BRINGING TRANSPARENCY TO ROBO INVESTING

EDITION 9

The Robo Report™ Third Quarter 2018

We are proud to publish the 9th edition of *The Robo Report*™, covering the third quarter of 2018. This report is a continuation of an ongoing study that monitors the most well-known robo advisors. We strive to provide a reliable resource for both investors and professionals interested in the digital advice industry.

Highlights:

- Growth equities outperformance over value extended through the third quarter, holding back Betterment and FutureAdvisor.
- International equities continued to fall behind domestic equities this quarter, helping Fidelity Go and Zacks post strong quarterly and YTD performance.
- tZero comes out of the gate strong, with a portfolio of individual equities that significantly outperformed the group this quarter.
- SoFi's high allocation to high-yield munis helped them secure the top YTD fixed income returns.

The Executive Summary

Robo Report Housekeeping

It has been a busy quarter for *The Robo Report*™. This quarter, we are introducing portfolios from UBS and tZero, which is owned by Overstock.com. We are also introducing coverage of Ellevest's impact portfolio, which has a theme of investing in companies that advance women. Next quarter, we will be introducing portfolios from Interactive Brokers, US Bank, and qplum. We will also be introducing portfolios with an active management style from Morgan Stanley and TIAA, while also initiating coverage of the newly released TD Ameritrade socially responsible portfolio. This quarter, we also saw Capital One close their automated portfolios following the sale of their investments arm. Due to the closure of their robo product, we have removed them from the report. We have also updated our Normalized Benchmarking methodology to account for changes in target allocations. Additionally, we are now using Normalized Benchmarking to compare the retirement portfolios.

Methodology

To get a first-hand understanding of how the different providers operate and invest clients' money, we opened up, funded, and sought specific portfolios at various robo advisors. For the taxable accounts, we sought a moderate allocation of approximately 60% stocks and 40% bonds for an investor in a high tax bracket. As for the retirement accounts, our goal was to have the most aggressive (highest stock) allocation. Starting with a similar baseline allocation across the portfolios allows us to measure performance and compare how our funds are invested as equally as possible. For comparability between portfolios that have different target allocations, we track the equity-only and fixed-income-only portions of the portfolios, and encourage investors to look at differences in target allocations and compare asset class to asset class when appropriate. Additionally, in the second quarter of 2018, we introduced Normalized Benchmarking as an alternative way to compare robo portfolios with differing equity allocations.

Taxable Top Performers

Year-to-Date Top Performers

	Best	2nd	3rd
Total Portfolio	Zacks Advantage	Fidelity Go	Wells Fargo
Equity	Zacks Advantage	Wells Fargo	Fidelity Go
Fixed Income	SoFi	Vanguard	Betterment & Fidelity Go

1-Year Trailing Top Performers

	Best	2nd	3rd
Total Portfolio	Fidelity Go	Zacks Advantage	Wealthfront
Equity	Fidelity Go	Zacks Advantage	Acorns
Fixed Income	Fidelity Go	Vanguard	Betterment

2-Year Trailing Top Performers

	Best	2nd	3rd
Total Portfolio	Fidelity Go	Vanguard	E*Trade
Equity	Fidelity Go	Vanguard	E*Trade
Fixed Income	Schwab	Fidelity Go	Vanguard

**Total Portfolio winners are based on the portfolio's return above/below the Normalized Benchmark.*

Robo News

Catch up on what you missed in the digital advice industry. Below are highlights of the biggest news from the past quarter.

Race to Zero

This has been another exciting quarter in the robo advice industry, as we see innovation across the digital advice space. Although they have not released a direct-to-consumer robo as of yet, JP Morgan rolled out an investing app in August tailored to self-directed investors. As part of this release, all customers will get 100 free stock or ETF trades for their first year, as well as access to equity research. Along with the release of this product, JP Morgan announced that clients can expect to see a robo advice option as part of this product in early 2019. JP Morgan launching a robo has been long anticipated and will be just another step in a long trend of large US financial institutions creating robo advice product offerings.

While JP Morgan released an app offering free trades, Fidelity is at work reducing expense ratios. Last quarter, we applauded Fidelity's move from earlier this year when they changed the funds held in Fidelity Go accounts to newly created mutual funds that have no expense ratios. Following this move, Fidelity recently released two mutual funds available outside of their robo with no management fees or loads.

Competition is fierce enough in financial services but could become even more competitive if one of the nation's tech giants enters the arena. Moody's Investor Service released a report speculating that large technology firms like Google, Facebook, and Apple will continue to expand their offerings and begin to offer financial products and services, eventually emerging as significant competitors to traditional consumer-facing financial institutions. Bain & Co. also released a report specific to Amazon and its potential to disrupt financial services. TD Ameritrade President, Tom Nally, reflected this sentiment in an editorial he published on September 11, in which he wrote, "When it comes to technological change, financial advisors no longer compete only against brokers, robo advisors and other advisory firms. Consumers also judge their RIAs against the convenience and responsiveness set by disruptors such as Google, Amazon and Uber."

Funding, Acquisitions, Launches, and Closures

On July 3, 2018, Principal Financial Group completed its acquisition of RobustWealth, which offers a suite of white label solutions for investment advisors, including a digital advice platform, goal-based investment tools, and efficient client on-boarding processes. Broker–dealer LPL Financial integrated Riskalyze to their Client Works platform to provide improved account synchronization and monitoring to their 2,500 advisors who utilize the digital advisement tool. Overstock.com's digitally driven advice platform, which is powered by security token exchange company tZero, signed a letter of intent with GSR Capital for the purchase of $160 million Security Tokens. A significant portion of these funds will go to developing their blockchain technology. United Income, a financial services and investment management firm geared toward older or retired customers, raised more than $10 million in a new funding round in August. On September 10, 2018, hybrid digital wealth management provider Facet Wealth announced it secured $33 million funding round led by Warburg Pincus. Bambu Wealth, a Singapore based robo, partnered with DriveWealth, a US company, to offer robo technologies through a white label offering to advisors.

This quarter we saw Capital One shut down their robo advice offering following the sale of their investment advice and brokerage assets in a move to further concentrate on their core banking business segments. Hedgeable completed the closure of their B2C advice business in August, with both co-founders shifting their attention to Hydrogen, a financial services blockchain company. Additionally, UBS announced they are closing SmartWealth, their UK, digital-only robo advice offering. SmartWealth is selling their technology to US based SigFig as part of the process. This move by UBS is particularly interesting, as earlier this year UBS partnered with SigFig to release Advice Advantage, a robo-advice offering in the US.

New Features

To stay ahead of the incumbents, independent robo advisors are continuing to differentiate their products by enhancing existing and adding new features. Personal Capital unveiled "Retirement Paycheck"—part of a larger upgrade to their financial planning features—as a tax forecasting tool to recommend an optimal account withdrawal order in retirement. Betterment introduced "Financial Advice Packages" where digital-only Betterment users can access live financial advice for specific needs without upgrading to the "Premium Plan" that comes with unlimited access to advisors. Betterment also introduced "Smart Saver", a new, low-risk portfolio aimed at helping clients take advantage of rising interest rates. WiseBanyan has released some features to encourage users to make more contributions, including a round-up feature similar to Acorns and an automated transfer triggered by a drop in portfolio value. United Income added a new feature to their automated investing platform enabling investors to see their "total wealth return," which will report clients' returns net of investment fees, tax considerations, and other factors, giving clients a better picture of their financial health over time.

Robos Evolving

We continue to see innovative ideas within investment management as well as other areas of financial services. Dream Forward, a digital 401(k) advisor, sells 401(k) and other employer-sponsored plans that come with an AI chatbot feature to provide digital advice and emotional support to plan participants. We are also starting to see more digital advice technologies pop up in areas of personal finance like budgeting, debt management, and insurance.

Advances in AI combined with digital advice expanding well beyond portfolio management make it possible to start conceptualizing a product that could automate large swaths of personal finance tasks. The idea of financial services software handling decisions on a user's investments, budgeting, savings, insurance, and other tasks is still just a concept at this point, but we are beginning to see some modest developments in technology that could eventually lead to a single product to handle these tasks. Wealthfront may have this aspiration, as CEO Andy Rachleff shared his vision of a central financial hub at the CB Insights' Future of Fintech Conference in New York City. Many firms are taking a step to become more involved in a user's spending, with Stash, Acorns, and SoFi all in the process of launching debit card products. A single AI-driven financial hub to handle finances from a paycheck to an estate plan is unquestionably a lofty goal and a long ways off, but with each new product offering and feature development, digital advice is tackling smarter personal financial management one small step at a time.

Funding and AUM Statistics

Robo	Raised to Date (Millions)	Last Funding Amount (Millions)	Last Funding Date	Post-Money Valuation at Last Funding Round (Millions)	AUM (in Millions)	Clients	Source of AUM and Clients Figures
Acorns	$152	$50	May, 2018	Unknown	$804	1,870,961	Most Recent ADV
Ally Invest Advisors	N/A	N/A	N/A	Acquired TradeKing for $294 Million June, 2016	$114	7,153	Most Recent ADV
Betterment	$275	$70	Jul, 2017	$800	$14,143	361,809	Most Recent ADV
Ellevest	$45	$35	Jul, 2017	$83	$191	14,423	Most Recent ADV
FutureAdvisor	N/A	N/A	N/A	Acquired by BlackRock for $152 Million August, 2015	$1,213	8,587	Most Recent ADV
Personal Capital	$275	$40	Aug, 2017	$540	$7,912	18,308	Most Recent ADV
Schwab Intelligent Portfolio Products	N/A	N/A	N/A	N/A	$33,300	223,000 Accounts (# of clients unavailable)	AUM from Q2 18' # of Accounts from Q4 17' Earnings Report
SigFig	$118	$51	June, 2018	$471	$308	5,977	Most Recent ADV
SoFi Wealth	N/A	N/A	N/A	N/A	$43	9,163	Most Recent ADV
TD Ameritrade Selective and Essential Portfolios	N/A	N/A	N/A	N/A	$20,500	Unknown	Company Reports
T Rowe Price ActivePlus Portfolios	N/A	N/A	N/A	N/A	$355	Unknown	Company Representative
United Income	$15	$10	Aug, 2018	$65	$436	318	Company Representative and Most Recent ADV
Vanguard Personal Advisor Services	N/A	N/A	N/A	N/A	$112,000	Unknown	News Media/ Vanguard Spokesperson
Wealthfront	$205	$75	Jan, 2018	$500△	$11,167	216,599	Most Recent ADV
Wealthsimple	$115	$52	Feb, 2018	Unknown	$52 (U.S.)	7,980 (U.S.)	Most Recent ADV
WiseBanyan	$11	$7	Apr, 2018	Unknown	$153	31,772	Most Recent ADV

**all funding and valuation amounts are estimates*
***sources: Crunchbase, Pitchbook, News Media*

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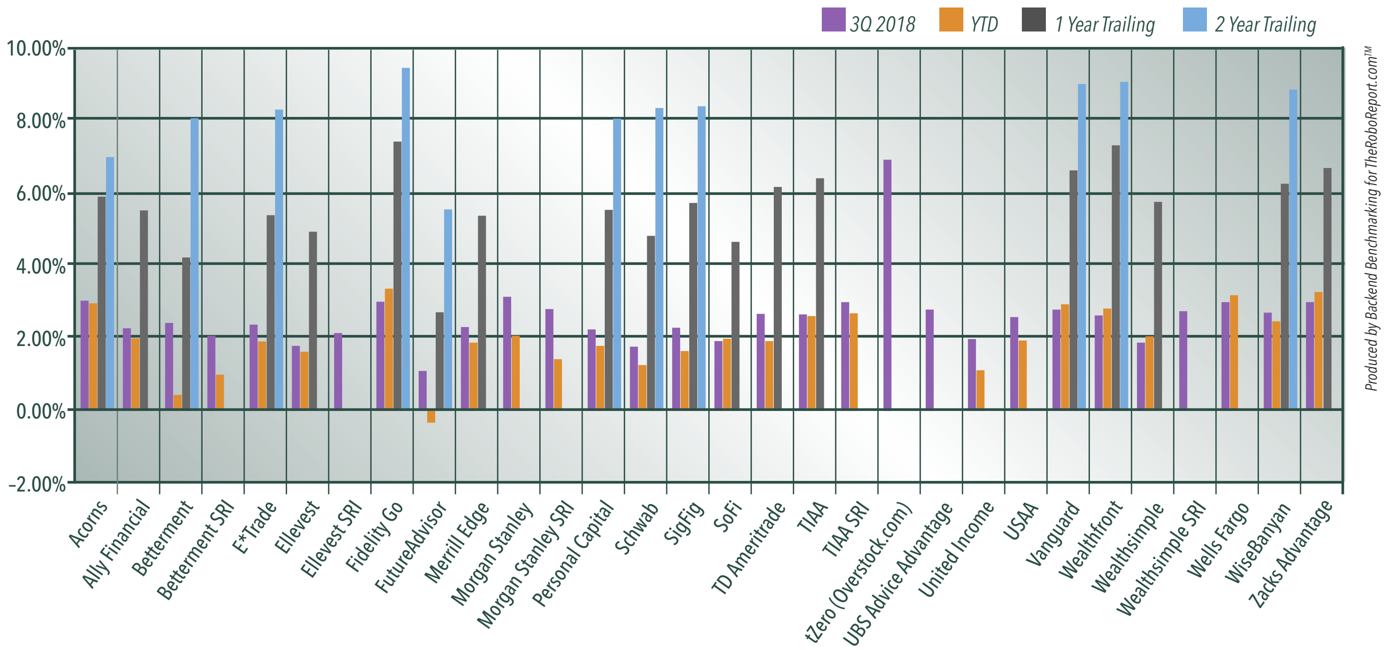
△This valuation number has been disputed

Taxable Account Performance



Performance Commentary

Despite higher gas prices, rising interest rates, and the threat of a trade war, all major domestic stock indices posted record highs during the third quarter of 2018, with the S&P 500 Index finishing the quarter up 7.71%. Healthcare was the top performing sector in the quarter, with innovative new drug launches and an uptick in M&A activity helping to offset concerns about regulatory reform to limit drug prices. Industrials posted impressive performance as well amid a strong domestic economy and attempts by firms to "pull forward" as much business as possible before any further escalation of trade tensions. Also of note in the quarter, Apple and Amazon capped off tremendous multi-year runs to become the first two companies in history to cross the $1 trillion valuation mark, and the S&P 500 implemented a sector reorganization affecting a large number of companies, including the so-called "FAANG" stocks. Following the reorganization, Facebook, Netflix, and Google are now classified in the communications space, whereas Amazon will remain in the consumer discretionary space. These big names, as well as an industry-wide movement towards 5G adoption, helped propel this new sector higher in the quarter. All told, the success of the communications and healthcare sectors helped propel growth stocks to once again outperform their value counterparts, while large-cap companies outpaced their mid- and small-cap counterparts for the first time in 2018.

Growth and Large Cap Lead

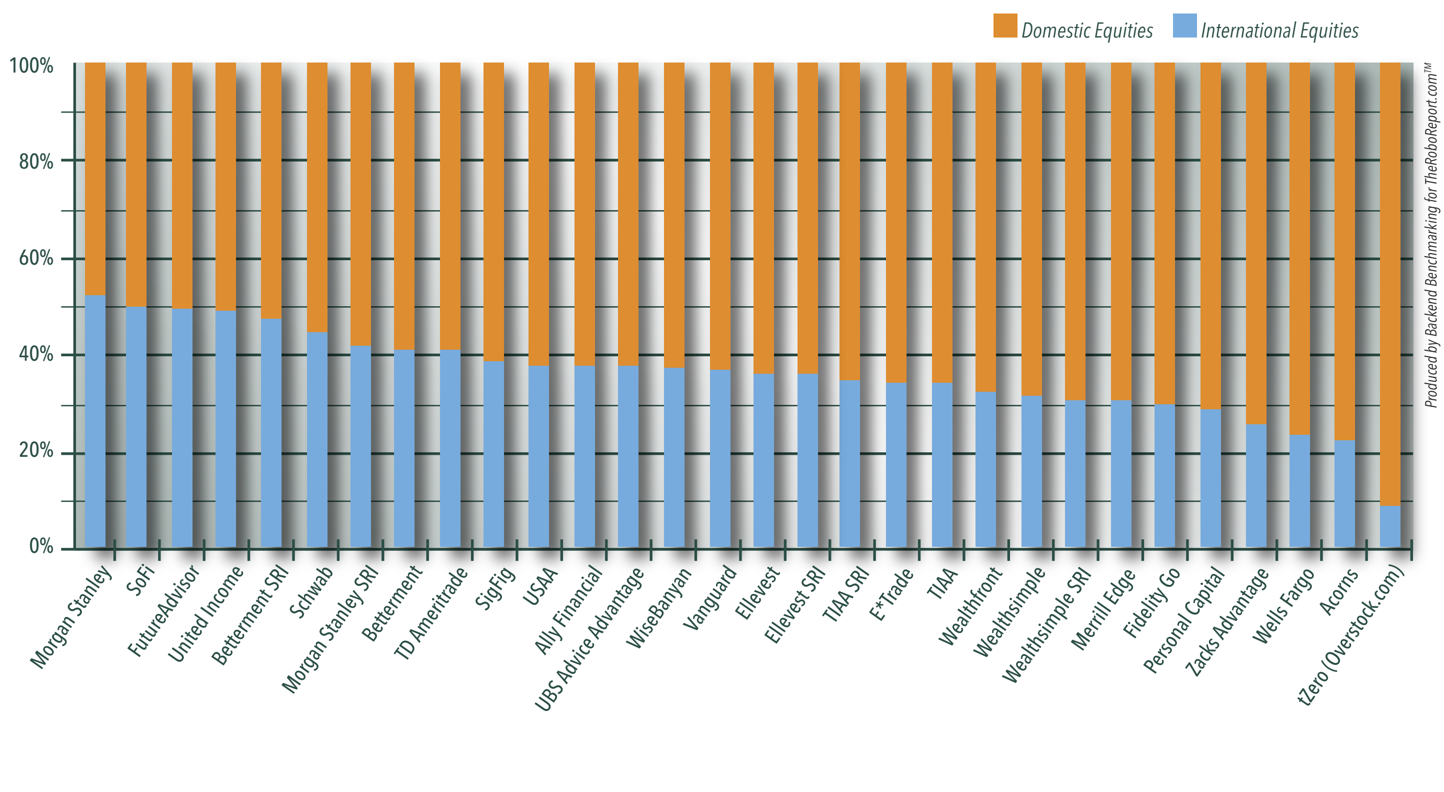
Over the summer, we saw a continuation of a growth outperforming value up until the end of the third quarter. This trend helped one of our newest robos, tZero, which is owned by Overstock.com, outperform the group in total, equities, and fixed income returns for the quarter. tZero holds individual stocks for their equity allocation, and although other robo providers offer strategies with individual security holdings, our portfolios are not invested in them, making tZero unique in our universe. In their first quarter, their underweight financials allocation, significant exposure to technology and telecom, as well as individual stock selection, helped them outperform in equities. Zacks robo has a weighting toward large-cap that helped their quarter, YTD, and 1-year trailing outperformance.

Meanwhile, our portfolios that have a tilt toward value have not fared well this year. With growth significantly outperforming value this year, FutureAdvisor and Betterment suffered and found themselves in the bottom of our group in YTD equities returns. Both portfolios also found themselves in the bottom half of returns when judging performance based on the Normalized Benchmark over the 2-year period.

International Continues to Underperform

International equities lagged domestic markets in the third quarter of 2018, with emerging markets coming in as the worst performer. Intensifying trade concerns sparked a flight from emerging markets assets, as President Trump levied tariffs on an additional $200B worth of imports from China. A strengthening dollar prompted an exodus of capital from emerging markets to the U.S. as well. Country-specific issues rattled both the Argentine Peso and the Turkish Lira in the quarter, while ongoing political instability in Brazil continued to adversely affect that country's capital markets. Developed equity markets fared better than the emerging market space but still lagged the U.S. market, due in part to uncertainty over when and how the European Central Bank will go about ending its easy money policies.

International Allocation of Total Equity for Taxable Robos



Portfolios with low exposure to international have outperformed YTD and in the third quarter. tZero has the lowest allocations to international equities, and a low percentage of their international allocation in emerging markets helped them to lead the group in total return for the quarter. Fidelity Go, which has performed well throughout the year, also has a low overall international allocation and relatively low exposure to emerging markets. Acorns' account also benefited from the same trends. Many of the taxable accounts with high allocations to international equities—often allocating around half of their portfolio abroad—suffered this year, including Schwab, Betterment, FutureAdvisor, and SoFi.

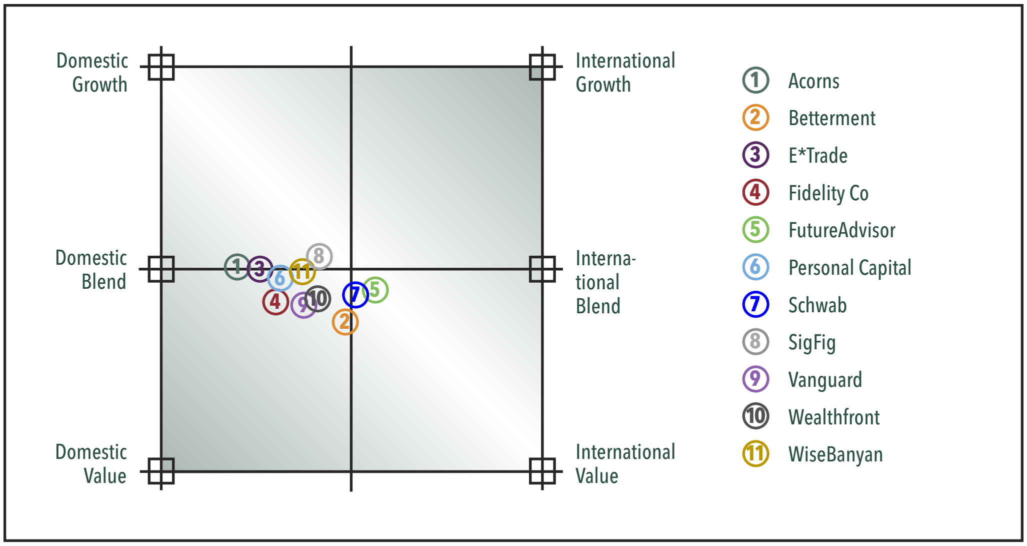
Fixed Income Amid Rising Rates

The Federal Reserve continues to play a large role in fixed income markets, increasing interest rates for the third time this year at its September meeting. Many investors believe that comments by Chairman Jerome Powell touting the U.S. economy's "particularly bright moment" are clearly signaling to market participants that the Fed remains on track to follow through with a fourth rate increase at its December meeting. Amid these trends, the U.S. yield curve continued to inch higher and flatter, with yields rising by between 20 and 30 basis points across the board. Overall, high-yield bonds were once again the top performer amid a continued risk-on attitude from investors seeking additional yield. Short-term bonds slightly outperformed longer-duration issues, and corporate bonds outpaced sovereign debt thanks largely to the strong corporate landscape and investors' appetite for yield. International debt issues were mixed, with local-currency-denominated debt generally struggling significantly due to the rising U.S. dollar. As with corporate bonds, higher-yielding municipal debt once again outperformed investment grade issues.

In 2018, those fixed income portfolios that have stayed close to even or only fallen slightly have been some of our top performers. SoFi has been the only portfolio in our universe to post a positive YTD return through the end of the third quarter. Their large allocation to a high-yield municipal bond fund has helped them buck the trend and post positive fixed income returns among rising rates. tZero's fixed income is heavily weighted toward shorter-term securities and helped them post strong quarterly fixed income returns. Acorns' positioning at the mid- to lower end of the yield curve also helped them post a positive quarterly fixed income return this quarter. Betterment posted a strong YTD fixed income return helping offset their poor equity performance with large allocations to municipal bonds and a holding in a broad-based international bond ETF.

Trailing 2-Year Style Maps for Taxable Robos

Equity Style Map



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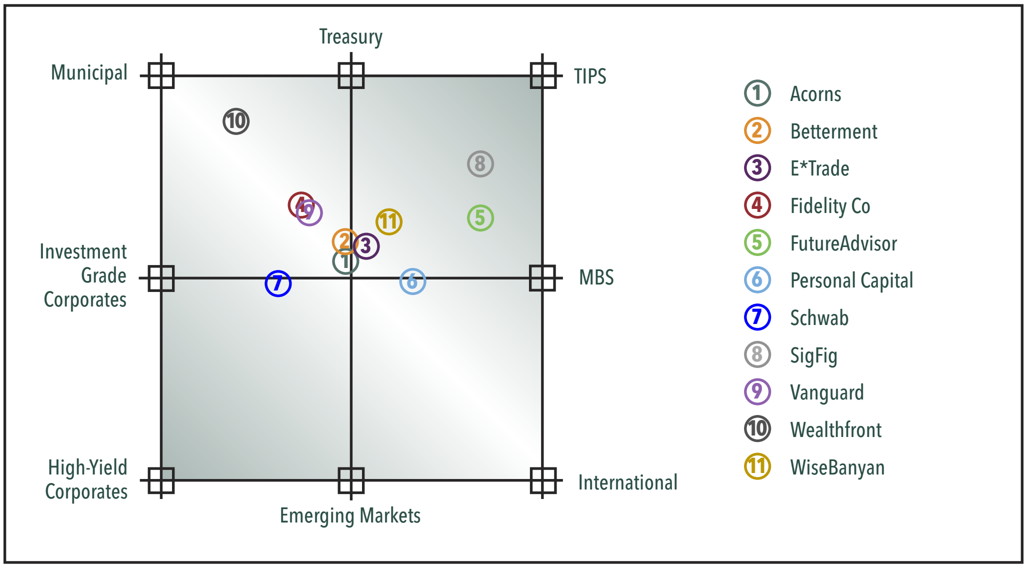
Created with MPI Analytics

Fixed Income Style Map



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Taxable Returns

	Total							
	3Q 2018	3Q 2018 Return Above/Below Benchmark	YTD	YTD Return Above/Below Benchmark	1 Year Trailing	1 Year Trailing Return Above/Below Benchmark	2 Year Trailing (Annualized)	2 Year Trailing Return Above/Below Benchmark (Annualized)
Acorns[1]	2.92%	0.15%	2.84%	0.06%	5.97%	-0.67%	6.91%	-2.34%
Ally Financial[9]	2.23%	-0.49%	1.94%	-0.78%	5.46%	-1.06%	-	-
Betterment[15]	2.38%	-0.62%	0.37%	-2.75%	4.17%	-3.09%	8.00%	-1.72%
Betterment SRI[15]	2.02%	-0.75%	0.94%	-1.84%	-	-	-	-
E*Trade (ETF)[21]	2.33%	-0.44%	1.87%	-0.91%	5.32%	-1.32%	8.26%	-0.69%
Ellevest[15]	1.75%	-0.84%	1.57%	-0.95%	4.88%	-1.43%	-	-
Ellevest SRI[15]	2.08%	-0.51%	-	-	-	-	-	-
Fidelity Go[7]	2.96%	0.15%	3.31%	0.46%	7.38%	0.61%	9.40%	0.30%
FutureAdvisor[3]	1.07%	-1.47%	-0.40%	-2.87%	2.67%	-3.48%	5.50%	-2.96%
Merrill Edge[7]	2.25%	-0.24%	1.82%	-0.69%	5.32%	-1.04%	-	-
Morgan Stanley[12]	3.10%	0.10%	2.02%	-1.10%	-	-	-	-
Morgan Stanley SRI[7]	2.76%	-0.19%	1.37%	-1.68%	-	-	-	-
Personal Capital[4]	2.19%	-1.22%	1.73%	-1.98%	5.50%	-2.87%	7.99%	-3.12%
Schwab[5]	1.74%	-1.17%	1.20%	-1.83%	4.77%	-2.45%	8.29%	-1.50%
SigFig[6]	2.23%	-0.63%	1.57%	-1.35%	5.68%	-1.21%	8.33%	-0.93%
SoFi[17]	1.85%	-0.92%	1.96%	-0.94%	4.60%	-1.73%	-	-
TD Ameritrade[10]	2.62%	-0.51%	1.88%	-1.43%	6.12%	-1.51%	-	-
TIAA[7]	2.61%	-0.20%	2.60%	-0.25%	6.34%	-0.43%	-	-
TIAA SRI[7]	2.94%	0.17%	2.62%	-0.16%	-	-	-	-
tZero (Overstock.com)[19]	6.86%	4.27%	-	-	-	-	-	-
UBS Advice Advantage[7]	2.74%	-0.39%	-	-	-	-	-	-
United Income[16]	1.91%	-0.81%	1.05%	-1.67%	-	-	-	-
USAA[7]	2.53%	-0.28%	1.89%	-0.93%	-	-	-	-
Vanguard[4,A]	2.73%	-0.04%	2.87%	0.09%	6.56%	-0.08%	8.96%	0.01%
Wealthfront (Risk 4.0)[22,B]	2.60%	-0.40%	2.76%	-0.36%	7.27%	0.01%	9.00%	-0.72%
Wealthsimple[11]	1.81%	-0.96%	2.04%	-0.74%	5.71%	-0.93%	-	-
Wealthsimple SRI[11]	2.68%	-0.09%	-	-	-	-	-	-
Wells Fargo[14]	2.95%	0.04%	3.14%	0.16%	-	-	-	-
WiseBanyan[8]	2.64%	-0.31%	2.41%	-0.64%	6.20%	-0.94%	8.73%	-0.84%
Zacks Advantage[4]	2.95%	0.32%	3.21%	0.63%	6.61%	0.34%	-	-

**Some accounts have not been open long enough for 1 year or 2 year trailing returns*

**SRI indicates the account is invested in a Socially Responsible Investing portfolio, also known as "Impact Investing"*

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Taxable Returns

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	Equity				Fixed Income			
	3Q 2018	YTD	1 Year Trailing	2 Year Trailing (Annualized)	3Q 2018	YTD	1 Year Trailing	2 Year Trailing (Annualized)
Acorns[1]	4.42%	5.91%	11.21%	12.14%	0.43%	-2.03%	-1.97%	-1.48%
Ally Financial[9]	3.77%	3.86%	9.69%	-	-0.15%	-1.02%	-0.80%	-
Betterment[15]	3.71%	0.97%	6.54%	12.21%	-0.04%	-0.77%	-0.39%	0.07%
Betterment SRI[15]	3.35%	2.13%	-	-	0.04%	-0.83%	-	-
E*Trade (ETF)[21]	3.72%	4.42%	10.06%	14.19%	0.32%	-2.15%	-1.82%	-0.64%
Ellevest[15]	3.51%	3.39%	9.15%	-	-0.45%	-0.87%	-0.75%	-
Ellevest SRI[15]	4.06%	-	-	-	-0.48%	-	-	-
Fidelity Go[7]	5.12%	6.08%	12.44%	15.75%	-0.24%	-0.77%	0.05%	0.33%
FutureAdvisor[3]	2.27%	0.16%	5.14%	10.15%	-0.36%	-1.13%	-0.73%	-0.68%
Merrill Edge[7]	4.39%	4.22%	9.99%	-	-0.26%	-1.21%	-0.74%	-
Morgan Stanley[12]	4.29%	3.55%	-	-	0.87%	-1.08%	-	-
Morgan Stanley SRI[7]	4.49%	3.07%	-	-	-0.01%	-1.39%	-	-
Personal Capital[4]	2.93%	3.01%	8.15%	11.08%	0.00%	-2.07%	-1.99%	-0.63%
Schwab[5]	2.84%	2.35%	7.55%	12.08%	-0.21%	-1.31%	-0.83%	1.45%
SigFig[6]	3.62%	3.47%	9.60%	14.06%	0.10%	-1.58%	-0.56%	-0.48%
SoFi[17]	3.17%	2.73%	8.91%	-	-0.13%	0.78%	-0.51%	-
TD Ameritrade[10]	3.90%	3.61%	9.64%	-	-0.20%	-2.15%	-1.77%	-
TIAA[7]	4.37%	4.88%	11.04%	-	-0.12%	-1.44%	-1.29%	-
TIAA SRI[7]	4.86%	5.08%	-	-	0.09%	-1.08%	-	-
tZero (Overstock.com)[19]	11.61%	-	-	-	0.91%	-	-	-
UBS Advice Advantage[7]	4.09%	-	-	-	-0.10%	-	-	-
United Income[16]	3.27%	3.03%	-	-	-0.01%	-1.85%	-	-
USAA[7]	4.24%	4.23%	-	-	-0.21%	-2.12%	-	-
Vanguard[4,A]	4.49%	4.87%	10.81%	14.65%	-0.23%	-0.47%	-0.17%	0.24%
Wealthfront (Risk 4.0)[22,B]	4.14%	4.54%	11.07%	13.71%	-0.38%	-1.13%	-0.54%	-0.09%
Wealthsimple[11]	3.30%	4.02%	9.79%	-	-0.56%	-1.10%	-0.58%	-
Wealthsimple SRI[11]	4.59%	-	-	-	-0.27%	-	-	-
Wells Fargo[14]	4.23%	6.10%	-	-	0.86%	-1.90%	-	-
WiseBanyan[8]	3.86%	4.32%	10.05%	13.85%	0.46%	-1.10%	-0.60%	-0.03%-
Zacks Advantage[4]	5.09%	6.16%	11.94%	-	-0.04%	-1.08%	-0.54%	-

**Some accounts have not been open long enough for 1 year or 2 year trailing returns*

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Retirement Returns

	Total							
	3Q 2018	3Q 2018 Return Above/Below Benchmark	YTD	YTD Return Above/Below Benchmark	1 Year Trailing	1 Year Trailing Return Above/Below Benchmark	2 Year Trailing (Annualized)	2 Year Trailing Return Above/Below Benchmark (Annualized)
Ally Financial IRA[9]	3.55%	-0.70%	3.78%	-1.10%	9.19%	-1.44%	-	-
Betterment IRA[15]	3.34%	-0.65%	1.74%	-2.80%	6.60%	-3.33%	11.09%	-2.02%
E*Trade (ETF) IRA[21]	3.67%	-0.79%	4.21%	-0.94%	9.79%	-1.42%	-	-
Fidelity Go IRA[7]	4.41%	0.50%	4.95%	0.52%	10.15%	0.46%	-	-
Merrill Edge IRA[7]	3.66%	-0.42%	2.62%	-2.03%	7.72%	-2.44%	-	-
Morgan Stanley IRA[7]	3.68%	0.03%	2.64%	-1.44%	-	-	-	-
Personal Capital IRA[4]	3.03%	-1.34%	3.07%	-1.97%	8.09%	-2.89%	11.17%	-3.32%
Schwab IRA[20]	2.94%	-1.35%	2.83%	-2.10%	7.94%	-2.80%	12.30%	-1.88%
SigFig IRA[6]	2.65%	-1.51%	0.97%	-3.79%	5.99%	-4.40%	10.95%	-2.77%
SoFi IRA[18]	3.19%	-1.35%	3.55%	-1.71%	9.91%	-1.53%	-	-
T Rowe Price IRA[13]	2.82%	-1.72%	4.99%	-0.27%	10.27%	-1.17%	-	-
TD Ameritrade IRA[10]	3.47%	-0.39%	2.91%	-1.46%	8.03%	-1.55%	-	-
TIAA IRA[7]	3.74%	-0.29%	4.22%	-0.38%	9.64%	-0.40%	-	-
United Income IRA[16]	3.23%	-1.27%	3.25%	-1.96%	-	-	-	-
USAA IRA[7]	4.27%	-0.23%	4.30%	-0.91%	-	-	-	-
Wealthsimple IRA[2]	2.95%	-0.74%	2.97%	-1.17%	7.67%	-1.44%	-	-
Wells Fargo IRA[14]	3.24%	-0.92%	4.02%	-0.74%	-	-	-	-
WiseBanyan IRA[8]	3.72%	-0.48%	4.05%	-0.77%	9.55%	-0.96%	13.32%	-0.56%
Zacks Advantage IRA[4]	3.75%	-0.50%	3.88%	-1.00%	-	-	-	-

**Some accounts have not been open long enough for 1 year or 2 year returns, others have no fixed income holdings thus no fixed income returns*

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Retirement Returns

continued from previous page

	Equity				Fixed Income			
	3Q 2018	YTD	1 Year Trailing	2 Year Trailing (Annualized)	3Q 2018	YTD	1 Year Trailing	2 Year Trailing (Annualized)
Ally Financial IRA[9]	3.84%	4.13%	9.95%	-	-0.11%	-0.71%	-0.35%	-
Betterment IRA[15]	3.81%	2.19%	7.71%	12.86%	0.21%	-1.23%	-0.56%	-0.10%
E*Trade (ETF) IRA[21]	3.70%	4.28%	10.00%	-	-	-	-	-
Fidelity Go IRA[7]	5.18%	6.15%	12.30%	-	0.00%	-1.88%	-1.60%	-
Merrill Edge IRA[7]	4.09%	3.31%	9.05%	-	0.55%	-3.00%	-2.43%	-
Morgan Stanley IRA[7]	4.41%	3.62%	-	-	0.84%	-1.30%	-	-
Personal Capital IRA[4]	3.13%	3.23%	8.42%	11.61%	-1.04%	-3.58%	-3.49%	-1.42%
Schwab IRA[20]	3.15%	3.02%	8.50%	13.17%	-	-	-	-
SigFig IRA[6]	2.73%	1.58%	7.14%	12.39%	1.99%	-4.25%	-3.62%	-1.33%
SoFi IRA[18]	3.19%	3.12%	9.45%	-	-	-	-	-
T Rowe Price IRA[13]	2.82%	4.99%	10.27%	-	-	-	-	-
TD Ameritrade IRA[10]	4.14%	3.88%	9.95%	-	-0.38%	-3.04%	-2.73%	-
TIAA IRA[7]	4.35%	4.97%	11.17%	-	-0.12%	-1.88%	-1.53%	-
United Income IRA[16]	3.25%	3.28%	-	-	-	-	-	-
USAA IRA[7]	4.27%	4.31%	-	-	-	-	-	-
Wealthsimple IRA[2]	3.73%	3.97%	9.74%	-	-0.31%	-1.16%	-0.63%	-
Wells Fargo IRA[14]	3.46%	4.58%	-	-	1.33%	-1.98%	-	-
WiseBanyan IRA[8]	4.02%	4.50%	10.46%	14.58%	0.50%	-1.06%	-0.28%	0.31%
Zacks Advantage IRA[4]	4.00%	4.31%	-	-	-	-	-	-

**Some accounts have not been open long enough for 1 year or 2 year returns, others have no fixed income holdings thus no fixed income returns*

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Taxable Account Facts

Portfolio	Advisory Fee	Account Minimum	Initial Target Asset Allocation (Equities/Fixed Income/ Miscellaneous/Cash)	Current Asset Allocation (Equities/Fixed Income/ Miscellaneous/Cash)	Initial Domestic/ International Equity Split	Current Domestic/ International Equity Split	Tax Efficiency Ratio (% Muni Bonds of Overall Fixed Income)
Acorns	$1/month for Acorns; $2/month when adding Acorns later for Retirement accounts.For balances above $1 million, $100/month per $1 million in AUM	No minimum	61%/39%/0%/0%	63%/37%/0%/0%	84%/16%	78%/22%	0%
Ally Financial	0.30% annually	$2,500	59%/39%/0%/2%	61%/36%/0%/3%	59%/41%	62%/38%	0%
Betterment	Digital Only: 0.25%; Premium: 0.40% (unlmited chat and calls with advisor)	Digital Only: No minimum; Premium: $100,000	65%/35%/0%/0%	65%/35%/0%/0%	49%/51%	59%/41%	36%
Betterment SRI	Digital Only: 0.25%; Premium: 0.40% (unlmited chat and calls with advisor)	Digital Only: No minimum; Premium: $100,000	60%/40%/0%/0%	61%/39%/0%/0%	50%/50%	52%/48%	59%
E*Trade (ETF)	0.30% (promo – fee waived for first year)	$5,000	60%/39%/0%/1%	61%/38%/0%/1%	75%/25%	66%/34%	0%
Ellevest	0.25% annually for digital only; 0.50% for premium adding access to live advisors at this level	Digital only: No minimum; Premium: $50,000	62%/36%/0%/2%	56%/42%/0%/2%	71%/29%	64%/36%	94%
Ellevest SRI	0.25% annually for digital only; 0.50% for premium adding access to live advisors at this level	Digital only: No minimum; Premium: $50,000	56%/43%/0%/1%	57%/42%/0%/1%	63%/37%	64%/36%	81%
Fidelity Go	0.35% annually; no expense ratios on underlying funds	No Minimum	61%/39%/0%/0%	61%/39%/0%/1%	71%/29%	70%/30%	100%
FutureAdvisor	0.50% annually	$10,000	58%/41%/0%/1%	56%/44%/0%/0%	49%/51%	51%/49%	0%
Merrill Edge	0.45% annually	$5,000	60%/39%/0%/1%	55%/41%/0%/4%	66%/34%	69%/31%	94%
Morgan Stanley	0.35% annually	$5,000	65%/30%/0%/5%	66%/33%/0%/1%	45%/55%	48%/52%	0%
Morgan Stanley SRI	0.35% annually	$5,000	64%/35%/0%/1%	63%/36%/0%/1%	56%/44%	58%/42%	6%
Personal Capital	0.89% annually for the first $1 million; lower at different tiers over $1 million	$100,000	69%/25%/5%/1%	71%/24%/4%/1%	70%/30%	71%/29%	0%
Schwab	Intelligent Portfolio: No fee (digital only); Intelligent Advisory: 0.28% fee (Access to live advisors)	Intelligent Portfolio: $5,000; Intelligent Advisory: $25,000	61%/23%/5%/10%	61%/26%/2%/11%	51%/49%	55%/45%	55%
SigFig	No fee for the first $10k; 0.25% annually for balance over $10k	$2,000	62%/37%/0%/1%	61%/38%/0%/1%	58%/42%	61%/39%	0%
SoFi	No Fee on first $10k invested; 0.25% annually on funds above $10k; no fee if client also has a SoFi loan	$100	52%/48%/0%/0%	61%/39%/0%/0%	67%/33%	50%/50%	75%
TD Ameritrade	0.30% annually for Essential Portfolios. Selective Portfolios tiered at a higher fee level depending on account balance and portfolio selected.	Essential Portfolios: $5,000; Selective Portfolios: $25,000	65%/33%/0%/1%	67%/30%/0%/2%	65%/35%	59%/41%	0%
TIAA	0.30% annually	$5,000	61%/37%/0%/2%	62%/36%/0%/2%	71%/29%	66%/34%	0%
TIAA SRI	0.30% annually	$5,000	60%/39%/0%/1%	61%/38%/0%/1%	71%/29%	65%/35%	11%
tZero (Overstock.com)	$9.95 per month (promo - fee waived for first year if Overstock Club O member)	$1,000	56%/39%/0%/5%	58%/37%/0%/5%	90%/10%	91%/9%	0%
UBS Advice Advantage	0.75% annually	$10,000	68%/27%/0%/5%	69%/26%/0%/6%	59%/41%	62%/38%	79%

**Due to rounding, may not add to 100%*

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Taxable Account Facts

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Portfolio	Advisory Fee	Account Minimum	Initial Target Asset Allocation (Equities/Fixed Income/ Miscellaneous/Cash)	Current Asset Allocation (Equities/Fixed Income/ Miscellaneous/Cash)	Initial Domestic/ International Equity Split	Current Domestic/ International Equity Split	Tax Efficiency Ratio (% Muni Bonds of Overall Fixed Income)
United Income	Self Service: 0.50% annually; Full Service: 0.80% to 0.45% depending on account balances	Self Service: $10,000; Full Service: $300,000	59%/40%/0%/1%	60%/40%/0%/1%	51%/49%	51%/49%	0%
USAA	0.50% annually	$2,000	66%/32%/0%/1%	63%/36%/0%/1%	63%/37%	62%/38%	0%
Vanguard[A]	0.30% annually for the first $5 million; lower at different tiers over $5 million	$50,000	60%/40%/0%/0%	64%/36%/0%/0%	60%/40%	63%/37%	100%
Wealthfront (Risk 4.0)[B]	0.25% annually	$500	65%/35%/0%/0%	67%/33%/0%/1%	67%/33%	68%/32%	100%
Wealthsimple	Basic: 0.50% fee on accounts less than $100k; Black: 0.40% on accounts greater than $100k	Basic: No minimum; Black: $100,000	60%/40%/0%/0%	62%/38%/0%/0%	66%/34%	68%/32%	55%
Wealthsimple SRI	Basic: 0.50% fee on accounts less than $100k; Black: 0.40% on accounts greater than $100k	Basic: No minimum; Black: $100,000	60%/40%/0%/0%	62%/38%/0%/1%	69%/31%	69%/31%	0%
Wells Fargo	0.50% annually; discounted to 0.40% if subscribed to other specific Wells Fargo products	$10,000	63%/34%/0%/3%	64%/33%/0%/3%	77%/23%	77%/23%	0%
WiseBanyan	No Fee for basic package; add-on packages,such as tax loss harvesting, come at additional cost	No minimum	64%/36%/0%/0%	65%/35%/0%/0%	62%/38%	63%/37%	0%
Zacks Advantage	0.70% on accounts less than $100K; 0.50% on accounts less than $250k; 0.35% on accounts $250K and above	$25,000	57%/34%/0%/9%	60%/30%/0%/10%	72%/28%	74%/26%	40%

**Due to rounding, may not add to 100%*

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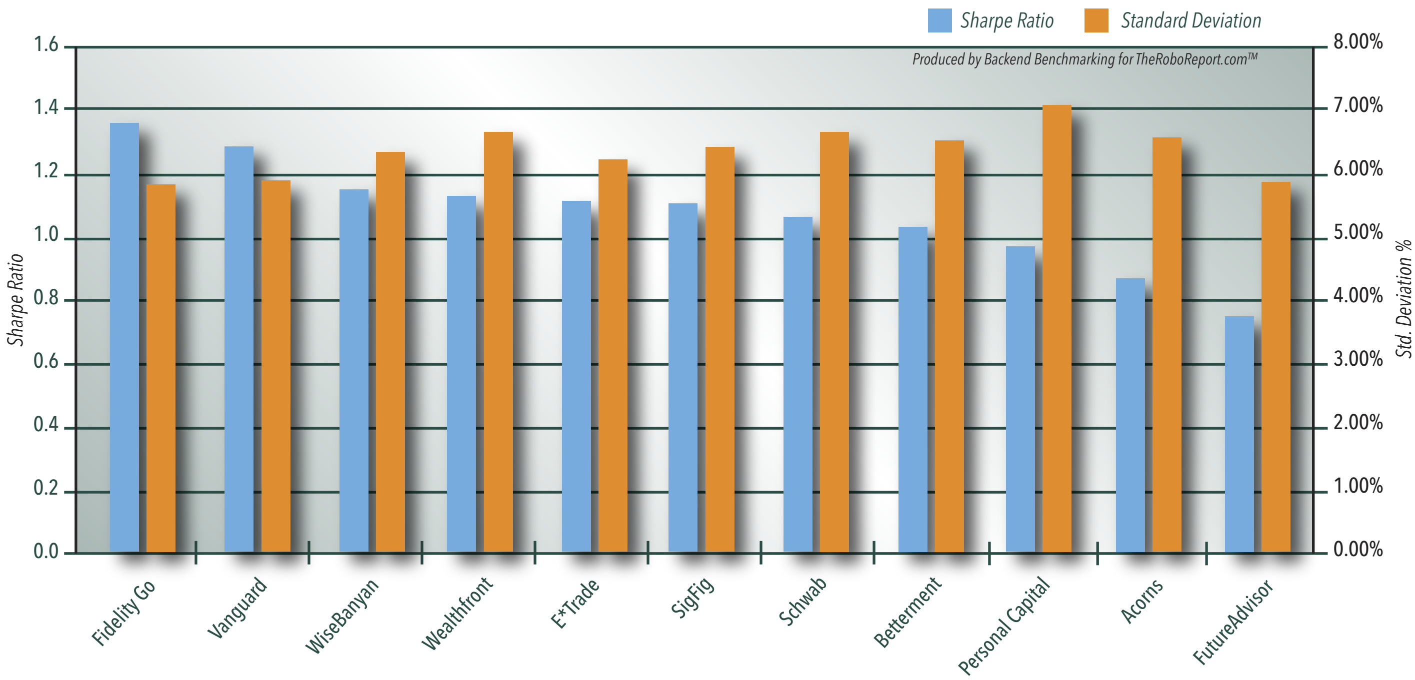
Retirement Account Facts

Portfolio	Advisory Fee	Account Minimum	Initial Target Asset Allocation (Equities/Fixed Income/ Miscellaneous/Cash)	Current Asset Allocation (Equities/Fixed Income / Miscellaneous/Cash)	Initial Domestic/ International Equity Split	Current Domestic/ International Equity Split
Ally Financial IRA	0.30% annually	$2,500	93%/5%/0%/2%	93%/5%/0%/3%	60%/40%	63%/37%
Betterment IRA	Digital Only: 0.25%; Premium: 0.40% (unlmited chat and calls with advisor)	Digital Only: No minimum; Premium: $100,000	87%/13%/0%/0%	87%/13%/0%/0%	47%/53%	56%/44%
E*Trade (ETF) IRA	0.30% (promo – fee waived for first year)	$5,000	98%/0%/0%/2%	99%/0%/0%/1%	75%/25%	65%/35%
Fidelity Go IRA	0.35% annually; no expense ratios on underlying funds	No Minimum	85%/14%/0%/1%	86%/14%/0%/0%	71%/29%	71%/29%
Merrill Edge IRA	0.45% annually	$5,000	89%/9%/0%/2%	88%/9%/0%/2%	64%/36%	66%/34%
Morgan Stanley IRA	0.35% annually	$5,000	79%/15%/0%/6%	80%/18%/0%/1%	47%/53%	48%/52%
Personal Capital IRA	0.89% annually for the first $1 million; lower at different tiers over $1 million	$100,000	91%/3%/2%/4%	94%/3%/3%/1%	69%/31%	70%/30%
Schwab IRA	Intelligent Portfolio: No fee (digital only); Intelligent Advisory: 0.28% fee (Access to live advisors)	Intelligent Portfolio: $5,000; Intelligent Advisory: $25,000	94%/0%/0%/6%	93%/0%/0%/7%	54%/46%	55%/45%
SigFig IRA	No fee for the first $10k; 0.25% annually for balance over $10k	$2,000	91%/9%/0%/0%	90%/10%/0%/1%	45%/55%	47%/53%
SoFi IRA	No Fee on first $10k invested: 0.25% annually on funds above $10k: no fee if client also has a SoFi loan	$100	100%/0%/0%/0%	100%/0%/0%/0%	66%/34%	50%/50%
T Rowe Price IRA[13]	No Advisory Fee	$50,000	100%/0%/0%/0%	100%/0%/0%/0%	63%/37%	63%/37%
TD Ameritrade IRA	0.30% annually for Essential Portfolios. Selective Portfolios tiered at a higher fee level depending on account balance and portfolio selected.	Essential Portfolios: $5,000; Selective Portfolios: $25,000	83%/15%/0%/1%	87%/12%/0%/1%	65%/35%	62%/38%
TIAA IRA	0.30% annually	$5,000	88%/11%/0%/1%	87%/12%/0%/1%	72%/28%	66%/34%
United Income IRA	Self Service: 0.50% annually; Full Service: 0.80% to 0.45% depending on account balances	Self Service: $10,000; Full Service $300,000	99%/0%/0%/1%	99%/0%/0%/1%	51%/49%	52%/48%
USAA IRA	0.50% annually	$2,000	99%/0%/0%/1%	100%/0%/0%/0%	59%/41%	63%/37%
Wealthsimple IRA	Basic: 0.50% fee on accounts less than $100k; Black: 0.40% on accounts greater than $100k	Basic: No minimum; Black: $100,000	80%/20%/0%/0%	81%/18%/0%/0%	66%/34%	68%/32%
Wells Fargo IRA	0.50% annually; discounted to 0.40% if subscribed to other specific Wells Fargo products	$10,000	91%/7%/0%/2%	91%/6%/0%/3%	67%/33%	70%/30%
WiseBanyan IRA	No Fee for basic package; add-on packages, such as tax loss harvesting, come at additional cost	No minimum	92%/8%/0%/0%	92%/8%/0%/0%	60%/40%	60%/40%
Zacks Advantage IRA	0.70% on accounts less than $100K; 0.50% on accounts less than $250k; 0.35% on accounts $250K and above	$25,000	93%/0%/0%/7%	95%/0%/0%/5%	62%/38%	64%/36%

**Due to rounding, may not add to 100%*

Taxable Risk/Returns

Risk/Return: Taxable Robos with 2-Year History (Sharpe Ratio and Standard Deviation)



Trailing 2-Year Risk/Return Statistics of Taxable Robos

	Acorns	Betterment	E*Trade	Fidelity Go	FutureAdvisor	Personal Capital
Annualized StdDev, %	6.59%	6.57%	6.18%	5.85%	5.89%	7.03%
Sharpe Ratio	0.87	1.03	1.13	1.37	0.75	0.97

	Schwab	SigFig	Vanguard	Wealthfront	WiseBanyan
Annualized StdDev, %	6.62%	6.41%	5.91%	6.60%	6.31%
Sharpe Ratio	1.06	1.10	1.29	1.17	1.18

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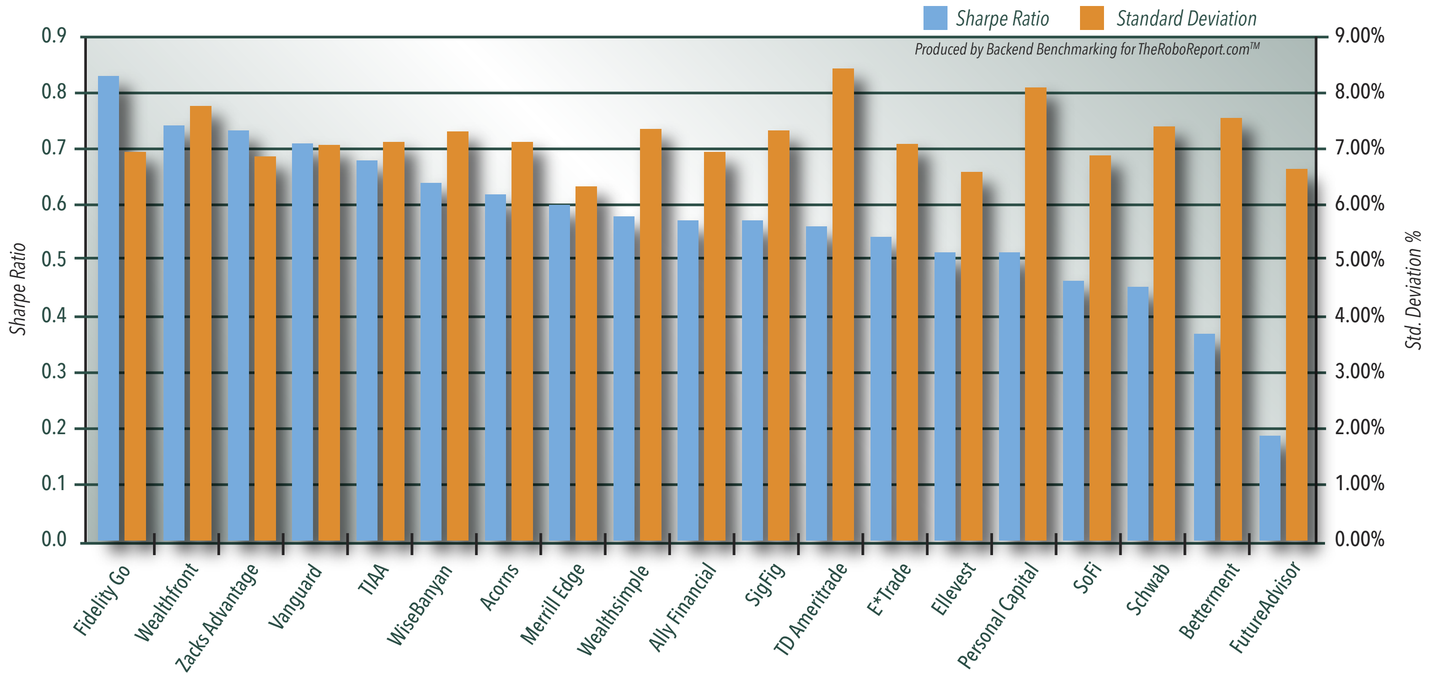
Risk/Return: Taxable Robos with 1-Year History (Sharpe Ratio and Standard Deviation)



Trailing 1-Year Risk/Return Statistics of Taxable Robos

	Acorns	Ally Financial	Betterment	E*Trade	Ellevest	Fidelity Go	Future Advisor	Merrill Edge	Personal Capital	Schwab
Annualized StdDev, %	7.12%	6.98%	7.57%	7.07%	6.61%	6.97%	6.64%	6.38%	8.12%	7.42%
Sharpe Ratio	0.62	0.57	0.37	0.54	0.51	0.83	0.19	0.60	0.51	0.45

	SigFig	SoFi	TD Ameritrade	TIAA	Vanguard	Wealthfront	Wealth-simple	Wise-Banyan	Zacks Advantage
Annualized StdDev, %	7.33%	6.92%	8.44%	7.06%	7.02%	7.76%	7.37%	7.34%	6.91%
Sharpe Ratio	0.57	0.46	0.56	0.68	0.71	0.74	0.58	0.64	0.73

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Trailing 2-Year Risk/Return Statistics of Retirment Robos

	Betterment IRA	Personal Capital IRA	Schwab IRA	SigFig IRA	WiseBanyan IRA
Annualized StdDev, %	8.76%	9.09%	9.24%	9.44%	9.01%
Sharpe Ratio	1.11	1.08	1.18	1.03	1.30

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Trailing 1-Year Risk/Return Statistics of Retirement Robos

	Ally Financial IRA	Betterment IRA	E*Trade (ETF) IRA	Fidelity Go IRA	Merrill Edge IRA	Personal Capital IRA	Schwab IRA
Annualized StdDev, %	10.79%	10.24%	11.50%	9.63%	10.45%	10.60%	10.49%
Sharpe Ratio	0.72	0.52	0.73	0.89	0.61	0.64	0.63

	SigFig IRA	SoFi IRA	T Rowe Price IRA	TD Ameritrade IRA	TIAA IRA	Wealthsimple IRA	WiseBanyan IRA
Annualized StdDev, %	10.88%	12.12%	14.74%	10.18%	10.41%	9.41%	10.62%
Sharpe Ratio	0.44	0.71	0.63	0.65	0.78	0.66	0.76

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Risk/Return Commentary

The third quarter of 2017 to the third quarter of 2018 has seen the return of volatility after years of historically calm markets. Trade policy conflicts, tax reform, and the steady rise of interest rates are just a few factors contributing to market volatility over the past year.

Our Fidelity Go account has a full 2-year return for the first time this quarter and has taken the top spot from Vanguard for the highest 2-year Sharpe ratio. Their low allocation to international and high level of large-cap exposure helped them lead the group over the 2-year period. Vanguard came in second in the 2-year period, continuing to show that a simple portfolio can perform well on a risk-adjusted basis. Vanguard allocates all of their fixed income to municipals and positions themselves at the low- to medium-term end of the yield curve, which has served them well.

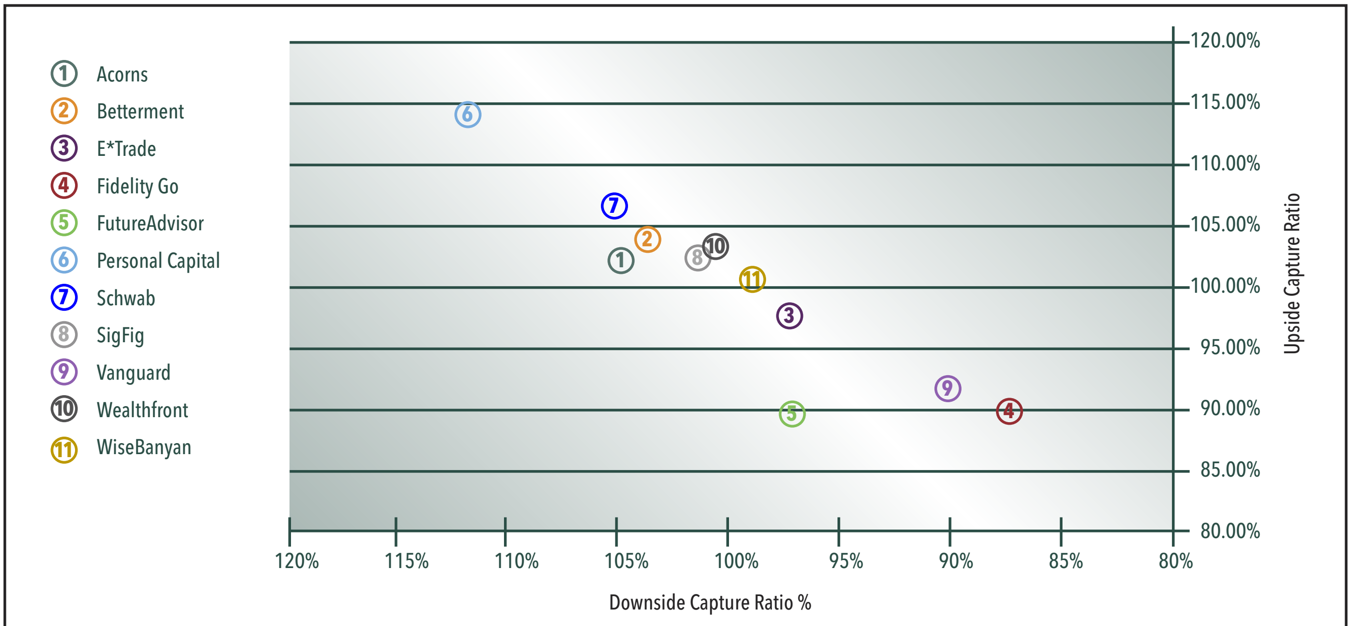
Robos with a tilt toward value and international equities underperformed over the past year. This driving trend is showing up in the 1-year Sharpe ratios, with Schwab, Betterment, and FutureAdvisor showing the lowest Sharpe ratios for this time period.

On the other hand, uncertainty around trade policies have made international holdings both volatile and low-performing over the past year, and have helped those robos with low allocations abroad take top spots. Fidelity Go, Wealthfront, and Zacks have all benefited from low international allocations and have taken the top three spots for the 1-year time period.

Acorns' portfolio has significantly changed since the account's inception. Those allocation shifts have helped bring their portfolio performance up in recent quarters. This is starting to become evident in their risk–return statistics, where they come in second to last in the 2-year numbers, but have a Sharpe ratio in the top half of the much larger universe of robos with a 1-year figure.

Taxable Upside/Downside Capture Ratios

Upside/Downside Capture Ratio 2-Year History of Taxable Robos



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2-Year Trailing Upside/Downside Capture Ratio for Taxable Robos

	Acorns	Betterment	E*Trade	Fidelity Go	Future-Advisor	Personal Capital	Schwab	SigFig	Vanguard	Wealthfront	Wise-Banyan
Up Market Capture Ratio, %	102.11%	104.01%	97.36%	89.69%	89.43%	113.80%	106.67%	102.38%	91.53%	103.19%	100.61%
Down Market Capture Ratio, %	104.94%	103.80%	97.31%	87.30%	97.20%	111.97%	105.34%	101.56%	90.18%	100.62%	99.02%

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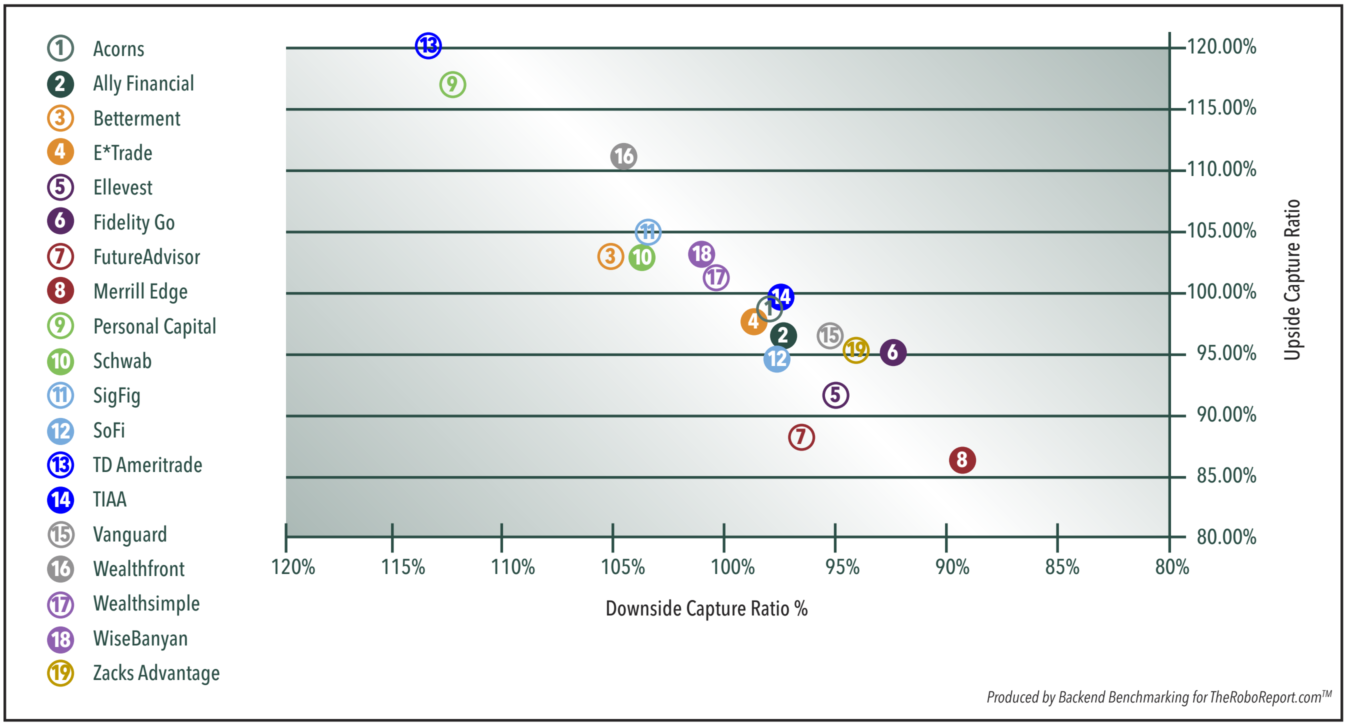
Upside/Downside Capture Ratio 1-Year History of Taxable Robos



1-Year Trailing Upside/Downside Capture Ratio for Taxable Robos

	Acorns	Ally Financial	Betterment	E*Trade	Ellevest	Fidelity Go	Future-Advisor	Merrill Edge	Personal Capital	Schwab
Up Market Capture Ratio, %	98.43%	96.42%	103.02%	97.58%	91.73%	95.08%	87.92%	86.26%	116.88%	102.94%
Down Market Capture Ratio, %	98.11%	97.52%	105.27%	98.73%	95.01%	92.39%	96.69%	89.52%	112.47%	103.97%

	SigFig	SoFi	TD Ameritrade	TIAA	Vanguard	Wealthfront	Wealth-simple	Wise-Banyan	Zacks Advantage
Up Market Capture Ratio, %	104.97%	94.43%	120.18%	99.22%	96.39%	110.83%	101.12%	103.44%	95.31%
Down Market Capture Ratio, %	103.62%	97.77%	113.51%	97.85%	95.18%	104.68%	100.64%	101.39%	94.20%

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Retirement Upside/Downside Capture Ratios

2-Year Trailing Upside/Downside Capture Ratio for Retirement Robos

	Betterment IRA	Personal Capital IRA	Schwab IRA	SigFig IRA	WiseBanyan IRA
Up Market Capture Ratio, %	94.03%	99.09%	102.53%	106.04%	98.43%
Down Market Capture Ratio, %	96.49%	100.26%	101.07%	105.64%	96.42%

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1-Year Trailing Upside/Downside Capture Ratio for Retirement Robos

	Ally Financial IRA	Betterment IRA	E*Trade (ETF) IRA	Fidelity Go IRA	Merrill Edge IRA	Personal Capital IRA	Schwab IRA
Up Market Capture Ratio, %	101.60%	92.51%	110.78%	86.87%	95.22%	98.93%	96.73%
Down Market Capture Ratio, %	100.33%	97.69%	105.19%	89.07%	98.06%	100.02%	98.77%

	SigFig IRA	SoFi IRA	T Rowe Price IRA	TD Ameritrade IRA	TIAA IRA	Wealthsimple IRA	WiseBanyan IRA
Up Market Capture Ratio, %	104.40%	119.57%	122.12%	93.75%	97.76%	83.09%	99.77%
Down Market Capture Ratio, %	105.98%	109.99%	110.95%	96.68%	97.30%	89.60%	98.72

This analysis produced by Backend Analytics with the help of Markov Process International, Inc. *Produced by Backend Benchmarking for TheRoboReport.com™*

Trades Commentary

The third quarter has been one of the most active quarters to date for trading within the robo portfolios. We saw many portfolios execute rebalancing trades both from equities to fixed income, as well as trades from domestic to international securities. Below is a recap of the most significant trading activity we saw.

Betterment experienced some significant shifts in their portfolio. They cut their large-cap value position nearly in half, and made a significant reduction to their international developed holdings while increasing their domestic total market and emerging markets holdings. Domestically, this represents a shift to be less value-oriented and away from large-cap holdings. While they nearly doubled their emerging markets holding, their overall international exposure was significantly reduced. Their taxable bond portfolio also saw some shifts. They reduced their municipal and corporate bond exposure while introducing a position in TIPS and increasing holdings in foreign bonds.

United Income also had an active quarter in their taxable account. They took advantage of opportunities to harvest tax losses in their international and fixed income holdings. Additionally, they modified their bond portfolio, doubling the number of bond funds they held. This shift moved their portfolio to the shorter end of the yield curve, and increased their exposure to US government bonds and US corporates while decreasing their exposure to securitized bonds.

Merrill Edge made adjustments to the fixed income holdings in both their taxable and IRA accounts. They eliminated their position in LQD, an investment-grade US corporate bond ETF, and introduced a position in USIG, a similar investment-grade bond fund that has exposure to both US corporate bonds, as well as dollar-denominated foreign bonds, helping them further diversify their fixed income portfolio. In the taxable account, Merrill Edge also used some of the proceeds of the LQD sale to increase their allocation to a municipal bond fund.

The Wells Fargo taxable account had some trades this quarter, the most significant of which was to eliminate their position in an intermediate-term corporate bond fund and reallocate the position to the iShares Core Aggregate Bond ETF, which is weighted toward treasuries, has a higher average credit rating in its bond mix, and is an overall shorter duration fund.

E*Trade increased international exposure, specifically in developed markets, in both their IRA and taxable accounts.

The Fidelity Go taxable portfolio, T. Rowe Price IRA, WiseBanyan taxable and IRA, and both SoFi portfolios all increased international exposure in trades that were small allocation shifts and likely due to rebalancing.

Personal Capital experienced some rebalancing trades and swapped a SPDR high-yield bond fund for an iShares high-yield fund with shorter duration.

TD Ameritrade executed what appears to be rebalancing trades, as well as a small trade from an iShares emerging markets fund to a SPDR emerging markets fund that appears to be tax-loss harvesting.

Normalized Benchmarking Methodology

Normalized Benchmarking is a method to compare portfolios with differing equity and fixed income allocations. The percent allocated to equities in a portfolio is one of the largest drivers of returns. Because of this, comparing two portfolios that have a different level of equity allocation is difficult and can be misleading. Normalized Benchmarking controls for differences in equity holdings by adjusting the benchmark to match the equity/fixed income ratio of the portfolio. When this is done across a group of portfolios, the portfolios can then be measured against each other by their return above or below the benchmark specific to the portfolio. Below is a more detailed explanation of how the benchmark is constructed and used.

To begin, one must define the universe of portfolios that will be analyzed. For our purposes, we analyzed taxable accounts at Robo Advisors as one universe and retirement accounts at Robo Advisors as a separate universe.

To construct the Normalized Benchmark, each portfolio within the investment universe must be separated into a portfolio of equity holdings and a portfolio of fixed income holdings (cash is included with the fixed income). This means that for each robo portfolio in a universe, we now have two portfolios, one made up of fixed income and one made up of equities. We then take all of the equity portfolios, equal weight them, and make them into one Equity Aggregate Portfolio. This portfolio contains a piece of every fund held in each equity portion of the portfolios. The same is done for fixed income.

After this step is completed, each aggregate portfolio is analyzed to determine the type and weight of assets held in each. The Equity Aggregate Portfolio is analyzed to determine the allocation of the portfolio to domestic equities and the allocation to international equities. For the Fixed Income Aggregate Portfolio, allocations to the following categories are determined: municipal bonds, investment-grade corporate bonds, high-yield corporate bonds, foreign emerging markets debt, foreign developed markets debt, TIPS, short-term treasuries (0-3 year maturities), mid-term treasuries (3-10 year maturities), long-term treasuries (maturities of 10 years or greater), multi-sector bond funds, and cash.

Next, we select a broad-based, passive, low-cost, commonly used ETF to represent each asset type. For example, the Vanguard Total Stock Market and Vanguard Total International Stock Market ETFs are used for the domestic and international positions in the equity benchmark portfolio, respectively. These are widely used, highly liquid, low-cost ETFs that are representative of the type of asset to which they are assigned.

We then match the weight of the selected ETFs to the allocation of the corresponding asset types within its respective aggregate portfolio. For example, the amount of the Vanguard Total Stock Market ETF in the Equity Portfolio of the Normalized Benchmark matches the weight of domestic stocks in the Equity Aggregate Portfolio. This creates the Equity and Fixed Income Portfolios of the Normalized Benchmark that represent the robo portfolios' equity and fixed income holdings, respectively.

Now that we have constructed the Normalized Benchmark, we can use it to compare performance across accounts within the previously determined investment universes. To compare an account, we first determine the initial target asset allocations to equity and fixed income, including cash. Next, we take note of significant shifts to these target allocations and when they occur. Then, we proportion the Equity and Fixed Income Portfolios of the Normalized Benchmark to match that of the portfolio being compared. For example, if we are measuring a portfolio with 60% equities and 40% bonds and cash, we create a benchmark that is made up of 60% of the equity benchmark and 40% of the fixed income benchmark. If we are measuring a portfolio with 65% equities and 35% fixed income, a benchmark is created, again using the Equity and Fixed Income Portfolios of the Normalized Benchmark, but in a 65% to 35% proportion. For portfolios that experienced significant shifts to their target allocations, their benchmark reflects these shifts. For example, if a portfolio experiences a shift from a 60% equity and 40% fixed income target allocation to a 55% equity and 45% fixed income target allocation on January 1, 2016, their Normalized Benchmark would reflect a 60% equity and 40% fixed income portfolio prior to January 1, 2016 and a 55% equity and 45% fixed income allocation thereafter.

The Equity and Fixed Income Portfolios of the Normalized Benchmark are consistent, holding the same funds, in the same weights, regardless of the account you wish to compare, but the proportion of all of the equities and all of the fixed income changes to match the target allocation of the portfolio we are comparing. Therefore, a 65/35 portfolio is measured against a 65/35 benchmark, and a 70/30 portfolio is measured against a 70/30 benchmark. Each of the underlying equity and fixed income assets of the benchmark are consistent in each case, but the amount of the benchmark that is fixed income or equities changes to match the portfolio.

Portfolios can then be measured based on their returns above or below the Normalized Benchmark. These returns for each portfolio above or below the Normalized can then be compared to each other. This gives the investor a good idea of how the portfolios are performing, regardless of how much is in equities and how much is in fixed income.

Normalized Benchmarks

Equity Portfolio

Category	Asset Type	Ticker	Name	Taxable Benchmark Weight	Retirement Benchmark Weight
Equity	Domestic	VTI	Vanguard Total Stock Market ETF	64%	63%
Equity	International	VXUS	Vanguard Total International Stock ETF	36%	37%

Bond Portfolio

Category	Asset Type	Ticker	Name	Taxable Benchmark Weight	Retirement Benchmark Weight
Fixed Income	Multi-Sector US	AGG	iShares Core US Aggregate Bond ETF	30%	29%
Fixed Income	Investment Grade Corporates	LQD	iShares iBoxx $ Investment Grade Corporate Bond ETF	7%	5%
Fixed Income	High-Yield Corporates	JNK	SPDR Bloomberg Barclays High Yield Bond ETF	4%	2%
Fixed Income	International Developed	IGOV	iShares International Treasury Bond ETF	5%	4%
Fixed Income	International Emerging Markets	EMB	iShares J.P. Morgan USD Emerging Markets Bond ETF	5%	7%
Fixed Income	Municipals	MUB	iShares National Muni Bond ETF	28%	3%
Fixed Income	TIPS	TIP	iShares TIPS Bond ETF	7%	3%
Fixed Income	Short-Term Treasuries (0-3 Year Maturity)	VGSH	Vanguard Short-Term Treasury ETF	3%	0%
Fixed Income	Intermediate-Term Treasuries (3-10 Year Maturity)	VGIT	Vanguard Intermediate-Term Treasury ETF	3%	3%
Fixed Income	Securitized	VMBS	Vanguard Mortgage-Backed Securities ETF	1%	2%
Fixed Income	Cash	FDRXX	Fidelity® Government Cash Reserves	6%	43%

**Due to rounding values may not add up to 100%*

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Benchmark Returns

Taxable Benchmark Returns

	3Q 2018	YTD	1 Year Trailing	2 Year Trailing (Annualized)
Acorns Normalized Benchmark	2.77%	2.78%	6.64%	9.25%
Ally Financial Normalized Benchmark	2.72%	2.72%	6.52%	8.80%
Betterment Normalized Benchmark	3.00%	3.12%	7.26%	9.72%
Betterment SRI Normalized Benchmark	2.77%	2.78%	6.64%	8.95%
E*Trade Normalized Benchmark	2.77%	2.78%	6.64%	8.95%
Ellevest Normalized Benchmark	2.59%	2.52%	6.31%	8.96%
Ellevest SRI Normalized Benchmark	2.59%	2.52%	6.15%	8.34%
Fidelity Go Normalized Benchmark	2.81%	2.85%	6.77%	9.10%
FutureAdvisor Normalized Benchmark	2.54%	2.47%	6.15%	8.46%
Merrill Edge Normalized Benchmark	2.49%	2.51%	6.36%	8.81%
Morgan Stanley Normalized Benchmark	3.00%	3.12%	7.26%	9.72%
Morgan Stanley SRI Normalized Benchmark	2.95%	3.05%	7.14%	9.57%
Personal Capital Normalized Benchmark	3.41%	3.71%	8.37%	11.11%
Schwab Normalized Benchmark	2.91%	3.03%	7.22%	9.79%
SigFig Normalized Benchmark	2.86%	2.92%	6.89%	9.26%
SoFi Normalized Benchmark	2.77%	2.90%	6.33%	8.07%
TD Ameritrade Normalized Benchmark	3.13%	3.31%	7.63%	9.97%
TIAA Normalized Benchmark	2.81%	2.85%	6.77%	9.10%
TIAA SRI Normalized Benchmark	2.77%	2.78%	6.64%	8.95%
tZero (Overstock.com) Normalized Benchmark	2.59%	2.52%	6.15%	8.34%
UBS Advice Advantage Normalized Benchmark	3.13%	3.31%	7.63%	10.18%
United Income Normalized Benchmark	2.72%	2.72%	6.52%	8.80%
USAA Normalized Benchmark	2.81%	2.82%	7.01%	9.68%
Vanguard Normalized Benchmark	2.77%	2.78%	6.64%	8.95%
Wealthfront Normalized Benchmark	3.00%	3.12%	7.26%	9.72%
Wealthsimple Normalized Benchmark	2.77%	2.78%	6.64%	8.95%
Wealthsimple SRI Normalized Benchmark	2.77%	2.78%	6.64%	8.95%
Wells Fargo Normalized Benchmark	2.91%	2.98%	7.01%	9.41%
WiseBanyan Normalized Benchmark	2.95%	3.05%	7.14%	9.57%
Zacks Advantage Normalized Benchmark	2.63%	2.58%	6.27%	8.49%

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Retirement Benchmark Returns

	3Q 2018	YTD	1 Year Trailing	2 Year Trailing (Annualized)
Ally Financial IRA Normalized Benchmark	4.25%	4.88%	10.63%	14.03%
Betterment IRA Normalized Benchmark	3.99%	4.54%	9.93%	13.11%
E*Trade (ETF) IRA Normalized Benchmark	4.46%	5.15%	11.21%	14.80%
Fidelity Go IRA Normalized Benchmark	3.91%	4.43%	9.69%	12.80%
Merrill Edge IRA Normalized Benchmark	4.08%	4.65%	10.16%	13.42%
Morgan Stanley IRA Normalized Benchmark	3.65%	4.08%	8.99%	11.89%
Personal Capital IRA Normalized Benchmark	4.37%	5.04%	10.98%	14.49%
Schwab IRA Normalized Benchmark	4.29%	4.93%	10.74%	14.18%
SigFig IRA Normalized Benchmark	4.16%	4.76%	10.39%	13.72%
SoFi IRA Normalized Benchmark	4.54%	5.26%	11.44%	15.11%
T Rowe Price IRA Normalized Benchmark	4.54%	5.26%	11.44%	15.11%
TD Ameritrade IRA Normalized Benchmark	3.86%	4.37%	9.58%	12.58%
TIAA IRA Normalized Benchmark	4.03%	4.60%	10.04%	13.26%
United Income IRA Normalized Benchmark	4.50%	5.21%	11.32%	14.96%
USAA IRA Normalized Benchmark	4.50%	5.21%	11.32%	14.96%
Wealthsimple IRA Normalized Benchmark	3.69%	4.14%	9.11%	12.04%
Wells Fargo IRA Normalized Benchmark	4.16%	4.76%	10.39%	13.72%
WiseBanyan IRA Normalized Benchmark	4.20%	4.82%	10.51%	13.88%
Zacks Advantage IRA Normalized Benchmark	4.25%	4.88%	10.63%	14.03%

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DISCLOSURES:

[1] These accounts were funded with more than the minimum amount required to establish an account. Had the accounts been funded with more assets, they would be charged a flat dollar fee up to $1,000,000. Because the fee is a flat dollar amount, a higher account balance would have the result of increasing reflected performance, while a lower account balance would have the result of decreasing reflected performance. In June of 2018 Acorns eliminated the ability to have the monthly fee deducted from the investment account held with them, and requires it be paid from an account separate from the investment account. We modified how we handle the fee that is charged to an outside account. The Q2 edition of the Robo Report did not include the $1 fee assessed in June when calculating performance. The Q3 report and future reports consider these monthly fees as a management fee and performance is calculated as such.

[2] This account has no minimum required to establish an account, but had the account been funded with more assets, it would, at certain asset levels, be eligible for a lower advisory fee. The lower advisory fee would have the result of increasing reflected performance.

[3] These accounts were funded with more than the minimum amount required to establish an account. There is no fee schedule; all accounts are charged the same asset-based fee. Therefore, performance is not affected by the account's asset level.

[4] This account was funded with the minimum amount required to establish an account at the time of opening. Had the account been funded with more assets it would, at certain asset levels, be eligible for a lower advisory fee. The lower advisory fee would have the result of increasing reflected performance.

[5] This account was funded with more than the minimum in order to take advantage of tax-loss harvesting. Tax-loss harvesting may result in better or worse performance compared to similarly positioned accounts that are not enrolled in tax-loss harvesting. This account is enrolled in their digital only "Intelligent Portfolios", thus it is not charged an advisory fee. If one were to upgrade to "Intelligent Advisory" which introduces access to live advisors, an asset-based advisory fee would be levied, which would decrease reflected performance.

[6] These accounts were funded with the minimum amount required to establish an account. At balances less than $10,000, there is no advisory fee. Had the account been funded with $10,000 or more, an asset-based advisory fee would be levied, which would decrease reflected performance.

[7] These accounts were funded with the minimum amount required to establish an account at the time of opening. There is no fee schedule; all accounts are charged the same asset-based fee. Therefore, performance is not affected by the account's asset level.

[8] These accounts have no minimum required to establish an account. There is no advisory fee on these accounts. Had additional service packages, such as tax-loss harvesting, been added, the lesser of an asset-based fee or flat dollar fee would have been assessed. These fees would decrease the reflected performance.

[9] This account was funded with the minimum investment amount at the time. At the time of opening, the account had a 0.25% management fee. Due to changes in the service at the end of the 1st quarter 2017, new accounts are charged a 0.30% management fee. The fee on our account was grandfathered in and remains at 0.25%. The higher advisory fee would have the result of decreasing reflected performance.

[10] These accounts were funded with the minimum amount required to establish an account. This account is enrolled in their digital only "Essential Portfolios" and is charged an asset-based advisory fee. If one were to upgrade to "Selective Portfolios" which introduces access to live advisors, a higher asset-based advisory fee schedule would apply, which would decrease reflected performance.

[11] This account has no minimum required to establish an account, but had the account been funded with more assets, it would, at certain asset levels, be eligible for a lower advisory fee. The lower advisory fee would have the result of increasing reflected performance. A special request was made for an allocation of 60% equities and 40% fixed income or close to it, but this allocation was not one of the standard models at the time of account opening. At the time of account opening the closest standard models offered were a in the range of 50/50 or 75/25 equity to fixed income split.

[12] These accounts were funded with more than the minimum amount required to establish an account. Due to the flat advisory fee, performance is not affected by the accounts' asset levels. In previous reports we reported the performance of two accounts that were combined to achieve a 60/40 allocation. Due to our introduction of Normalized Benchmarking we are no longer reporting the combined account, but just the account with the closest to a 60/40 allocation as we could achieve at this provider.

[13] These accounts were funded with less than the minimum investment through an agreement between BackEnd Benchmarking and the provider. There is no advisory fee levied regardless of the amount of assets invested.

[14] This account was funded with the minimum amount required to establish an account. A flat, asset-based advisory fee is levied on the account. Had we subscribed to additional, specific, Wells Fargo Products the account would be eligible for a lower asset-based asset-based advisory fee. A lower advisory fee would have the result of increasing reflected performance.

[15] This account has no minimum required to establish an account and is enrolled in the Digital Only plan. If the account was enrolled in the premium service with access to live advisors, there would be a higher asset-based advisory fee. The higher advisory fee would have the result of decreasing reflected performance.

[16] This account is enrolled in the Self Service plan. If the account was enrolled in the Full Service Plan, the fee would be higher or lower depending on the level of assets in the account. The higher/lower advisory fee would have the result of decreasing/increasing reflected performance.

[17] This account was funded with more than the minimum amount required to establish an account. This account is not charged an advisory fee because there is less than $10,000 invested. For larger accounts, an asset-based advisory fee would be levied on any balance greater than $10,000, which would decrease reflected performance. However, if an individual also has a loan with SoFi, no fee would be assessed regardless of the amount invested. In previous reports we reported the performance of two accounts that were combined to achieve a 60/40 allocation. Due to our introduction of Normalized Benchmarking we are no longer reporting the combined account, but only the account with the closest to a 60/40 allocation as we could achieve at this provider.

[18] This account was funded with more than the minimum amount required to establish an account. This account is not charged an advisory fee because there is less than $10,000 invested. For larger accounts, an asset-based advisory fee would be levied on any balance greater than $10,000, which would decrease reflected performance. However, if an individual also has a loan with SoFi, no fee would be assessed regardless of the amount invested.

[19] These accounts were funded with the minimum required to establish an account. Had the account been funded with a greater amount, it would still be charged the same flat dollar fee. Because the fee is a flat dollar amount, a higher account balance would have the result of increasing reflected performance, while a lower account balance would have the result of decreasing reflected performance. Fee was waived for the first year starting in June 2018. Had a fee been levied, reflected performance would have been lower.

[20] This account was funded with the minimum required to establish an account. This account is enrolled in their digital only "Intelligent Portfolios", thus it is not charged an advisory fee. If one were to upgrade to "Intelligent Advisory" which introduces access to live advisors, an asset-based advisory fee would be levied, which would decrease reflected performance.

[21] These accounts were funded with more than the minimum amount required to establish an account. There is no fee schedule; all accounts are charged the same asset-based fee. Therefore, performance is not affected by the account's asset level. Fee was waived for the first year. Had a fee been levied, reflected performance would have been lower.

[22] These accounts were funded with more than the minimum amount required to establish an account. There is currently no fee schedule; all accounts are charged the same asset-based fee. Therefore, performance is not affected by the account's asset level. Previously, the fee was only assessed on balances in excess of $10,000.

[A] On June 19th, 2017, Vanguard removed Backend Benchmarking's primary Vanguard account from the Vanguard Personal Advisor Services program. As of June 20th, 2017, the primary account was replaced by a secondary account with the same risk profile as the primary account. The returns for the secondary account have been linked to the original primary account. Asset type and allocation between the two accounts at the time of the switch were very close but not identical.

[B] In the 1st Quarter of 2018 Wealthfront liquidated the positions in the account used for the 4th Quarter 2017 and previous editions of this report. A different account was used for this report and is labeled "Wealthfront (Risk 4.0)". The performance numbers from the previous account are available in the addendum labeled as "Wealthfront (Risk 3.0)". The risk scores and thus allocations of the two accounts are different and labeled as such. Asset type and allocation between the two accounts at the time of the switch were close but not identical. The difference of equity allocation between the accounts on 12/31/2017 was approximately 5.4%.

In previous reports the initial target asset allocation was calculated as the asset allocation at the end of the first month after the account was opened. In the Q3 2018 report we adjusted our method to calculate the initial target asset allocation as of the end of the trading day after all initial trades were placed in the accounts. This adjustment has caused some portfolio's initial target allocation to be updated from previous reports. These updates did not change any initial target allocations of equity, fixed income, cash, or other by more than 1%.

Prior to Q3 2018, due technological limitations of our portfolio management system, some accounts which contained fractional shares had misstated the quantity of shares when transactions quantities were smaller than 1/1000th of a share in a position as a result of purchases, sales, or dividend reinvestments. This had a marginal effect on historical performance of the accounts. The rounding of position quantities caused by this limitation has been resolved, and quantities have been adjusted to reflect the full position to the 1/1,000,000th of a share as of the end of Q3 2018. Therefore, this rounding of fractional shares will not be necessary in the future.

This report represents Backend Benchmarking's research, analysis and opinion only; the period tested was short in duration and may not provide a meaningful analysis; and, there can be no assurance that the performance trend demonstrated by Robos vs indices during the short period will continue. Backend Benchmarking is under common ownership and control with Condor Capital Management, an SEC registered investment adviser. A copy of Condor's disclosure Brochure is available at www.condorcapital.com. Condor Capital initiated a position in Schwab and TD Ameritrade in one of the strategies used in many of their discretionary accounts on 5/30/2017 and 5/31/2017. As of 9/30/2018 the total size of the position was 35,934 shares of Schwab common stock and 33,741 shares of TD Ameritrade common stock.

For more information, please contact BackendBenchmarking at Info@BackendB.com

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