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# China Focus: Yesterday's Story Or An Unappreciated Opportunity?

The near-term outlook is extremely cloudy. But this manager has rarely been so constructive on Chinese stocks. Find out why.

BY **ERIC MOFFETT**, MANAGER OF THE ASIA OPPORTUNITIES FUND

Investors and companies around the world have been laser-focused on China's slowing economic growth, the country's trade tensions with the United States, and its high debt burden. These concerns contributed significantly to the global market sell-off toward the end of last year and continue to cloud the outlook for this year.

China's economy, the world's second largest, grew 6.6% in 2018, the slowest pace since 1990 and a far cry from the double-digit growth rates of a decade ago—levels unlikely to be seen again. Growth has slowed for three consecutive quarters as China continues to rein in domestic leverage.

This trend is expected to continue in the near term as consumer confidence remains extremely weak. However, to some extent the slowdown is in line with reforms implemented by the government in recent years, such as controlling the debt burden and cooling and improving an overheated property market.

Moreover, the government is taking a measured approach to the slowdown, as evidenced by more targeted spending instead of a traditional huge stimulus package. In this, Beijing is fine-tuning policy to achieve more balanced growth as China transitions to more of a service/innovation economy from one dependent on low-value manufacturing. Nevertheless, some observers are suggesting that China is at risk of becoming yesterday's economic success story.

Certainly, a sustained slowdown in China would have global repercussions. Real gross domestic product (GDP) growth in China accounted for roughly 30% of the world's GDP growth in 2017. China is the world's second-largest importer, particularly of industrial commodities, factory equipment, and consumer goods. The sum of China's exports and imports of goods overall accounts for 34% of the country's GDP.

Indeed, China's growth slowdown has become a drag on sales for various consumer-oriented, technology, and industrial companies in the Unites States, Europe, and Asia. U.S. tariffs on Chinese imports have dampened business and consumer sentiment in China and are forcing some companies to consider reducing their dependence on China for their global supply chains. The International Monetary Fund has lowered its forecast for global growth to 3.5% this year from 3.7%, due in part to such international trade tensions.

Yet, while China's growth outlook ranks high among global investors' concerns, growth remains solid from a global standpoint. The economy is still growing at more than a 6% rate, making it the fastest-growing major economy in the world. And with the steep and indiscriminate decline in China's domestic stock market last year, it offers extremely attractive investment opportunities in well-managed companies

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that are genuinely innovating, especially among A-shares—stocks traded on mainland stock exchanges.

I don't expect the Chinese economy to accelerate, but I've rarely been as constructive on Chinese stocks as I am today. Here's why:

*Eric Moffett*

### Household income

What matters most for many domestic companies is not so much national GDP growth, but household income growth. Despite the slowing economy, Chinese disposable household income has increased significantly over the past 10 years. (See Figure 1.)

There are two reasons for this: demographics and policy. The pool of working age people in China has been stagnant for some years, but spending by this group continues to grow. Chinese factory owners, for example, are contending with progressively higher wages every year, to attract and retain new recruits amid a shortage of skilled blue-collar workers—fallout from China's one-child policy.

On the policy side, the government has made a priority of delivering meaningful wage increases every year over the past decade across every province in China. Average working-class household income has been growing 10% annually in recent years. The approach is not popular with businesses, but the government's aim is to deliver more money into the hands of minimum wage earners to help ignite a consumption boom.

This income growth contributes to improved affordability for working-class families across a range of consumables, including holidays, home ownership, insurance, health care, and medical services. And the increased spending is unfolding across hundreds of millions of people.

### Trade tensions

The China-U.S. trade war remains a key concern for investors. The United States has taken a harder line, notably extending sanctions to the industries in the "China 2025" plan—the high-tech sectors at the heart of China's plans to become a developed, self-sufficient country.

It is highly unlikely that China will succumb to a western power intent on containing its modernization progress. Even if a trade deal is reached, the issues between China and America are going to be long-standing.

Despite this, it is a misconception that China's economy is dependent on exports. While it is a huge exporter, China's net exports (exports minus imports) accounted for only around 2% of its total GDP in 2017. This is largely because the "value-add" in China has been surprisingly quite low. For example, while the iPhone is manufactured in China, only about 4% of the value-add happens there. Most of the components come from elsewhere, and the profit is largely captured by Apple in California.

Significantly, China trades far more with other emerging market countries than it does with G-3 areas (Europe, Japan, and the United States). As such, U.S. leverage today is less than it was 15 years ago when trade was heavily weighted to the G-3. This mitigates the pressure on China to react.

### Value chain

As wages have risen, China has become less competitive and has moved out of several low-value manufacturing areas. Much of the manufacturing capacity concentrated in southern China, for example, either has been closed or moved away.

China is now moving up the value chain, with a growing amount spent on research and development in such high-tech areas as artificial intelligence, facial recognition, and even cancer research. Companies are creating their own intellectual property; expenditure on research and development has risen to OECD (Organization for Economic Cooperation and Development) levels of 2% to 2.5% of GDP.

For example, China has effectively skipped the credit card stage and gone straight to electronic payment processing. The progress in this area is well beyond many major markets, including in the United States. This represents a powerful trend that can be directly accessed by investing in the parent internet companies of these service providers.

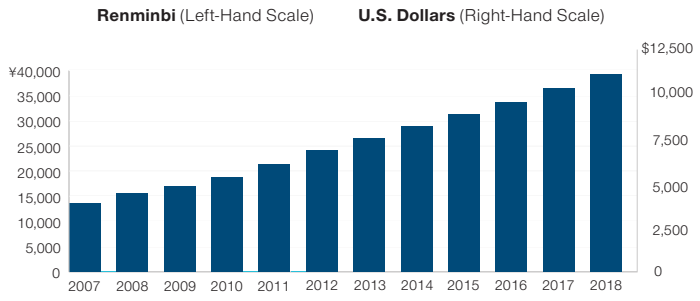
When it comes to applying new technologies, China is a fertile testing ground, as new ideas and products can be rolled out to millions of people in a relatively short time. Good ideas are quickly adopted, while the bad ideas disappear just as quickly.

### Debt

Investors also view China's substantial debt stockpile as a primary risk. It is true that, over the past 10 years, nonfinancial corporate debt

**Figure 1** Rising Chinese Household Income

In Chinese Renminbi and USD Purchasing Power*




*Conversion of renminbi values to U.S. dollars done by using a purchasing power parity calculation, an exchange rate based on the ratio of the two currencies' respective purchasing powers. Source: National Bureau of Statistics of China; data analysis by T. Rowe Price.

to GDP in China has risen from 100% to 153% as of March 2019, which some observers consider unsustainable.

However, interest rates in China have plummeted over the same period. Ten years ago, the corporate borrowing rate was in the double digits. Today, it is between 4% and 5%. As a result, the corporate debt service burden has not been rising as a percentage of GDP—so corporate debt has been manageable.

As the rate cycle turns, China is likely to feel the stress, but unlike some other major markets, there is no pressure to raise rates anytime soon. There are no signs of inflation, and the impact of tariffs is likely deflationary. All of which suggests that the stock of debt is not yet a major concern.

### A-shares

Because of indiscriminate stock selling by local investors on the back of trade tensions, China's A-share market offers very compelling valuations.

As of the end of March of this year, the A-share market was trading at a price/earnings ratio of less than 16 times earnings. This represents a relatively low valuation for an economy that is still growing by more than 6%. (See Figure 2.)

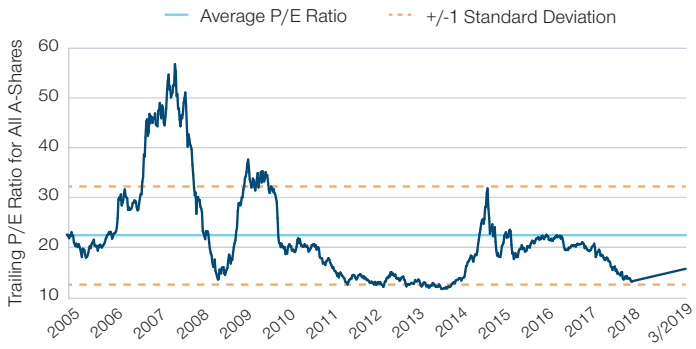
As a result, in the 15 years that I have been investing in emerging markets, I have rarely seen greater inefficiencies than I see in the China A-share market today or domestic sentiment this poor.

Of course, there are many low-quality companies in the A-share market, particularly among smaller and mid-size companies. However, there are blue chip companies growing at about 15% a year at very reasonable valuations with sound balance sheets and good dividend profiles. Some are moving up the value chain, becoming more innovative and globally competitive.

As China's market is retail-driven, information is not often published in English, nor are investor road shows common, resulting in only a small percentage of the market owned by foreign investors. This represents a fertile environment for finding mispriced opportunities, particularly in cyclical and trade-related sectors that have been depressed and where earnings expectations and valuations are low.

**Figure 2** Chinese A-Share Values Have Fallen

Trailing P/E Ratios* 2005 Through March, 2019




*Trailing price-to-earnings ratios. Sources: Wind and UBS China Equity Strategy.

> **China is an economy that is moving up the value chain, one in which incomes are still growing and supported by government policy, and companies are starting to innovate.**

For example, China auto sales declined sharply over the second half of last year, and sentiment and valuations of auto stocks plummeted. However, auto penetration in China is still low compared with other countries in the Asia Pacific region.

And in the China property market, inventory levels are very low and affordability outside the top few cities is very good, offering opportunities for large, high-quality property companies to gain market share and compound earnings through different market cycles. Property is an important engine of the economy that has been stagnant for a few years, and the government is already easing policy in this sector.

The United States accounts for less than 20% of China's exports. Even considering the potential impact of various tariff proposals, the valuation of many trade-related companies also looks cheap. Moreover, most of the China stocks we own are supported by domestic demand and rising wages, so the impact of trade uncertainty is limited.

Our A-share investments, about 12% of the fund at the end of March 2019, include a high-end spirits maker, an airport that is the gateway to China's technology hub, an auto components maker with exposure to electric vehicle components, and a surveillance products manufacturer.

Certainly, China is facing many challenges, including cyclical headwinds in some sectors, but the structural story remains intact. China is an economy that is moving up the value chain, one in which incomes are still growing and supported by government policy, and companies are starting to innovate. Our focus remains on investing in high-quality companies with talented management and holding them for the long term, and the notion that China is yesterday's story has created lots of these opportunities in Chinese stocks today. ■

*International investments can be riskier than U.S. investments due to the adverse effects of currency exchange rates; differences in market structure and liquidity; and specific country, regional, and economic developments. These risks are generally greater for investments in emerging markets.*

FRONTIER MARKETS

# China's Path To Africa, Central Asia, Europe, And The Middle East

A stunning, long-term foreign investment plan with great but uneven impact.

**OLIVER BELL**, MANAGER, T. ROWE PRICE AFRICA & MIDDLE EAST FUND

In 2013, China President Xi Jinping unveiled plans for one of the largest overseas investment programs ever undertaken by a single country, the Belt and Road (BR) initiative.

At the heart of the plan—now well underway—is a desire to reestablish China's ancient Silk Road trading routes, thereby securing the country's future as a leading player on the world's economic and political stage.

It has two main components: An "economic land belt" will link China by land with countries through central and west Asia with the Middle East and, ultimately, Europe, and a "maritime road" will link China by sea with the eastern coast of Africa, and, through the Suez Canal, the Mediterranean Sea.

Aimed at promoting better connectivity, closer links, and long-term regional stability, the BR initiative will develop several major economic corridors, requiring substantial investment in physical infrastructure in many developing countries along these routes—with not only economic but potential political consequences.

## Vast scale

China already has signed cooperation agreements with about 65 nations that, including China itself, represent more than 60% of the world's population and a third of global gross domestic product, according to the World Bank. Some estimates suggest that the BR initiative could potentially result in more than $6 trillion in investment, effectively reshaping global trade in the process.

Critics are quick to point out that the main beneficiary of the BR initiative is China itself, and any benefits for poorer, regional partners will likely pale in comparison.

Certainly, from an economic perspective, improved interconnectivity allows Chinese companies better access to export markets. Establishing a large, cooperative outlet for China's vast production output is essential to the country's long-term growth outlook.

As China's population matures over the coming decades, investment in domestic infrastructure will inevitably slow, leading to a buildup of excess capacity across various industries. A principal aim of the BR initiative is to help alleviate this longer-term problem by developing necessary export markets, trade routes, and connections to take up the slack in China's production output.

## Investment welcomed

However, far from being viewed as one-sided, Chinese investment has generally been welcomed by local governments, from Malaysia, Pakistan, and Sri Lanka to as far away as Estonia, Egypt, and Nigeria.

Regardless of China's motives, there is little doubt that its developing nation partners also stand to reap the benefits of substantial Chinese investment and increased trade. Many are in dire need of new and better-quality infrastructure as rising populations, economic development, and increasing urbanization place ever more pressure on existing frameworks.

As most of these countries lack the financial capacity and often the technical capabilities to develop their own infrastructure, the prospect of Chinese investment represents a welcome solution.

## Uneven impact

Nevertheless, the size and impact of Chinese investment will not be uniform.

From China's perspective, some countries offer clear and significant opportunities because of their physical location or geographic attributes. Others, however, present challenges and heightened risks—due to political instability, corruption, terrorist threats, or poor transparency—and so they are less appealing in terms of prospective investment.

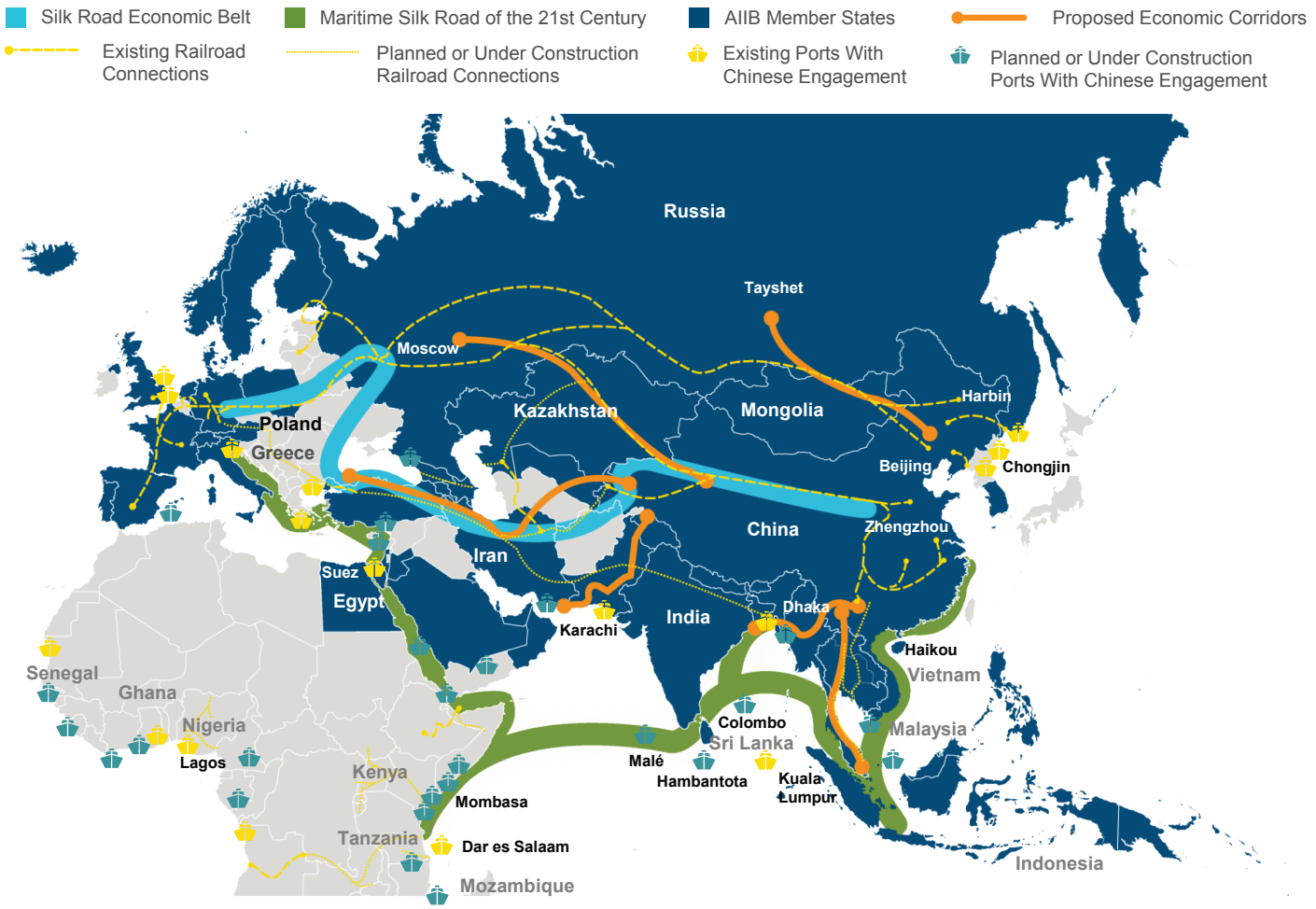
Given the wide variance in the potential impact of the BR initiative, we remain stock specific in the way that we seek to play this theme in our portfolios.

But, as a starting point, we take a top-down view of the overall benefit to the countries affected. We seek to identify those that are attracting significant investment and whether the necessary political stability exists to capitalize on the BR initiative, leading to superior economic growth. Some country-by-country views:

- **Kazakhstan:** Central Asia is set to play a major role as the principal land route through to Europe. Historically, this corridor was rendered largely inaccessible given the differences in railway track gauges that have existed. However, investment support from China has replaced the old rail network with new, standard-gauge railway links. This has effectively opened the land corridor to Europe and connected landlocked Central Asia to the Persian Gulf. Kazakhstan appears to be a key piece in China's BR plans, given its capacity to help absorb China's excess output in cement, steel, and glass.
- **Pakistan:** Opening the China-Pakistan economic corridor—which many consider to be the showcase of the BR project—is expected to involve more than $50 billion in new and upgraded infrastructure, including rail and road networks and power generation facilities. The corridor is strategically significant for China,

**Figure 1** The Scale and Reach of China's Belt and Road Initiative

Infrastructure Projects, Planned or Completed*




*As of December 31, 2017. Some elements of the existing and proposed corridors are not shown, in order to simplify the image. Source: Mercator Institute for China Studies.

proving a more direct route to the Middle East, Central Asia, Africa, and Western Europe.

- **Sri Lanka:** China already has invested significantly in Sri Lanka as it looks to establish a maritime gateway to the subcontinent. Sri Lanka is crucial to China's plans as it sits off the continental shelf, thus providing access to deepwater ports that can accommodate the world's largest ships.

## Selectivity key

Impacting about 65 nations, China's BR initiative represents an investment program that is simply stunning in its scale.

There is little doubt that many developing nation partners stand to reap considerable benefits of this investment. Less developed countries with the poorest infrastructure will likely be among the biggest beneficiaries of Chinese investment—such nations as Kazakhstan, Bangladesh, Pakistan, and Sri Lanka.

Clearly, there is much benefit to be gained from achieving greater connectivity and trade along the proposed BR land and sea routes. However, the initiative is no magic solution, in which all impacted countries would benefit greatly. As such, from an investment perspective, selectivity at the country level and among stocks will remain key. ■

*International investments can be riskier than U.S. investments due to the adverse effects of currency exchange rates; differences in market structure and liquidity; and specific country, regional, and economic developments. These risks are generally greater for investments in frontier markets.*

INTERVIEW

# Seeking Companies With Breakthroughs That Improve Lives

In the health-care sector, small-cap innovators stand out for their growth opportunities.

*Among the S&P 500 Index sectors in 2018, health care was the leading performer. Ziad Bakri, once a practicing physician, has been with T. Rowe Price since 2011, first as a health sciences stock analyst and then as manager of the Health Sciences Fund for the last three years. In this interview, he discusses how he manages the fund, what drives the sector's performance, and how he's positioned the portfolio.*

**Q. What's your approach to managing this fund?**

**A.** This is a diversified fund that invests across all the subsectors in health care with the aim of compounding wealth for our clients. About half the fund is invested in drug companies, a quarter in health-care services, and a quarter in makers of medical devices and life science tools. It differs from some health-care stock benchmarks, a large proportion of which are made up of larger health-care conglomerates, including big pharmaceutical firms. We have the view that innovation in health care is disproportionately found in small and mid-size companies—companies in which we often can get better insights into specific growth drivers and in which we can leverage those insights to a greater degree, as their breakthroughs can move their stock prices significantly.

We're looking for companies that discover and develop medicines and therapeutic devices that can make a difference for patients' unmet needs and improve their lives and, on the services side, for providers that can offer better access to health care or lower health-care costs. We're agnostic when it comes to growth stocks versus value stocks, per se, but the reality is that the companies in which we're investing—especially those working on promising new medicines—are more likely to be regarded as growth stocks, as their future growth drivers are a big part of the bet we are making.

**Q. What's a good example of this kind of company that excites you?**

**A.** Sage Therapeutics, which is developing treatments for central nervous system diseases. It is launching this year the first-ever drug for postpartum depression, which is related to hormonal changes to women after they give birth. It afflicts about 10% of all new mothers. The drug involves a totally new mechanism that can lead to a very rapid resolution of symptoms—within a day—that's very durable. It could end up working with a variety of forms of depression and even insomnia, which are potential multibillion-dollar markets. Sage now is a mid-cap company with a market cap of more than $6 billion, but we bought it when it was a small-cap.

**Q. How is your investing in health care influenced by the political debate over expanding government-provided health care?**

**A.** The health-care industry is very complex, very interrelated. There's been talk for 10 years about "single-payer health care" and "Medicare for all." If that happens, we'd of course need to adjust, but you should recognize that such things change at a much slower rate than assumed. At the same time, the general direction of health care is toward some form of government-supported managed care, and we're a big shareholder of many of these companies that offer Medicare Advantage programs and can benefit from this, such as Humana, UnitedHealth, and Anthem. Politics remains a risk every election cycle, but it's one we manage with position size and, in the case of the drug companies, by investing in the most potentially transformational drugs. There could be, say, drug price controls, but we believe America is always going to pay for the highest-value, most innovative, and most transformative therapies.

> **We're coming off about five years of relatively mediocre biotech performance. Now it seems the rate of change, the rate of medical breakthroughs, has stepped up significantly.**

**Q. What drove the health-care sector's relative outperformance in 2018, and what's your sector outlook for 2019?**

**A.** Remember that the indexes are market-cap weighted, and health care's big market-cap companies are the big pharmaceuticals, which trade at lower earnings multiples. In late 2018, the market turned defensive, so that these large pharma companies and health-care conglomerates meaningfully outperformed the market at a time when high-growth and more volatile names lost a large proportion of their value. This dynamic dictated virtually all of 2018's performance.

As for this year's outlook, our views are broken down by subsectors. Pharma had a big upward move last year, so we think its story is more stock specific this year. Biotech is off to a good start and that should continue, in part driven by a pickup in mergers and acquisitions. Life science tool companies are trading at premiums, but we don't see a slowdown. Managed care firms should continue to deliver earnings, despite volatility from politics. Overall, we think we're in a favorable regulatory environment—there were 49 new drug approvals last year—and that's going to continue.

It seems to me that we are at the point where innovation, especially in the drug sector, is really accelerating. We're seeing treatments getting approved now that 10 years ago would have been science fiction—revolutions, for example, in gene therapies that are transforming lives. We're coming off about five years of relatively mediocre biotech performance. Now it seems the rate of change, the rate of medical breakthroughs, has stepped up significantly.

Consider that you now can sequence a human genome for $100. It used to be $1 million. And with electronic medical records and big data tools, you can do population studies much quicker and cheaper. It's leading to big breakthroughs. There are, for example, very powerful new cholesterol-regulating drugs from Amgen and Regeneron, whose original discovery and development was essentially based on the genome sequencing of a single family with severely high cholesterol. You could never do that before, but the possibilities are everywhere now.

**Figure 1** Health Sciences Fund*

Diversification Within the Sector**

| Sector | % Net Assets |
|---|---|
| Biotechnology | 32.43 |
| Products and Devices | 21.39 |
| Services | 20.45 |
| Pharmaceuticals | 15.50 |
| Life Sciences | 9.98 |
| Reserves and Others | 0.12 |

Top 10 Holdings

| Issuer Name | % Net Assets |
|---|---|
| UnitedHealth Group | 6.5% |
| Intuitive Surgical | 5.2% |
| Becton, Dickinson & Company | 4.6% |
| Vertex Pharmaceuticals | 3.7% |
| Thermo Fisher Scientific | 3.3% |
| Anthem | 2.9% |
| Pfizer | 2.9% |
| Stryker | 2.8% |
| Sage Therapeutics | 2.3% |
| Eli Lilly | 2.2% |
| **Top 10 Issuers % of TNA*** ** | **36.5%** |

*As of March 31, 2019. **Numbers may not add up to 100% due to rounding. ***TNA stands for total net assets. Source: T. Rowe Price.

**You've got to hunt for the gold, and on our health sciences team we benefit significantly from having trained scientists as analysts—who know what that gold looks like.**

**Q.** Given that, how was the fund positioned at the end of March of this year?

**A.** First, from a risk mitigation standpoint, we have our larger positions in established companies that we think can compound earnings at a double-digit rate, such as Intuitive Surgical and UnitedHealth. On the opposite end of the spectrum, we have riskier biotech companies in which we've done a lot of research. We manage that risk with position size. As clinical trials proceed positively for a drug made by a company in which we've initially invested, for example, we may reinvest because the risks now are becoming lower.

From a sector standpoint, we're now overweight biotech firms, such as Amarin; life science tool companies, such as Danaher; and managed care insurance companies, which is a bet that America is going to need these private companies to manage health-care services and costs, whatever share of the cost the government is paying. Conversely, I'm generally underweight big pharma relative to the market-cap-weighted benchmarks, though I have big bets on Roche, Pfizer, and others. I'm also underweight for-profit hospital groups and such middle men as pharmacy benefit managers.

**Q.** Last word?

**A.** In a world in which we've had so many technological advances in the last 60 years—we've put a man on the moon, mapped virtually the whole world, connected almost everyone—there are still some types of cancers that you can get today from which you'd die in six months and no one knows what to do for these patients. In other words, there's still so much fertile ground to be plowed, so many drugs and therapies to be developed. And because it's so complicated and idiosyncratic—every single company is different—the very best way to invest in all this is a portfolio approach. You've got to hunt for the gold, and on our health sciences team we benefit significantly from having trained scientists as analysts—who know what that gold looks like.

*All investments are subject to risk, including the possible loss of principal. Due to the fund's concentration in health sciences companies, its share price will be more volatile than that of more diversified funds. Further, these firms are often dependent on government funding and regulation and are vulnerable to product liability lawsuits and competition from low-cost generic products.*

TECHNOLOGY STOCKS

# Innovations Unleashing Disruption, Creating New Business Models

How T. Rowe Price identifies companies on the right side of secular change.

*David Eiswert*

*Joel Grant*

*Emily Scudder*

The spectacular pace of innovation in the technology sector in recent years has drawn investors' and the public's interest. But not all technology companies benefit from innovation, and some prominent firms suffer. Moreover, many of the companies benefiting the most are in industries that seemingly have little to do with the tech sector.

### Cyclical versus secular

For almost 15 years, a group of T. Rowe Price managers and analysts has traveled annually to Silicon Valley to meet with leading tech firms. The trip supplements many other individual visits each year.

A chief objective is to identify the long-term, secular forces at work. These are distinguished from the short-term, cyclical swings that may lead to short-term profits or losses but say little about a company's potential to create long-term wealth.

That distinction may be especially important in early 2019, as the previous few years have seen a powerful cyclical upswing in tech. Business spending on software, hardware, and services has grown rapidly. But signs have emerged that the cycle might be turning.

The deceleration in the Chinese economy in the latter half of 2018 took a toll on semiconductor firms that supply its electronics factories, and companies supplying parts for smartphones produced in China especially felt the pinch. Growth also is slowing in Europe.

While industry cycles are important, T. Rowe Price managers and analysts also are focused on the powerful secular market forces unleased by innovation. Finding the companies that stand to benefit from them is crucial—and so is avoiding the firms being disrupted.

Dave Eiswert, manager of the Global Stock Fund, says the recent trip fortified his view that three powerful secular forces are creating widespread disruption:

**Growth of media platforms**. Alphabet (Google) and Facebook have become two of the most highly valued companies in the world by harnessing the power of the internet and mobile telephony. The two companies provide platforms that link content creators, advertisers, and customers. As a result, these and other platform companies benefit from significant network effects—the more users, the more value.

Indeed, one effect of recent innovation has been a vast increase in the scale of top companies. Mr. Eiswert points out that Netflix—also a platform company in that it links content creators with viewers—has become the largest video company in history because it is not constrained by infrastructure. This is a key advantage over firms that need to lay cable or set up broadcast towers to reach customers. International expansion has allowed Netflix to spread the cost of high-quality programming among a global subscriber base. (See Figure 1.)

**Three powerful secular forces are creating widespread disruption: the growth of media platforms, the rise of machine learning and artificial intelligence, and the digitization of the enterprise.**

**Rise of machine learning and artificial intelligence (AI)**. The spread of AI also is reshaping industries. AI relies on powerful computing resources, now available to many firms through cloud computing services.

But providing computers with the information needed to make decisions and perform tasks without human intervention—the branch of AI known as machine learning—also requires vast amounts of data. The need for massive data is one reason that the biggest tech companies and internet platforms with the most customers are taking the lead.

Some of the uses of AI may be surprising. Workday is a cloud-based provider of human resources software. Its experience with millions of employee records means it can now predict, for example, which workers are in danger of growing dissatisfied with their jobs.

**Digitization of the enterprise**. Computers have been used in the workplace for over half a century, but recent years have seen a transformation in the way businesses collect and deploy information. Key to recent changes have been constantly updated cloud-based software systems, which allow companies to integrate information in new ways.

Salesforce.com is at the leading edge of this transformation. Salesforce's customer relationship management system, offered

by subscription, not only allows companies to maintain records on current customers, but also lets them identify new prospects—data that then flow into revenue forecasts, inventory management, and other parts of the enterprise.

### Wrong side of change

While scale is an advantage, not all large firms are on the "right side of change," as Mr. Eiswert puts it. Indeed, several of the largest tech players are at risk of falling behind as new advances threaten their businesses.

Apple may be the primary example. Emily Scudder, a T. Rowe Price analyst, has been following Apple for years and believes the company faces significant challenges in its reliance on the smartphone market. Replacement cycles for the iPhone are elongating, she notes, as cellphones grow more durable and enhancements fail to entice buyers.

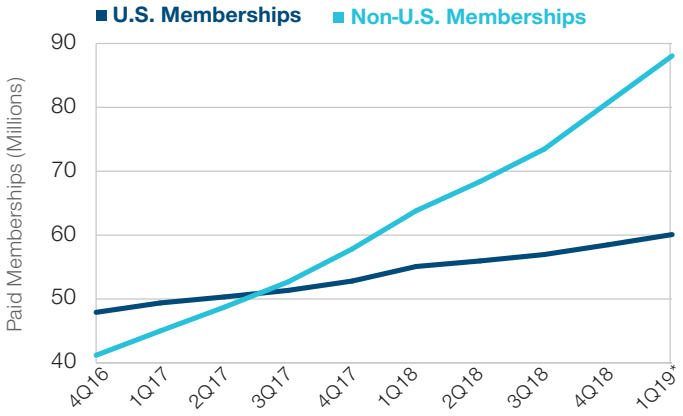
Anyone with a teenager might be surprised that Ms. Scudder also sees leading video game companies at risk of being on the wrong side of change. To be sure, the growing popularity of gaming as a leisure activity is a secular tailwind for the industry, as is its aging and wealthier user base. But the industry is also experiencing disruption from newcomers offering free online games that work across devices and function as social media platforms.

Mr. Eiswert notes that the real center of game innovation is in China. China's Tencent has the largest gaming franchise in the world, thanks to the popularity of its mobile games.

Of course, established tech players are not doomed to irrelevance. For example, Cisco Systems has pivoted from a focus on the aging market for physical routers to software-based routers. Ms. Scudder thinks the company is early in a new product cycle based around the cloud and subscription-based services.

**Figure 1** Netflix Growing Faster Outside the U.S.

Growth in Paid Memberships Since the End of 2016




*Estimated. Source: Netflix.

### Disruption everywhere

All sectors and industries are being affected by secular change. As Mr. Eiswert says, "The companies that harness technology in whatever sector are winning." For example, Exact Sciences has used recent advances in DNA analysis to develop a popular and noninvasive screening tool for colon cancer, and it is developing assays for other cancers.

The auto sector may be among the most visible areas of disruption in the coming years. Analyst Joel Grant says two major secular changes are at work. First, electric vehicles (EVs) are steadily gaining market share. He predicts a dramatic shift in consumer preferences toward EVs around 2025—because of their smaller environmental impact and because they will be cheaper. While EVs currently cost roughly $10,000 more to make than internal combustion vehicles, Mr. Grant expects them to cost $5,000 less to produce in a decade.

He doubts traditional automakers can adjust. While traditional automakers focus design efforts and production costs on maintaining brands, many future customers may be hailing, rather than owning, EVs and may be more concerned with getting to their destinations at minimal cost with maximum comfort, safety, and convenience—not with what they are seen pulling into their garages.

Autonomous driving also is moving ahead, although at a slower pace than some anticipated. Mr. Grant does not downplay the challenges in adopting AI to cars. "As a driver, you encounter things you've never encountered before," he says. "It's difficult to estimate when the technology will be ready to handle them safely."

Nevertheless, Mr. Grant believes it is possible that fully autonomous electric vehicles will be available as early as 2030. The cost per mile of transporting a passenger in such a car should be under $0.50 per mile, and perhaps as low as $0.20. This would make ride hailing a much more attractive option relative to car ownership, which currently costs around $1 per mile.

*As of March 31, 2019, Alphabet made up 4.0% of the Global Stock Fund, Facebook 3.8%, Netflix 1.7%, Workday 1.1%, Salesforce 1.0%, Tencent 2.3%, and Exact Sciences 1.4%. Cisco and Apple were not held by the fund. International investments can be riskier than U.S. investments due to the adverse effects of currency exchange rates; differences in market structure and liquidity; and specific country, regional, and economic developments. Investing in technology stocks entails specific risks, including the potential for wide variations in performance and unusually wide price swings, both up and down. Technology companies can be affected by, among other things, intense competition, government regulation, earnings disappointments, dependency on patent protection, and rapid obsolescence of products and services due to technological innovations or changing consumer preferences.*

NEW FUND

# In Shifting Landscape, Dynamic Credit Fund Seeks Income And Risk Management

The fund leverages the firm's global resources to capitalize on market dislocations.

Fluctuating markets, increased volatility across asset classes, and fading global monetary stimulus after a long era of growth since the end of the global financial crisis may worry investors. However, this shifting landscape presents areas of opportunity for such strategic investors as T. Rowe Price.

Against this backdrop, the new T. Rowe Price Dynamic Credit Fund expands the firm's suite of dynamic fixed income funds in offering a flexible strategy to find opportunities created by unsynchronized global credit cycles.

Managed by Saurabh Sud, the fund seeks total return through a combination of income and capital appreciation by investing in a variety of credit instruments. Mr. Sud joined T. Rowe Price in April of last year to develop this strategy and has 11 years of fixed income investment experience spanning the corporate credit, high yield, securitized, emerging markets, and interest rate sectors.

"T. Rowe Price has managed global bond portfolios for more than 30 years, and this is a very exciting time for the evolution of our platform," Mr. Sud says. "We listened to our clients and designed the Dynamic Credit Fund to seek an attractive return stream with a strong emphasis on risk management.

"As such, this fund is a complement to investors' existing fixed income portfolios over the long term, and especially in volatile markets like now."

## Benchmark agnostic

The Dynamic Credit Fund is the firm's newest "benchmark agnostic" offering. Compared with the firm's other, somewhat similar offerings, this fund has more leeway across a wide-ranging investable universe—in an effort to deliver strong risk-adjusted returns, preserve capital through the credit cycle, and outperform equities and high yield in periods of market stress.

The fund has the flexibility to invest in a broad range of traditional and nontraditional global fixed income securities across a variety of sectors, including corporate and sovereign bonds; bank loans; and securitized instruments, such as mortgage- and asset-backed securities.

*Saurabh Sud*

> **We...designed the Dynamic Credit Fund to seek an attractive return stream with a strong emphasis on risk management....this fund is a complement to investors' existing fixed income portfolios over the long term, and especially in volatile markets like now.**

It also may invest in noninvestment-grade and unrated bonds.

And the fund plans to use more derivatives than traditional bond funds use, in order to limit volatility while seeking excess returns.

## Key differentiators

Several factors set the Dynamic Credit Fund apart from other products in the fast-growing unconstrained bond category.

Mr. Sud emphasizes the focus on flexibility and efficiency in the fund. "A simple portfolio of best ideas is too prone to the ups and downs of the cycle." he says.

Simply going long on credit while hedging interest rate risk also is not optimal as credit and interest rate cycles differ. For example, in 2015 as oil prices plummeted, high yield spreads widened, and U.S. interest rates declined, which was a double-whammy for long credit/negative duration-unconstrained funds, Mr. Sud says.

"The fund seeks attractive returns in a variety of market environments," he says, "while providing more defensive exposure over the credit cycle."

The fund's intended attributes:

- **Broad and Flexible:** Because it's benchmark agnostic, Dynamic Credit can strategically invest across a broad range of traditional and nontraditional fixed income securities and find opportunities across sectors.
- **Efficient:** Dynamic Credit aims to navigate this large opportunity set by seeking out high-conviction investment ideas created by dynamic global market conditions, allowing for patience in waiting for market dislocations.
- **Defensive:** With a holding horizon of one to three years and a thoughtful, efficient approach to portfolio

construction, Dynamic Credit aims to outperform and offer diversification benefits versus riskier assets when market volatility rises.

While there are similarities with some of T. Rowe Price's existing products, the Dynamic Credit Fund fills a unique place in the firm's fixed income lineup. Some of the key similarities and differences are outlined below and in Figure 1.

- **Versus the Dynamic Global Bond Fund:** Dynamic Credit is more focused on credit instruments and can employ active shorting to generate total return. Both of these funds are benchmark agnostic and have wide opportunity sets in which to invest. And both generally have flexibility when it comes to duration positioning.
- **Versus the Credit Opportunities Fund:** Dynamic Credit has more emphasis on securitized and emerging market holdings, while the Credit Opportunities Fund focuses on bank loans and below investment-grade issuers. The new fund has a higher use of derivatives. Both funds have a primary focus on credit instruments.
- **Versus the Global Multi-Sector Bond Fund:** Dynamic Credit falls in the unconstrained bond space and does not seek broad strategic allocation across sectors, while the Global Multi-Sector Bond Fund aims for broader sector representation.

Additionally, all these funds leverage T. Rowe Price's global research platform, rigorous risk management approach, and dedicated analyst teams to ensure that every fixed income investment decision is made by experts immersed in every aspect of their sector. Our independent credit research process, broad knowledge of global markets, and firmwide collaboration can help fixed income managers uncover opportunities that others may miss. ■

*All investments are subject to market risk, including possible loss of principal. The fund is subject to the risks of fixed income investing, including interest rate risk and credit risk.*

*Any use of derivatives may expose the fund to additional volatility in comparison with investing directly in bonds and other debt securities. Derivatives can be illiquid and difficult to value and may involve leverage so that small changes produce disproportionate losses for the fund. Short sales are speculative transactions with potentially unlimited losses. Investments in high yield securities expose the fund to greater volatility and credit risk. Such issuers are usually not as strong financially as investment-grade bond issuers and, therefore, are more likely to suffer an adverse change in financial condition that would result in the inability to meet a financial obligation. Accordingly, securities and loans involving such companies should be considered speculative. Investments in foreign bonds are subject to special risks, including potentially adverse overseas political and economic developments, greater volatility, lower liquidity, and the possibility that foreign currencies will decline against the dollar. These risks are higher for investments in emerging markets.*

**Figure 1** Dynamic Credit Fund vs. Certain Other T. Rowe Price Funds

| | Dynamic Credit | Dynamic Global Bond | Credit Opportunities | Global Multi-Sector Bond |
|---|---|---|---|---|
| Morningstar Category | Nontraditional Bond | Nontraditional Bond | High Yield Bond | World Bond |
| Objective | Total return via income and capital appreciation | High current income | Long-term capital appreciation and high income | High income and some capital appreciation |
| Benchmark | 3-Month LIBOR in USD* | 3-Month LIBOR in USD* | Bloomberg Barclays U.S. High Yield 2% Issuer Capped Bond | Bloomberg Barclays Global Aggregate Bond USD Hedged |
| Benchmark Agnostic | Yes | Yes | No | No |
| Expected No. of Securities | No defined range | 50 to 200 securities | 75 to 100 issuers | 100 to 300 issuers |
| Expected Duration** | -2 to 6 years | -1 to 6 years | 2 to 5 years | +/-2 years relative to benchmark |
| Fund Investment Flexibility | At least 80% in credit instruments. Up to 10% in equities and 25% non-U.S. currencies. No limit on credit quality for foreign issuers. | At least 80% in bonds and at least 40% in non-U.S. securities. Up to 30% in below investment-grade bonds. | At least 80% in credit and derivative instruments and up to 50% in bank loans, 50% in non-USD-denominated holdings, 20% in securitized instruments, and 10% in equities. No limit on credit quality. | At least 80% in bonds and 40% in non-U.S. securities. Up to 65% in below investment-grade bonds. |

*London Interbank Offered Rate, the interest rate at which banks offer to lend funds to one another in the international interbank market for short-term loans. **Duration is a measure of the sensitivity of the price of a bond or other debt instrument to a change in interest rates. Source: T. Rowe Price.

MUNICIPAL BONDS

# Active Muni Portfolios Can Provide A Strategic Advantage Over Passive

Credit research and efficient trading add value to active portfolios.

BY **HUGH MCGUIRK**, HEAD OF THE MUNICIPAL BOND GROUP, AND **DAWN MUELLER**, MUNICIPAL BOND PORTFOLIO SPECIALIST

Although passively managed products in the municipal bond market are not as popular as in other investment areas, such as equities and taxable fixed income, passive muni portfolios saw rapid growth in 2018.

Flows into passive muni funds accounted for 58% of all money coming into the asset class in 2018, up from about 19% three years ago, driven largely by a rapid acceleration in flows into muni exchange-traded funds (ETFs) in the fourth quarter and by outflows from muni mutual funds. (See Figure 1.)

Nevertheless, passive funds still account for a small sliver of the $4 trillion muni market, and flows into muni mutual funds turned positive again in the first quarter of 2019.

While passive portfolios typically offer a lower-cost approach to investing in muni bonds, they also have risks and opportunity costs that may not be clear, and their lower fees do not guarantee outperformance.

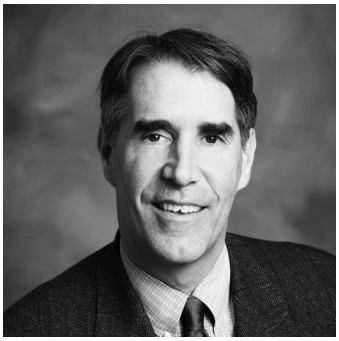
We believe that active credit research that seeks superior risk-adjusted yields, along with smart liquidity management and efficient trading strategies, provides the ability to create muni bond portfolios that have the potential to produce a performance advantage over passive products and justify the cost of an active approach.

### Not all equal

The municipal bond market is highly fragmented and complex, with almost 54,000 issues in the Bloomberg Barclays Municipal Bond Index, a broad benchmark for investment-grade muni performance.

While municipal default rates remain very low, credit quality varies much more now than it did before the global financial crisis. Until 2008, almost 70% of the muni market was AAA rated; at the end of 2018, the figure had fallen to about 15%.

The changing landscape means that sector and security selection matter now more than ever, and the ability to perform fundamental credit research can play a pivotal role in creating a municipal bond portfolio that meets an investor's objectives.



*Hugh McGuirk*

*Dawn Mueller*

State and local general obligation (GO) bonds make up 28% of the muni index and a similar portion of many passive portfolios. However, these bonds, backed by a government's taxing authority, represent an area of the market that should be approached with caution. Many governments are grappling with underfunded pension and retiree health care obligations—funding gaps that stem from losses during the financial crisis, insufficient plan contributions, and unrealistic return projections.

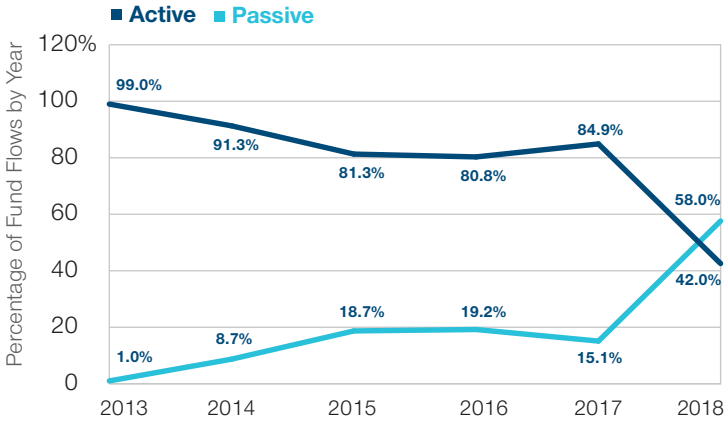
Some of the largest positions in the muni index consist of GO debt from the most heavily indebted states and cities and can include issuers with various credit challenges. For example, at the end of 2018, bonds from Illinois—the state with the lowest credit rating of any state—represented just over 1% of the muni index.

Pennsylvania and Connecticut, which face some of the largest unfunded pension challenges, are also among the largest guarantors in the index.

In any case, investors should be aware of the geographic risks that come from having a significant portion of a portfolio in one state's general obligation bonds, where factors such as natural disasters or political disfunction could negatively affect an issuer.

**Figure 1** Muni Fund Flows: Passive Gaining Share

New ETF Investments Accelerated in 2018




Sources: Strategic Insight Simfund and Morningstar; data analysis by T. Rowe Price.

Because of the challenging credit situations that many GO issuers face, T. Rowe Price municipal bond portfolios maintain notable underweights to GO debt and corresponding overweights to revenue bonds, which are more insulated from the pension risks that we believe will become increasingly priced into the market over time.

Revenue bonds also typically offer an incremental yield advantage over state and local GO debt, and we maintain overweight positions in segments, such as health care, that have the potential for higher risk-adjusted returns within revenue debt.

### Security selection

Although Puerto Rico is in many ways a unique situation, the commonwealth does illustrate the risks that go along with investing in a portfolio that tries to match an index. Puerto Rico bonds made up about 4% of the investment-grade muni index as recently as mid-2012.

Puerto Rico underperformed the index in 2012 as its fiscal problems became increasingly apparent, and the island's GO debt was downgraded to junk status by 2014. While some active managers also held large positions in Puerto Rico bonds, the island's troubled history does show that passive investing does not necessarily provide an easy path to a higher-quality or lower-risk portfolio.

**Figure 2** Active Muni Funds vs. Benchmarks
Active Has Outperformed Over Longer Periods*

**Performance Averages**

| Muni Bond Classes | | 1 Year | 5 Years | 10 Years |
|---|---|---|---|---|
| **Municipal National Short** | Active Funds | 1.27% | 1.16% | 2.00% |
| | Benchmark | 1.75% | 1.38% | 2.20% |
| | *% Active Outperforming* | *6%* | *29%* | *31%* |
| **Municipal National Intermediate** | Active Funds | 0.93% | 3.20% | 4.36% |
| | Benchmark | 1.58% | 3.00% | 3.90% |
| | *% Active Outperforming* | *9%* | *49%* | *66%* |
| **Municipal National Long** | Active Funds | 0.56% | 4.04% | 5.41% |
| | Benchmark | 1.28% | 3.82% | 4.85% |
| | *% Active Outperforming* | *14%* | *67%* | *64%* |
| **Municipal High Yield** | Active Funds | 2.28% | 5.89% | 8.02% |
| | Benchmark | 2.49% | 4.77% | 6.35% |
| | *% Active Outperforming* | *22%* | *82%* | *93%* |

**Past performance cannot guarantee future results.** *Total return as of December 31, 2018, less fees for active funds. It is not possible to invest directly in benchmarks. Sources: Bloomberg Barclays benchmark data for each category and Morningstar active fund data; T. Rowe Price analysis. **Additional disclosures on page 24.**

(Puerto Rico-related debt made up 1.12% of the T. Rowe Price muni platform in 2012, and we had virtually eliminated the exposure in our investment-grade portfolios by the end of 2013.)

Aside from the importance of security selection, investors also should be aware of the value that trading can add to an actively managed portfolio. Passive muni portfolios employ sampling strategies to match key index characteristics such as maturity and interest rate risk. But because many muni securities are smaller and trade infrequently, passive funds tend to underweight segments that face liquidity constraints.

The health-care sector, for example, makes up about 9% of the muni index, but some passive muni portfolios have little or no exposure to it because of the difficulty of trading in the segment. Active traders, on the other hand, can patiently build up positions as securities become available.

### Other factors

An active approach to trading also can potentially improve a portfolio's tax efficiency.

Passively managed portfolios generally only trade when inflows to or outflows from a portfolio make purchases or sales necessary. While this can reduce costs and produce higher tax efficiency in some asset classes, there are some questions about whether it is the best approach in the muni market, where avoiding taxable gains is a priority for many investors.

In an actively managed fund, portfolio managers can sell bonds in down markets and book tax losses that can be used to offset future gains.

Another factor is that muni market performance is driven by supply and demand more than certain other asset classes, and the impact of technical factors has increased as market regulation has reduced the ability of dealers to provide liquidity in the municipal market when needed. As a result, an actively managed muni portfolio can take advantage of market dislocations caused by supply and demand imbalances.

During a market sell-off, for example, an active portfolio manager can sell lower-yielding but highly liquid bonds and purchase higher-yielding debt that is trading at a relative discount. Passive portfolios, meanwhile, may be limited in when they can buy and sell.

We believe active management offers multiple advantages for an investor seeking attractive risk-adjusted yields in the municipal bond market. Risk-aware portfolio construction based on rigorous, bottom-up security selection, combined with prudent liquidity management and efficient trading strategies, can offer the potential for long-term outperformance. ■

*Fixed income securities are subject to credit risk, liquidity risk, call risk, and interest rate risk. As interest rates rise, bond prices generally fall. Some income from municipal securities may be subject to state and local taxes and the federal alternative minimum tax. Capital gains, if any, are generally taxable.*

RETIREMENT

# Knowing Your Income Replacement Rate For Retirement Planning

Consider targeting about 75% of your preretirement income as a starting point.

BY **ROGER YOUNG**, CFP®, T. ROWE PRICE
SENIOR FINANCIAL PLANNER

There's more to planning for retirement than just saving money. It's important to know if your savings will fund your living expenses when you stop working.

So, it's helpful to have a target for what you might spend in retirement. That's a challenge of course, particularly if you are many years from retiring. One approach is to estimate your retirement income needs as a percentage of your preretirement household income, known as the income replacement rate.

To start, consider planning to replace about 75% of your gross preretirement income at the onset of retirement to maintain your current lifestyle.

Why 75%? Generally, living expenses go down in retirement. Taxes likely will be reduced. And you won't be saving for retirement any more. (See Figure 1.)

Figure 1 also shows what happens to your income replacement rate if your current savings rate or planned spending are different. The 75% starting point is based on reducing your spending at retirement by 5% and saving 8% of your gross household income during your working years. Every extra percentage point of savings beyond 8%, or spending reduction beyond 5%, roughly reduces your income replacement rate by 1%.

### Other factors

You can go further in more precisely estimating your own income replacement rate.

Many investors fund their retirement with personal savings and Social Security benefits. Your marital status and household income are two factors that affect Social Security benefits and your tax situation, and those two factors, in turn, affect your income replacement rate.

Figure 2, on page 15, shows varying replacement rates by source of income for three types of retirees: those who are married in a dual-income household, those who are married and are single earners, and those who are single.

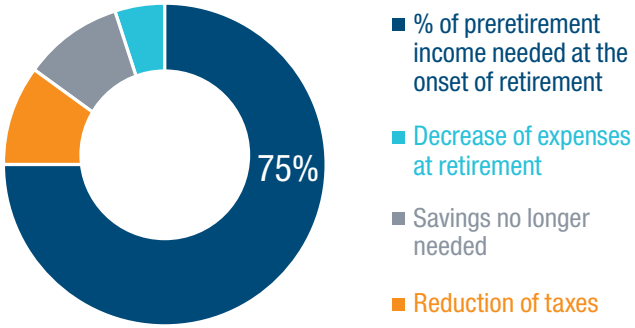
It shows that marital status and income have only a modest effect on income replacement rates but that both factors have a major impact on how much money you may need from sources other than Social Security. Understanding your relative income sources can help you estimate a savings level to aim for before you retire.

At higher income levels, the net effect is that Social Security benefits make up a much smaller percentage of the total income replacement rate—meaning more savings or other income sources would be needed to fund retirement.

Also keep in mind that, if you claim Social Security before full retirement age, the total replacement rate doesn't go up much, but the percentage you'll need from sources other than Social Security can increase significantly, especially at lower income levels.

**Figure 1** Income Replacement in Retirement*

Overall Replacement Rate**




Rate Depends on Spending...

| Spending Reduction at Retirement | Replacement Rate*** |
|---|---|
| 0% | 80% |
| 5% | 75% |
| 10% | 71% |

...and on Savings

| Household Savings Rate | Replacement Rate*** |
|---|---|
| 4% | 79% |
| 8% | 75% |
| 12% | 72% |

*See assumptions at the end of this article. **Assumes household income of $100,000 to $150,000 at retirement and a 5% spending reduction at retirement. ***Assumes dual-income married couple with $125,000 gross annual earnings. Other factors held constant. Source: T. Rowe Price.

### Tax-free income

Pretax savings—such as Traditional IRAs and 401(k) accounts, which will be taxed in retirement—is usually the primary vehicle for retirement savings. The 75% income replacement rate in these charts assumes all savings are pretax.

However, using a Roth IRA or a Roth 401(k) account that generates tax-free income in retirement or saving on an after-tax basis reduces your income replacement rate. This is especially true at higher income levels.

This does not mean you should always choose to make Roth contributions. This decision depends on a variety of other factors. But Roth savings can allow you to maintain your standard of living on a smaller percentage of your current income.

### Your destination

Retirement planning involves many steps, and among the first is determining what you might spend in retirement. A guideline for your income replacement rate may be helpful even when retirement is many years in the future.

As an example, suppose you're the sole breadwinner and earn $100,000 a year before taxes. If our savings and spending assumptions seem reasonable to you, that means you should plan to replace around 75%, or $75,000, of that income.

Let's then assume you expect $26,000 of annual Social Security benefits, plus $13,000 in benefits for your spouse, so you'll need about $36,000 of gross income from other sources.

If you're comfortable with a 4% initial withdrawal rate on your assets, you then should aim for a $900,000 nest egg. Keep in mind, that's in today's dollars, so you'll want to bump that up for inflation, especially if you're a long way from retirement. (Another way to think of it is targeting nine times your ending salary: $900,000 divided by $100,000.)

**A guideline for your income replacement rate may be helpful even when retirement is many years in the future.**

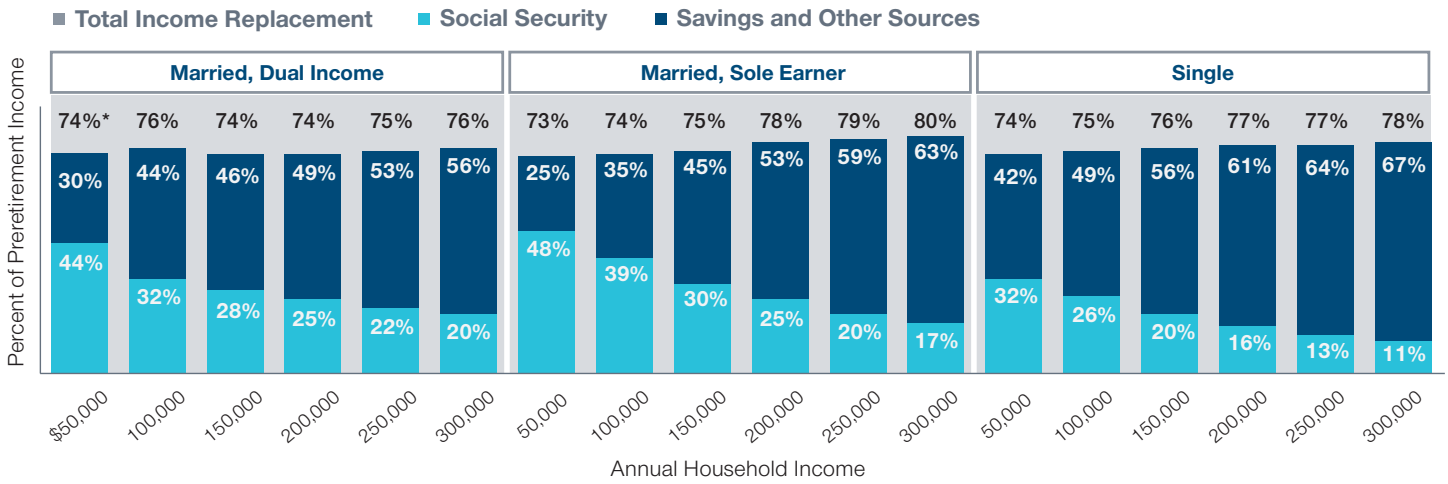
As you move closer to retirement, it's critical to assess your spending needs—and income plan—with more precision. Knowing your destination is key to planning how to achieve your financial goals in retirement.

*Assumptions: Household income and spending keep pace with inflation until retirement, and then spending is reduced by 5%. Spouses are the same age, and "dual income" means that the one spouse generates 75% of the income that the other spouse earns. Federal taxes are based on rates as of January 1, 2018. While rates are scheduled to revert to pre-2018 levels after 2025, those rates are not reflected in these calculations. The household uses the standard deduction, files jointly (if married), and is not affected by the alternative minimum tax or any tax credits. The household saves 8% of its gross income, all pretax. Federal income tax in retirement assumes all income is taxed at ordinary rates and reflects the phase-in of Social Security benefit taxation. State taxes are a flat 4% of income after pretax savings and are not assessed on Social Security income. Social Security benefits are based on the SSA.gov Quick Calculator (claiming at full retirement age), which includes an assumed earnings history pattern.*

*Charts are shown for illustrative purposes only. This material is provided for general and educational purposes only and is not intended to provide legal, tax, or investment advice. This material does not provide fiduciary recommendations concerning investments or investment management, nor is it intended to serve as the primary basis for an investment decision.*

**Figure 2** Income Replacement by Source*

Marital Status and Income Have a Modest Effect on Replacement Rate but a Major Impact on the Need for Savings




*See assumptions at the end of this article. Source: T. Rowe Price.

LAST WORD

# Five Conversations Aimed At Keeping The Cost Of Higher Education In Check

Financial planner discussed college-cost options with her kids early in the process.

BY **JUDITH WARD**, CFP®, T. ROWE PRICE SENIOR FINANCIAL PLANNER

Deciding where your child will go to college is a big emotional and financial investment.

The College Board last year estimated that the average cost of tuition, fees, and room and board for a four-year education at a public, in-state university is more than $85,000, making saving and paying for college daunting.

A 2017 T. Rowe Price survey* found that 62% of kids expect their parents to cover the cost of "whatever college I want." However, 65% of parents say they'll only be able to contribute "some" of the cost of college.

It's wise to put parameters around college costs and discuss options with your children early on. When my two kids started looking at colleges, they understood they did not have a blank check. However, before you talk to your kids, you and your spouse need to be on the same page.

## The issues

Then it's time to talk with the kids about:

- **The budget:** If you have been saving for college with a 529 plan,** let them see how much is in there so they understand your budget.
- **Who's responsible:** If you're expecting the kids to contribute, be specific. Will they pay for their books, living expenses, or tuition? Make sure they understand in advance if job earnings might go toward college bills.
- **Financial aid:** Financial aid may be loans, not the "free money" families expect. The key figure is your expected family contribution toward college costs. (See Figure 1.)
- **Student loans:** Borrowing for college with federal student loans may be unavoidable. They're usually already inserted into the financial aid package. Keep track of the amounts; knowing the payback options can help your student budget for them.
- **Grant and scholarship options:** Grants and scholarships are the "free money" most people think about when they hear "financial aid." Comparing a college's "sticker price" to its published "net price" can give you an indication of how much grant and scholarship money the college may provide.

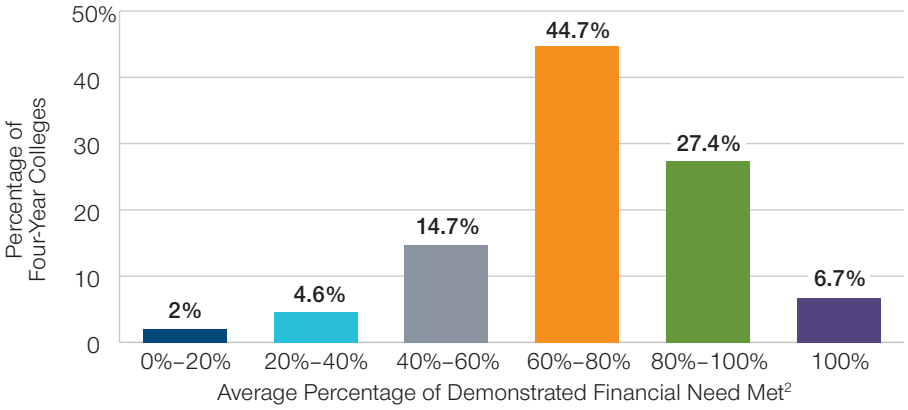
Both my kids have graduated college and have a small amount of student loans to pay off. My son attended an expensive, private liberal arts school, but we saved because he lived at home for three years and earned money to pay for commuting. My daughter wanted to be a teacher, so we limited her search to in-state public colleges—affordable options close to home.

Getting a head start on saving for college is one of the best things you can do to minimize the amount you or your child will have to borrow later—as well as being a fruitful journey with your kids. ■

**2017 T. Rowe Price Parents, Kids & Money Survey. **A 529 college savings plan's disclosure document includes investment objectives, risks, fees, expenses, and other information that you should read and consider carefully before investing. You should review the 529 plan offered by your home state or your beneficiary's home state and consider, before investing, any state tax or other state benefits, such as financial aid, scholarship funds, and protection from creditors, that are only available for investments in such state's 529 plan.*

**Figure 1** Financial Need Met by Colleges[1]

Relatively Few Colleges Cover All Demonstrated Need




[1]As of August 2018. [2]Colleges determine financial aid awards based on the Free Application for Federal Student Aid (FAFSA), which is used to calculate families' expected contributions to college costs and thus their demonstrated financial need. Financial award data used here include grants, federal loans, and money from other sources. Federal loans can be a significant part of financial aid. For undergraduates in the 2016–2017 academic year, they made up 32% of all financial aid. Source: T. Rowe Price calculations based on College Board "Big Future college search" data.

# Global Stocks Rebound as U.S. Federal Reserve Turns Dovish

March 31, 2019

## KEY POINTS

- **U.S. shares rise as fourth-quarter corporate earnings growth moderated but was better than expected.**
- **Fed stops raising rates while central bank officials assess the economy and the effects of previous rate increases.**
- **Productive U.S.-China trade negotiations and U.S. tariff delays raise hopes for a trade dispute resolution.**

## EQUITY REVIEW

### U.S. Shares, Led by Small- and Mid-Caps, Outpace Many World Markets

All Wilshire 5000 sectors advanced. Information technology firms did best. The interest rate-sensitive real estate sector also performed well, as long-term interest rates declined. Energy stocks were buoyed by rising oil prices. Health care and financials stocks lagged with relatively mild gains.

Stocks in developed non-U.S. markets underperformed U.S. shares in dollar terms. In Asia, New Zealand and Hong Kong did very well, but Japanese shares lagged with a 7% gain. In Europe, UK shares surged almost 12%, despite Brexit-related uncertainty. Late in the quarter, the European Union offered UK Prime Minister Theresa May an extension until April 12 to pass a Brexit plan in Parliament.

Stocks in emerging markets performed mostly in line with developed non-U.S. markets. In Asia, Chinese A shares surged over 33% for the quarter, in part, due to government stimulus efforts and trade deal optimism. In emerging Europe, Russian stocks advanced over 12% amid rising oil prices. Turkish shares were extremely volatile and fell almost 3%. In Latin America, most markets rose. Brazilian shares gained more than 8% amid expectations that the new president would pursue business-friendly policies and pension reform.

**Figure 1** U.S. and International Stock Market Performance

Total Returns for Periods Ended March 31, 2019

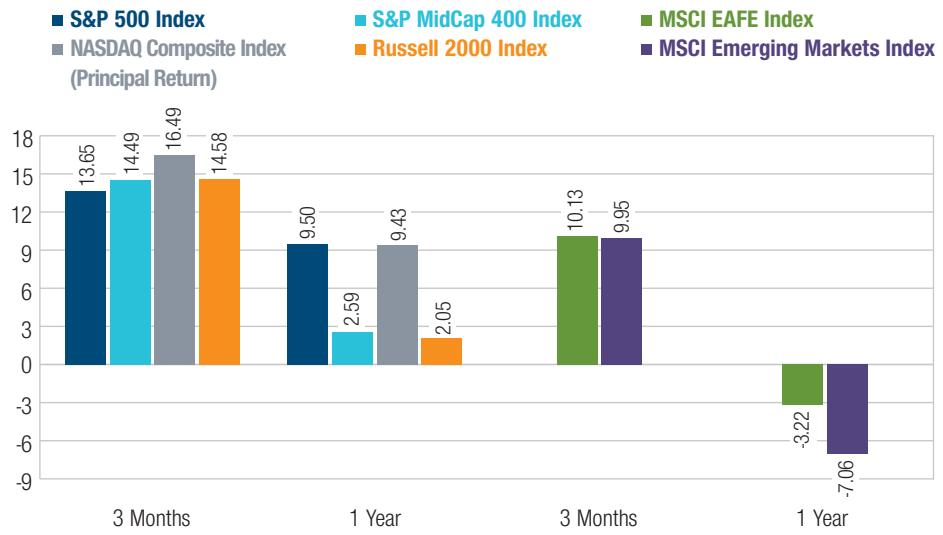
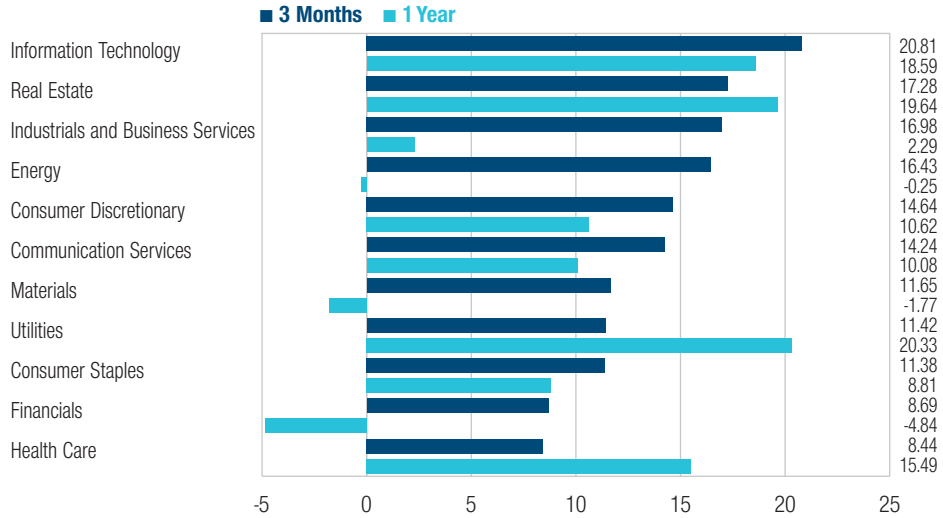



**Figure 2** Performance of Wilshire 5000 Series

Total Returns for Periods Ended March 31, 2019




Ranked by highest to lowest quarterly returns.

## FIXED INCOME REVIEW

### Global Bonds Rise as Yields Decline and Fed Pauses Rate Hikes

Domestic bonds produced solid returns, as long-term Treasury yields declined amid a dovish tone from the Federal Reserve. In the investment-grade universe, long-term Treasuries and corporate bonds fared best. Mortgage-backed securities lagged, as falling long-term rates could lead to increased mortgage prepayments and refinancing activity. Municipal bonds performed in line with taxable bonds. High yield bonds strongly outperformed as credit spreads narrowed.

Bond returns in developed non-U.S. markets were positive in dollar terms, as yields declined and bond prices rose due to signs of slowing global growth. However, a stronger U.S. dollar versus some currencies reduced returns to U.S. investors. In the UK, bond yields fell due to Brexit uncertainty, while a stronger pound boosted returns to U.S. investors. In the eurozone, bond yields dropped as the European Central Bank announced a new round of cheap loans to banks to help stimulate the economy. In Japan, the 10-year government bond yield slipped into negative territory as the central bank left its stimulative monetary policy unchanged.

Dollar-denominated emerging markets debt strongly outperformed local currency bonds in developing countries. The latter lagged as several key currencies depreciated versus the dollar.

**Figure 3** U.S. and International Bond Market Performance

Total Returns for Periods Ended March 31, 2019

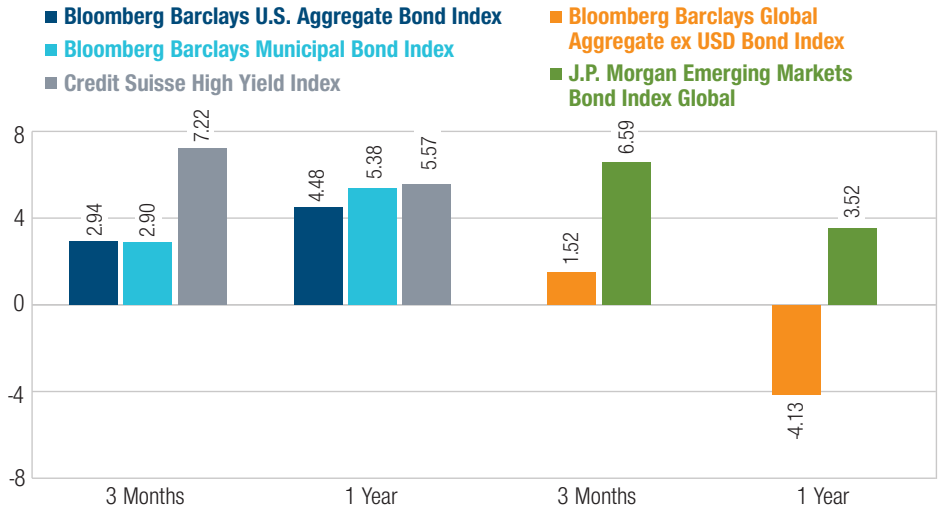
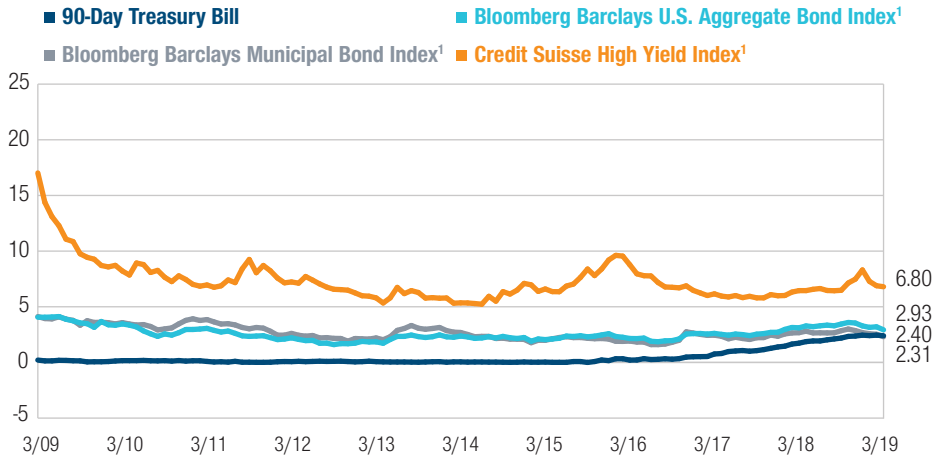



**Figure 4** Trends in Interest Rates

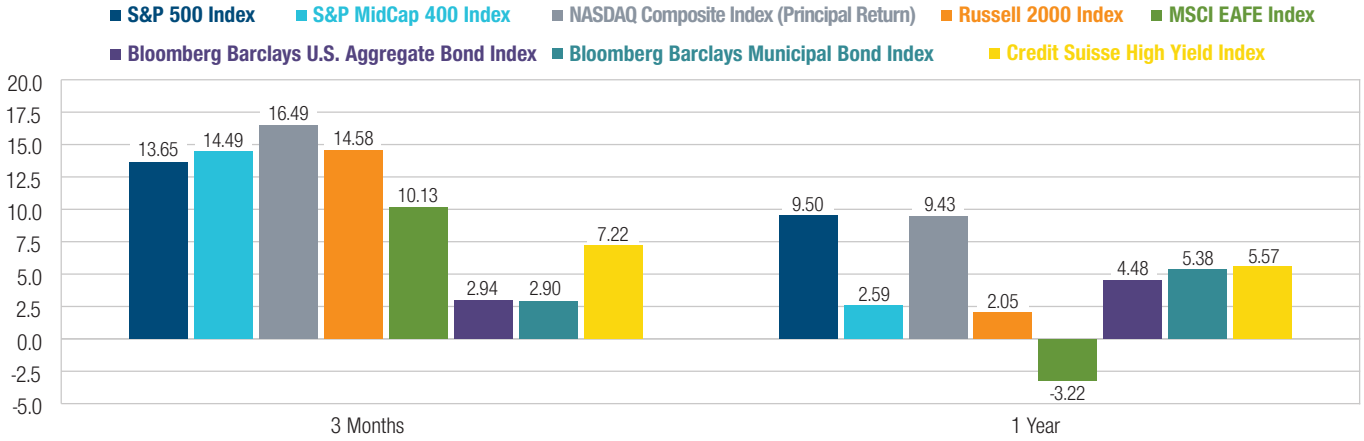
As of March 31, 2019




[1]Yield-to-worst

**Figure 5** Stock and Bond Market Performance

Total Returns for Periods Ended March 31, 2019




Unlike stocks, U.S. government bonds are guaranteed as to the timely payment of interest and principal.

The performance information presented here includes changes in principal value, reinvested dividends, and capital gain distributions. *Current performance may be higher or lower than the quoted past performance, which cannot guarantee future results. Share price, principal value, yield, and return will vary, and you may have a gain or loss when you sell your shares. To obtain the most recent month-end performance, call us at 1-800-225-5132 or visit our website. Call 1-800-225-5132 to request a prospectus or summary prospectus; each includes investment objectives, risks, fees, expenses, and other information that you should read and consider carefully before investing.* Funds are placed in alphabetical order in each category. To learn more about each fund's objective and risk/reward potential, visit **troweprice.com/mutualfunds**.

## **Figure 6** Stock Funds

| Domestic | Ticker symbol | 3 months | 1 year | 3 years | 5 years | 10 years or since inception[1] | Inception date | Expense ratio | Expense ratio as of date |
|---|---|---|---|---|---|---|---|---|---|
| Blue Chip Growth | TRBCX | 16.16% | 12.10% | 20.02% | 14.95% | 18.91% | 6/30/93 | **0.70%** | 12/31/2017 |
| Capital Appreciation[2] | PRWCX | 11.91 | 12.12 | 11.28 | 10.10 | 14.28 | 6/30/86 | **0.71** | 12/31/2017 |
| Capital Opportunity | PRCOX | 14.46 | 9.41 | 14.11 | 11.18 | 15.76 | 11/30/94 | **0.71** | 12/31/2017 |
| Communications & Technology[3] | PRMTX | 19.09 | 12.71 | 19.20 | 14.72 | 21.82 | 10/13/93 | **0.78** | 12/31/2017 |
| Diversified Mid-Cap Growth | PRDMX | 19.39 | 12.72 | 15.84 | 11.57 | 17.51 | 12/31/03 | **0.84** | 12/31/2017 |
| Dividend Growth | PRDGX | 13.00 | 12.63 | 13.36 | 11.03 | 15.30 | 12/30/92 | **0.64** | 12/31/2017 |
| Equity Income | PRFDX | 10.99 | 2.98 | 10.73 | 6.62 | 13.70 | 10/31/85 | **0.65** | 12/31/2017 |
| Equity Index 500 | PREIX | 13.60 | 9.29 | 13.27 | 10.65 | 15.64 | 3/30/90 | **0.22** | 12/31/2017 |
| Extended Equity Market Index | PEXMX | 15.76 | 4.66 | 13.07 | 7.73 | 16.46 | 1/30/98 | **0.35** | 12/31/2017 |
| Financial Services | PRISX | 10.02 | -2.78 | 14.14 | 8.18 | 14.46 | 9/30/96 | **0.85** | 12/31/2017 |
| Growth & Income | PRGIX | 12.53 | 9.43 | 12.28 | 10.39 | 15.17 | 12/21/82 | **0.66** | 12/31/2017 |
| Growth Stock | PRGFX | 15.90 | 10.48 | 17.99 | 13.68 | 17.78 | 4/11/50 | **0.67** | 12/31/2017 |
| Health Sciences | PRHSX | 15.51 | 15.36 | 15.15 | 13.53 | 21.54 | 12/29/95 | **0.77** | 12/31/2017 |
| Mid-Cap Growth[2] | RPMGX | 16.21 | 9.40 | 14.91 | 12.12 | 18.12 | 6/30/92 | **0.76** | 12/31/2017 |
| Mid-Cap Value[2] | TRMCX | 10.82 | -0.28 | 8.90 | 7.21 | 15.05 | 6/28/96 | **0.79** | 12/31/2017 |
| New America Growth | PRWAX | 15.76 | 12.28 | 18.88 | 13.97 | 17.72 | 9/30/85 | **0.79** | 12/31/2017 |
| New Era | PRNEX | 12.63 | -1.27 | 6.34 | -1.07 | 6.55 | 1/20/69 | **0.69** | 12/31/2017 |
| New Horizons[2] | PRNHX | 20.77 | 18.27 | 22.91 | 14.19 | 22.09 | 6/3/60 | **0.78** | 12/31/2017 |
| QM U.S. Small-Cap Growth Equity | PRDSX | 17.23 | 7.04 | 14.94 | 10.16 | 18.52 | 6/30/97 | **0.79** | 12/31/2017 |
| QM U.S. Small & Mid-Cap Core Equity | TQSMX | 15.20 | 3.16 | 11.84 | – | 13.84 | 2/26/16 | **1.61†** | 12/31/2017 |
| QM U.S. Value Equity | TQMVX | 10.91 | 0.20 | 9.92 | – | 11.81 | 2/26/16 | **2.46†** | 12/31/2017 |
| Real Assets | PRAFX | 12.98 | 4.71 | 6.80 | 2.03 | 3.45 | 7/28/10 | **0.82** | 12/31/2017 |
| Real Estate | TRREX | 16.15 | 13.90 | 3.93 | 7.66 | 18.12 | 10/31/97 | **0.73** | 12/31/2017 |
| Science & Technology | PRSCX | 22.81 | 8.38 | 22.45 | 16.26 | 19.54 | 9/30/87 | **0.80** | 12/31/2017 |
| Small-Cap Stock[2] | OTCFX | 17.56 | 11.67 | 15.91 | 9.53 | 18.14 | 6/1/56 | **0.89** | 12/31/2017 |
| Small-Cap Value | PRSVX | 12.77 | 1.45 | 12.26 | 6.65 | 15.06 | 6/30/88 | **0.91** | 12/31/2017 |
| Tax-Efficient Equity[4] | PREFX | | | | | | 12/29/00 | **0.83** | 2/28/2018 |
| *Returns before taxes* | | 18.22 | 13.08 | 17.26 | 12.71 | 17.29 | | | |
| *Returns after taxes on distributions* | | – | 12.74 | 16.84 | 12.21 | 16.96 | | | |
| *Returns after taxes on distributions and sale of fund shares* | | – | 7.94 | 13.55 | 10.06 | 14.75 | | | |
| Total Equity Market Index | POMIX | 14.01 | 8.36 | 13.21 | 10.12 | 15.85 | 1/30/98 | **0.30** | 12/31/2017 |
| U.S. Large-Cap Core | TRULX | 12.47 | 9.26 | 12.13 | 10.91 | 14.18 | 6/26/09 | **0.79†** | 12/31/2017 |
| Value | TRVLX | 12.46 | 4.04 | 10.15 | 7.63 | 15.78 | 9/30/94 | **0.81** | 12/31/2017 |

†This fund currently operates under a contractual expense limitation that may be lower than the expense ratio shown in the table above; for information about the expense limitation, including its expiration date, please see the fund's prospectus.

[1] If a fund has less than 10 years of performance history, its since-inception return is shown.

[2] Closed to new investors except for a direct rollover from a retirement plan into a T. Rowe Price IRA invested in this fund.

[3] Formerly the T. Rowe Price Media & Telecommunications Fund.

[4] The returns presented reflect the return before taxes; the return after taxes on dividends and capital gain distributions; and the return after taxes on dividends, capital gain distributions, and gains (or losses) from redemptions of shares held for 1-, 5-, and 10-year periods, as applicable. After-tax returns reflect the highest federal income tax rate but exclude state and local taxes. The after-tax returns reflect the rates applicable to ordinary and qualified dividends and capital gains effective in 2003. During periods when a fund incurs a loss, the post-liquidation after-tax return may exceed the fund's other returns because the loss generates a tax benefit that is factored into the result. An investor's actual after-tax return will likely differ from those shown and depend on his or her tax situation. Past before- and after-tax returns do not necessarily indicate future performance.

## Figure 7 Benchmarks

| Domestic Stock | 3 months | 1 year | 3 years | 5 years | 10 years |
|---|---|---|---|---|---|
| *S&P 500 Index* | 13.65% | 9.50% | 13.51% | 10.91% | 15.92% |
| *S&P MidCap 400 Index* | 14.49 | 2.59 | 11.24 | 8.29 | 16.28 |
| *NASDAQ Composite Index (Principal Return)* | 16.49 | 9.43 | 16.65 | 12.98 | 17.59 |
| *Russell 2000 Index* | 14.58 | 2.05 | 12.92 | 7.05 | 15.36 |
| *Lipper Indexes* | | | | | |
| *Large-Cap Core Funds* | 12.52 | 8.05 | 12.85 | 9.46 | 14.58 |
| *Equity Income Funds* | 11.50 | 6.94 | 10.60 | 7.85 | 13.69 |
| *Small-Cap Core Funds* | 13.63 | 1.63 | 11.55 | 6.77 | 15.07 |

## Figure 8 Stock Funds

| International/Global | Ticker symbol | 3 months | 1 year | 3 years | 5 years | 10 years or since inception[1] | Inception date | Expense ratio | Expense ratio as of date |
|---|---|---|---|---|---|---|---|---|---|
| Africa & Middle East | TRAMX | 5.94% | -8.91% | 8.51% | 0.87% | 9.20% | 9/4/07 | **1.52%** | 10/31/2018 |
| Asia Opportunities | TRAOX | 13.87 | 0.22 | 14.79 | – | 9.65 | 5/21/14 | **1.32†** | 10/31/2018 |
| Emerging Europe | TREMX | 9.48 | -11.80 | 7.75 | -1.72 | 7.70 | 8/31/00 | **1.62** | 10/31/2018 |
| Emerging Markets Discovery Stock[5] | PRIJX | 10.60 | -3.74 | 12.98 | – | 11.71 | 9/14/15 | **1.90** | 10/31/2018 |
| Emerging Markets Stock | PRMSX | 13.82 | -7.23 | 13.12 | 6.62 | 10.94 | 3/31/95 | **1.22†** | 10/31/2018 |
| European Stock | PRESX | 11.14 | -2.53 | 4.57 | 0.11 | 10.17 | 2/28/90 | **0.97** | 10/31/2018 |
| Global Consumer | PGLOX | 14.56 | 5.64 | – | – | 10.01 | 6/27/16 | **3.15** | 12/31/2017 |
| Global Growth Stock | RPGEX | 17.72 | 6.39 | 14.87 | 10.19 | 14.57 | 10/27/08 | **0.92†** | 10/31/2018 |
| Global Industrials | RPGIX | 14.75 | 0.62 | 10.93 | 6.26 | 6.54 | 10/24/13 | **2.12†** | 12/31/2017 |
| Global Real Estate | TRGRX | 14.49 | 9.33 | 3.93 | 5.48 | 13.57 | 10/27/08 | **1.08†** | 12/31/2017 |
| Global Stock | PRGSX | 17.87 | 7.59 | 18.01 | 12.22 | 15.46 | 12/29/95 | **0.82** | 10/31/2018 |
| Global Technology | PRGTX | 20.98 | 4.71 | 21.47 | 19.36 | 24.18 | 9/29/00 | **0.89** | 12/31/2017 |
| International Disciplined Equity[6] | PRCNX | 8.87 | -1.81 | 6.99 | – | 2.80 | 8/22/14 | **1.22†** | 10/31/2018 |
| International Discovery | PRIDX | 12.04 | -9.66 | 9.71 | 6.72 | 14.56 | 12/30/88 | **1.20** | 10/31/2018 |
| International Equity Index | PIEQX | 9.64 | -5.28 | 7.22 | 2.27 | 8.85 | 11/30/00 | **0.46** | 10/31/2018 |
| International Stock | PRITX | 12.96 | -3.07 | 8.51 | 4.48 | 11.02 | 5/9/80 | **0.81** | 10/31/2018 |
| International Value Equity[7] | TRIGX | 8.62 | -10.09 | 2.98 | -0.52 | 8.03 | 12/21/98 | **0.81** | 10/31/2018 |
| Japan | PRJPX | 10.76 | -6.97 | 12.12 | 9.71 | 11.31 | 12/30/91 | **0.96** | 10/31/2018 |
| Latin America | PRLAX | 9.05 | -5.65 | 12.28 | 1.62 | 6.50 | 12/29/93 | **1.32** | 10/31/2018 |
| New Asia | PRASX | 14.59 | -3.59 | 11.78 | 6.85 | 14.03 | 9/28/90 | **0.93** | 10/31/2018 |
| Overseas Stock | TROSX | 9.89 | -6.40 | 7.34 | 2.62 | 9.77 | 12/29/06 | **0.81** | 10/31/2018 |
| QM Global Equity | TQGEX | 13.24 | 2.73 | – | – | 10.20 | 4/15/16 | **2.92** | 12/31/2017 |

## Figure 9 Benchmarks

| International/Global Stock | 3 months | 1 year | 3 years | 5 years | 10 years |
|---|---|---|---|---|---|
| *MSCI EAFE Index* | 10.13% | -3.22% | 7.80% | 2.81% | 9.47% |
| *Lipper Averages* | | | | | |
| *Emerging Markets Funds* | 10.46 | -9.32 | 9.01 | 2.55 | 8.85 |
| *International Large-Cap Core Funds* | 10.34 | -5.93 | 6.34 | 1.35 | 8.11 |
| *International Large-Cap Growth Funds* | 12.38 | -3.35 | 7.51 | 2.95 | 8.99 |
| *International Small/Mid-Cap Growth Funds* | 11.44 | -10.37 | 7.06 | 3.60 | 12.66 |

[5] Formerly the T. Rowe Price Emerging Markets Value Stock Fund.
[6] Formerly the T. Rowe Price International Concentrated Equity Fund.
[7] Formerly the T. Rowe Price International Growth & Income Fund.

All mutual funds are subject to market risk, including possible loss of principal. Funds that invest overseas generally carry more risk than funds that invest strictly in U.S. assets due to factors such as currency risk, geographic risk, and emerging markets risk. Funds that invest in fixed income securities are subject to credit risk and liquidity risk, with high yield securities having a greater risk of default than higher-quality securities. Such funds are also subject to the risk that a rise in interest rates will cause the price of a fixed rate debt security to fall. During periods of extremely low or negative interest rates, some funds may not be able to maintain a positive yield.

MSCI index returns are shown with gross dividends reinvested.

## **Figure 10** Bond Funds

| Domestic Tax-Free[8] | Ticker symbol | 3 months | 1 year | 3 years | 5 years | 10 years or since inception[1] | Inception date | Expense ratio | Expense ratio as of date |
|---|---|---|---|---|---|---|---|---|---|
| California Tax-Free Bond | PRXCX | 2.64% | 4.41% | 2.35% | 3.92% | 5.23% | 9/15/86 | **0.54%** | 2/28/2018 |
| Georgia Tax-Free Bond | GTFBX | 2.56 | 4.25 | 2.04 | 3.44 | 4.60 | 3/31/93 | **0.59** | 2/28/2018 |
| Intermediate Tax-Free High Yield | PRIHX | 2.59 | 4.32 | 2.92 | – | 3.64 | 7/24/14 | **1.15†** | 2/28/2018 |
| Maryland Short-Term Tax-Free Bond | PRMDX | 1.10 | 2.22 | 0.79 | 0.81 | 0.96 | 1/29/93 | **0.63** | 2/28/2018 |
| Maryland Tax-Free Bond | MDXBX | 2.55 | 4.31 | 2.51 | 3.58 | 4.89 | 3/31/87 | **0.47** | 2/28/2018 |
| New Jersey Tax-Free Bond | NJTFX | 2.44 | 4.77 | 2.64 | 3.81 | 4.83 | 4/30/91 | **0.57** | 2/28/2018 |
| New York Tax-Free Bond | PRNYX | 2.45 | 4.14 | 2.23 | 3.69 | 4.73 | 8/28/86 | **0.54** | 2/28/2018 |
| Summit Municipal Income | PRINX | 2.92 | 4.35 | 2.61 | 4.04 | 5.54 | 10/29/93 | **0.53** | 3/1/2019 |
| Summit Municipal Intermediate | PRSMX | 2.69 | 4.64 | 2.01 | 2.95 | 3.97 | 10/29/93 | **0.52** | 3/1/2019 |
| Tax-Free High Yield | PRFHX | 3.22 | 4.42 | 3.49 | 5.03 | 7.59 | 3/1/85 | **0.71** | 2/28/2018 |
| Tax-Free Income | PRTAX | 2.60 | 4.23 | 2.37 | 3.65 | 4.96 | 10/26/76 | **0.53** | 2/28/2018 |
| Tax-Free Short-Intermediate | PRFSX | 1.49 | 3.01 | 1.12 | 1.29 | 2.11 | 12/23/83 | **0.51** | 2/28/2018 |
| Virginia Tax-Free Bond | PRVAX | 2.46 | 4.00 | 2.33 | 3.56 | 4.55 | 4/30/91 | **0.50** | 2/28/2018 |

## **Figure 11** Bond Funds

| Domestic Taxable | Ticker symbol | 3 months | 1 year | 3 years | 5 years | 10 years or since inception[1] | Inception date | Expense ratio | Expense ratio as of date |
|---|---|---|---|---|---|---|---|---|---|
| Corporate Income | PRPIX | 5.01% | 4.52% | 3.26% | 3.45% | 6.83% | 10/31/95 | **0.61%** | 5/31/2018 |
| Credit Opportunities | PRCPX | 6.64 | 5.40 | 8.48 | – | 2.66 | 4/29/14 | **1.49†** | 5/31/2018 |
| Floating Rate | PRFRX | 3.60 | 2.63 | 4.28 | 3.23 | 3.65 | 7/29/11 | **0.78†** | 5/31/2018 |
| GNMA[9] | PRGMX | 1.81 | 3.35 | 1.28 | 1.97 | 2.90 | 11/26/85 | **0.60** | 5/31/2018 |
| High Yield[2] | PRHYX | 6.76 | 4.41 | 7.30 | 4.00 | 10.21 | 12/31/84 | **0.73** | 5/31/2018 |
| Inflation Protected Bond | PRIPX | 3.40 | 2.74 | 1.41 | 1.62 | 3.05 | 10/31/02 | **0.58** | 5/31/2018 |
| Limited Duration Inflation Focused Bond | TRBFX | 1.86 | 2.12 | 1.14 | 0.65 | 1.44 | 9/29/06 | **0.49** | 5/31/2018 |
| New Income | PRCIX | 3.27 | 4.09 | 2.18 | 2.59 | 4.28 | 8/31/73 | **0.56** | 5/31/2018 |
| Short-Term Bond | PRWBX | 1.51 | 3.07 | 1.67 | 1.33 | 2.10 | 3/2/84 | **0.47** | 5/31/2018 |
| Total Return | PTTFX | 3.53 | 4.72 | – | – | 3.51 | 11/15/16 | **1.50†** | 5/31/2018 |
| Ultra Short-Term Bond | TRBUX | 1.13 | 2.73 | 2.06 | 1.49 | 1.23 | 12/3/12 | **0.42†** | 5/31/2018 |
| U.S. Bond Enhanced Index | PBDIX | 3.04 | 4.60 | 2.20 | 2.76 | 3.76 | 11/30/00 | **0.30** | 10/31/2018 |
| U.S. High Yield[10] | TUHYX | 7.41 | 4.33 | – | – | 3.86 | 5/19/17 | **1.13** | 5/31/2018 |
| U.S. Treasury Intermediate[9] | PRTIX | 2.30 | 4.72 | 0.63 | 1.87 | 2.44 | 9/29/89 | **0.52** | 5/31/2018 |
| U.S. Treasury Long-Term[9] | PRULX | 4.59 | 6.30 | 1.21 | 4.81 | 4.66 | 9/29/89 | **0.48** | 5/31/2018 |

## **Figure 12** Benchmarks

| Bond | 3 months | 1 year | 3 years | 5 years | 10 years |
|---|---|---|---|---|---|
| *Bloomberg Barclays U.S. Aggregate Bond Index* | 2.94% | 4.48% | 2.03% | 2.74% | 3.77% |
| *Bloomberg Barclays Municipal Bond Index* | 2.90 | 5.38 | 2.71 | 3.73 | 4.72 |
| *Credit Suisse High Yield Index* | 7.22 | 5.57 | 8.71 | 4.52 | 10.81 |
| *Lipper Averages* | | | | | |
| *Short Investment Grade Debt Funds* | 1.66 | 2.89 | 1.95 | 1.39 | 2.72 |
| *Core Bond Funds* | 3.20 | 3.96 | 2.18 | 2.43 | 4.45 |
| *GNMA Funds* | 1.96 | 3.49 | 1.00 | 1.72 | 2.72 |
| *High Yield Funds* | 6.56 | 4.39 | 6.93 | 3.43 | 9.56 |
| *Short Municipal Debt Funds* | 0.99 | 2.18 | 1.02 | 0.94 | 1.36 |
| *Intermediate Municipal Debt Funds* | 2.57 | 4.35 | 1.93 | 2.68 | 3.75 |
| *General & Insured Municipal Debt Funds* | 2.94 | 4.69 | 2.48 | 3.58 | 4.95 |

[8] Some income from the tax-free funds may be subject to state and local taxes and the federal alternative minimum tax.

[9] The market value of shares is not guaranteed by the U.S. government.

[10] The T. Rowe Price U.S. High Yield Fund (Fund) commenced operations on May 19, 2017. At that time, the Fund received all of the assets and liabilities of the Henderson High Yield Opportunities Fund (the Predecessor Fund) and adopted its performance and accounting history. The Fund and the Predecessor Fund have substantially similar investment objectives and strategies. The Predecessor Fund was managed by the same portfolio manager as the Fund.

## Figure 13 Bond Funds

| International/Global | Ticker symbol | 3 months | 1 year | 3 years | 5 years | 10 years or since inception[1] | Inception date | Expense ratio | Expense ratio as of date |
|---|---|---|---|---|---|---|---|---|---|
| Dynamic Credit | RPIDX | — | — | — | — | 1.88% | 1/10/19 | **1.92%** | 1/10/2019 |
| Dynamic Global Bond[11] | RPIEX | -0.92 | -0.68 | 0.40 | — | 1.57 | 1/22/15 | **0.63†** | 12/31/2017 |
| Emerging Markets Bond | PREMX | 7.35 | 0.49 | 5.78 | 4.55 | 8.18 | 12/30/94 | **0.92†** | 12/31/2017 |
| Emerging Markets Corporate Bond | TRECX | 5.40 | 5.15 | 6.26 | 4.64 | 5.24 | 5/24/12 | **1.44†** | 12/31/2017 |
| Emerging Markets Local Currency Bond | PRELX | 3.31 | -9.05 | 3.56 | -0.88 | -0.75 | 5/26/11 | **0.99** | 12/31/2017 |
| Global High Income Bond | RPIHX | 6.25 | 5.16 | 7.88 | — | 6.44 | 1/22/15 | **1.13†** | 12/31/2017 |
| Global Multi-Sector Bond | PRSNX | 3.62 | 3.92 | 4.66 | 3.72 | 6.27 | 12/15/08 | **0.72** | 5/31/2018 |
| International Bond | RPIBX | 1.97 | -4.80 | 1.28 | -0.13 | 2.56 | 9/10/86 | **0.67†** | 12/31/2017 |
| International Bond (USD Hedged) | TNIBX | 3.68 | 4.13 | --- | --- | 4.21 | 9/12/17 | **0.67†** | 12/31/2017 |

## Figure 14 Benchmarks

| International/Global Bond | 3 months | 1 year | 3 years | 5 years | 10 years |
|---|---|---|---|---|---|
| *Bloomberg Barclays Global Aggregate ex USD Bond Index* | 1.52% | -4.13% | 0.96% | -0.26% | 2.46% |
| *J.P. Morgan Emerging Markets Bond Index Global* | 6.59 | 3.52 | 5.20 | 4.80 | 8.12 |
| *Lipper Averages* | | | | | |
| *Emerging Market Hard Currency Debt Funds* | 5.90 | 0.31 | 5.18 | 2.92 | 7.24 |
| *International Income Funds* | 2.64 | -1.14 | 2.16 | 0.94 | 4.14 |

## Figure 15 Money Market Funds

| Tax-Free[12] | Ticker symbol | 7-day yield | 7-day unsubsidized yield[10] | 3 months | 1 year | 3 years | 5 years | 10 years or since inception[1] | Inception date | Expense ratio | Expense ratio as of date |
|---|---|---|---|---|---|---|---|---|---|---|---|
| California Tax-Free Money◊ | PCTXX | 0.94% | 0.72% | 0.22% | 0.83% | 0.44% | 0.27% | 0.14% | 9/15/86 | **1.17%†** | 7/1/2018 |
| Maryland Tax-Free Money◊ | TMDXX | 1.14 | 0.89 | 0.28 | 1.08 | 0.53 | 0.32 | 0.17 | 3/30/01 | **0.86** | 7/1/2018 |
| New York Tax-Free Money◊ | NYTXX | 0.96 | 0.81 | 0.23 | 0.94 | 0.48 | 0.29 | 0.16 | 8/28/86 | **1.04†** | 2/28/2018 |
| Summit Municipal Money Market◊ | TRSXX | 1.15 | 1.15 | 0.29 | 1.10 | 0.61 | 0.37 | 0.20 | 10/29/93 | **0.45** | 10/31/2018 |
| Tax-Exempt Money◊ | PTEXX | 1.21 | 1.19 | 0.29 | 1.12 | 0.61 | 0.37 | 0.20 | 4/8/81 | **0.54** | 7/1/2018 |
| **Taxable[10]** | | | | | | | | | | | |
| Cash Reserves◊‡[13] | TSCXX | 2.20% | 2.20% | 0.54% | 1.89% | 1.01% | 0.61% | 0.32% | 10/29/93 | **0.45%** | 10/31/2018 |
| Government Money‡[14] | PRRXX | 2.13 | 2.13 | 0.51 | 1.74 | 0.83 | 0.50 | 0.26 | 1/26/76 | **0.44** | 5/31/2018 |
| U.S. Treasury Money‡ | PRTXX | 2.15 | 2.15 | 0.51 | 1.74 | 0.83 | 0.50 | 0.26 | 6/28/82 | **0.43** | 5/31/2018 |

[11] Formerly the T. Rowe Price Global Unconstrained Bond Fund.

[12] In an effort to maintain a zero or positive net yield for the fund, T. Rowe Price may voluntarily waive all or a portion of the management fee it is entitled to receive from the fund. This voluntary waiver would be in addition to any contractual expense ratio limitation in effect for the fund and may be amended or terminated at any time without prior notice. This fee waiver would have the effect of increasing the fund's 7-day yield. Please see the prospectus for more details.

[13] Formerly the T. Rowe Price Summit Cash Reserves Fund.

[14] Formerly the T. Rowe Price Prime Reserve Fund.

*Money Market Funds:*

◊*Retail Funds: You could lose money by investing in the Fund. Although the Fund seeks to preserve the value of your investment at $1.00 per share, it cannot guarantee it will do so. Beginning October 14, 2016, the Fund may impose a fee upon the sale of your shares or may temporarily suspend your ability to sell shares if the Fund's liquidity falls below required minimums because of market conditions or other factors. An investment in the Fund is not insured or guaranteed by the Federal Deposit Insurance Corporation or any other government agency. The Fund's sponsor has no legal obligation to provide financial support to the Fund, and you should not expect that the sponsor will provide financial support to the Fund at any time.*

‡*Government Funds: You could lose money by investing in the Fund. Although the Fund seeks to preserve the value of your investment at $1.00 per share, it cannot guarantee it will do so. An investment in the Fund is not insured or guaranteed by the Federal Deposit Insurance Corporation or any other government agency. The Fund's sponsor has no legal obligation to provide financial support to the Fund, and you should not expect that the sponsor will provide financial support to the Fund at any time.*

## **Figure 16** Asset Allocation Funds

| Asset Allocation | Ticker symbol | 3 months | 1 year | 3 years | 5 years | 10 years or since inception[1] | Inception date | Expense ratio | Expense ratio as of date |
|---|---|---|---|---|---|---|---|---|---|
| Balanced | RPBAX | 9.54% | 4.19% | 9.02% | 6.50% | 11.21% | 12/31/39 | **0.64%** | 12/31/2017 |
| Global Allocation | RPGAX | 9.11 | 1.38 | 7.94 | 5.31 | 5.95 | 5/28/13 | **1.09†** | 10/31/2018 |
| Multi-Strategy Total Return | TMSRX | 3.24 | -1.40 | – | – | -0.91 | 2/23/18 | **1.93** | 10/31/2018 |
| Personal Strategy Balanced | TRPBX | 9.21 | 3.69 | 9.06 | 6.38 | 11.47 | 7/29/94 | **0.86** | 5/31/2018 |
| Personal Strategy Growth | TRSGX | 11.33 | 3.65 | 10.96 | 7.45 | 13.45 | 7/29/94 | **0.88** | 5/31/2018 |
| Personal Strategy Income | PRSIX | 7.05 | 3.45 | 7.03 | 5.09 | 9.07 | 7/29/94 | **0.78** | 5/31/2018 |
| Retirement 2005 | TRRFX | 6.56 | 3.54 | 5.93 | 4.47 | 8.55 | 2/27/04 | **0.54** | 5/31/2018 |
| Retirement 2010 | TRRAX | 7.09 | 3.61 | 6.44 | 4.81 | 9.42 | 9/30/02 | **0.54** | 5/31/2018 |
| Retirement 2015 | TRRGX | 7.85 | 3.63 | 7.22 | 5.32 | 10.48 | 2/27/04 | **0.57** | 5/31/2018 |
| Retirement 2020 | TRRBX | 8.91 | 3.62 | 8.24 | 5.93 | 11.48 | 9/30/02 | **0.61** | 5/31/2018 |
| Retirement 2025 | TRRHX | 9.79 | 3.56 | 9.05 | 6.41 | 12.29 | 2/27/04 | **0.64** | 5/31/2018 |
| Retirement 2030 | TRRCX | 10.63 | 3.52 | 9.79 | 6.85 | 12.96 | 9/30/02 | **0.67** | 5/31/2018 |
| Retirement 2035 | TRRJX | 11.32 | 3.39 | 10.33 | 7.15 | 13.40 | 2/27/04 | **0.70** | 5/31/2018 |
| Retirement 2040 | TRRDX | 11.90 | 3.33 | 10.80 | 7.39 | 13.63 | 9/30/02 | **0.72** | 5/31/2018 |
| Retirement 2045 | TRRKX | 12.27 | 3.32 | 10.96 | 7.49 | 13.67 | 5/31/05 | **0.72** | 5/31/2018 |
| Retirement 2050 | TRRMX | 12.20 | 3.23 | 10.95 | 7.48 | 13.67 | 12/29/06 | **0.72** | 5/31/2018 |
| Retirement 2055 | TRRNX | 12.27 | 3.32 | 10.95 | 7.47 | 13.68 | 12/29/06 | **0.72** | 5/31/2018 |
| Retirement 2060 | TRRLX | 12.20 | 3.28 | 10.93 | – | 6.86 | 6/23/14 | **0.72** | 5/31/2018 |
| Retirement Balanced | TRRIX | 6.75 | 3.46 | 5.86 | 4.29 | 7.77 | 9/30/02 | **0.52** | 5/31/2018 |
| Retirement Income 2020 | TRLAX | 8.77 | 3.49 | – | – | 5.52 | 5/25/17 | **2.81** | 12/31/2017 |
| Spectrum Growth | PRSGX | 13.30 | 2.71 | 12.14 | 8.10 | 14.49 | 6/29/90 | **0.78** | 12/31/2017 |
| Spectrum Income | RPSIX | 4.64 | 2.37 | 4.40 | 3.25 | 6.64 | 6/29/90 | **0.65** | 12/31/2017 |
| Spectrum International | PSILX | 11.41 | -5.67 | 7.30 | 2.99 | 10.44 | 12/31/96 | **0.91** | 12/31/2017 |
| Target 2005 | TRARX | 6.41 | 3.45 | 5.60 | 4.23 | 4.97 | 8/20/13 | **1.19** | 1/1/2019 |
| Target 2010 | TRROX | 6.51 | 3.53 | 5.78 | 4.33 | 5.15 | 8/20/13 | **0.81** | 1/1/2019 |
| Target 2015 | TRRTX | 6.77 | 3.46 | 6.14 | 4.55 | 5.47 | 8/20/13 | **0.60** | 1/1/2019 |
| Target 2020 | TRRUX | 7.46 | 3.47 | 6.82 | 4.96 | 6.02 | 8/20/13 | **0.63** | 1/1/2019 |
| Target 2025 | TRRVX | 8.14 | 3.30 | 7.52 | 5.42 | 6.61 | 8/20/13 | **0.69** | 1/1/2019 |
| Target 2030 | TRRWX | 9.09 | 3.40 | 8.34 | 5.95 | 7.28 | 8/20/13 | **0.75** | 1/1/2019 |
| Target 2035 | RPGRX | 9.89 | 3.40 | 9.06 | 6.41 | 7.84 | 8/20/13 | **0.86** | 1/1/2019 |
| Target 2040 | TRHRX | 10.55 | 3.30 | 9.65 | 6.76 | 8.26 | 8/20/13 | **0.92** | 1/1/2019 |
| Target 2045 | RPTFX | 11.05 | 3.28 | 10.10 | 7.01 | 8.58 | 8/20/13 | **1.03** | 1/1/2019 |
| Target 2050 | TRFOX | 11.58 | 3.26 | 10.48 | 7.21 | 8.85 | 8/20/13 | **1.12** | 1/1/2019 |
| Target 2055 | TRFFX | 11.95 | 3.23 | 10.80 | 7.39 | 9.03 | 8/20/13 | **1.44** | 1/1/2019 |
| Target 2060 | TRTFX | 12.19 | 3.21 | 10.83 | – | 6.81 | 6/23/14 | **2.99** | 1/1/2019 |

Indexes included in this update track the following: S&P 500–500 large-company U.S. stocks; S&P MidCap 400–stocks of 400 mid-size U.S. companies; NASDAQ Composite (principal only)–U.S. stocks traded in the over-the-counter market; Russell 2000–stocks of 2,000 small U.S. companies; MSCI EAFE–stocks of about 1,000 companies in Europe, Australasia, and the Far East; MSCI Emerging Markets–more than 850 stocks traded in over 20 emerging markets; Bloomberg Barclays U.S. Aggregate Bond–investment-grade corporate and government bonds; Bloomberg Barclays Municipal Bond–tax-free investment-grade U.S. bonds; Credit Suisse High Yield–noninvestment-grade corporate U.S. bonds; Bloomberg Barclays Global Aggregate ex USD Bond–investment-grade government, corporate, agency, and mortgage-related bonds in markets outside the U.S.; J.P. Morgan Emerging Markets Bond–Global–U.S. dollar-denominated Brady Bonds, Eurobonds, traded loans, and local market debt instruments issued by sovereign and quasi-sovereign entities; Lipper averages–all funds in each investment objective category; and Lipper indexes–equally weighted indexes of typically the 30 largest mutual funds within their respective investment objective categories. It is not possible to invest directly in an index.

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