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Robo-advisors and wealth management

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Abstract

The recent rise of robo-advisors (RAs) has threatened the traditional fund and wealth management industry. RAs' assets under management (AUM) have risen manyfold through competitiveness on pricing, transparency and services and better expected returns linked to the use of quantitative finance and technology with less subjective human intervention. This article examines the postulation that RAs have an edge over traditional wealth managers. RAs can combine the judgement and computing resources of both human and machine, or bionic power, to provide alternative wealth management services to meet the diverse needs of private wealth clients. However, the authors expect traditional wealth managers to respond by providing new and improved customized and integrated services at competitive fees.

The financial sector has recently seen significant innovations that both enhance as well as disrupt the way clients are served. This is not surprising, having seen other traditional industries in which business models have been completely disrupted by the arrival of technology-centric newcomers, such as Amazon for global distribution, Uber for domestic transportation, and Airbnb for peer-to-peer room rentals. The 2008 global financial crisis has provided the impetus for a whole range of innovations that are likely to disrupt existing ways in which financial services are provided while improving market reach and reducing cost in providing such services. Thus, there is no doubt that wealth management in its current form will be disrupted.

Treanor [2014] stated that the banking sector is likely to see more change in the following 10 years than it did in the past two centuries because of innovations in financial technology, or FinTech. Wealth management services provided by banks and other traditional providers are, therefore, facing significant challenges from new technology-based providers that provide better access, lower fees, or improved processes. Traditional wealth managers have archaic legacy systems, high compliance cost resulting from more stringent regulations and enforcement, increasingly sophisticated and demanding clients, and fast-changing technological innovation that changes the cost structure of the industry.

In this context, this article examines the juxtaposition of wealth management and FinTech. One area that has been evolving steadily over the last 50 years is the introduction of advanced technology to facilitate security trading, transaction processing, and advisory services to investors (Schwinn and Teo [2017]). Often using proprietary advanced technology, including artificial intelligence and quantitative models, the new industry is collectively termed robo-advisory, robo-advisors, or digital advisors.

Many banks and financial advisors have jumped on this bandwagon and have also introduced apps and websites to compete in this space. There is even an arms race to be the pioneer and the best. A compiled list of U.S.-focused robo-advisors and their key services is shown in the Appendix. In this context, we have three key questions:

1. Are robo-advisors adequately meeting the needs of clients?

2. What are the gaps in client services?

3. Which services are needed but not served?

The Sovereign Wealth Fund Institute (SWFI) defined robo-advisors as a type of financial advisor that provides web-based portfolio management with almost zero human intervention, typically using algorithms and formulas (SWFI [2015]). On the other hand, Investopedia [2017] provided a narrower definition by specifying the services provided as follows:

Robo-advisors are digital platforms that provide automated, algorithm-driven financial planning services with little to no human supervision. A typical robo-advisor collects information from clients about their financial situation and future goals through an online survey, and then uses the data to offer advice and/or automatically invest client assets.

The genesis of robo-advisory perhaps can be traced to the trading of securities that was carried out via phone calls between brokers and their clients. The birth of electronic communication networks with the introduction of Instinet in 1967 and NASDAQ in 1971 gave rise to improved efficiencies. In 1985, Trade*Plus started offering one of the first retail trading platforms on America Online and CompuServe (Stetz Tobias [2010]). Several others such as TD Ameritrade soon followed. The introduction of such retail platforms allowed not only improved efficiency but also inclusiveness, resulting in a larger percentage of the U.S. population participating as share owners (the NYSE census showed that 4.2% of the U.S. population owned common stocks in 1952; by 1990, this had increased to 20%).

With increasing competition, online platforms compete for clients by providing investor education, timely access to appropriate information, and investment advice. This has led to the provision of tools to aid in researching and selecting investments, such as charting software, technical analysis tools, and online trading front-ends. Platforms that stream prices live and execute orders are now commonly available.

The first robo-advisors were introduced after the 2008 global financial crisis. These were mainly passive, automated asset allocation and portfolio management tools that automatically rebalance a client's portfolio when there are significant market movements. These early robo-advisors were introduced at a time when investors preferred low-risk portfolios, given their recent unpleasant experience from the global financial crisis. In addition, the low interest rate environment in the post-crisis period and the lack of positive returns from active asset management led to investors shifting toward passive investment management. This created demand for relatively more automated and cheaper approaches to portfolio rebalancing and management, giving rise to the introduction of robo-advisors, such as Betterment and Wealthfront.

In recent years, established asset managers and brokers such as Charles Schwab, Vanguard, BlackRock, Goldman Sachs, and Merrill Lynch have also developed their own robo-advisors to retain clients and to develop new clienteles. The current landscape consists of a wide array of robo-advisors, from standalone one-man operations, and robo-partnerships with registered investment advisors, broker robo-advisors to full-service wealth managers with e-advisor capabilities (Accenture [2015]). The availability of a wide range of robo-advisors allows potential investors choice and broadens the market to include the underserved segment.

In the following sections, we discuss an overview of robo-advisors and a selection of robo-advisors with more detail. We evaluate the essential elements of wealth management provided by these robo-advisors.

ROBO-ADVISORS

Lam [2016] explained that the current cohort of robo-advisors generally offers passive investment strategies focusing on three main areas:

1. Asset allocation and implementation

2. Portfolio monitoring

3. Portfolio rebalancing

A quick survey reveals that robo-advisory is still at a very early stage of its potential. Client profiling uses simple surveys to assess client needs. Asset allocation, portfolio monitoring, and rebalancing are generally not rigorous. However, robo-advisors offer quick and easy account-opening processes and transfer of assets for management. Robo-advisors also offer their services at lower prices. However, current robo-advisors are not likely to meet the needs of sophisticated investors who have even moderately complex financial needs (Accenture [2015]).

Currently, there are two main types of robo-advisors:

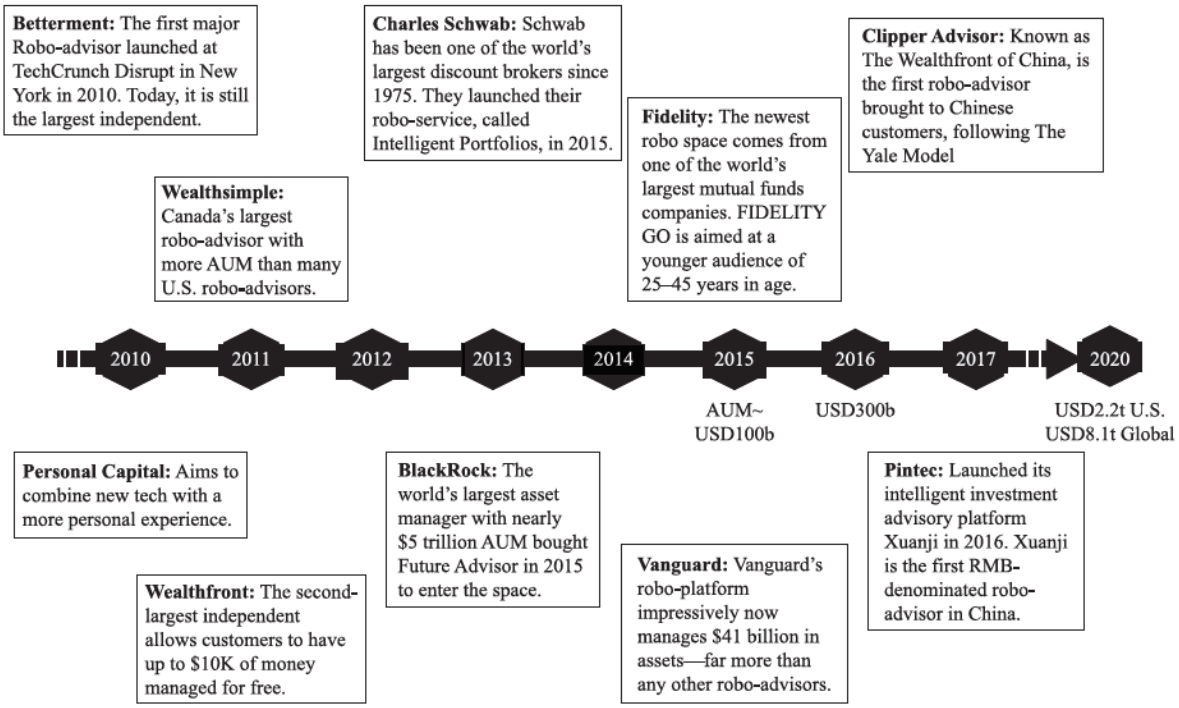
1. Independent start-ups like Betterment and Wealthfront.

2. Robo-advisory platforms of established investment companies like Vanguard and BlackRock.

The chart in Exhibit 1, adapted from Burnmark [2017], illustrates the growth of robo-advisors from 2010 to 2017. First introduced as private start-ups, subsequent robo-advisory platforms have been adopted by more established investment companies like Vanguard and BlackRock.

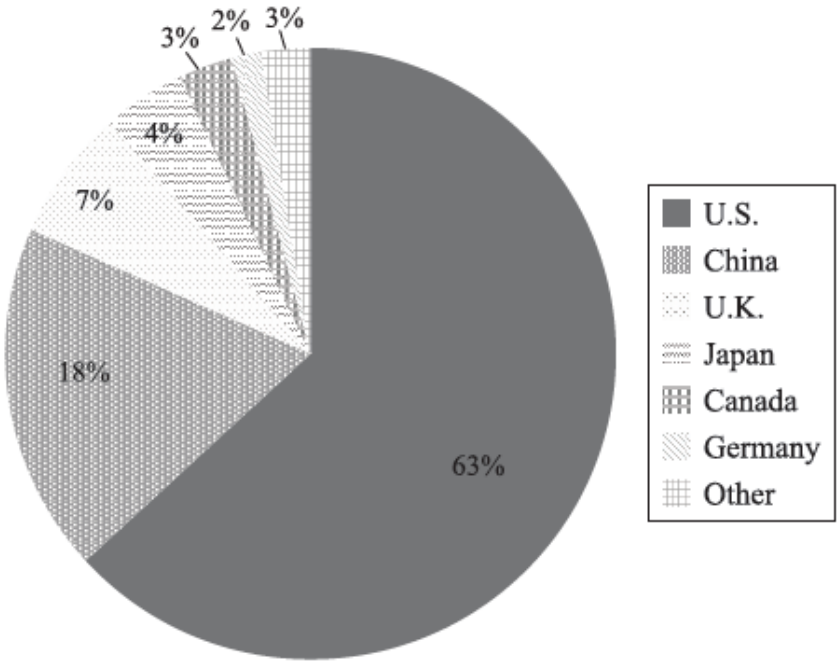
Exhibit 1 also shows the estimated assets under management (AUM) of the robo-advisors in the Burnmark database and other sources. Fintech News Hong Kong [2017] estimated that AUM of robo-advisors totaled US$20 billion in 2014, whereas BI Intelligence [2015] reported that AUM managed by robo-advisors were about US$100 billion in 2015. Regan [2015] reported that by 2016, AUM would have increased to US$300 billion with the entry and subsequent growth of larger advisors like Vanguard. He forecasted that by 2020, U.S. robo-advisors alone would have AUM of US$2.2 trillion, whereas BI Intelligence [2015] estimated that robo-advisors would manage US$8.1 trillion globally by the same year. As observed in Exhibit 1, recent growth of robo-advisors has come from both established institutions and start-ups. However, as of 2016, investments in 68 robo-advisory start-ups totaled US$1.7 billion, with the United States claiming the largest share of 63% (CB Insights [2017]) (Exhibit 2).

Exhibit 1 Growth of AUM Managed by Robo-Advisors (2010-2017)



Source: Burnmark [2017], Regan [2015], BI Intelligence [2015], and Fintech News Hong Kong [2017].

Exhibit 2 Global Deal Flow to Robo-Advisory Start-Ups as of 2016



Sources: CB Insights [2017], Chinese company websites.

ASIAN ROBO-ADVISORS

We found that the Asian robo-advisors (China, Hong Kong, and Singapore) are still very much in the nascent stage. Because of their relatively late development, the AUM managed are smaller compared with those in the United States. In addition, the relative scarcity of Asian exchange-traded funds (ETFs) has resulted in slower development of the passive management approach compared to the U.S. robo-advisors. However, the growth potential of Asian robo-advisors is highly positive given its late start.

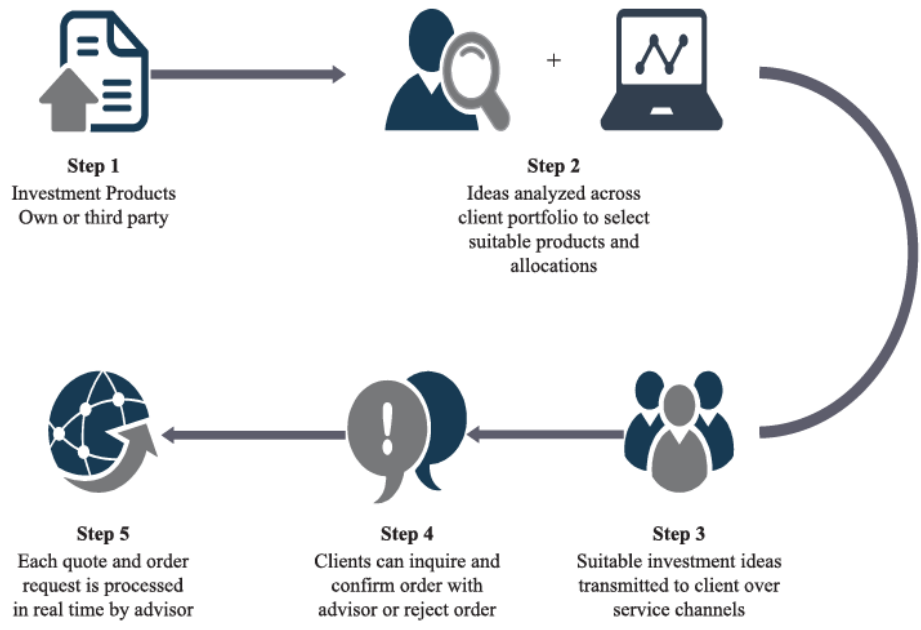
Yet, the Asian robo-advisors in the region generally provide services to clients who are global investors. Clipper, for example, allows Chinese investors better access to investments worldwide with some limitations. Similarly, Youyu provides access to top global managers. Currently, the outlook for robo-advisory services in China is undergoing dramatic changes. The key development is the growth of large distributors (including banks and large e-commerce players) using the power of digital technology to compete and gain a competitive advantage over fund manufacturers (DiBiasio [2017]). As a result, the market is likely to see more wealth management products for the mass and affluent segments sold online by large banks and big players like Yu'e Bao alongside large robo-advisors with strong distribution capabilities.

GENERIC WORKFLOW

As mentioned earlier, robo-advisors rely mainly on automated platforms to provide rudimentary financial advice. The desired outcome of such advice is to offer clients the flexibility to invest in their own portfolios, which are consistent with their objectives (Gennaioli, Shleifer, and Vishny [2015]). Robo-advisors largely employ ETFs and other passive indexed investment strategies (Lam [2016]). The modus operandi involves mean-variance optimization to achieve a low-cost and tax-efficient portfolio. A good example of this basic model is illustrated by the case of Betterment, a pioneer robo-advisor discussed later.

Exhibit 3 presents a schematic of this approach:

Exhibit 3 **Generic Investment Management Workflow**



1. Step 1 is the availability of a set of investment products either produced internally as in Vanguard or sourced from a third party;

2. Step 2 is to analyze and/or combine the products tailored to the client based on his or her investment objectives, risk tolerance, and other factors that determine the suitability of the recommendation. The recommendation may use algorithms and/or heuristic judgement;

3. Step 3 involves timely communication with the client;

4. Step 4 may involve some interactions with clients and allow for some level of discretion; and

5. Step 5 involves the execution and transactions of decisions.

However, some robo-advisors may not follow the entire process and may act merely as conduits of investment ideas advanced by issuers and producers. They support the front offices with marketable investment ideas. In the following sections, we discuss a selection of established robo-advisors as well as recently minted Asian robo-advisors.

BETTERMENT (U.S.)

Betterment was launched in 2010 by founder John Stein. It specializes in providing online financial advice on a case-by-case basis. Betterment uses well-grounded approaches to portfolio selection and focuses on goals-based investing that takes into account an investor's time horizon and attributes like age, retirement timeline, annual income, and investment goals. However, it does not emphasize an investor's subjective risk tolerance. Betterment selects securities from a diverse set of asset classes using open-ended ETFs (Gardon [2015]) and employs mean-variance optimization to construct efficient portfolios. It also pays attention to tax efficiency, developing separate efficient frontiers for taxable and tax-deferred accounts. Betterment also provides a retirement investment product that dynamically adjusts an individual's asset allocation in response to the client's future spending needs.

The client on-boarding process is fully automated, and clients are provided with a portfolio allocation that is transparent. Portfolios are automatically reweighted on an ongoing basis (Lotich [2016]). Another feature is the reinvestment of dividends and yields, which are allocated across the portfolio.

Betterment's services are restricted to U.S. customers. Hence, its products are customized for clients in the U.S. market, and it provides proprietary products such as Tax Loss Harvesting[1] and RetireGuide,[2] both of which consider U.S. tax implications. It targets long-term passive investors who have a basic understanding of financial markets and offers competitive prices with quality customer service. The automated platform allows for streamlined, efficient operations. It also has a behavioral monitoring system to assist a user in making safer financial decisions.

Betterment charges only 0.35% of AUM per year for accounts under US$10,000 with no minimum investment. This compares with an average annual fee of 0.7% of AUM charged by traditional investment advisors in the United States.

With over 175,000 customers and more than US$5 billion in AUM, Betterment (as of July 2016) is the largest independent robo-advisory platform (Stein [2016]).

WEALTHFRONT (U.S.)

Founded in 2008, Wealthfront Inc. is a privately owned investment manager. The firm was formerly known as kaChing Group Inc. It primarily provides services to individuals in their 20s and 30s, many

of whom are first-time investors. The firm also caters to high-net-worth individuals (HNWIs), charitable organizations, and corporations.

The company uses its complex proprietary algorithms and software to offer financial advisement to its clients. Like Betterment, Wealthfront employs passive investing with mean-variance optimization for portfolio construction. Securities for investing include global public equities, fixed income (including corporate bonds, government bonds, municipal bonds, emerging market bonds, and Treasury inflation-protected securities [TIPs]), real estate, and natural resources. The firm benchmarks the performance of its portfolio against the S&P 500 Index. It conducts in-house research to make its investments.

Wealthfront employs direct indexing, a tax-loss harvesting platform that purchases individual securities for investment portfolios. Other features of its services include automated portfolio rebalancing, customized portfolio recommendations, choice of risk levels, a single stock diversification program, and automated deposits. It also provides loans to its clients. Personal loans are available to clients who have invested at least US$100,000. Personal lines of credit of up to 30% of monies invested are available, with funds available 24 hours after application without additional paperwork (Neal [2017]; Shieber [2017]).

Wealthfront charges fees at 0.25% of AUM. The first US$10,000 is managed free without fees. The minimum initial investment is US$500, although a higher US$100,000 is required for a tax-optimized direct indexing service. Shieber and Crook [2015] reported that by early 2015, Wealthfront had US$2 billion in AUM and about 22,000 clients. The average amount works out to about US$90,000 with the largest account at about US$10 million.

Wealthfront was the first Silicon Valley-based robo-advisor to obtain US$1billion in AUM, a sum reached in a short period of 2.5 years. It has AUM of about US$6 billion as of April 2017.

VANGUARD (U.S.)

Vanguard launched its robo-advisory services in 2015 after observing the attractive growth of such services by independent start-ups and brokers. Although the engine behind the service is not very different from other start-ups, Vanguard has grown much faster. It reported that it has an AUM of about US$41 billion using its robo-advisory platform[3] and reached US$61 billion in June 2017, as reported by Barrons [2017]. Vanguard's service (called Vanguard Personal Advisor Services) is a hybrid model that includes the use of personal advisors and robo-advisory; it serves an estimated 20 million clients. Vanguard offers clients its very own low-cost index funds and ETFs. It manufactures investment products and thus enhances its distribution capabilities using the robo-advisory platform to provide services to an underserved clientele.

Vanguard's services include assigning a personal advisor for clients. Clients meet with an investment professional to map out their future goals, which can include investing for retirement, financial management, and/or saving for college, to create investment plans to meet their goals. The client-advisor relationship is the selling point of its robo-advisor platform. It allows the consolidation of portfolio information and allows clients access to the relevant information via computer, tablet, or mobile phone.

Vanguard requires a minimum deposit of US$50,000 to open an account and charges a flat fee of 0.3% of AUM.

NUTMEG (U.K.)

Nutmeg is a U.K.-based direct-to-consumer (D2C) robo-advisor founded in 2011. It facilitates simple on-boarding to evaluate a client's investment goals and risk profile. Based on the inputs, a diversified

portfolio (across many different types of assets, in different countries and industry sectors) is designed to meet the client's needs. The portfolios are invested in ETFs, which are automatically rebalanced on a regular basis. Clients are free to add funds or redeem their investments. The initial investment is a low £500, and management fees range from 0.25% to 0.75% of AUM, which is cheaper than the average of 1.24% charged for professional management in the U.K.[4]

CLIPPER ADVISOR (CHINA)

Clipper Advisor was founded in Beijing in 2015 and was the first robo-advisor in China. Its platform facilitates the account-opening process using a rudimentary process to assess the return objective and risk appetite of clients. Based on this assessment, Clipper will recommend to the client an optimized portfolio of global stocks, bonds, real estate, and commodities, as illustrated in Exhibit 4. Clipper uses an automated risk management process that includes real-time monitoring of market conditions to execute portfolio rebalancing.

Exhibit 4 Clipper Advisor Categories of Portfolio Recommendations

Portfolio Category	Composition	Required Return (%)	Annual Volatility (%)
Conservative	20% Equity, 70% Bonds, 10% Commodity	4.3	5.2
Mild	50% Equity, 50% Bonds, 7% Commodity, 3% Real Estate	6.9	9.8
Moderate	70% Equity, 20% Bonds, 5% Commodity, 5% Real Estate	8.7	13.3
Moderate to High	80% Equity, 10% Bonds, 5% Commodity, 5% Real Estate	9.7	15.2
Aggressive	90% Equity, 5% Commodity, 5% Real Estate	10.6	17.1

In 2016, a platform called AlphaCloud was introduced to advise banks, brokerage houses, and financial advisors on investment strategy and financial products. Clipper focuses on high-net-worth clients who have an equivalent of US$500,000, allowing them to invest in global assets via the route of Qualified Domestic Institutional Investors funds, which are permitted to invest in overseas assets. In 2017, Clipper Advisor upgraded it services and lowered the minimum investment threshold to US$50,000.[5]

YOUYU (HONG KONG)

Youyu was launched in April 2017 by Yunfeng Financial Group Ltd., a listed Hong Kong financial services company funded by Alibaba Chairman Jack Ma. Yunfeng, the parent company, is a broad-based financial services provider offering securities brokerage, wealth management, and investment research.

Clients are screened using a simple risk-assessment tool to evaluate their risk appetite. After the evaluation, clients are recommended a model portfolio. Fund screening and portfolio asset allocation are carried out by a team of six professionals. Investment portfolios are constructed using a top-down approach, using strategic asset allocation and tactical asset allocation followed by manager selection.

Youyu's model portfolios include mutual funds in six major asset classes: equities, bonds, real estate investment trusts, commodities, diversified funds, and money market funds. The model portfolio for each risk profile includes weights in each asset class, with each asset class containing two to three selected individual funds. Youyu differentiates itself from those already in the market by focusing on individual fund selection from a list 300 well-established global funds managed by global names to deliver more customized advisory to both experienced and inexperienced clients. Although clients are provided with recommendations, they have the discretion to design their own portfolios.

Youyu targets retail investors who need convenient fund investment services using their mobile smartphones rather than face-to-face consultations from banks and other fund management firms. For lay investors, the model portfolio of Youyu provides a "one-touch order" to execute global asset allocation. For experienced investors, Youyu provides useful information and services with real-time research reports, including updated information on the fund managers, to support investment decisions.

Youyu claims that its mobile offering charges lower subscription and redemption fees when compared with traditional investment advisory services to retail investors. It requires an investment minimum sum of between US$120 and US$800 for individual funds, whereas the minimum subscription is US$4,000 for clients wishing to invest in a portfolio of funds.[6]

Youyu's mobile app, which includes elements of artificial intelligence, is currently available on the Apple iPhone.

BAMBU/CROSSBRIDGE CAPITAL (SINGAPORE)

Bambu/Crossbridge Capital is a collaboration between a traditional wealth manager and a robo-advisory platform. Bambu, based in Singapore, is a business-to-business (B2B) robo-advisor established in February 2016. It offers customized solutions to serve HNWIs, affluent investors, and retail investors. It uses proprietary algorithms for portfolio management and processes third-party data and investor information to provide goal-based solutions to different classes of investors.

Crossbridge Capital is a traditional wealth manager founded in 2008. Serving mainly Middle Eastern clients from its inception, Crossbridge Capital has evolved to be a wealth manager providing a whole range of solutions to entrepreneurs and families in emerging markets worldwide. Its robo-advisory service, using the Bambu's platform, is called Connect. Crossbridge uses the platform to evaluate important personal information, including investment goals and risk preferences; review investment recommendations; and execute the plan online. In doing so, Connect uses Morningstar to develop a series of actively managed portfolios (that may comprise up to 12 asset classes) that correspond to different risk-return trade-offs. Based on the investors' goals and risk profiles, one of the portfolios is recommended. Such portfolios are actively rebalanced to maintain alignment with the investor's risk profile. The minimum investment is US$100,000 for an investor using Connect, whereas other high-net-worth clients need to invest a minimum of US$1 million. Crossbridge Capital's management fees range from 0.3% to 0.7% of AUM.[7]

A SUMMARY OF THE KEY CHARACTERISTICS OF ROBO-ADVISORS

From the preceding selected robo-advisors, a number of key characteristics can be deduced. These are summarized in Exhibit 5.

First, we can classify robo-advisors into the following models:

1. D2C model: These are online platforms that provide automated algorithm-based portfolio management without human intervention.

2. B2B model: These are digital platform providers that support traditional advisors to provide a digital wealth management solution.

3. Hybrid firms, which include those providing personalized services and actively managed portfolios blended with computerized portfolio recommendations.

Exhibit 5 Characteristics and Capabilities of Seven Key Robo-Advisors

Robo-Advisor	Service Model	Minimum Investment Amount	Asset Management Fee (% of AUM)	Investment Products in Recommended Portfolio	Tax Planning	Goal Based
Betterment (U.S.)	D2C and B2B	None	0.35	ETFs	Yes	Yes
Wealthfront (U.S.)	D2C	US$500	0.25	Mutual funds and ETFs	Yes	Yes
Vanguard (U.S.)	Hybrid	US$50,000	0.30	Mutual funds and ETFs	Yes	No
Nutmeg (U.K.)	D2C	£500	0.25–0.75	ETFs	No	Yes
Clipper (China)	D2C	US$50,000	NA	ETFs and funds	Yes	No
Youyu (Hong Kong)	D2C	US$120 for an individual fund; US$4,000 for portfolio of funds	NA	Funds	No	No
Bambu/Crossbridge (Singapore)	B2B/D2C	US$100,000	0.30 to 0.70	Actively managed portfolio with up to 12 asset classes	No	No

Second, we can also categorize robo-advisors by other client-related criteria, including minimum investment amount, asset management fees, access to investment products, and capabilities (tax planning and goal-based approach). Exhibit 5 summarizes the characteristics and capabilities of the seven key robo-advisors.

THE BURNMARK DATABASE

We also analyzed the Burnmark Database, which has more than 250 robo-advisors, to generalize the salient features of robo-advisors operating globally. Of the robo-advisors operating across the globe in the database, 76 were operating in the United States and Canada, 106 in Europe, and 59 in Asia and Australia, with 12 more in other countries (including Russia and Brazil). Although robo-advisors mainly provide investment advice, 10 of the robo-advisors focus on retirement planning.

Exhibit 6 summarizes the robo-advisors in the database using the various business models. The dominant model is D2C. However, about 6% of the robo-advisors are in the D2C and B2B space. It is interesting to note that some 20% of robo-advisors blend computerized recommendations with a human touch.

Exhibit 6 Robo-Advisors by Types of Business Models

Business Model	Number Reported	Percentage of Total
D2C	160	63.2
B2B	28	11.1
D2C and B2B	15	5.9
Hybrid	50	19.8

Reduced fees are an explanation for the fast growth of the robo-advisory service. Annual fees for traditional financial advice are 0.7% of AUM for the United States and about 1.25% for the United Kingdom. Exhibit 7 reports that only 18% of robo-advisors charge a fee that exceeds 0.7%, and none were based in the United States.

Exhibit 7 Annual Fee Charged by Robo-Advisors

Asset Management Fee (per annum)	Number Reported	Percentage of Total
Fixed cost per annum	18	7.1
Fixed fee and percentage of profit or AUM	82	32.4
Maximum less than 0.7% of AUM	107	42.3
Maximum more than 0.7% of AUM	46	18.2

Global robo-advisors have grown in number such that they are focusing on different demographics and social segments. Exhibit 8 shows that about 75% of robo-advisors focus on mass affluent investors.

Exhibit 8 Segment Focus of Robo-Advisors

Niche Segment Focus	Number Reported	Percentage of Total
Millennials	3	1.2
Mass affluent	190	75.1
High net worth	20	7.9
Other focus (socially responsible, etc.)	40	15.8

Exhibits 9 to 11 give details on the investment products and services provided. Exhibit 9 shows that the bulk of assets are invested in ETFs. Exhibit 10 shows that tax planning is offered by about 27% of robo-advisors, most of which are based in the United States.

Exhibit 9 Asset Types in Portfolios Recommended by Robo-Advisors

Asset Types	Number Reported	Percentage of Total
Stocks	4	1.6
In-house funds	3	1.2
ETFs	182	71.9
ETFs and funds	10	4.0
ETFs, funds, stocks, and bonds	4	1.6
Broader-based products	50	19.8

Exhibit 10 Percentage of Robo-Advisors Providing Tax Planning Services

Tax Planning	Number Reported	Percentage of Total
Yes	68	26.9
No	185	73.1

Exhibit 11 Percentage of Robo-Advisor Providing Portfolio Management Using the Goal Investing Objective

Portfolio Management	Goal Investing		
	Yes	No	Total
Yes	22.5%	52.2%	74.7%
No	11.5%	13.8%	25.3%
Total	34.0%	66.0%	

Exhibit 11 shows that whereas 75% of advisors provide portfolio management advice and services, 34% use goal-based investing to develop recommendations for clients. With goal-based investing and tax planning services for affluent as well as HNWIs, leveraging on sophisticated platforms and tools, robo-advisors will significantly affect the global wealth management industry in the near future.

WEALTH MANAGEMENT FOR PRIVATE CLIENTS

We now turn to the services that wealth management firms provide to clients, especially HNWIs and ultra-HNWIs. A full-service wealth manager broadly provides the following services:

1. Investment advice, including tax advice,

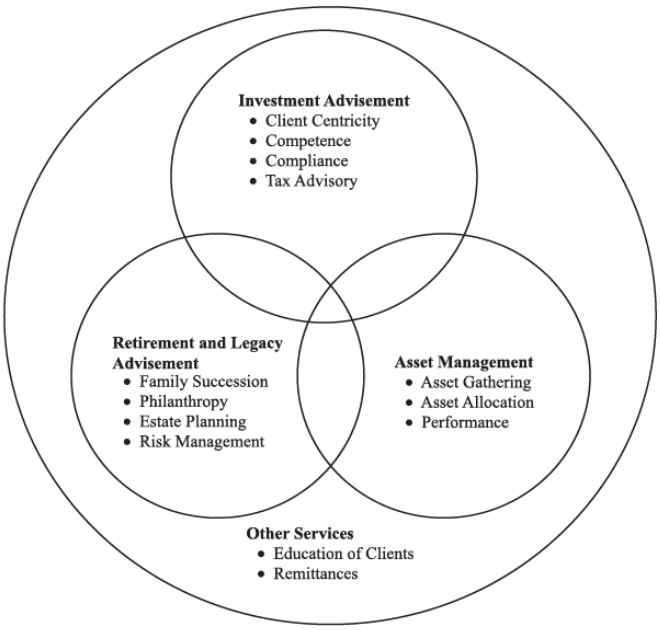
2. Retirement and legacy advice, including estate planning and risk management,

3. Asset management, including asset gathering and allocation, and

4. Other services, including client education.

See the graphical depiction as shown in Exhibit 12.

Exhibit 12 **A View of Private Wealth Management**



Source: Koh [2017].

Jennings, Horan, and Reichenstein [2010] reiterated that successful and competent private wealth management portfolio managers design effective investment solutions that are distinct from institutional money management and/or asset management, which usually provides generic products. Wealth solutions need to be comprehensive and customized to reflect clients' unique circumstances. Furthermore, although it is centered on investment management, it needs to consider the client's complete profile in a well-integrated fashion that incorporates the nature of the client's explicit and implied assets and liabilities, the complexity of his or her tax profile, and even the nuances of his or her behavioral biases as well as legal, ethical, succession, and philanthropic concerns.

Furthermore, risk management for HNWIs is more complex. The size of their AUM is larger, and they have increased demand for more intricate investment solutions. They may also have complex family situations, family businesses, and globally located assets in faraway jurisdictions with legal risks. A wealth manager's role is to identify and manage such risks.

Currently, most robo-advisors are focused on helping individual clients manage relatively passive portfolios. Few robo-advisors assist clients in addressing their estate and retirement planning, nor do many address insurance requirements. Tax planning remains very rudimentary and focused on tax-loss harvesting.

The larger robo-advisors are located in the United States and Europe and are not globally focused. As such, current robo-advisors remain strongly domestically focused solutions. Some newly established Asian robo-advisors do allow clients to invest globally. However, providing robo-advice internationally or even regionally faces several challenges, not only because of diverse compliance and tax regulations, but also because of the dearth of financial instruments like ETFs that are used to implement asset allocation recommendations in an increasingly difficult legal and governance environment (Schwinn and Teo [2017]).

POTENTIAL FOR ROBO-ADVICE

In principle, robo-advice is infinitely customizable; the design and use of ever more complex algorithms can allow robo-advisors to tailor portfolios to individuals who have even the most unusual financial circumstances. Data on clients' income and career trajectories, saving and spending behavior, and assets and liabilities may be used with artificial intelligence, machine learning, and other data analytics techniques to improve investment recommendations. Over time, robo-advisors will also become more adept at managing clients' behavior and needs.

Furthermore, data on clients' trading patterns, fund investing, and withdrawals and rebalancing activities in the client's accounts would improve risk measurement processes. Insights from behavioral economics and related fields can also assist robo-advisors in redesigning improved platforms to promote better investment solutions.

Robo-advisory would accelerate the route toward more passive investing. Taken as a whole, robo-advisors are currently providing useful services, complementing traditional investment advisors (Lam [2016]). Currently, they are gaining market share and increased client confidence. This is reinforced by the participation of established investment companies and global banks like UBS, Credit Suisse, and Deutsche Bank. Robo-advisors have already begun to affect traditional wealth management, in particular how relationship managers interact with their clients.

What Can Robo-Advisors Do into the Future?

A whole range of wealth management services can be offered and improved using the robo-advisory platform. The objective is to provide services in a cost-effective way, while giving due consideration to the holistic and personal needs of the client. The key role of relationship managers is to assist clients by providing optimal wealth management solutions, recognizing that there are trade-offs in

returns, risks, and costs. Investment and personal needs may not be fully achievable given market and other constraints.

We offer some specific improvements that would enhance wealth management service provided to private clients:

1. **Investment Advisory and Asset Management:** Product suitability is the most important criterion. Helping a client to design and execute an investment portfolio relevant to his or her life situation and risk appetite is the overriding concern. In addition to product suitability, other factors such as expenses and liquidity needs are embedded in the solution.

2. **Retirement Planning:** For affluent clients, retirement planning is an important requirement. According to Sharpe [2017], this is the "nastiest and hardest problem in finance." Wealth managers who assists clients in retirement planning have to contend with (1) actuarial life expectancy, (2) lifetime income, (3) potential inflation, (4) market outcomes, (5) product returns, and (6) utility of income. Robo-advisors may help in managing some of these factors by using data analytics and simulations. Preliminary solutions such as the lockbox spending strategy based on allocation between assets like TIPs, shares, and funds of stocks and bonds to meet a range of future year needs can play a useful role in providing future income. (Sharpe, Scott, and Watson [2008]; Sharpe [2017]).

3. **Estate Planning Services:** For HNWIs and ultra-HNWIs, a key function of wealth management is to help clients pass on their assets to their heirs and loved ones. This is an emotional area for a client. Again, simulation and data analytics may help the client to decide on appropriate intergeneration asset transfers. This may include the use of mega-insurance and other investment solutions with efficient tax structures (Bernstein Wealth Management Research [2005]). Often, intergeneration wealth planning is complicated by patriarch issues, sibling rivalry, and philanthropic objectives. Using goal programming is one approach to assist in this complicated private wealth management function (Mulvihill [2005]).

4. **Tax Planning:** Some robo-advisors are already helping clients to manage taxes. In studies based on U.S. tax regulations, Arnott, Berkin, and Ye [2001] noted that three likely types of mismanagement of taxable assets are (1) unnecessary realization of capital gains, (2) failure to harvest losses, and (3) failure to prefer lower-dividend stocks. Tax harvesting needs to be fully incorporated in portfolio recommendations. Other findings, which are again very relevant to U.S.-based investors, include paying due consideration to the tax-timing option implicit in trading (Constantinides [1984]). Volatile assets, if uncorrelated with other assets in the portfolio, may be valuable for tax planning (Brunel [2006, pp. 72-73]). For robo-advisors serving global clients, a key consideration is the issue of taxation of income at source or residence of the investors (Tax Justice Briefing [2005]; Kane [2015]). Rules and algorithms can be customized to recommend combinations of assets and securities from different source countries that are tax beneficial to clients, depending on their country of residence.

5. **Insurance Management:** A robo-advisor may also add insurance products as a solution for clients who need wealth and/or income protection. Insurance management can be used to mitigate issues of mortality and health risks.

6. **Client Education:** Retail investors do not always have time to research opportunities for making money. Robo-advisors would do well to provide more client education and online training to help individual investors make more informed investment choices. An interesting way to start is to provide clients with various options, starting with a great deal of hand-holding and progressing to a stage at which clients make independent decisions using robo-advisory support like market and securities information and analyses, after a period of experiential learning.

7. **Mobile Platform:** With increased use of the mobile phone as a communication and personal planning tool, a smartphone can be the device for payments as well as investment execution. This is

already provided by Youyu for Asian clients. Wider and improved platforms will increase the use of robo-advisory.

8. **Data-Mining and Artificial Intelligence Software:** Use of data analytics and artificial intelligence can lead to a better matching of investment opportunities with the needs of clients and lead to improved investment outcomes, including satisfying behavioral preferences. Furthermore, such software may be made available to more sophisticated clients to enable them to gain insights into financial markets and the fast-changing environment. With better analytical tools, clients may avoid some human judgmental errors and behavioral biases (Reiff [2017]). Use of such software may allow investors to have enhanced capabilities to compete with institutional investors.

9. **Enhanced Client Servicing:** This is another area in which robo-advisors can do more. Data chatbots (Burnmark [2017]), which are artificial intelligence tools, can provide intuitive answers to generic customer questions, thus freeing up relationship managers to focus on complex requests and products. Chatbots would allow robo-advisors to enlarge the client base, catering to another market segment that embraces technology and social media. This is consistent with the function of robo-advisory to rely more on technology and to use less human interface. However, the capabilities of chatbots remain limited because they have constraints, especially in servicing clients with longer-term goals.

Although we have discussed the areas in which robo-advisory can add to the service of wealth management, we recognize that robo-advisors consist mainly of a platform to support financial services with or without human intervention. Financial services offered to clients and customers involve the risk of losses and misselling of investment products and services. Weaknesses specific to robo-advice can include inadequate assessment of clients and the use of erroneous and biased algorithms. As a result, regulations that include licensing and responsibility of management may be needed to mitigate such potential weaknesses.

LICENSING OF ROBO-ADVISORS IN SINGAPORE

In June 2017, the Monetary Authority of Singapore (MAS) issued a consultation paper on the provision of digital advisory (robo-advisory) services (MAS [2017]). The consultation paper seeks views from the industry to facilitate the regulation of robo-advisors. It proposed that "digital advisors seeking to offer their platforms to investors in Singapore will have to be licensed under the Securities and Futures Act (Cap. 289) and/or providing financial advice on investment products under the Financial Advisers Act (Cap. 110)."

MAS recognizes that robo-advisors may operate under different business models. Those that provide intermediary services by passing a client's trade orders to a brokerage firm for execution may be allowed to operate as licensed or exempt financial advisers.

MAS noted that the business model of robo-advisors may have unique risks because they employ client-facing tools that rely on data obtained through a set of questions and/or algorithms to construct the client's portfolio allocation. The methodology of the algorithms must be sufficiently robust. Thus, MAS intends to set out minimum requirements on the monitoring and control of algorithms and holds senior management responsible for effective oversight of the process.

Robo-advisors also need to have a reasonable basis for recommending investment products to their clients. Thus, these recommendations must satisfy the test of product suitability and/or client suitability.

MAS is embarking on stricter regulation of robo-advisors. Going forward, if robo-advisors aim to be "trusted" advisors of private clients, they naturally will need to have self-imposed voluntary discipline or face more compliance and regulatory guidelines.

A CONCLUDING NOTE

One shortcoming of many robo-advisors is the lack of personal customization for their clients. A client is better served if the provider is able to have a clearer picture of the client's risk profile, needs, and objectives. In using rudimentary and simplistic on-boarding processes, robo-advisors end up offering simple asset allocation solutions and easy-to-reach products.

Yet, the need to provide customized and personalized services to private clients who have different risk tolerances, biases, and personalities along with varying business and personal objectives while planning for their families may offer opportunities to robo-advisors. They can play a very important role as the interface between clients, their needs, and the use of appropriate technology.

However, clients do have complex needs and wants. Human judgment may still be needed to solve more complex problems, especially those in which human emotions and feelings are involved because these cannot be totally ignored. Human interface is often helpful to clarify wealth solutions, provide assurance, and explain complicated situations to ensure that clients are clear about the recommendations and product suitability.

Would robo-advisors replace traditional wealth managers? Our answer is a qualified "yes." Robo-advisors are able to combine the judgement and computing resources of both "man and machines" or "bionic power" to provide alternative wealth management services. Robo-advisors, with the help of appropriate technology and innovation, will in the longer term commoditize the simpler and technical aspects of wealth management. The world of wealth management will be bifurcated into a bar bell. Investors with simpler needs will increasingly choose robo-advisors because the latter are cheaper, accessible, and client-centric. However, the more sophisticated investors as well as high-net-worth clients may stay with asset managers, private bankers, and other traditional wealth managers for some time yet.

Certainly, though, this is a wake-up call for all wealth managers to step up their performance or be replaced by robo-advisors. We expect traditional wealth managers to respond to this disruption with new and improved products and services at competitive fees.

ENDNOTES

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[1] Available at: https://www.betterment.com/resources/research/tax-loss-harvesting-white-paper/ .

[2] See https://www.betterment.com/retirement/ .

[3] See https://investor.vanguard.com/advice/personal-advisor .

[4] See https://www.nutmeg.com/our-fee .

[5] See http://www.clipperadvisor.com/pc/pc_index.html .

[6] See http://www.yff.com/wm/ , https://36kr.com/p/5067193.html , and http://news.cnfol.com/it/20170407/24555262.shtml .

[7] See www.bambu.life/ and www.crossbridgeconnect.com/ .