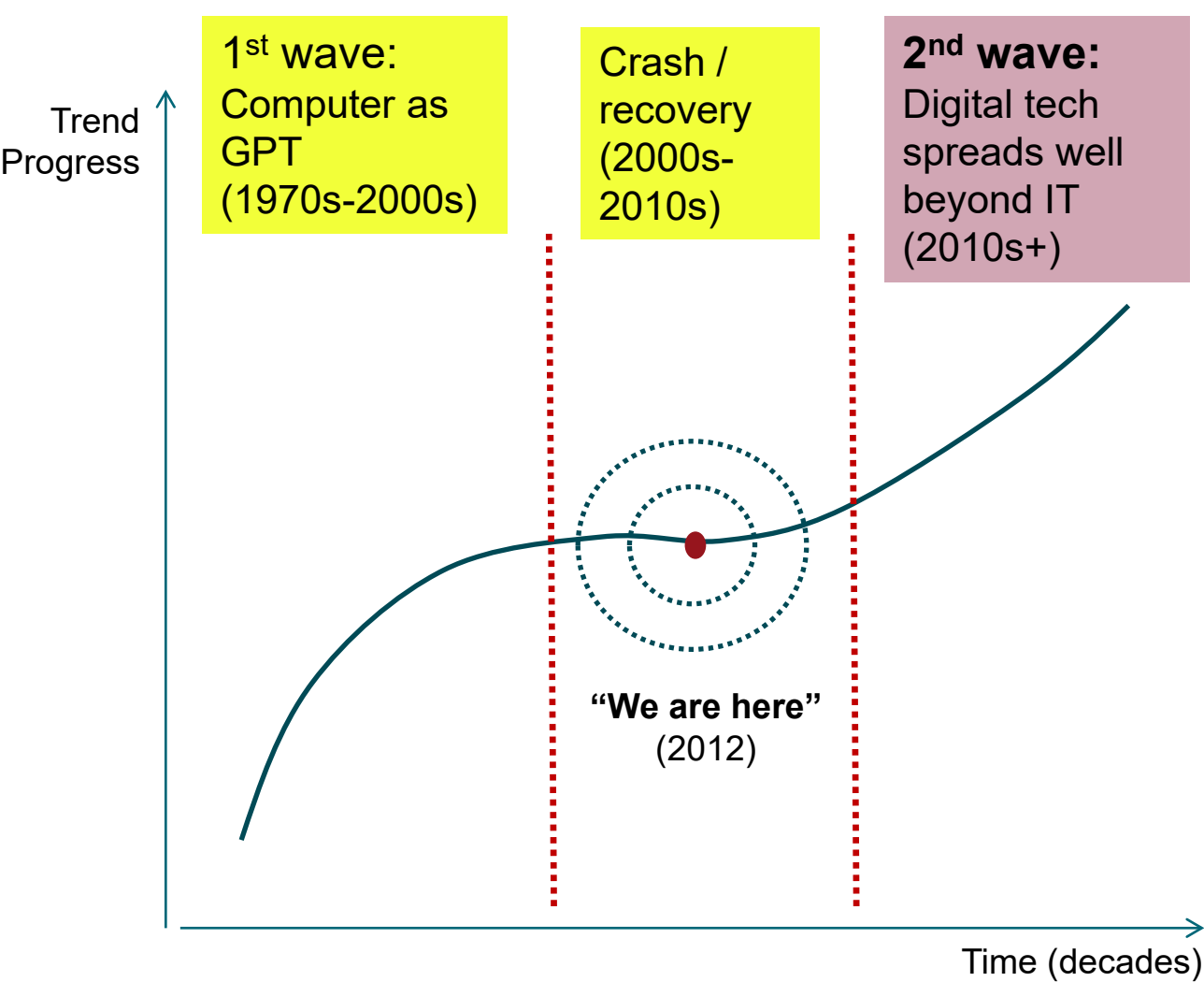


**Notes:** (RHS): The bars represent the average year-over-year change in each of the indicators in high- versus low-uncertainty periods. Periods of low versus high uncertainty are obtained through a Markov-switching model for global growth. Global financial conditions are an aggregate measure of risk sentiment and include variables such as equity returns, credit spreads, and lending behavior. Lower values denote easier financial conditions and risk-on attitudes. Z-scores measure how far a value differs from the historical average, accounting for the measure's typical fluctuations **Source:** (LHS) Index values are based on the Economic Policy Uncertainty Index. Data and methodology are available at <http://www.policyuncertainty.com>. (RHS) Vanguard calculations, based on data from Moody's Analytics Data Buffet and Thomson Reuters Datastream.

# A world of extremes



3<sup>rd</sup> industrial revolution: Evolving according to script

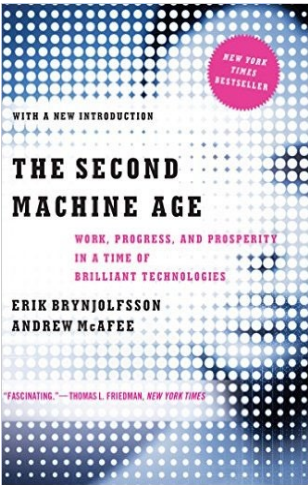


Big data

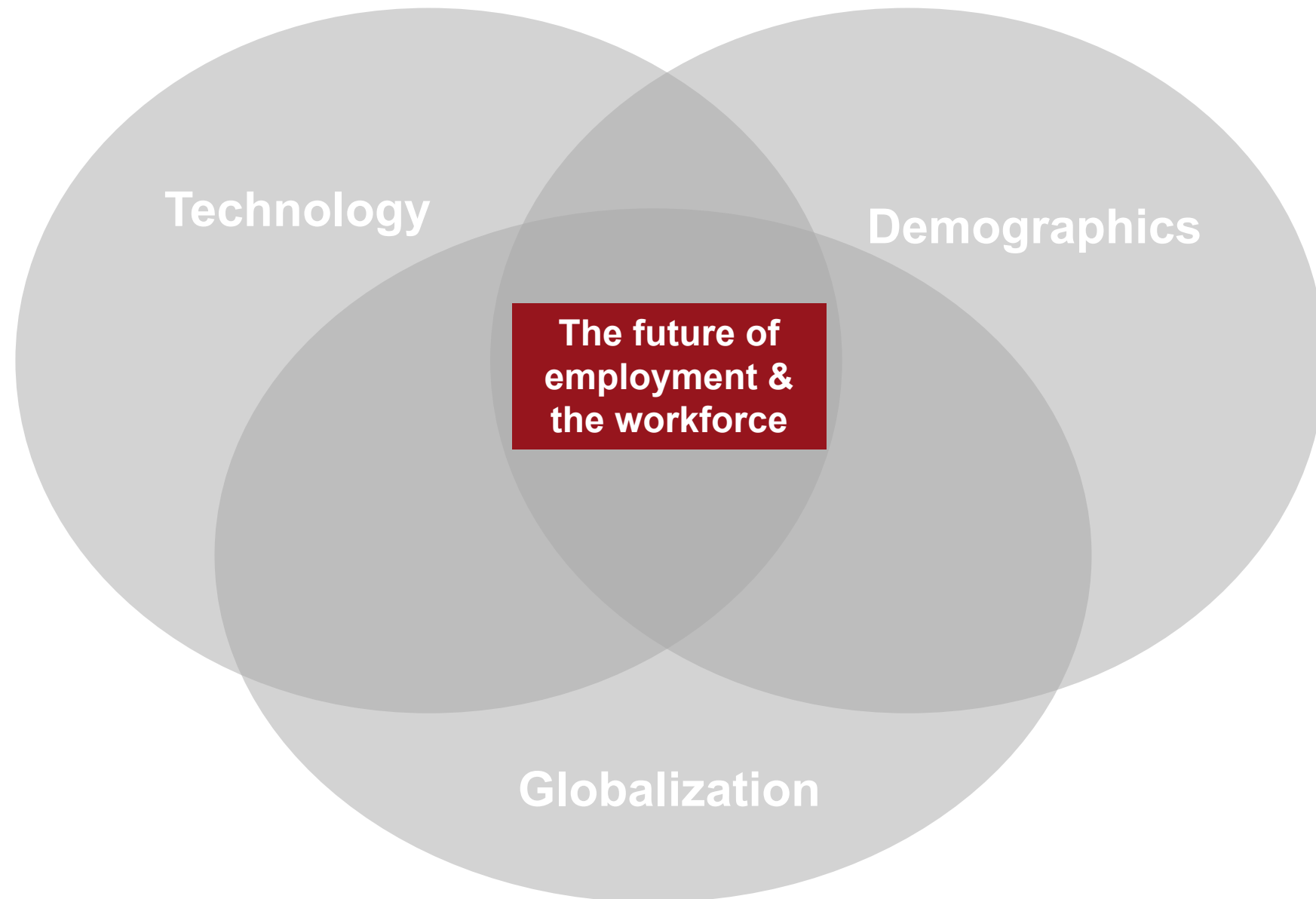
Machine learning

Genomics

Biotech

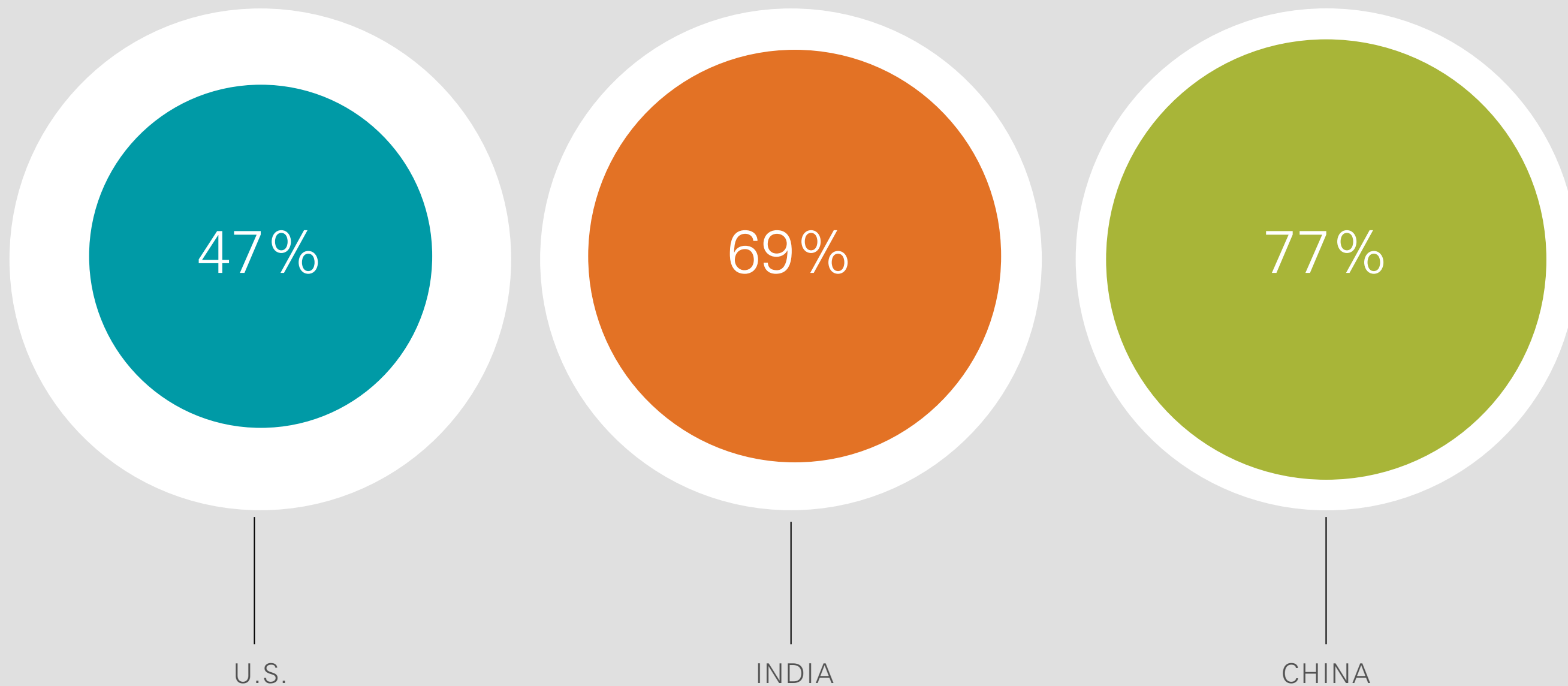


## Three secular forces & the key megatrend





Will there be **more** jobs in the world  
10 years from now, or **fewer**?

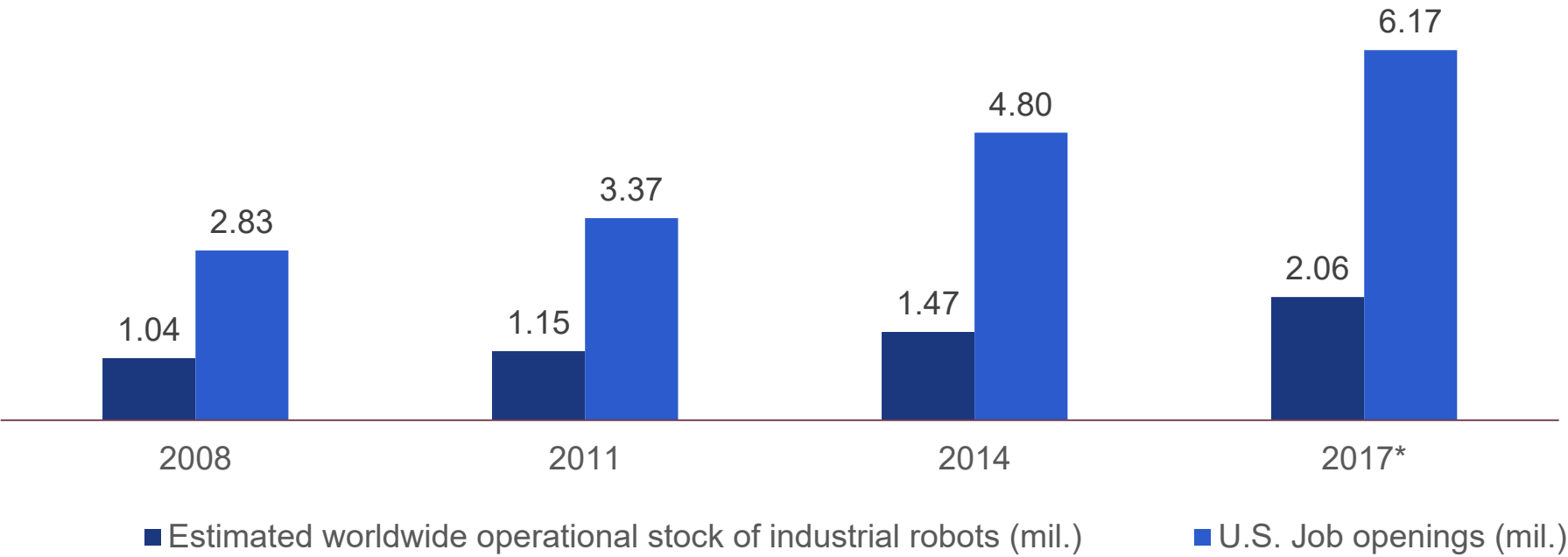


Source: Frey and Osborne (2013), *The future of employment: How susceptible are jobs to computerisation?*

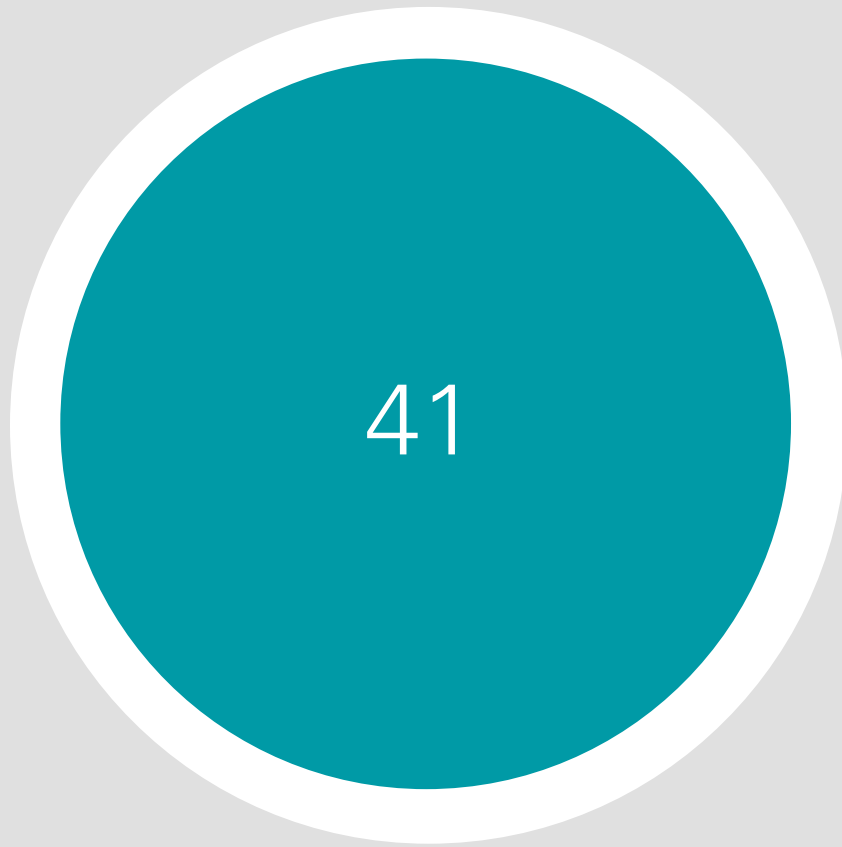
## Flawed assumptions in the debate

- Technology only substitutes for human labor
- Jobs don't change
- 1 job = 1 task
- Amount of work is fixed & finite

# More automation...yet labor shortages



\* 2017 forecast (robots).  
Notes: Monthly job opening data covers December 2015, December 2016 and July 2017.  
Sources: IFR World Robotics 2017 & U.S. Bureau of Labor Statistics (BLS): Job Openings and Labor Turnover Survey.



TASKS



ACTIVITIES



JOBS

Source: Vanguard calculations using data from U.S. Department of Labor O\*Net OnLine.



## BASIC

Growing  
Harvesting  
Digging  
Moving objects  
Recording information



## REPETITIVE

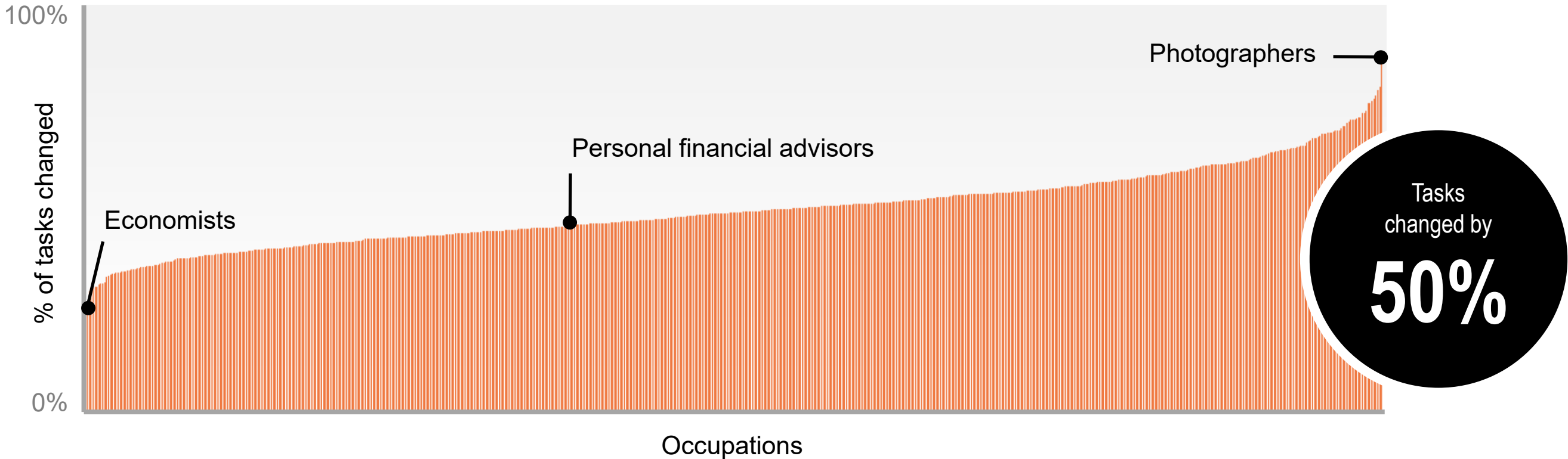
Inspecting  
Monitoring  
Assembling  
Getting information  
Processing information  
Scheduling



## ADVANCED

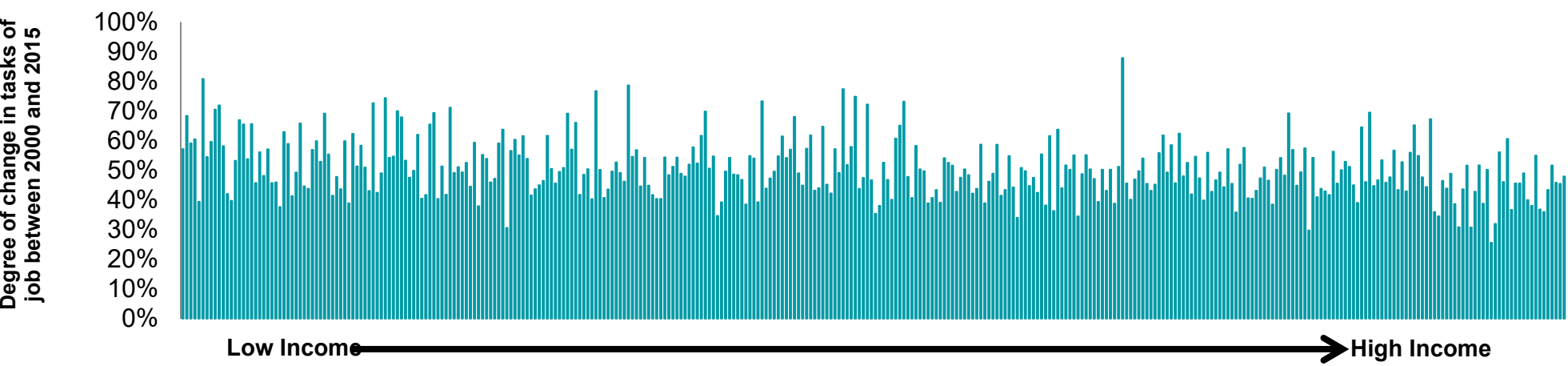
Maintaining relationships  
Interacting with the public  
Persuading outcomes  
Training  
Developing teams  
Applying knowledge  
Strategizing  
Thinking creatively  
Solving problems  
Assisting/Caring for others  
Judging quality  
Conducting complex  
physical movements

# Change in occupational tasks

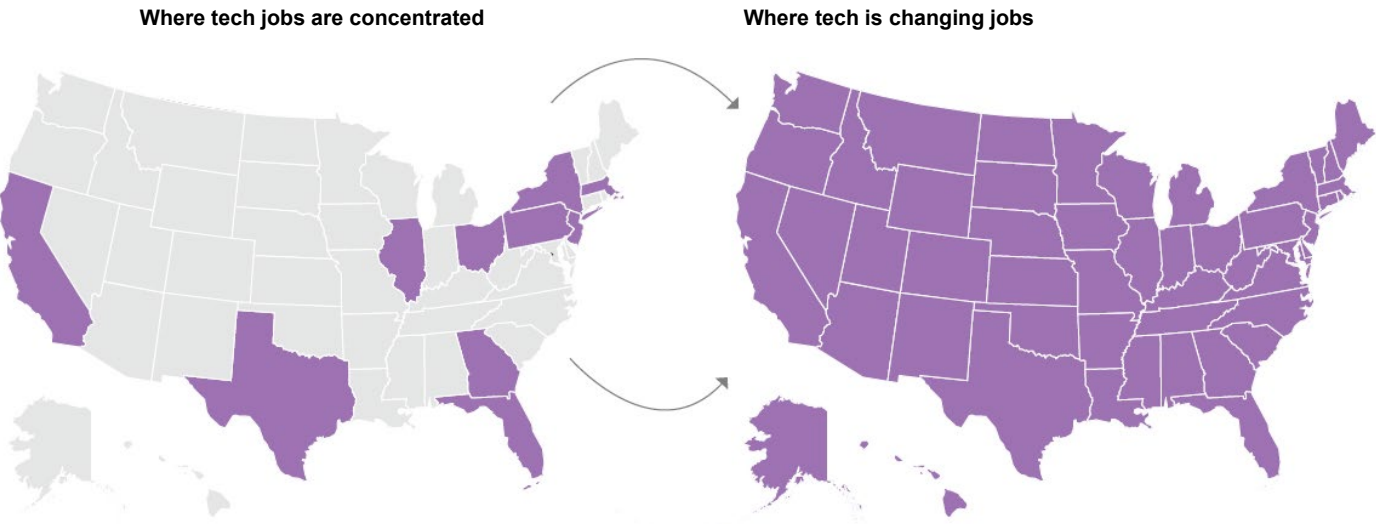


Source: Vanguard calculations, based on data from U.S. Department of Labor O\*Net OnLine (2000–2015).

# The mix of tasks has changed across all income levels



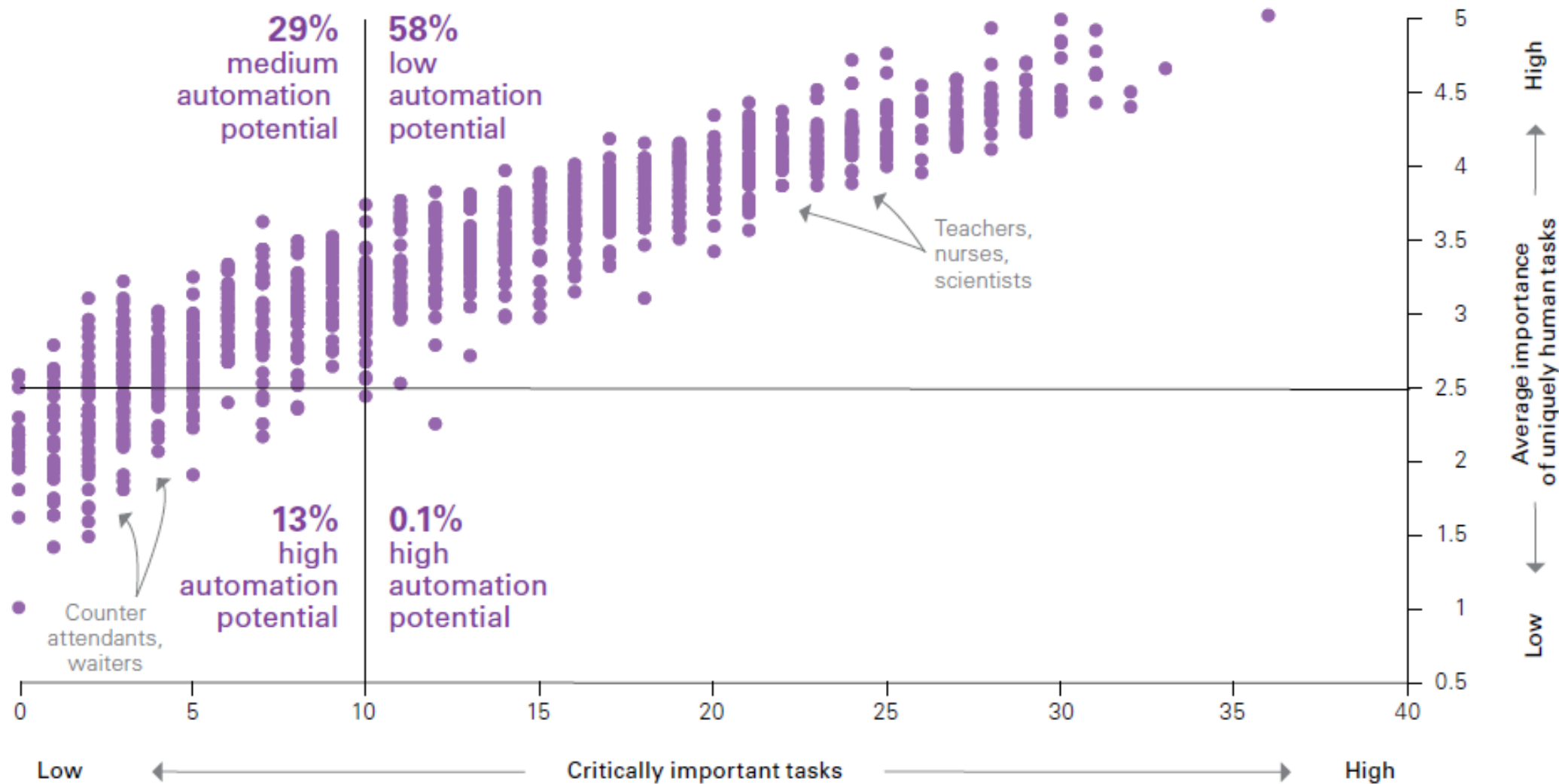
It's not just Silicon Valley, Cambridge, and Austin. Work is changing everywhere.



Sources: Vanguard calculations, using data from the U.S. Census Bureau American Community Survey, U.S. Department of Labor O\*Net OnLine and U.S. Bureau of Labor Statistics.

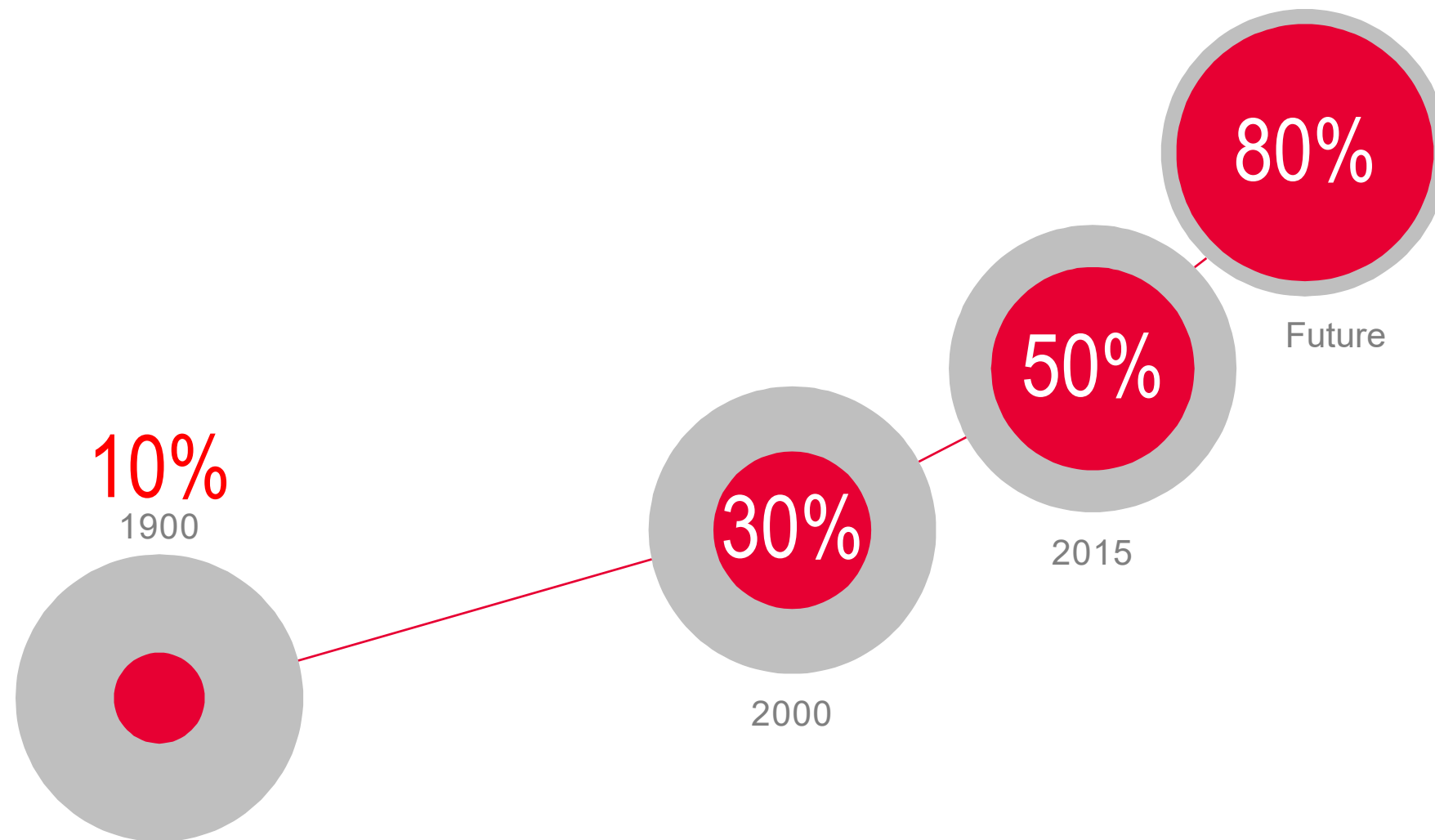


# The number of tasks and importance of uniquely-human tasks limits potential automation



Notes: The graph maps the average importance of human tasks in an occupation against the number of critically important tasks in that occupation. We observe that the occupations with a higher proportion of critically important tasks are associated with higher average importance of uniquely human tasks.  
Sources: Vanguard calculations, using data from U.S. Department of Labor O\*Net OnLine, U.S. Bureau of Economic Analysis, and U.S. Bureau of Labor Statistics.  
Data available as of October 2018.

## Work of the future will be dominated by advanced tasks



Sources: Vanguard calculations, based on data from McKinsey & Company, U.S. Bureau of Labor Statistics, and U.S. Department of Labor O\*Net OnLine.

# Implications for discussion

## WORKERS

- Automation anxiety is real: ~15% jobs automated away
- Job retraining need will be massive across most occupations
- Mid-career most at risk
- EQ > IQ

## FIRMS

- Average worker has been upskilling & can do more
- Massive investments in on-job-training will be needed & exceed IT spend
- Mid-career re-training & advancement of lifelong learning programs
- WTA economy & race for talent unlikely to change

## EDUCATION

- Three skills critical for future of work
  - *Creative intelligence*
  - *Emotional intelligence*
  - *Technology acumen*
- Majors evolve toward competencies?
- Interdisciplinary & cross-functional the new norm?
- Large market for lifelong learning as technology advances

Expect more disruption  
Focus on re-tasking  
Lead the path forward

A **NETFLIX** ORIGINAL SERIES

NETFLIX ORIGINAL  
**STRANGER THINGS**

★★★★★ 2016 TV-14 1 Season HD 5.1

A lost boy. A government lab steeped in terrible secrets. A mother who won't rest until her son is found.

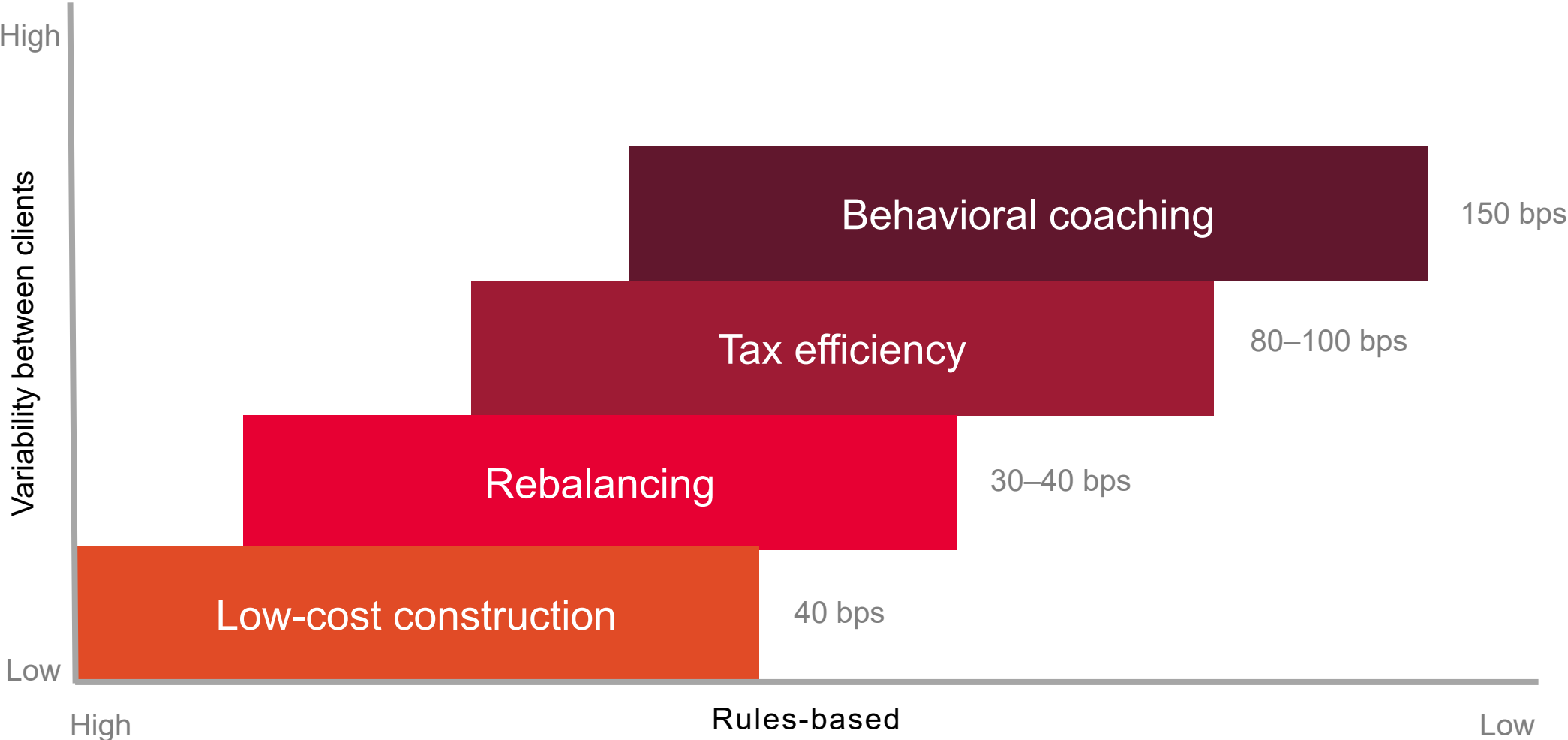


*This nostalgic nod to 1980s sci-fi/horror classics pays homage to "E.T.," "Poltergeist" and the novels of Stephen King.*

Continue Watching for Montage

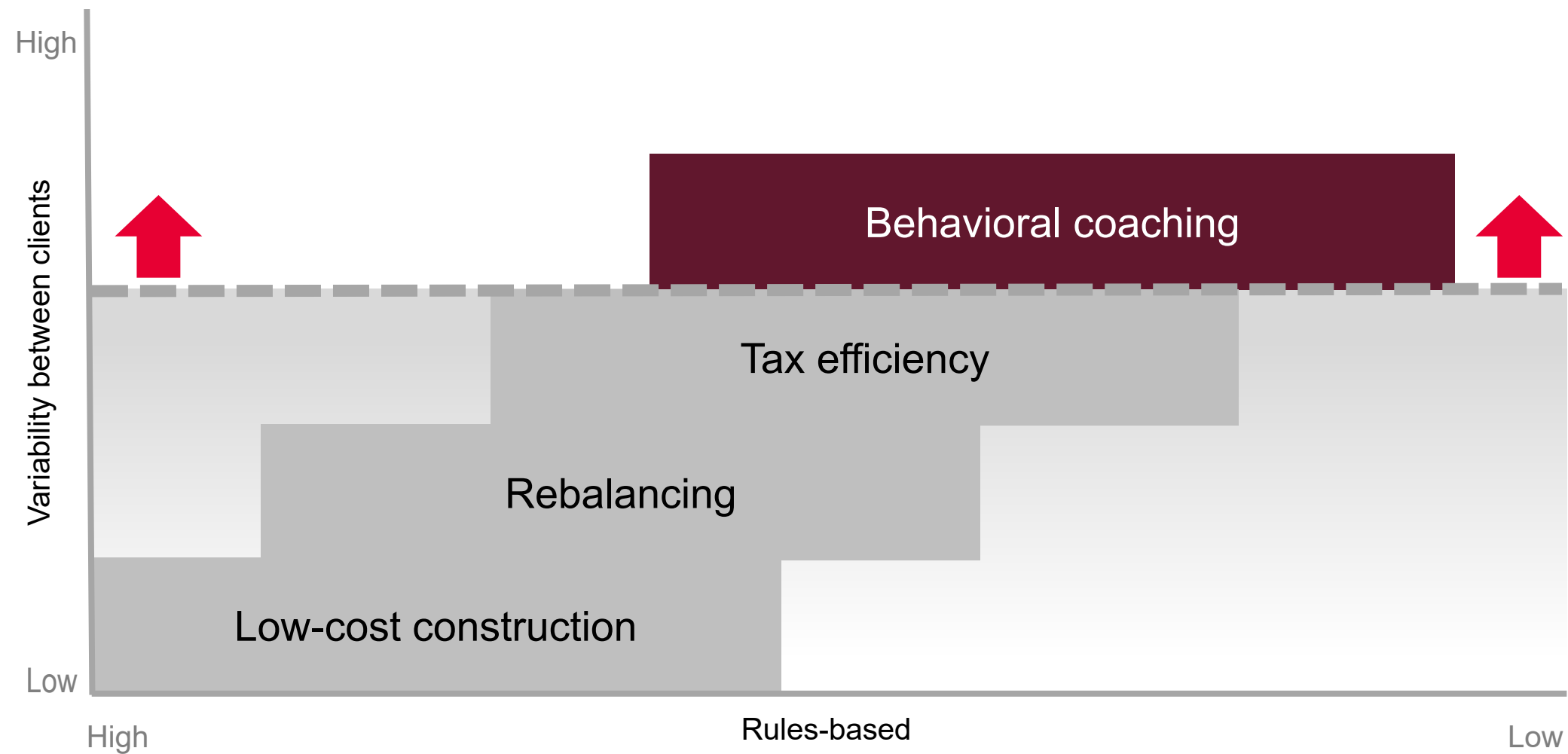


# Vanguard advisor's alpha<sup>®</sup> value stack



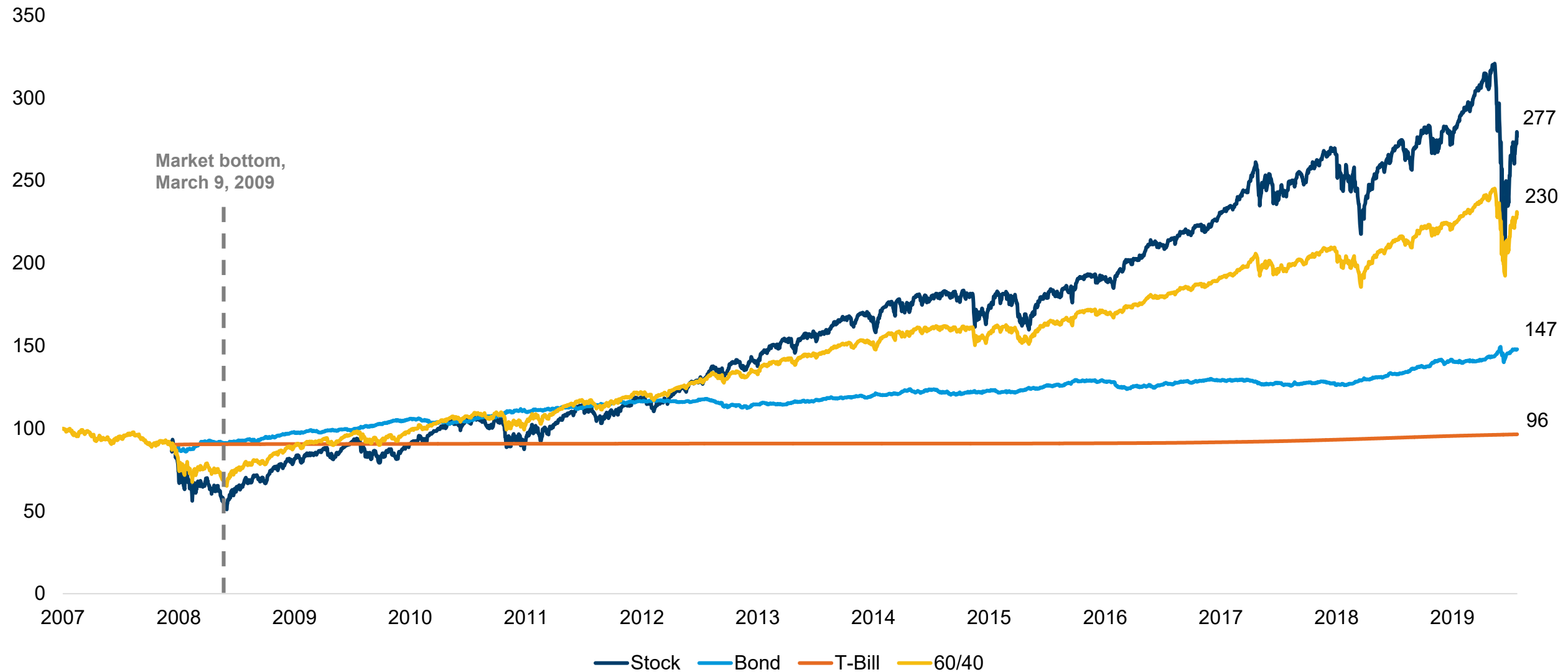
Source: Francis M. Kinniry Jr., Colleen M. Jaconetti, Michael A. DiJoseph, Yan Zilbering, and Donald G. Bennyhoff, 2016. *Putting a value on your value: Quantifying Vanguard Advisor's Alpha*® Valley Forge, Pa.: The Vanguard Group.

# Moving up the Vanguard advisor's alpha value stack



Source: Francis M. Kinniry Jr., Colleen M. Jaconetti, Michael A. DiJoseph, Yan Zilbering, and Donald G. Bennyhoff, 2016. *Putting a value on your value: Quantifying Vanguard Advisor's Alpha®*. Valley Forge, Pa.: The Vanguard Group.

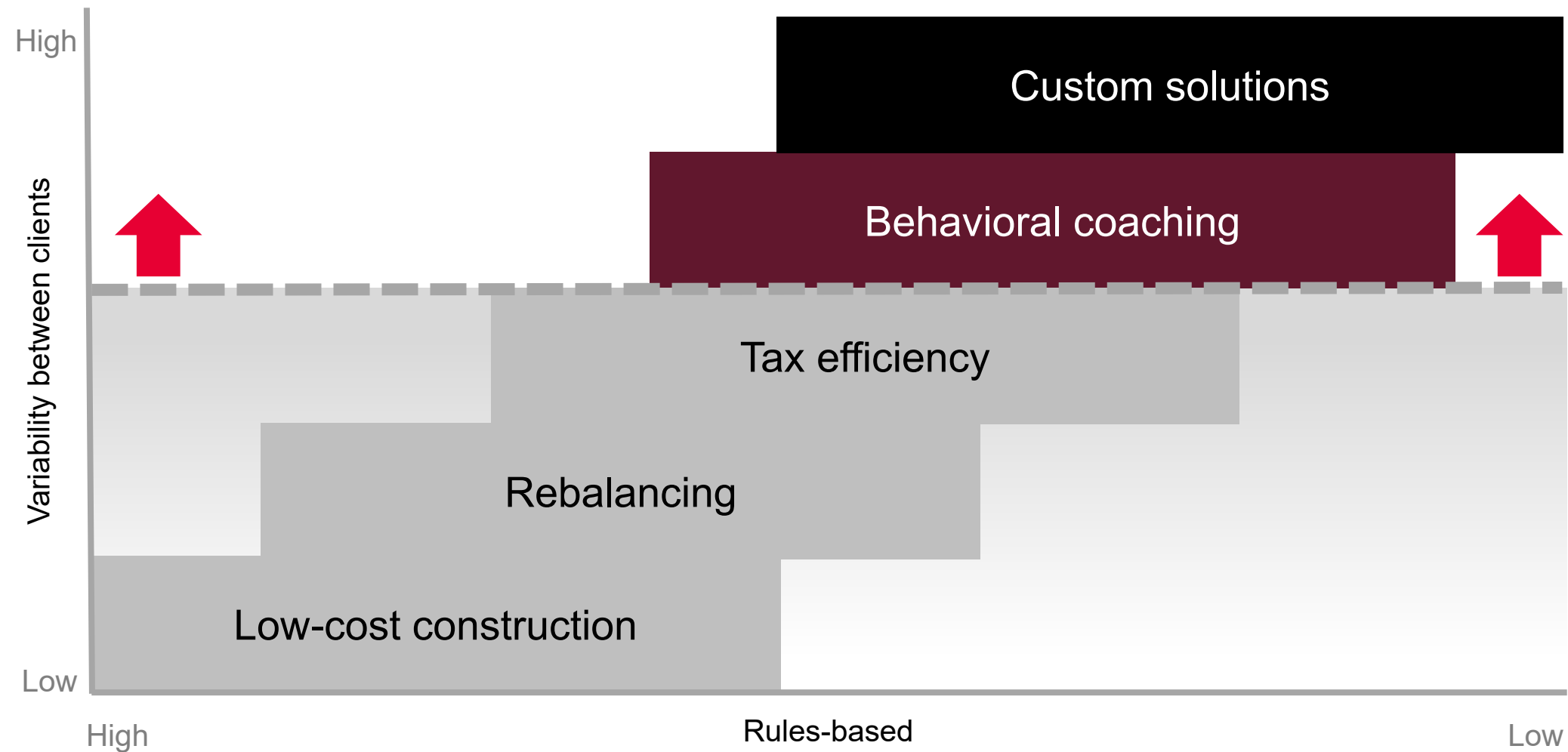
# Portfolio value indexed to 100 as of market peak



Source: Stocks represented by the S&P 500 index. Bonds represented by the Bloomberg Barclays Aggregate Bond Index. Cash represented by the 3-month T-Bill. 60/40 portfolio rebalanced monthly. Data as of 4/30/2020.  
Past performance is no guarantee of future results. The performance of an index is not an exact representation of any particular investment, as you cannot invest directly in an index.

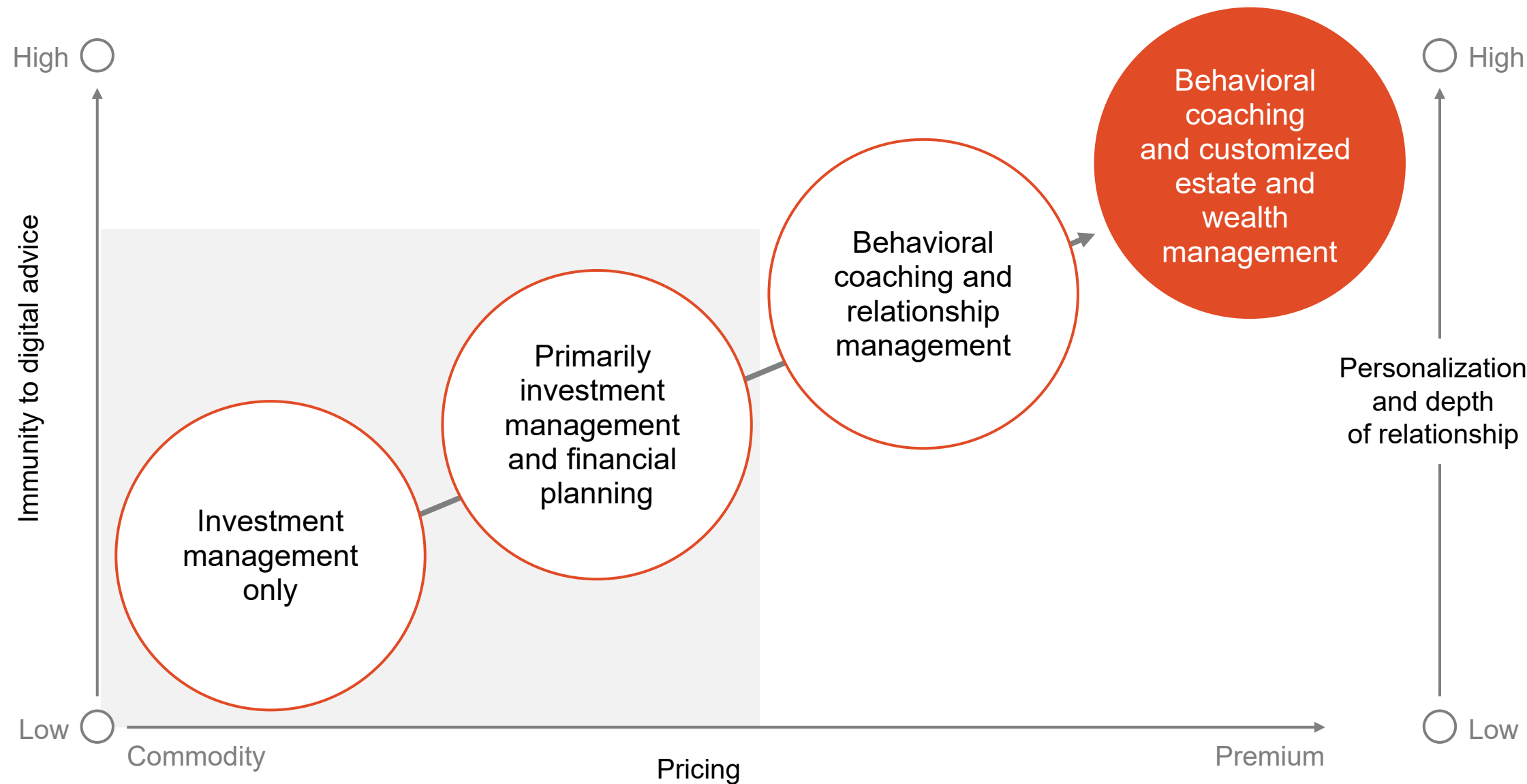


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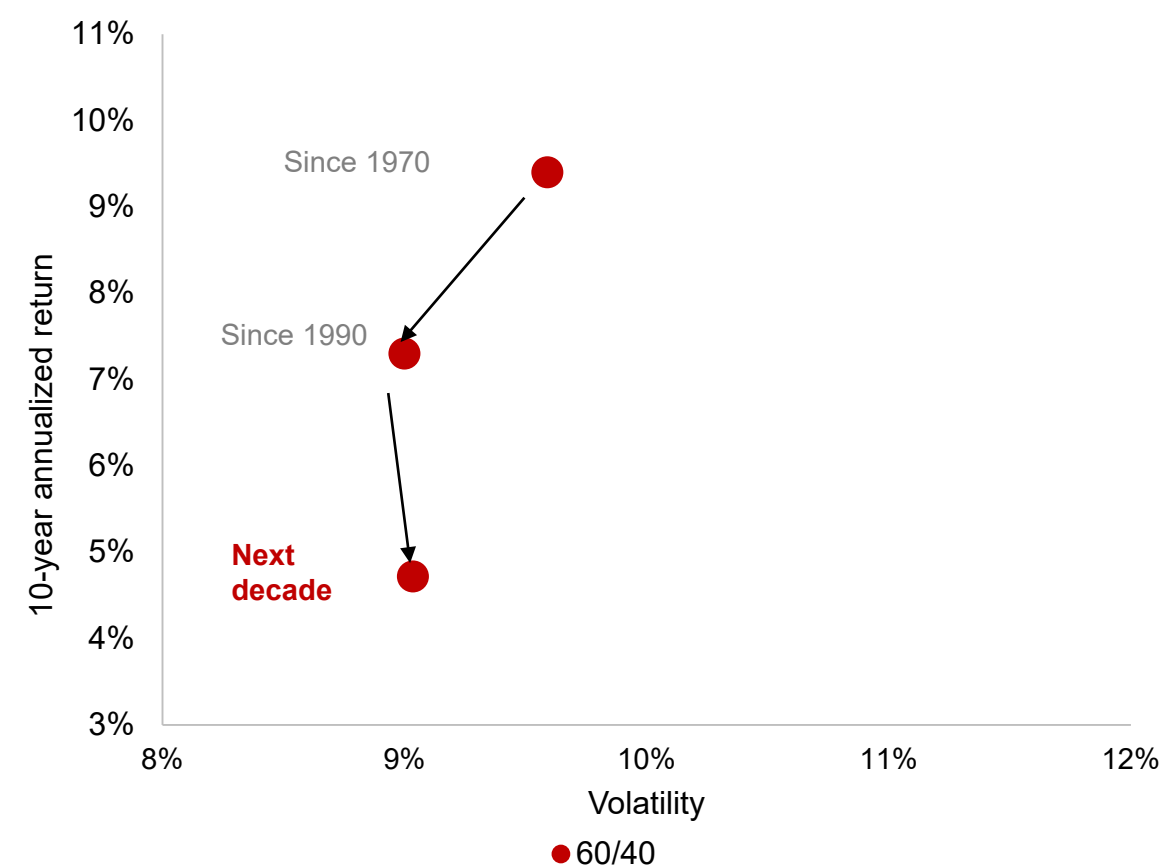
# Vanguard advisor's alpha value stack



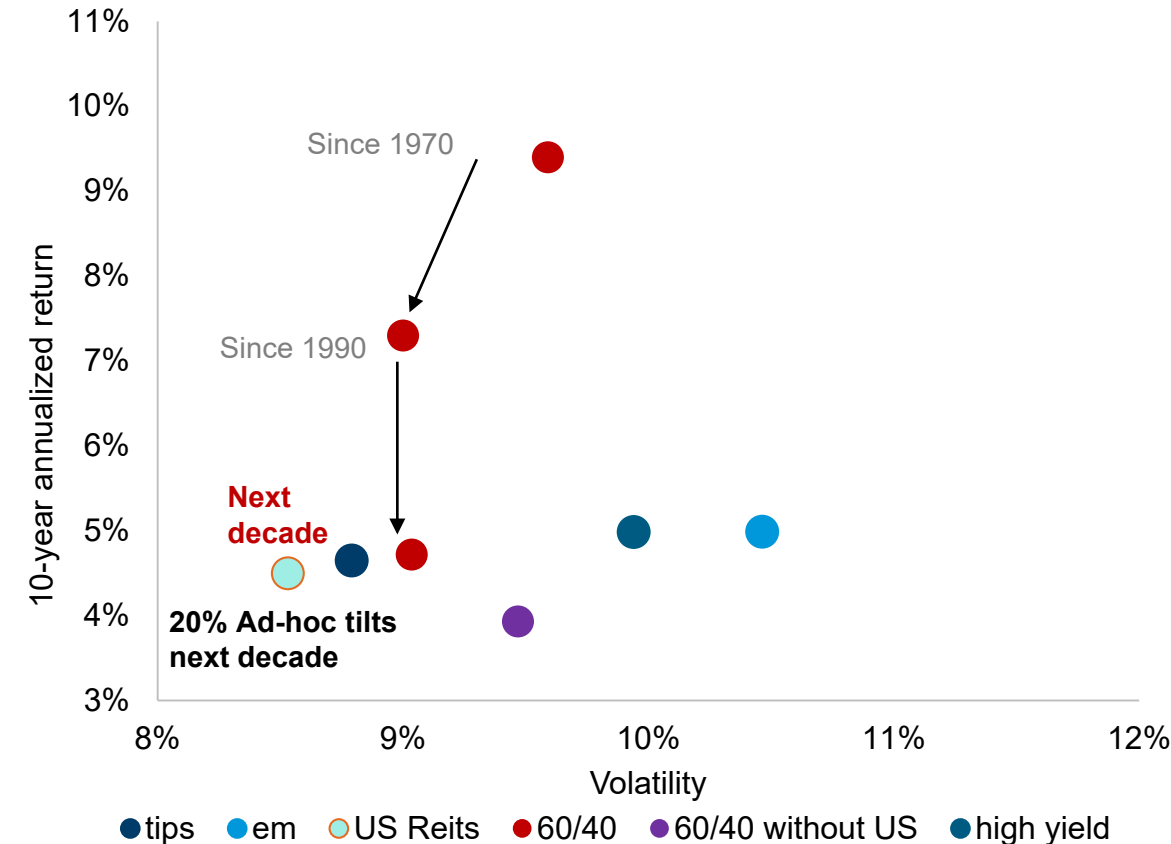
Source: Vanguard.

# Ad-hoc active tilts ignore diversification and are not likely to help

## A lower return orbit...



## ...that popular “active tilts” will likely fail to escape



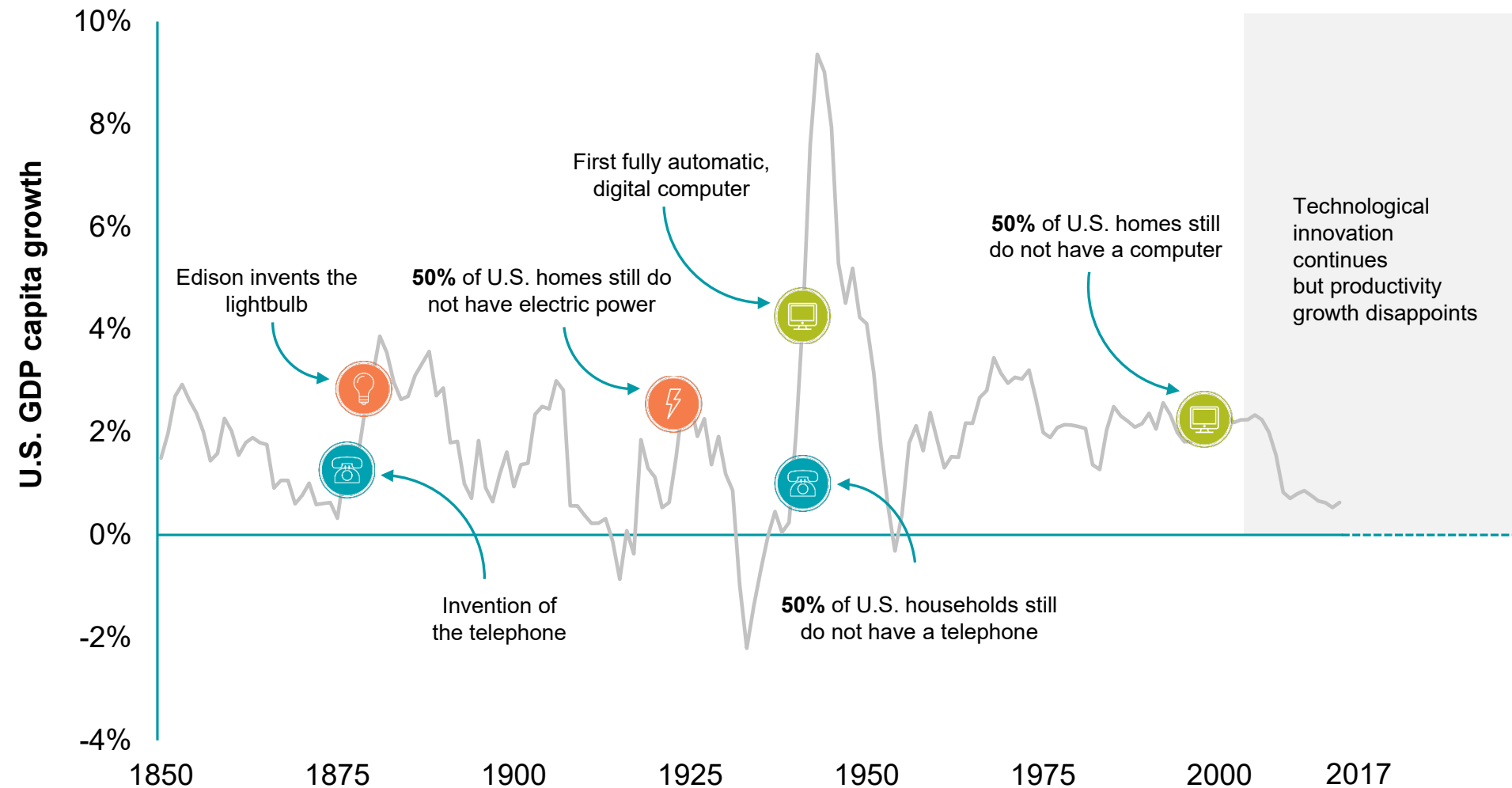
**IMPORTANT:** The projections and other information generated by the VCMM regarding the likelihood of various investment outcomes are hypothetical in nature, do not reflect actual investment results, and are not guarantees of future results. Distribution of return outcomes from VCMM are derived from 10,000 simulations for each modeled asset class. Simulations as of December 31, 2019. Results from the model may vary with each use and over time. For more information, please see the important information slide.

**Notes:** Summary statistics of 10,000 VCMM simulations for projected ten-year annualized nominal returns are as of September 2018 in U.S. dollars before costs. Historical returns are computed using indexes defined in “Indexes used in our historical calculations” on page 5 of Vanguard economic and market outlook for 2019: Down but not out. The global equity portfolio is 60% U.S. equity and 40% global ex-U.S. equity. The global bond portfolio is 70% U.S. bonds and 30% global ex-U.S. bonds. Portfolios with tilts include a 20% tilt to the asset specified funded from the fixed income allocation for the fixed income tilt and the equity allocation for the equity tilt.

Sources: Vanguard.

# Progress on The Idea Multiplier

# Technological innovations do not result in an immediate productivity spike



Source: Vanguard calculations, based on data from Our World in Data, the World Development Indicators of the World Bank, and Global Financial Data.

## Absent a significant increase in productivity, higher wage growth unlikely



**Notes:** Real wage growth is calculated as the growth rate of hourly wages as reported in the Employment Cost Index minus core Personal Consumption Expenditure inflation rate for that year. Trend for real wage growth is estimated as a centered three-year moving average of real wage growth.  
**Sources:** Congressional Budget Office and Bureau of Labor Statistics.



# The myth of the lone genius



Master Isaac Newton, 1905 (oil on canvas), Hannah, Robert (1812-1909) / The Royal Institution, London, UK / Bridgeman Images.




## A global effort: The ideas that led to the modern-day smart phone



**Note:** Thickness of lines represents the quantity of patents.

**Source:** Vanguard calculations, based on data from Google Patents.



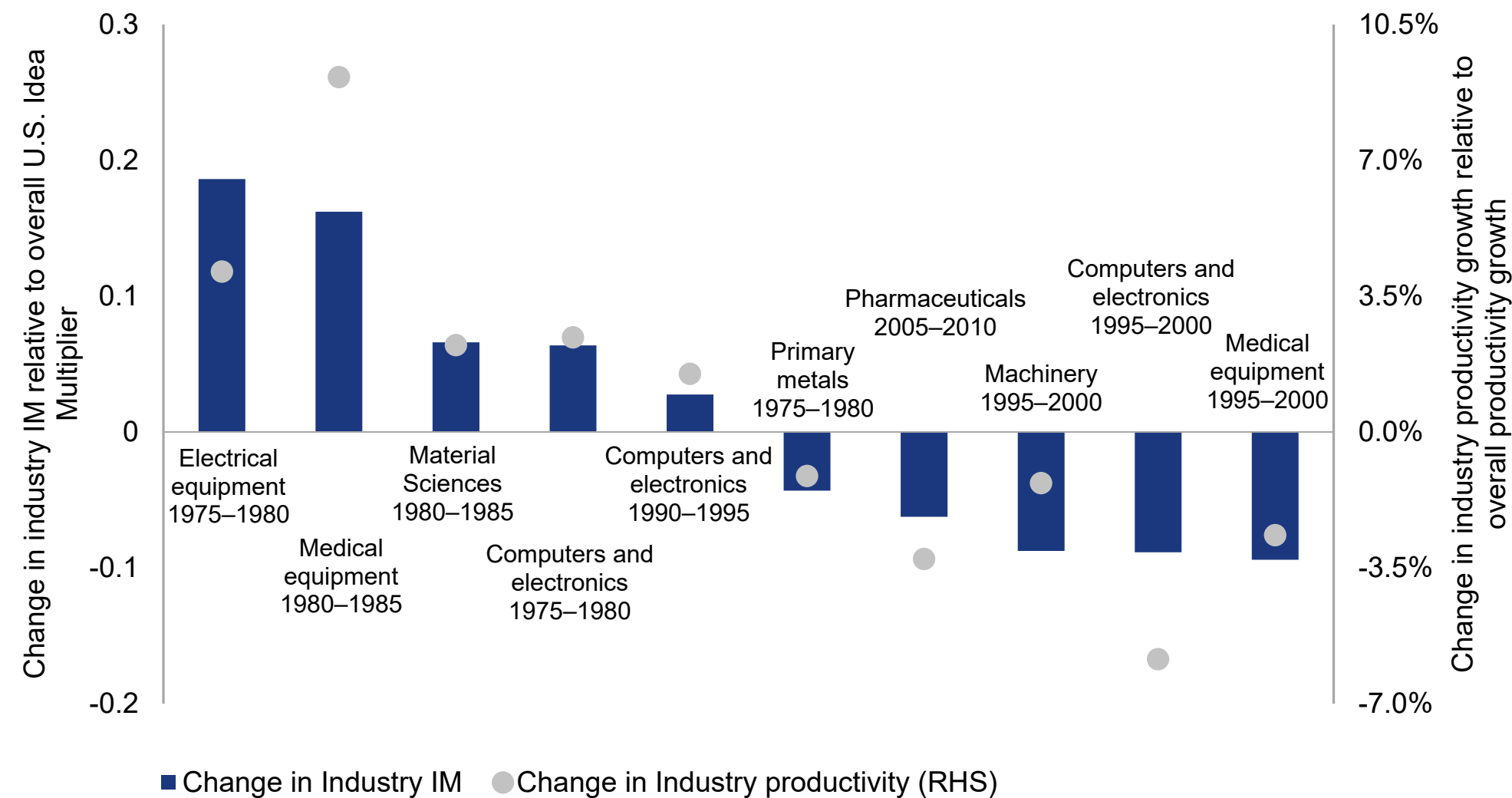


1.8 billion  
records

Across  
**1,000**  
industries  
and all  
countries

Screen for  
**influential**  
ideas

# Industries with large IM increases had faster productivity growth, and vice versa



**Notes:** Change in industry IM is measured as the IM at the start of the period minus the IM at the start of the previous five-year period, minus the change in the U.S. Idea Multiplier. Change in industry productivity is measured as productivity growth in the five-year period minus productivity growth in the previous five-year period, minus overall U.S. productivity growth. Real value of industry shipments per worker is used as a proxy for productivity.

**Source:** Vanguard calculations, based on data from Clarivate Web of Science and National Bureau of Economic Research (NBER).

# The future of productivity: Industries with the largest Idea Multiplier increases



## TRANSPORTATION AND CIVIL ENGINEERING

- Smart energy grids
- Advanced traffic pattern recognition



## MATERIAL SCIENCES

- Natural fiber composites
- Supercapacitor carbons

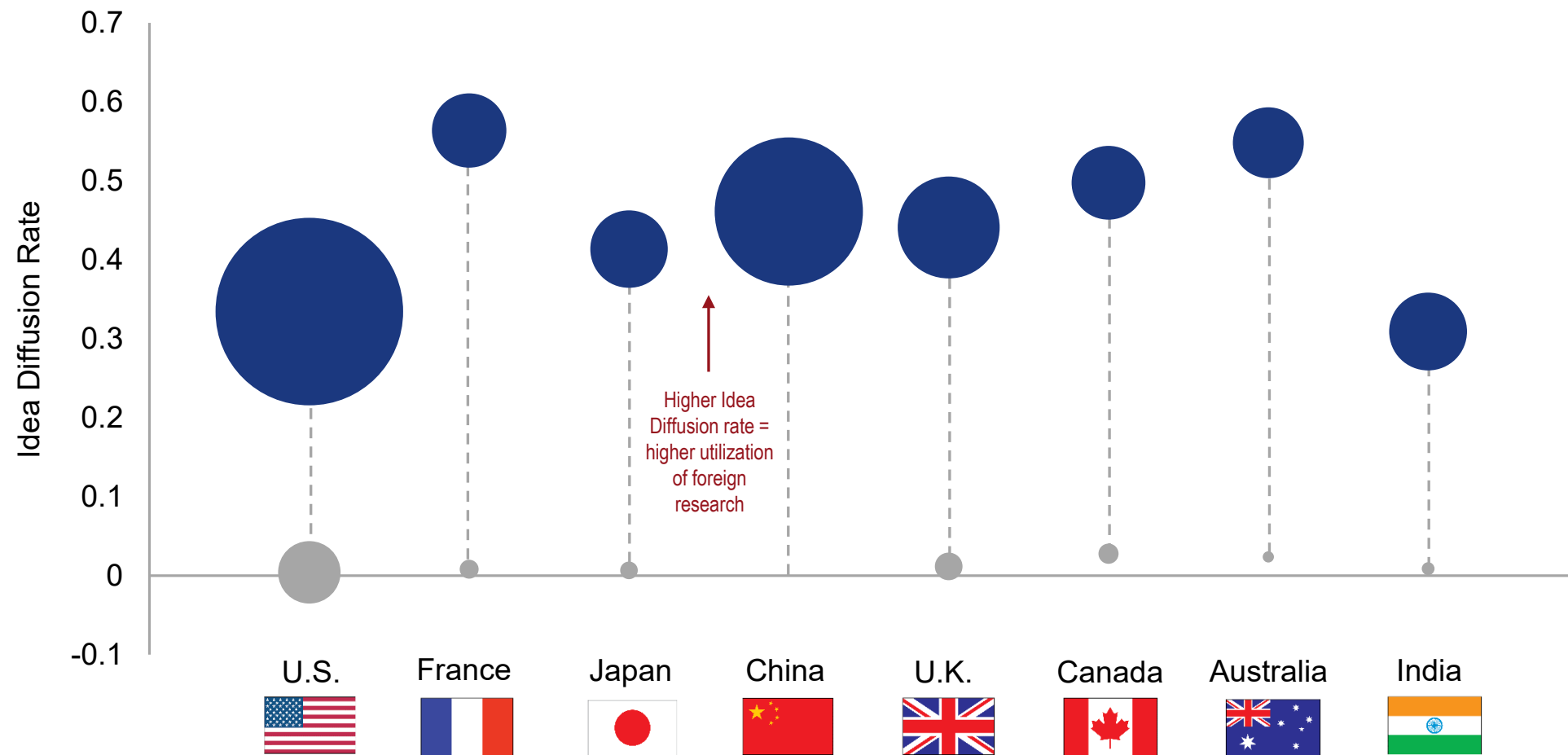


## MACHINERY

- Solar cells
- Cybernetics

# Idea Diffusion then and now

An upward shift in diffusion for all countries reflects more ideas and more sharing



Source: Vanguard calculations, based on data from Clarivate Web of Science, 1970 through 2015.

40:1 to 400:1

1.2% TFP v  
0.4% since  
2000

Transportation  
Materials  
Machinery

# Important information

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