

The Future of the Wealth Management Industry: Evolution or Revolution?

by
Jason D. Traff

Bachelor of Business Administration in Finance
Texas A&M University, 2006

Submitted to the MIT Sloan School of Management
in Partial Fulfillment of the Requirements of the Degree of

Master of Business Administration

at the

Massachusetts Institute of Technology

February 2016

© 2016 Jason D. Traff. All rights reserved.

The author hereby grants MIT permission to reproduce and to distribute
publicly paper and electronic copies of this thesis document in whole
or in part in any medium now known or hereafter created.

Signature of Author

Signature redacted

MIT Sloan School of Management
December 14, 2015

Certified by

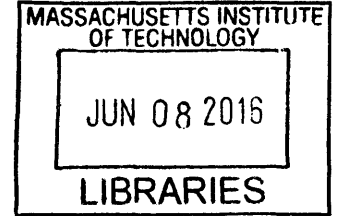
Signature redacted

Christian Catalini
Assistant Professor of Technological Innovation,
Entrepreneurship, and Strategic Management
Thesis Supervisor
MIT Sloan School of Management

Accepted by

Signature redacted

Maura Herson
Director MBA Program
MIT Sloan School of Management



ARCHIVES

Page intentionally left blank

The Future of the Wealth Management Industry: Evolution or Revolution?

by
Jason D. Traff

Submitted to the MIT Sloan School of Management on December 14, 2015 in Partial Fulfillment of the Requirements for the Degree of Master of Business Administration.

ABSTRACT

Like many service-oriented industries before it, the wealth management industry is facing changing demographics, regulations, and technologies. This thesis examines the major trends impacting the industry, namely regulations and technology, to see where the industry is headed.

Thesis Supervisor: Christian Catalini

Title: Assistant Professor of Technological Innovation, Entrepreneurship, and Strategic Management,
MIT Sloan School of Management

Page intentionally left blank

ACKNOWLEDGEMENTS

First and foremost, thanks to my advisor, Christian Catalini, for his expertise and guidance. His thoughts and insights into the world of machine learning and artificial intelligence elevated this paper far beyond what it would have been without his help.

Also, thanks to the MIT Sloan faculty and staff, especially Maura Herson and Lisa Monaco. Without their patience and willingness to help, I would have never been able to undertake this thesis.

Lastly, thanks to my wife, Lindsay, for her endless amounts of support and encouragement. Thank you for listening to my rants on wealth management, for being the first person to read this thesis, and for just generally keeping everything together while I was busy writing.

Page intentionally left blank

TABLE OF CONTENTS

ABSTRACT	3
ACKNOWLEDGEMENTS.....	5
TABLE OF CONTENTS	7
LIST OF FIGURES	9
1. INTRODUCTION	11
1.a. What is wealth management?	11
1.b. Why does wealth management only cater to wealthy clients?	12
1.c. Emergence of the Independent Advisor	13
The arrival of the robo-advisor	14
1.d. Definition of Wealth Management for this paper.....	16
2. REGULATORY LANDSCAPE.....	18
2.a. Governing bodies	18
2.b. Dodd-Frank Wall Street Reform and Consumer Protection Act.....	18
2.c. Gramm-Leach-Bliley Act	19
Financial Privacy Rule	19
Safeguards Rule.....	20
2.d. Investment Advisers Act of 1940	20
2.e. Redefining Fiduciary Standards.....	21
Can a robo-advisor be a fiduciary?.....	22
2.f. Regulatory Conclusion	24
3. EVOLUTIONARY TECHNOLOGY FOR ADVISORS.....	26
3.a. Introduction to Technology.....	26
3.b. Tools for Advisors.....	27
3.b.i. Financial Planning.....	27
3.b.ii. Marketing and Lead Generation	30
3.b.iii. Online Archiving	32

3.b.iv. Customer Relationship Management (CRM).....	33
3.b.v. Online Document Storage and Management.....	35
3.b.vi. Portfolio Risk Analysis.....	36
3.b.vii. Portfolio Rebalancing Tools.....	37
3.b.viii. Portfolio Management and Reporting.....	38
4. REVOLUTIONARY TECHNOLOGY AS ROBO-ADVISORS.....	41
4.a. Robo-Advisor Advantages	42
4.a.i. Lower Fees Relative to Traditional Wealth Managers.....	43
4.a.ii. Lower Minimum Account Sizes	47
4.a.iii. No Trading Costs to Clients.....	49
4.a.iv. Target-Based Rebalancing	51
4.a.v. Efficient Tax-loss Harvesting.....	53
4.a.vi. Less Emotional Decision Making.....	55
4.a.vii. Miscellaneous Benefits	56
5. SUSTAINABILITY OF ADVANTAGES FOR TRADITIONAL WEALTH MANAGERS	58
5.a. Difficult Financial Conversations	60
5.b. Evaluating Client Priorities with Limited Data.....	61
5.c. Optimizing Across Several Accounts.....	62
5.d. Resiliency	63
6. CONCLUSION	68
6.a. Adopt Technology and Replace Back-Office.....	69
6.b. Create Customer Value Outside of Investments.....	70
6.c. Financial Custodians Need to Evolve	70
6.d. Closing Words	71
BIBLIOGRAPHY	72

LIST OF FIGURES

- Figure 1.1. Seven roles of a financial advisor 13
- Figure 1.2. List of popular robo-advisors 15
- Figure 2.1. Summarized areas where robo-advisors fail to meet fiduciary standards..... 23
- Figure 3.1. Most popular types of financial planning software..... 27
- Figure 3.2. Penetration of financial planning software 28
- Figure 3.3. eMoney Advisors client portal screenshot..... 30
- Figure 3.4. Custom-built advisor websites 31
- Figure 3.5. Advisor discovery websites 31
- Figure 3.6. Client discovery websites 32
- Figure 3.7. Popular online archiving services 33
- Figure 3.8. Popular CRM services..... 34
- Figure 3.9. Popular investment advisor-focused CRM services 35
- Figure 3.10. Popular providers for online document storage and management..... 36
- Figure 3.11. Online workflow management..... 36
- Figure 3.12. Popular portfolio risk analysis software providers..... 37
- Figure 3.13. Popular portfolio rebalancing services..... 38
- Figure 3.14. Popular portfolio management and reporting services 39
- Figure 4.1. Average fees for traditional wealth managers 44
- Figure 4.2. Popular robo-advisors and their fee structures 45
- Figure 4.3. Percentage fee comparison between traditional advisory firm and robo-advisors..... 46
- Figure 4.4. Dollar-amount fee comparison between traditional advisor firm and robo-advisors 46
- Figure 4.5. Impact of fee differential over 30 years 47
- Figure 4.6. Average client size for traditional wealth management firms 48
- Figure 4.7. Minimum account size for robo-advisors..... 48
- Figure 4.8. Tax-loss harvesting ETF alternatives 54
- Figure 5.1. Average assets under management comparison 64
- Figure 5.2. The chart included in Betterment's letter to Department of Labor 66
- Figure 5.3. Betterment customer service activity as enclosed in their letter to Department of Labor 67
- Figure 6.1. Human capital in an RIA firm..... 69
- Figure 6.2. Estimated annual technology costs..... 71

Page intentionally left blank

1. INTRODUCTION

When I originally picked this topic for my thesis, it was largely out of personal and professional curiosity. I hadn't realized that the debate for technological evolution or revolution is one that stretches back decades. As early as the 1950s and the dawn of the information age, the debate between artificial intelligence (AI) and intelligence amplification (IA), also called intelligence augmentation or intelligence assistance, has tried to parse out the future of human society and how it will either be replaced by or augmented through technology.

While the earliest incarnations of automation, such as assembly lines, only replaced elements of human labor, today that conversation has shifted as technology and robots have begun to replace human intelligence and white-collar jobs. Now, it's common in most service industries for professionals to have to compete against new, technology-based entrants that have increasingly begun to displace them.

However, while technology is the fastest-acting catalyst on the competitive landscape of wealth management, there are also changing regulations. As regulations change, so do the cost structures associated with them, and in some instances, certain business models can face intense pressure to adapt.

In the coming pages, I'll look at how regulations and technology are changing the wealth management industry, and draw conclusions as to how the industry will change in the coming years and decades.

1.a. What is wealth management?

The term "wealth management" occurs as early as 1933 (Fowler, 1933), and is generally used as a catchall term for a service that includes some form of discretionary investment management, financial or tax advice, and occasionally some level of concierge or banking-related services. The term "wealth management" can be used interchangeably with "money management" or "asset management" with the caveat that "wealth management" may be considered the broader term as a wealth manager may supervise other money or asset managers. However, I'll use these terms interchangeably as there are no set guidelines or certifications to distinguish wealth management from any other form of asset management. The only substantive difference is that traditionally a wealth manager has only serviced clients with over \$5 million (Investment Management Consultants Association, 2012) whereas neither money nor asset management are associated with a specific dollar amount.

The wealth management industry became popularized in the 1970s, when companies, such as Goldman Sachs and Morgan Stanley, began offering wealth management as an enhanced service to their wealthier retail customers. This began a trend of offering more exclusive and extensive services to wealthier and wealthier clients to further distinguish them from other mass-market customers. This exclusivity trend has continued and now includes newer structures, such as family offices, private banking, and private wealth management, that also fall under the broader category of wealth management, and the requirements for accessing these services have also grown as they are generally reserved for clients with \$10 million in assets or more (Mergers and Inquisitions).

1.b. Why does wealth management only cater to wealthy clients?

Based on the history of wealth management, the connotation is that these types of services are only offered to wealthy clients. Historically, this has been due to a few reasons, but primarily, as wealth management services originated at large banking institutions, it made sense that having an exclusive tier of servicing would enhance the perceived value of the wealth management services, much like how a luxury brand manages its image. The scarcity and exclusivity of these wealth managers enhanced their perceived value, but also their actual value as they grew to have wealthy, homogenous client bases.

This phenomenon was similar to that of a Veblen good, which is a type of commodity that scales demand in proportion to a higher price, contradicting the basic economic law of demand. This is still seen today in other areas, such as fine wine or exotic cars.

Additionally, it has historically been the case that a wealth manager's ability to provide value to a client is dependent on that client having some amount of wealth, and generally, the greater that amount of wealth, the more value that a wealth manager has been able to provide. For example, a family with hundreds of millions of dollars in assets faces a number of complex wealth management issues related to investments, taxes, and family dynamics. For clients like this, a wealth manager can help to provide an investment plan and additional counseling to minimize tax liabilities and preserve the original intent of those wealth transfers for long after the originators have passed on.

It would follow then that someone with less wealth, such as a recent college graduate that needs help prioritizing debts to pay down and how much to save for retirement, would have more common problems and that they would have a relatively lower need for a wealth manager and, likewise, the wealth manager would be able to provide relatively less value.

However, in terms of adding value, it's true that a wealth manager could provide more value in absolute terms to the wealthy family, but in relative terms, they might also be able to make a large impact on the recent graduate's financial life too—especially with the advent of new technologies that make it easier for a wealth manager to handle smaller accounts.

This also recognizes that both examples, the family and college graduate, have their own individual preferences, which are complex regardless of the amount of assets they control. There would be different consumption preferences, investment time horizons, different phases of life, and so on, where each type of client could have suitably complex needs that necessitate a wealth manager's help and guidance.

Finally, a wealth manager has historically been able to service around 30 clients before reaching their capacity of relationships that they have time to manage (Fidelity Investments and Quantuvis Consulting, 2012), and as wealth managers are usually compensated with a fee based on the amount of assets under their management, the most direct way to increase their compensation is with wealthier clients.

1.c. Emergence of the Independent Advisor

While wealth management has been associated with larger banks and wirehouses in the past, the fastest growing segment of the wealth management industry is that of the independent, registered investment advisor (RIA), which has been growing at 6.8% annually to now manage over \$2.4 trillion, collectively (Touryalai, 2013).

RIAs accounted for around 20% of the market in 2013, but this is expected to grow to a 28% market share by 2018. This growth comes at the expense of the wirehouse or bulge-bracket channel, which includes firms like Merrill Lynch, Morgan Stanley, and UBS, where market share is expected to drop from 41.1% in 2011 to 34.2% at the end of 2014 (Shidler, 2014).

Being an independent advisor means that a wealth manager is not affiliated with a bank or other financial entity, and thus, the advice they give may be seen as more trustworthy as they generally have fewer conflicts of interest. In the broadest sense, being an RIA means that an advisor or firm gives up financial advice on a fiduciary basis, which means that they have a fundamental and contractual obligation to act in their clients' best interests. The nature of fiduciary duty and its possible implications are examined in further detail later.

Over time, as client relationships evolve, an RIA can become many things to their client; here is a list of the seven main roles that an advisor can play, as compiled by Dimensional Fund Advisors (DFA), a mutual fund company that works exclusively with financial advisors.

Figure 1.1. Seven Roles of a Financial Advisor

Role	Description
1. The Expert	Providing client-centered expertise to assess the state of a client's finances and develop risk-aware strategies to help clients meet their goals
2. The Independent Voice	An independent and objective voice in a world full of product-pushers and salespeople
3. The Listener	The emotions triggered by financial uncertainty are real, and a good advisor must listen to clients' fears, tease out the underlying issues, and provide practical answers
4. The Teacher	Teaching investors to go beyond the fear-and-flight phase to understand risk and return, diversification, the role of asset allocation, and virtue of discipline
5. The Architect	Build a long-term wealth management strategy that matches each person's risk appetites and lifetime goals

6. The Coach	Doubts and fears will arise even with a strategy in place; the advisor must reinforce principles and keep clients on track
7. The Guardian	A long-term role to proactively look for issues that may affect a client and keep them informed

These are the roles that an independent financial advisor can play in their clients' lives, and they form the core of the experience of working with an independent RIA.

The arrival of the robo-advisor

Starting in 2008, and ramping up in the past few years, a new type of independent advisor has increasingly become a topic of conversation within the industry—the robo-advisor.

A robo-advisor stands in stark contrast to the traditional investment advisor experience because they exist only as an online wealth management service, which provides automated portfolio management advice through the use of algorithms. These services use an online interface as a means to interact with an expert system that governs asset allocation and investment decisions. Occasionally, a robo-advisor, such as Personal Capital or Vanguard's Personal Advisor Services, will use a human investment advisor to act as a personalized account representative, but the vast majority of these services only have humans in their customer service centers with the rest of the investment decisions done by algorithms.

The typical process to get started with a robo-advisor is that a new client will fill out an online questionnaire about their risk constraints, return objectives, and some demographic data such as their income and age. The robo-advisor will then select an appropriate portfolio for that client and handle the initial asset allocation along with building that model portfolio. Over the course of the relationship, the robo-advisor will continue to maintain that asset allocation with periodic rebalancing and occasional tax-loss harvesting, which we'll talk about later in more detail.

Most of today's robo-advisors are concerned primarily with different flavors of investment management, such as allocating investments across asset classes, and are not currently addressing financial planning issues or giving advice about securities. However, for all of their criticized inflexibility, robo-advisors often charge much less than a traditional financial advisor.

Wealthfront, a popular robo-advisor, has a minimum account size of \$500, and an annual fee of 0.25% of assets; furthermore, it's free for portfolios with between \$500 and \$10,000 in assets (Wealthfront, 2015). Similarly, Betterment, another popular robo-advisor, doesn't have a minimum, but charges accounts under \$10,000 an annual fee of 0.35%, which drops to 0.25% between \$10,000 and \$100,000, and it drops again to 0.15% after \$100,000 (Betterment, 2015).

These low fees have made robo-advisors more appealing for non-typical wealth management clients, such as millennials, which are generally defined as people who were young adults in the early 2000s. In a 2015 survey by Capital One ShareBuilder, nearly 60% of millennials said that they "distrust financial markets" (Egan, 2015a).

This mistrust from millennials comes from their experiences of both the dotcom bubble of 2001 and the 2008 financial crisis, both of which occurred in their relatively short adult lives. Despite all of this, Wealthfront has said that 60% of its clients are under the age of 35 (Egan, 2015b).

Overall, robo-advisors manage about \$19 billion, but to put that into perspective, that represents about 0.1% of the world's \$18 trillion wealth management market (Moyer, 2015). Yet, robo-advisors have attracted hundreds of millions of dollars in venture capital money and mainstream financial service companies, such as Fidelity and Charles Schwab, have launched their own robo-advisors, and their share of the market is projected to reach \$55 to \$60 billion by the end of 2015 (Caplan, 2015).

While there are hundreds of robo-advisors currently on the market, the most popular ones are:

Figure 1.2. List of popular robo-advisors

Name	Website
AssetBuilder	http://assetbuilder.com
Betterment	http://betterment.com
Charles Schwab Intelligent Portfolios	http://intelligent.schwab.com
Covestor	http://covestor.com
Fidelity Investments Portfolio Builder	https://sectorportfoliobuilder.fidelity.com
Financial Guard	http://financialguard.com
FlexScore	http://flexscore.com
Folio Investing	http://folioinvesting.com
FutureAdvisor (acquired by BlackRock in 2015)	http://futureadvisor.com
Hedgeable	http://hedgeable.com
Jemstep	http://jemstep.com
LearnVest	http://learnvest.com
MarketRiders	http://marketriders.com
Motif Investing	http://motifinvesting.com
Motley Fool Wealth Management	http://foolwealth.com
Nutmeg	http://nutmeg.com

Personal Capital	http://personalcapital.com
RebalanceIRA	http://rebalance-ira.com
SigFig	http://sigfig.com
TradeKing	http://tradeking.com
Vanguard Personal Advisor Services	https://investor.vanguard.com/advice/personal-advisor
Wealthfront	http://wealthfront.com
WiseBanyan	http://wisebanyan.com

The rapid growth from robo-advisors is concerning to traditional investment advisors, who just years ago began disrupting wirehouses and stockbrokers, because it threatens to disrupt their business models.

1.d. Definition of Wealth Management for this paper

For the purpose of this paper, I'm going to be treating wealth management as a category based on the services provided, such as investment management and financial advice, and not paying particular attention to the distinction of how much money a client is investing.

The reason for this is that as the industry evolves due to regulatory change or technological advancement, many of the old constraints on a wealth management firm disappear, and as firms become more efficient and can choose to serve more clients, not only in number but in variety, the main benefit to requiring a minimum account size of several million dollars is primarily a function of perceived brand value.

As an example, for years now, new entrants into the wealth management space have been willing to take on clients with little-to-no minimum account size, charge a lower fee, or offer a lower level of service to make this business model fit into their requirements. Often, these new entrants are independent advisors and, as such, are able to make their own rules about what clients they want to service and how much they want to charge them.

Also, technology has a long history of improving efficiency in business, and as the classic business model for wealth management changes, it may be that a wealth manager can service more clients than they've been able to historically. This could either take the form of a lower or more automated level of service, or it might just be that they're able to be more efficient with the other areas of their business, which frees them up to handle a large number of clients.

So while there will always be wealth management firms that focus on the prestige of managing finances exclusively for the wealthy, there has already been an influx of new entrants that are making the traditional wealth management experience available in some form to a broader range of people. The two will have drastically different internal workings, but the end result of managing a client's investments and providing advice on their financial needs is the same.

2. REGULATORY LANDSCAPE

Within the wealth management industry, there is a constant dialogue about how changing regulations impede and threaten to derail the industry. However, it's difficult to know how much truth there is to this because this dialogue rarely goes into details, so I'll outline the relevant regulations that govern an RIA, and then look at recent changes to those regulations to see if there is a pattern of regulatory creep.

2.a. Governing bodies

The two governing bodies that regulate the asset management industry are the Securities and Exchange Commission (SEC) and the Financial Industry Regulatory Authority (FINRA).

The SEC was established by the Securities Exchange Act in 1934 and functions as an independent government agency that is focused on protecting investors and ensuring fairness in the securities markets. It has broad ranging powers, but in regard to investment advisors, the SEC directly regulates an advisor once they have over \$150 million in assets under management. If an advisor has fewer assets than \$150 million, they won't be regulated on the federal level with the SEC, and instead, they will have to register with and be regulated by the individual states in which they do business (Lins, 2014).

FINRA operates underneath the SEC as a pseudo-independent organization that is tasked with enforcing SEC rules and regulations among its members. While FINRA is predominantly focused on regulating stockbrokers and broker-dealers, as there are often cases where an investment advisor or wealth manager also functions as a broker-dealer, many wealth management firms find themselves also regulated by FINRA. Even in cases where a wealth manager is not a broker-dealer, FINRA imposes reporting requirements on investment advisors, such as annual disclosures on staffing, assets, and regulatory infractions

In terms of responsibilities, there is a lot of overlap between the SEC and FINRA, and it's possible that an investment advisor might be subject to sanctions or audits from either or both organizations.

Lastly, it's possible for other government agencies, such as the Federal Reserve, the Treasury Department, and the Federal Deposit Insurance Corporation (FDIC) to be involved in the regulation of a large, multi-strategy wealth management firm if they include investment or traditional banking. However, it's rare for an investment advisory firm to become large enough that it engages in actions that would subject them to regulation from these entities.

2.b. Dodd-Frank Wall Street Reform and Consumer Protection Act

To simplify the conflicts and overlaps that having multiple regulators can create, the Dodd-Frank Wall Street Reform and Consumer Protection Act (Dodd-Frank) was passed in 2010. While a large part of Dodd-Frank was concerned with preventing the recurrence of another financial crisis, such as the one

seen in 2008, by lowering the systemic risk of various parts of the US financial system, it also created the Financial Stability Oversight Council (FSOC), which acts as a coordinating body charged with simplifying bank regulations while also monitoring risks in the financial industry.

For an independent RIA, though, most of Dodd-Frank isn't applicable because independent RIAs don't generally function as an investment bank, a commercial bank, or an insurance company. Dodd-Frank was mostly concerned with protecting consumers, which can be seen in the creation of the Consumer Financial Protection Bureau (CFPB) that tries to prevent predatory mortgage lending and provide increased transparency into mortgage and credit card disclosures. The other significant part of Dodd-Frank was the Volcker Rule, which restricts banks from making speculative investments in derivatives, commodity futures, and options with their own funds. However, neither of these areas provides a material regulatory burden to an independent asset manager.

2.c. Gramm-Leach-Bliley Act

In terms of legislation, the two most relevant pieces concerning a wealth manager are the Gramm-Leach-Bliley Act (GLBA) and the Investment Advisors Act of 1940 (IAA), which I'll examine next.

The GLBA, which is often pronounced as "glibba," goes by many different names, including the Financial Services Modernization Act of 1999, and its primary function was to repeal the Glass-Steagall Act of 1933 (Glass-Steagall). Glass-Steagall was put in place to restrict the affiliations between commercial banks and securities firms, but by the time of its repeal, most commentators thought that Glass-Steagall was already dead. This was most evident in the merger between Citibank, a large commercial bank, and Salomon Smith Barney, a large securities firm, in 1998, which was allowed under the Federal Reserve Board's interpretation of Glass-Steagall.

The reasoning for GLBA, which was supported at the time by most financial institutions, was that it would create more financial stability in the industry. Their argument was that individuals put more money into investments when times are good but shift that money into savings when times are bad, and by having an institution to manage both the investments and the savings, they would be better suited to weather both good and bad economic times.

However, while GLBA shifted the competitive landscape for major financial institutions, for wealth managers, the only direct effect from GLBA was in the mandatory enforcement of privacy data. Namely, GLBA stated that any financial institution, whether they dealt with nonpublic information or not, had to have a policy to ensure the integrity of that client's information and to protect it from security threats. These were known as the Financial Privacy Rule and the Safeguards Rule, respectively.

Financial Privacy Rule

The Financial Privacy Rule requires wealth managers to serve their clients with a privacy notice when the relationship is established and on an annual basis thereafter. The notice has to disclose what information is collected, how it is shared, and how it is protected. It also has to give the client the ability

to opt-out of any information sharing that the wealth manager might be engaged in, and has to provide the client with another notice if the contents of the privacy policy change.

Safeguards Rule

The Safeguards Rule requires wealth managers to develop a written information security plan to describe how the company protects sensitive client information. This plan has to include designating a key employee to head the efforts, along with conducting a risk analysis on the potential vulnerabilities. This often includes a mixture of physical protection, such as restricting access to key employees or implementing locks or alarm systems, along with digital protection, such as digital encryption or passwords.

2.d. Investment Advisers Act of 1940

The most direct federal law that regulates wealth managers is the SEC's Investment Advisers Act of 1940, which defines an investment advisor as basically anyone who gives advice, either written or spoken, regarding the purchase or sale of securities, has contact with clients, and does business across state lines. The IAA was passed in an attempt to curb the many instances where an investment advisor would abuse clients through unfounded stock tips or exorbitant performance fees.

Dodd-Frank created some exemptions to the IAA, but for the vast majority of investment advisors, the IAA requires them and their firm to register with the SEC. The exceptions concern advisors that only deal within one state, meaning that both their clients and the securities they deal in are all self-contained within that state, along with advisors that only have clients that are insurance companies or have had fewer than 15 clients in the previous 12-month period. Also, if a professional, such as a lawyer or teacher, were to end up giving investment advice on a "solely incidental" basis in the practice of their profession, they would not have to register as an investment advisor. However, for example, if an accountant routinely gave investment advice to their clients, they would be required to register as an investment advisor under the IAA.

The cornerstone of the IAA is that basically all people or firms involved in the investment advisory business must register with the SEC. Alongside this, they must also file a Form ADV upon inception and provide an updated copy every year alongside operational reports and a moderate fee. The Form ADV acts as a "plain-English" document detailing an investment advisor's fees, educational background, litigation and criminal history, services rendered, and type of advice offered. A copy of the Form ADV must be provided to clients upon inception of the relationship, and the investment advisor must take care to keep the Form ADV updated at least annually or when material changes occur, and provide a copy each time it changes to their respective regulators.

The IAA also states that investment advisors can receive compensation based on their advice in a number of predetermined ways, and that an investment advisor cannot engage in excessive trading or profit from market activity resulting from the advice given to their clients. In the industry, these terms could also be called "churning" or "frontrunning" a client's account.

The most important clarification of the IAA came in 1963 when the US Supreme Court ruled that Section 206 of the IAA imposes a "fiduciary" standard on RIAs, which is a different and higher standard of care than a "suitability" standard.

For example, a stockbroker, who is paid through commission on trades made, is only held to a suitability standard, which means they are only required to make suitable trades for their clients. As long as a trade isn't subject to negligence, an argument can be made that a trade was suitable for the client even if it performed worse yet compensated the stockbroker more than a different yet similar security. This is often seen in securities or mutual funds that offer front- or back-loaded fees or that enter into a fee-sharing agreement with a stockbroker.

The stricter fiduciary standard requires the investment advisor to always act in the best interest of their clients and to consider clients' financial positions and their level of sophistication. It also requires the investment advisor to act ethically and legally in regard to being forthright in how they advertise, how they market themselves in disclosures, and how they handle and control client assets.

2.e. Redefining Fiduciary Standards

Aside from regulations concerning communication and recordkeeping, it seems that the biggest potential regulatory impact to the wealth management industry concerns whether or not an advisor has to adhere to a fiduciary standard or not.

For RIAs, this wouldn't represent a change in how they are currently doing business, as they already voluntarily adhere to a fiduciary standard. As an RIA, breaching the fiduciary standard is the most serious transgression that can be committed, and whether it happens internationally or not, the SEC and state securities regulators are quick to bring litigation against an RIA for violating the IAA. These reports are often circulated through press releases and local news stories and are forever recorded in the mandatory Form ADV that an advisor is required to distribute to new clients.

However, for the larger financial services companies and broker-dealers, this would represent a fundamental shift in how they are able to do business.

In 2011, the SEC began pushing for a uniform fiduciary standard that would apply to broker-dealers as well (Abromovitz, 2012). While there are a number of benefits in the new standard that would increase investor protection, the main point is to close a loophole that can potentially leave consumers in the dark about whether the professional giving them advice is classified as a broker-dealer or an RIA. Because of this loophole, consumers may not know if they are receiving a fiduciary level of care or are simply being sold suitable investments from a salesperson.

This risk is especially heightened in retirement accounts, where the industry has historically been dominated by hidden fees. A common practice with 401(k)s and other employer-sponsored plans was for a salesperson, masquerading as a fiduciary financial advisor, to offer a free or low-cost way to set up

a 401(k) and then put people into high-priced securities, which would more than make up for the low initial cost. These securities would be deemed "suitable" but would not pass the fiduciary standard.

Further compounding the issue was the "principal-agent" problem that was posed in these defined contribution plans. As the business owner and plan sponsor was generally in charge of paying for the retirement plan, a free or low-cost defined contribution plan would save them money while passing the cost on to the employees, who were adversely affected by being invested in securities with higher fees.

A case related to this practice eventually ended up at the Supreme Court, where on May 18, 2015, the court ruled on *Tibble v. Edison International* (Supreme Court of the United States Blog, 2015). The case concerned Edison International's 401(k) plan, which invested in a series of mutual funds in 1999 and in 2002. A group of employees filed a suit in 2007 that claimed the fiduciaries responsible for the 401(k) should have invested in "wholesale" funds, which have a lower management fee than the "retail" funds that were selected.

While it has been long understood that The Employee Retirement Income Security Act of 1974 (ERISA), which governs the administration and management of retirement plans, including 401(k)s, requires a fiduciary level of care, Edison argued that they only had a duty to monitor the 401(k) and reevaluate investments if there was a material change. The employees, on the other hand, argued that running a defined contribution retirement plan required a more general level of "ongoing prudent supervision."

In a 9-0 ruling, the Supreme Court ruled in favor of the employees and reaffirmed the requirement of prudence in ERISA plans. In their ruling, the Supreme Court affirmed the six-year window in which an investor is able to file suit for an alleged breach of fiduciary care, and compared the case to trust law, where "a trustee has a continuing duty to monitor trust investments and remove imprudent ones. This continuing duty exists separate and apart from the trustee's duty to exercise prudence in selecting investments at the outset" (Supreme Court of the United States, 2015).

This ruling has wide-ranging implications for any wealth manager that has a 401(k) as a client because it indicates that plan fiduciaries must choose the best investment vehicles, reassess those investment vehicles, and charge reasonable fees throughout the process, lest they be charged with negligence and breaching their fiduciary duty.

Then in 2015, the Department of Labor proposed to extend the fiduciary standard to anyone offering advisory services for retirement accounts through RIN 1210-AB32, which was labeled with a high, "economically significant" priority status (Office of Information and Regulatory Affairs, 2015).

Can a robo-advisor be a fiduciary?

Through the discussion created by RIN 1210-AB32, many began to speculate on whether or not a robo-advisor could be considered a fiduciary. In a paper dated June 30, 2015, Melanie Fein, a lawyer who has lectured at Yale law school and was the senior counsel to the Board of Governors of the Federal Reserve, delved into whether or not robo-advisors could claim to meet the fiduciary standard (Fein, 2015). She asserted that robo-advisors did not meet the fiduciary standard based on five areas:

Figure 2.1. Summarized areas where robo-advisors fail to meet fiduciary standards (Clark, 2015)

Category	Summary
1. Data Collection	Most robo-advisors collect information through online questionnaires, which could be criticized as too simplistic; Fein argues that asking "canned" questions leads to superficial answers that result in superficial asset allocations.
2. Conflicts of Interest: Outside Compensation	Some robo-advisors receive compensation from "affiliated and non-affiliated broker-dealers, custodians, and clearing firms that handle their customer's securities transactions," and this could be misleading to customers that believe they are getting a free or low-cost service, when it has simply transferred costs to another portion of the value chain.
3. Conflicts of Interest: Self Dealing	Some robo-advisors receive compensation from the securities they invest in, which creates misaligned incentives.
4. Standard of Client Care	Some robo-advisors deliberately eschew the fiduciary duty by stating that it is a client's responsibility "to monitor their own account, while robo-advisor personnel will only conduct limited, non-periodic reviews of customer accounts," which would not meet the previously discussed ERISA-defined level of fiduciary care.
5. Acting in Client's Best Interests	Some robo-advisors have agreements worded to say that it's a client's responsibility to determine that the investments are in their best interest and never obligate themselves to specifically state they will act in a client's best interests.

These are the arguments levied against robo-advisors, but it's important to note that not all robo-advisors are the same and that almost certainly some of them will fall short of the fiduciary standard of care, just as much of the investment management industry itself has fallen short of being considered a fiduciary.

In Fein's critique of robo-advisors, she examines the legal agreements of various robo-advisors, and in her effort to protect the identity of each individual robo-advisor, she replaces all references back to a specific robo-advisor with simply "[Robo-advisor]." This has the effect of taking isolated robo-advisor agreements and implying that they are emblematic of the entire industry.

Two examples of Fein's critique of robo-advisors come from Charles Schwab's Intelligent Portfolios and Wealthfront's user agreements. Specifically, Charles Schwab's Intelligent Portfolios robo-advisor service maintains an intentionally high cash balance, invests in its own Schwab ETFs, and has a trade flow agreement with UBS—all so that it can present itself as a "free" service (Charles Schwab, 2015).

Likewise, Wealthfront's customer agreement mentions that it could receive fees from its partner, Apex Clearing, for routing trades through that company (Wealthfront, 2015).

However, it would be unfair to characterize the entire industry this way, and in Wealthfront's case, as an SEC-registered financial advisor, the company has also declared that it has to meet the fiduciary rules and regulations set forth by the SEC.

Also, some robo-advisors are very open about how they act in a fiduciary capacity for their clients. For example, Betterment wrote in an open letter to support the Department of Labor's RIN 1210-AB32 proposal to extend the fiduciary standard because they consider themselves to be a fiduciary robo-advisor.

In a rather apt comparison, Betterment's letter compared the difference between a fiduciary investment advisor and a stockbroker to that of a doctor and a pharmaceutical rep. Just as most patients would be unwilling to let a pharmaceutical rep pick their healthcare options, most investors would not allow a stockbroker to handle their investment choices, the letter pointed out. Yet, 75% of investors are unaware of the difference between a fiduciary advisor and a stockbroker (Peiffer, 2015).

The letter also quoted a report from the Public Investors Arbitration Bar Association (PIABA) from March 25, 2015 that looked at the difference between advertisements from financial institutions and their corresponding, on-the-record statements from arbitration proceedings (Lazaro, 2015). It contains conversation snippets such as:

- Merrill Lynch Ad: "It's time for a financial strategy that puts your needs and priorities front and center."
- Merrill Lynch Arbitration Statement: "Respondents did not stand in a fiduciary relationship with Claimants."

So despite advertising that clients' interests would be "front and center," Merrill Lynch still didn't feel that obligated a fiduciary relationship. This same story is retold from numerous institutions, and the report includes excerpts from Fidelity Investments, Wells Fargo, Charles Schwab, and so on. Yet, Betterment, to attest to its own fiduciary standard, only receives compensation from a flat-percentage fee on client assets under management.

It seems that in such a wide and diverse competitive landscape, there will be companies that are fiduciaries and ones that aren't. However, the onus for the fiduciary standard falls on the individual company and should not be broadly applied to whole categories.

2.f. Regulatory Conclusion

While increased regulation has required more man-hours to complete forms and disclosures concerning recordkeeping and communication, one side effect has been that wealth managers of all sizes have become more institutionalized and scalable. As regulations have mandated and standardized internal

controls, wealth managers have had to form policies to govern their workflows, which have in turn led them to become more scalable.

The larger investment firms are in the best position to benefit from this, as they are better able to absorb the costs that come from a higher regulatory baseline; while the smaller brokerages and RIAs will be able to absorb these costs, they will most likely have to insource consultants or other compliance services. These specialists will be needed to decipher and understand the growing list of regulations that a firm needs to stay compliant with, and in fact, we see the emergence of some of these services already with websites like RIAINabox.com. These outsourced services will be especially needed for areas such as technology, social media, and cloud document storage compliance, where the regulators are still forming their views on the rules surrounding them.

One example of this is the archiving of all online activity because it is regulated as advertising. This means that all versions of a website, all blog posts, and all social media posts need to be logged for review by regulators. This is the type of regulation that would be very difficult for a small firm to follow on its own without the help of a third-party vendor, like Smash.com.

Lastly, the shift to a fiduciary standard would decimate the business models of some investment firms, such as broker-dealers, who make a significant amount of their money through selling loaded funds, which generally kick back a portion of the increased costs to the brokerage firm. I believe that the shift of many broker-dealer firms toward dual-listing themselves as RIAs is partially in preparation for the day when they need to switch to a straight fiduciary model.

Overall, it feels as though current regulation trends are placing an emphasis on trust and culture within organizations. That is a difficult thing to enforce through regulation, but as an industry that deals with such sensitive issues, there is a possibility for unscrupulous people to take advantage of their clients, and many of the regulations are designed to flag these sorts of conflicting interests.

In conclusion, while regulations have introduced more safeguards into the financial system, and it is likely that they will continue to do so, the pace and substance of recent regulatory change does not seem to endanger the future of wealth management. While there will be cost increases from labor and IT, it seems the best course of action for wealth managers is to develop a proactive and transparent organizational culture, while investing in a strong infrastructure to support investor, marketplace, and regulator expectations.

3. EVOLUTIONARY TECHNOLOGY FOR ADVISORS

3.a. Introduction to Technology

In 1995, Clayton Christensen introduced the idea of disruptive innovation through technology in his article titled "Disruptive Technologies: Catching the Wave" and further elaborated on the point in his book *The Innovator's Dilemma*. Disruptive innovation is the idea that technology and innovation can create a new market and value chain that will eventually displace the currently prevailing market and value chain.

However, not all innovations are disruptive or revolutionary; some just serve to improve the status quo or have no impact at all. In this context, the question is whether financial advisors will be master, slave, or partner to new technologies.

In answering this question, part of the difficulty is that technology both augments the ability of humans while also dispensing with the need for them. This is particularly true of disruptive innovations. As Christensen noted in his book, disruptive changes are generally introduced by outsiders while the current market leaders follow a more conventional approach to innovation, which is usually incremental or evolutionary.

When looking at how technology has changed and continues to change the wealth management industry, it's also important to remember the context, which is that technology is also shaping the broader world and not just the wealth management industry itself. Along with demographic changes and changes in consumer preferences, the wealth management industry, like most other industries, is going to change regardless of technology in the coming years.

For example, the average client today has much more information available to them, as opposed to 30 years ago, about how to manage their money, whether through social media, search engines, or online articles. They also have increased access to this information through their computer or smart phone—not just in libraries. This increased level of transparency benefits the client, but also changes the dynamic between them and their wealth manager. In some cases, the client may have access to tools and information that rivals their advisor's. This is the same trend that is shaping many other knowledge-driven, service-focused businesses, such as doctors or lawyers, where clients are becoming increasingly empowered outside of their direct relationship with a professional.

Though humans can currently accomplish tasks that machines cannot, will this always be true? Maybe we are simply in the brief period of time before machines become more sophisticated and replace humans altogether, or maybe humans and machines will remain dependent on each other in an equilateral agreement.

As for the industry itself, I think the best approach is to break the impact from technology into two segments: one for how technology is driving existing advisors to adapt and improve their business and a second part for how new entrants are trying to disrupt the space by bringing in new business models.

3.b. Tools for Advisors

Investment advisors are using a multitude of technological tools to improve how they manage portfolios, connect with new customers, maintain existing customer relationships, and conform to regulatory requirements. While these tools represent advances for an advisor, on some level they simply represent a more specialized version of what investment advisors were doing a decade or two ago through a spreadsheet, an email program, or a filing cabinet.

However, these tools undoubtedly augment an advisor's ability to do their job better. This section focuses on tools that help advisors to do their jobs better. In the classic example of a chessmaster versus an AI opponent, such as Garry Kasparov and Deep Blue, the best results against an AI always came when a chessmaster was paired with a computer to assist him. This would suggest that pairing an expert with tools to make him better at his job will always win out over a strictly AI opponent.

In total, I believe there are about eight addressable areas, where investment advisors are actively seeking help from third-party technology vendors. They are: financial planning, marketing and lead generation, online archiving, customer relationship management, online document storage and management, portfolio risk analysis, portfolio rebalancing, and portfolio management and reporting.

3.b.i. Financial Planning

As investment managers have increasingly sought to add value for clients beyond just managing investments, financial planning has become a larger area of focus for many advisors. In general, financial planning is concerned with analyzing a client's current assets and cash flows and comparing that against future outlays, such as college, retirement, or estate needs. It can even be used for more day-to-day budgetary needs.

In 2013, only 44% of financial advisors offered financial planning services, but when ranking advisors in terms of asset growth, over 55% of advisors in the top quintile of growth offered financial planning services (RIA in a Box, 2014).

Today, around 61% of emerging advisory firms, which have \$50 million or less in assets under management, provide financial planning services that utilize financial planning software, whereas 78% of established advisory firms, which have more than \$50 million in assets under management, use financial planning software (RIA in a Box, 2014).

Figure 3.1. Most popular types of financial planning software

Name	Website
MoneyGuidePro	https://moneyguidepro.com
inStream	http://instreamwealth.com/
AdvisoryWorld	http://advisoryworld.com/

Finance Logix (acquired by Envestnet in 2015)	http://www.financelogix.com
Money Tree Software	http://www.moneytree.com
eMoney Advisor (acquired by Fidelity in 2015)	http://www.emoneyadvisor.com
Zywave	http://www.zywave.com
Advicent	http://www.advicent.com
NaviPlan	http://www.naviplan.com
Interactive Advisory Software	http://www.interactiveadvisorysoftware.com
ESPlanner	http://www.esplanner.com
Morningstar Advisor Workstation	http://corporate.morningstar.com/us/asp/subject.aspx?xmlfile=144.xml

Among these, according to the InvestmentNews 2013 annual survey of 1,300 advisors, the most popular financial planning software tools among advisors that used financial planning software were (Janowski, 2013):

Figure 3.2. Penetration of financial planning software

Product	% of Advisors Using
MoneyGuidePro	45.5%
eMoney Advisor	11.9%
Morningstar Advisor Workstation	5.4%
NaviPro Planning / Advicent	4.6%
Advisor created / custom	3.3%
Finance Logix	3.3%

In this category, the survey also showed that 85.5% of advisors were either "satisfied" or "very satisfied" with their financial planning software.

While many of these products focus on one particular part of financial planning, such as Zywave, which focuses on insurance, or Advicent's NaviPlan, which focuses on high-net-worth clients, the key components of a financial planning software system appear to be:

1. Account Aggregation and Integration

Many financial planning software providers have integrated themselves into a number of financial custodians, CRMs, and other data partners so that a client is able to import their bank or investment accounts into the software, which will automatically read and keep updated numbers such as account balances, transaction history, or investment performance.

This eliminates the need for an advisor or a client to manually input account values, and it helps both the client and the advisor to have a more accurate view of a client's assets.

2. Reporting and Analysis

Up-to-date financial information can provide a useful snapshot of a client's finances, but it's also important to draw insights from it. This is where analyzing and reporting become key features in understanding a client's financial life, whether that is analyzing investment performance, budgets and spending habits, or long-term financial planning for college or retirement.

These types of analyses will generally look at the cash-flow information that has been pulled in through the account aggregation, and then they will be able to incorporate that cash-flow information alongside projections for taxes or inflation to develop a plan around the likelihood of funding a short-term or long-term goal.

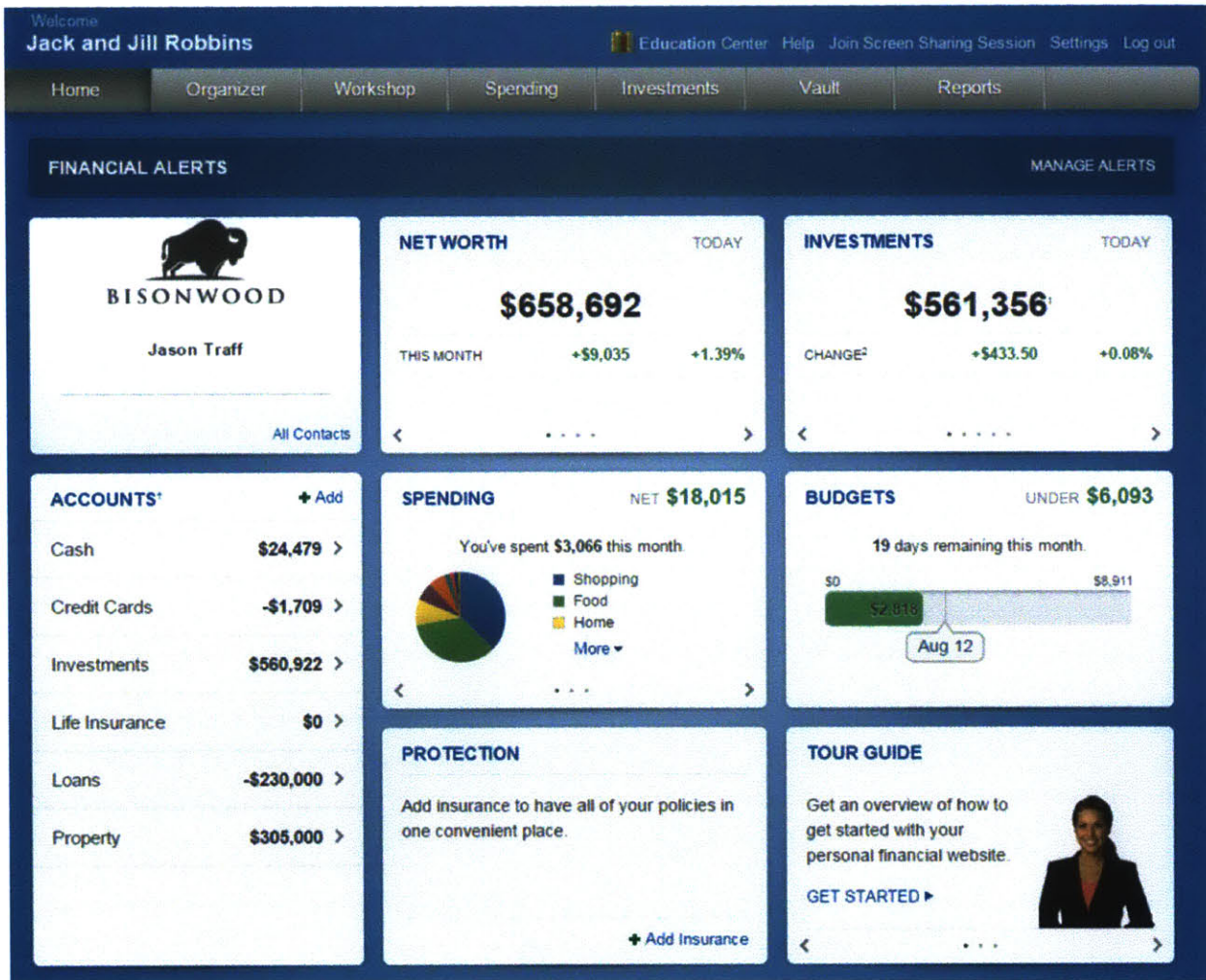
These reports are generated on-the-fly and are usually displayed in the browser or generated into a PDF to be shared between a client and advisor.

3. Client Portal

All of this information is generally accessed through an online client portal, similar to Mint.com, where a client logs in to see their aggregated account information and run reports on their finances. Many services also offer the advisor the ability to see into a client's portal for the purposes of consulting on budgets or spending habits.

While basic client portals have been around for years, recently there has been a big push by companies, such as eMoney, to provide a professional client portal experience that rivals a client's other online experiences. This represents a marked improvement over older client portals that were poorly designed and cumbersome to use.

Figure 3.3. eMoney Advisors Client Portal Screenshot



Here you can see eMoney's client portal, which features account aggregation through data sharing agreements with banks and other financial institutions alongside financial planning, investment monitoring, and online cloud document storage.

3.b.ii. Marketing and Lead Generation

There are hundreds, if not thousands, of marketing and lead generation tools in the market today, and the vast majority of them aren't specific to the investment management industry. These could encompass anything from a what-you-see-is-what-you-get (WYSIWYG) website editor like Weebly or Squarespace to broader marketing automation tools like Hubspot or any number of other tools that could be used to help an investment manager promote their business and attract new clients.

However, for the purposes of this paper, I want to specifically target tools for advisors, and these seem to fall into just a handful of categories.

In terms of online presence, there are a number of places that an advisor can get a custom-built website, such as:

Figure 3.4. Custom-build advisor websites

Name	Website
AdvisorFlex	http://advisorflex.com
AdvisorWebsites	http://advisorwebsites.com

The main differences for these are that you get a website built for you, rather than a WYSIWYG interface where you build it yourself, and that they will do some of the more advisor-centric customizations, such as linking your client portal or risk management software into your website.

Another key category of marketing and lead generation tools is online discovery, both for a prospective client to find an advisor and for an advisor to find a prospective client.

For a client to find an advisor, popular sites are:

Figure 3.5. Advisor discovery websites

Name	Website
WiserAdvisor	http://wiseradvisor.com
Paladin Research and Registry	http://paladinregistry.com
The National Association of Personal Financial Advisors	http://napfa.org
FINRA IARD Advisor Search	http://www.adviserinfo.sec.gov/IAPD/Content/Search/iapd_Search.aspx

These are mostly screened online directories, where a prospective client could find information on an investment advisor that has chosen to be listed. However, there is also FINRA's IARD search function, which searches regulatory filings and, as such, doesn't require an advisor to opt-in.

However, for an advisor to search for prospective clients, there are very few tools available, and the tools that are available are focused more on B2B applications, such as an advisor looking to manage a business' 401k or other retirement plan. This makes sense because none of the other online tools that an advisor would use to find a prospective client would be industry-specific. Instead, an advisor would use a combination of search engine optimization (SEO), search engine marketing (SEM), and inbound techniques, such as social media or thought-leadership articles or blog posts.

For an advisor looking for new B2B relationships, the most used websites are:

Figure 3.6 Client discovery websites

Name	Website
Brightscope	http://brightscope.com
FreeERISA	http://freerisa.benefitspro.com
Judy Diamond Associates	http://judydiamond.com

These websites deal with the sourcing, analysis, and lead generation of a business' retirement plan by looking at details available from the business' own regulatory filings. Businesses with retirement plans are required to annually file a Form 5500 to the government stating the basic terms of their plan. From these filings, advisors are able to analyze the fees, options, and competitiveness of a business' retirement plan with the idea that a business with a lackluster plan would be a great target for an advisor to approach with a better alternative.

3.b.iii. Online Archiving

One area of compliance that has become increasingly complicated in recent years is the archiving of all online media. In addition to the traditional records an investment advisory firm may hold, either in paper or digital formats, SEC Rule 17a-4 has set guidelines for how all online media is to be treated (Securities and Exchange Commission, 1997). This is because the SEC and FINRA consider online media to be a form of advertising, which means that it is subject to review for false claims. So every live change to your website (including blog posts), every Facebook update, and every tweet on Twitter needs to be retained for posterity. Additionally, all internal and external messages should be preserved as well, so many archiving service providers will also monitor instant messenger programs, email, along with more nuanced Thomson Reuters, Bloomberg, Blackberry, and other industry-specific messaging programs.

Once all of this data has been collected and retained, the integrity of the data must be protected, and this means that it is difficult for a firm to maintain these records themselves without the help of a third party. In some cases, the service providers themselves offer archiving capabilities. For example, Google Apps offers Google Vault, which retains emails for regulators and administrators to review, and some sites like Weebly, a WYSIWYG website developer, has integrated ways to track and export website changes.

However, it's often better to employ a third-party archiving firm to manage all aspects of compliance archiving because they not only encrypt and physically protect the information; they also offer detailed monitoring tools, such as audit trails, workflow supervision, along with the other elements required for regulatory compliance, which may be helpful if a firm is audited.

The most popular providers of archiving services are:

Figure 3.7. Popular online archiving services

Name	Website
Smarsh	http://smarsh.com
PageFreezer	http://pagefreezer.com
Global Relay	http://globalrelay.com
Erado	http://erado.com
Arkovi	http://arkovi.com

I find archiving to be one of the most interesting categories of third-party software because it's essentially a required cost for most firms, which are unable to provide these services for themselves. So when looking for ways that regulatory creep has directly impacted investment advisory firms, this is one of the most measurable effects. Yet, interestingly, in InvestmentNews' 2013 survey of 1,300 advisors, the list of the "top 25 technology products used by advisors" doesn't include a single archiving solution (InvestmentNews, 2013).

3.b.iv. Customer Relationship Management (CRM)

CRM tools help a firm interact with current and future customers by categorizing, organizing, and occasionally automating business functions around sales, marketing, and customer service. CRM tools are ubiquitous today in virtually all industries, and investment management firms are no different with over 60% of them utilizing CRM tools (RIA in a Box, 2014).

CRM tools grow in usefulness as an RIA firm grows because the need for communication across and within teams becomes a bigger challenge. For a one-man firm, a CRM tool may consist of little more than a spreadsheet or email program. However, larger teams need to know when a client was last contacted, what was said to them, and what the next step should be.

CRM tools can go even further in enhancing a client relationship by remembering a client's personal details, purchase history, preferences, and possibly even aggregating that data from several other sources. For an RIA, this usually means that CRM software can pull information from the custodian that holds the funds or the performance reporting system that monitors and measures portfolio performance.

Most of the top CRM tools are the same across industries; these include:

Figure 3.8. Popular CRM services

Name	Website
Salesforce	http://salesforce.com
Microsoft Dynamics	https://www.microsoft.com/en-us/dynamics/crm.aspx
SugarCRM	https://www.sugarcrm.com/
Zoho CRM	https://www.zoho.com/crm/
Zendesk	https://www.zendesk.com/
Spiceworks	http://www.spiceworks.com/
Act!	http://www.act.com
NetSuite	http://www.netsuite.com/portal/products/netsuite/crm.shtml
InfusionSoft	http://www.infusionsoft.com/
TeamSupport	http://www.teamsupport.com/
Marketo	http://www.marketo.com/software/marketing-automation/crm-integration/
mHelpDesk	http://www.mhelpdesk.com

I've listed a dozen of the most popular CRM systems here, but I could have easily kept going and added another dozen because there are hundreds of companies that provide these services. However, a few specialize in doing CRM for financial advisors, such as:

Figure 3.9. Popular investment advisor-focused CRM services

Name	Website
RedTail	http://www.redtailtechnology.com
Junxure	http://www.junxure.com
AppCrown	http://www.appcrown.com
Concenter Services	http://www.concenterservices.com
ProTracker Software	www.protracker.com
Salentica	http://www.salentica.com
Wealthbox CRM	http://www.wealthbox.com
SmartOffice's E-Z Data	http://www.ez-data.com
Tamarac Advisor CRM	http://www.tamaracinc.com/Advisor-CRM.aspx
Grendel	http://www.grendelonline.com

Most RIA firms today use CRM tools, and the two most popular choices are RedTail and Junxure, which are used by 30% and 15% of RIA firms, respectively (InvestmentNews, 2013).

3.b.v. Online Document Storage and Management

These technology vendors represent the shift from the desktop to "the cloud," where firms are increasingly keeping sensitive documents online. The main benefit for these types of services are that they are generally considered safer since the files are encrypted and physically secured in an offsite location, but regulations surrounding them are still nascent and subject to change in the coming years.

While the SEC and state regulators are still putting together rules surrounding document storage, the only guidance that the industry has received so far is that FINRA prefers documents to be stored in a 256-bit encryption format, but it's unclear if the SEC or state regulators would agree.

However, it's worth noting that while these vendors may do a good job with physically securing and encrypting the data in their possession, it's outside of their scope to know how well a firm is securing the data inside their office or data that is transmitted.

The most popular choices for online document storage are:

Figure 3.10. Popular providers for online document storage and management

Name	Website
Dropbox	http://dropbox.com
Box	http://box.net
NetDocuments	http://netdocuments.com
Barracuda Networks	http://barracuda.com
Citrix's ShareFile	https://www.citrix.com/products/sharefile/overview.html

There are also a few niche players that focus on the workflows around online documents, such as digital signatures or business process automation, such as:

Figure 3.11. Online workflow management

Name	Website
Laser App Software	http://laserapp.com
Laserfiche	http://laserfiche.com
HelloSign	http://hellosign.com
EchoSign	http://echosign.com

It's not surprising that there aren't many financial advisor-focused products in this market because the best-in-class products are designed for much higher qualifications, such as HIPAA, so there isn't much of a need to build something special for advisory firms.

3.b.vi. Portfolio Risk Analysis

A typical interaction between a client and an investment advisor begins with the client sharing their financial information, including investments, with that advisor. The advisor will then prepare recommendations based on the client's current circumstances along with the client's risk preferences and objectives for return. A key step occurs when the advisor looks at a prospective client's current investments and then has to make recommendations as to what they would do differently, if anything. This is where quantified portfolio risk analysis tools come into the picture.

Then, if a prospective client is impressed by the advisor and their recommendations, and becomes an actual client, the portfolio risk tools will be used to keep the client's portfolio risk and return characteristics in line with the client's expectations.

Companies that perform risk analysis can be difficult to categorize because many companies monitor investment risk as an inherent and integral part of investments. However, to contain the scope, I'm specifically going to be looking at companies that monitor the risk level of an entire portfolio of investments and not any one investment individually. Otherwise, I would have to include the various rating agencies, such as Moody's, or data providers, such as Bloomberg.

The most popular portfolio risk analysis companies are:

Figure 3.12. Popular portfolio risk analysis software providers

Name	Website
Morningstar	https://corporate.morningstar.com/us/asp/subject.aspx?xmlfile=2846.xml
Riskalyze	http://www.riskalyze.com
Kwanti	http://www.kwanti.com
YCharts	http://www.ycharts.com
IPS Advisor Pro	http://www.fi360.com
Pocket Risk	http://www.pocketrisk.com
FinaMetrica	http://www.riskprofiling.com
HiddenLevers	http://www.hiddenlevers.com

Each company addresses different areas. For example, HiddenLevers specializes in stress tests, and PocketRisk specializes in risk profiling questionnaires to give a quantitative "risk score" to clients. In some cases, such as with Riskalyze, these companies have attempted to become closer to an all-in-one solution for advisors by adding in rebalancing and cloud storage tools.

3.b.vii. Portfolio Rebalancing Tools

When onboarding a new client, many advisors will discuss how that client's portfolio will be put together, such as 60% in stocks and 40% in bonds. As time passes, this allocation will drift because of the changing values of the underlying holdings, and this is where an advisor would use a rebalancing tool to bring that allocation drift under control. For a small advisor, this may be manageable by just periodically

checking accounts or by using a spreadsheet, but for larger advisors, it becomes difficult to manage a large number of portfolios without neglecting some of them.

This is one of the fastest growing areas of advisor technology tools; in 2011, only 29.3% of advisors used a rebalancing tool and by 2013, that number had grown to 45%. This represents a 23.9% growth rate among advisors between 2011 and 2013 (InvestmentNews, 2013).

Many rebalancing tools are part of a larger technology platform because they benefit greatly when introduced into a CRM system, a portfolio risk analysis tool, or a portfolio reporting tool. These include:

Figure 3.13. Popular portfolio rebalancing services

Name	Website
Technology Platforms:	
Investnet's Tamarac	http://www.tamaracinc.com/
Advent's BlackDiamond	https://www.advent.com/blackdiamond
Stand-Alone Products	
tRx (Total Rebalancing Expert) (acquired by Morningstar in 2015)	http://www.trxpert.com
iRebal	http://www.tdainstitutional.com/lp/irebal.page
ATOM ALIGN	http://www.blazeportfolio.com/features/model-rebalancing
RedBlack	http://www.redblacksoftware.com
TradeWarrior	http://www.tradewarriorsoftware.com

Often, the stand-alone rebalancing tools focus on sensitive issues, such as tax efficiency, and since they primarily target investment firms with a large amount of assets under management, their prices are generally several thousand dollars per quarter, which prices them beyond the reach of a smaller RIA firm.

3.b.viii. Portfolio Management and Reporting

One of the largest and most important categories of technology tools for an RIA firm is the portfolio management and reporting system (PMR). A PMR is central to most of the core areas of a firm's business, so it's one of the most important tools for an RIA firm.

A PMR will help a firm to:

1. Calculate Management Fees

These features vary from generating a simple *.csv spreadsheet with corresponding billing amounts to full automation with a customizable system that allows advisors to tailor fees differently for different clients or client groups.

2. Generate Client and Advisor Reports

These could range from traditional reports with position lists and pie charts to advanced reports that quote Modern Portfolio Theory statistics, compare performance on either a dollar- or time-weighted basis to thousands of benchmarks, and heavy data visualization customization.

3. Import and Reconcile Client Accounts across Multiple Custodians

This allows an advisor to aggregate all of their client records directly from their corresponding custodians and to view them all in one centralized location, and by getting this data directly from the custodian, they are able to have an independent party that is able to re-check account positions, amounts, and performance.

Many PMRs also offer portfolio management systems that have built-in rebalancing tools, which will either generate a list of trades to be made or will automatically place those trades on behalf of an advisor. They may also include client portals, CRM functionality, and outside data aggregation through third parties, which will let an advisor view a client's complete financial life.

Each of these individual functions would be enough to warrant a separate technology product in many cases, but their usefulness is magnified by having them condensed into one product. This helps to explain why it is one of the most active areas of mergers-and-acquisitions among technology products for investment advisors, as there are several large firms that are working to consolidate this market.

The most popular choices are:

Figure 3.14. Popular portfolio management and reporting services

Name	Website
Advent and Advent's Black Diamond	http://www.advent.com
Charles Schwab's Portfolio Center	https://schwabpt.com/products/portfoliocenter/
Morningstar Office	http://corporate.morningstar.com/us/asp/subject.aspx?xmlfile=95.xml

Envestnet and Envestnet's Tamarac	http://www.envestnet.com http://www.tamaracinc.com
Orion Advisor Services	http://www.orionadvisor.com
FinFolio	http://www.finfolio.com
BridgePortfolio	http://www.bridgeportfolio.com
Albridge Solutions	http://www.albridge.com
Portfolio Pathway	http://www.portfoliopathway.com
Blueleaf	http://www.blueleaf.com
AssetBook	http://www.assetbook.com

Traditionally, these types of services required a heavy up-front investment from an RIA, but the emergence of cloud computing has meant that these systems have become far more accessible for the average advisor.

4. REVOLUTIONARY TECHNOLOGY AS ROBO-ADVISORS

A disruption to the existing advisor landscape does not require the creation of a fully formed artificial intelligence or a superintelligent machine, such as the one described in Nick Bostrom's 2014 book *Superintelligence: Paths, Dangers, Strategies*. Bostrom explains how humans could be replaced by and possibly endangered by functional, superintelligent machines (though that would certainly represent a disruptive technology).

Instead, a lower form of AI, such as an expert system, which replicates the decision-making ability of a human expert, would be sufficient to replace many of the essential functions of a human financial advisor. Expert systems, which are also sometimes called decision support systems, are seeded with an extensive database of rules and facts and then generally apply if-then logic to this database in an attempt to replicate the logical thinking of an expert. The two main parts of an expert system are: i) the database portion of rules and facts, which are generally referred to as the knowledge system, and ii) the logic portion that makes judgments, which is generally referred to as the inference system.

Many of the earliest forms of expert systems date back to the 1980s and were used in complex scientific fields, such as to detect blood infections or find mineral deposits, and their main advantage was that they were supposed to be reprogrammable without the need for a dedicated IT or software engineer. Instead, an expert was supposed to be able to peer into the underlying code to examine the assumptions made by the machine and adjust how the machine was processing and executing new data. This was supposed to allow for rapid prototyping and easy code maintenance. In reality, maintaining an expert system still required a good deal of technical skill to understand the syntax that the expert system's computer code used (Wong & Monaco, 1995).

However, the main problem with expert systems was that it was difficult to seed them with the knowledge required to get them up to speed, and depending on their use, it was often difficult to keep them up-to-date with all of the relevant facts and figures that an expert needed to do their job well. After all, a human expert would simply watch the news, read the paper, or have a conversation with a coworker to stay informed, but to then ask that human expert to regularly relay everything that they had learned into the expert system was a daunting task.

While expert systems have been historically used for many things to varying degrees of success, they do have a successful history in money management, especially in tax planning. As far back as 1982, there were programs, such as Taxadvisor, that were developed to solve problems dealing with income and tax planning for individuals. By the mid-1980s, there were several commercially successful rule-based, tax planning expert systems (Porter, 1994). Indeed, TurboTax, which is one of today's most popular income tax preparation software packages, was developed in the mid-1980s (Forbes, 2012).

Ultimately though, just as the TurboTax of the mid-1980s looked very different from the product that millions of Americans use to do their taxes today, the problem with comparing any potentially disruptive

technology to the status quo is that the new technologies are generally unfinished or incomplete as a product offering at the point when they are brought to the public's attention.

For example, buggy whip manufacturers were probably unconcerned by the first automobiles because they were so expensive. The first few Ford cars, such as the Model B and Model K, were prohibitively expensive for most people. If an analysis of the future potential of buggy whips and automobiles had been conducted at that time, it might have cited the high cost of automobiles as a reason why the horse and cart would be around for many more years. However, this type of myopic comparison doesn't take into account the fact that technologies evolve, such as when Ford released their lower-cost automobiles, the Model N and later its famous Model T.

Instead, understanding the intricacies of the buggy whip market would require a deeper look into the possible market forces that would preserve the buggy, which, as it turns out, is now mainly used for novelty and tourism purposes. So for the purposes of comparing human and robot financial advisors, we have to assume that today's robo-advisor is just an early iteration of what it could become. To do this, I'll look closely at the current robo-advisor advantages and the circumstances surrounding them, and then later we'll do the same for human advisors to see how they could be assisted by a future robo-advisor.

4.a. Robo-Advisor Advantages

One of the common arguments for a robo-advisor is that many of the functions of a human advisor are already done by software, such as many of the examples in the "3.b. Tools for Advisors" segment of this paper can attest to, and as such, it's also possible for them to be done by a computer without the intervention of a human advisor. The only real difference is that, for a robo-advisor, the information has to come either through the client's input or through their approval for the data to be pulled from another online partner, whereas for a human advisor, that information usually comes through a conversation with the client.

It's often said that a computer can perform well at all of the tasks that a human has to think about, but it has a much harder time with all of the tasks that a human does not need to think about. Traditionally, for example, this has meant that computers excelled in math, whereas they had a harder time recognizing an object within a picture or understanding the nuances of spoken languages. However, for investment decisions, most of the financial knowledge that an advisor possesses may come from their own experience, but it is increasingly being filtered through software. As Sam Swift, a data and behavioral scientist at Betterment described in an interview, "most of the decisions that an advisor makes are just math problems" (Swift, 2015).

For example, the typical person may need to choose how they are going to save for retirement and whether that would be done through a Traditional or a Roth Individual Retirement Account (IRA). Now, there are comparative advantages and disadvantages between a Traditional or a Roth IRA, such as income limits and tax advantages. Also, to make the choice between a Traditional or Roth IRA, an advisor would need to know more about their client, such as their age, large planned expenses, and

their projected income. Once an advisor knows all of these inputs, they would be able to make a decision as to the best retirement account type for their client. However, as Swift described, these are math problems, and they could easily be done by a robo-advisor.

To further illustrate this point, in April 2015, Betterment launched their RetireGuide, which provides advice for individual retirement plans. It allows investors to assess themselves and their retirement situations by inputting personal data, assumptions about their future, such as Social Security, and their current retirement savings. The RetireGuide will then tell the client how much they should be saving, what type of account it should be saved in, and how those funds should be invested.

So robo-advisors have already made forays into giving advice to clients, and because their advice isn't based on human intervention, it's also not reliant on traditional business hours. A robo-advisor can constantly monitor its investment portfolios and be available to help clients any time of the day and on any day of the year.

Aside from these structural advantages, which come from being an automated online service, robo-advisors have also introduced other innovations to further separate themselves from traditional investment advisors. Here are some of the main advantages of robo-advisors over their traditional counterparts:

4.a.i. Lower Fees Relative to Traditional Wealth Managers

In general, robo-advisors charge less for their services than human advisors, and this is perhaps the most material difference between the two. Because of how money compounds, any additional fee comes directly from the returns that the portfolio generates, and even a small percentage difference on a portfolio can compound into a meaningful number over time.

For example, the difference between a \$1 million portfolio that earns 6.75% and one that earns 7.0%, which is just a difference of 0.25% or 25 basis points, over 30 years is \$515,881. In this example, consider two identical portfolio managers that produce identical returns; the only difference is that one of them charged an extra 0.25% in their fees. While the investment manager with the higher fee would have earned more money than their lower-fee counterpart, this comes at the expense of the client.

By far the most popular way for an investment advisor, human or robo, to charge their clients is by taking a fee based on a percentage of assets under management. Often, these fees are tiered so that larger clients pay relatively less than smaller clients. For example, Yeske Buie, a wealth manager based in San Francisco, has a minimum account size of \$3,000,000 and charges clients (Yeske Buie, 2015):

- 1.00% per year on the first \$5,000,000, plus
- 0.50% per year for amounts greater than \$5,000,000 up to \$10,000,000, plus
- 0.35% per year for amounts greater than \$10,000,000.

This tiered system means that while a client with \$5,000,000 would pay a flat 1.00% fee equal to \$50,000 per year, a client with \$15,000,000 would pay \$50,000 for their first \$5,000,000, then \$25,000

for their next \$5,000,000 and then \$17,500 for their final \$5,000,000. This works out to \$92,500 per year or a 0.617% management fee as opposed to the original client's 1.0% management fee.

In a 2015 survey of 556 financial advisory and asset management firms across the US and the UK, AdvisoryHQ pulled together the average fee rates based on account size for human investment advisors (AdvisoryHQ, 2015).

Figure 4.1. Average Fees for Traditional Wealth Managers

Client Investment Account Size	Average Fees (% / Annual)	Average Fees (\$ / Annual)
\$50,000	1.61%	\$805
\$100,000	1.53%	\$1,530
\$150,000	1.48%	\$2,220
\$250,000	1.24%	\$3,100
\$500,000	1.20%	\$6,000
\$1,000,000	1.14%	\$11,400
\$1,500,000	1.09%	\$16,350
\$2,000,000	0.99%	\$19,800
\$2,500,000	0.93%	\$23,250
\$5,000,000	0.88%	\$44,000
\$7,500,000	0.82%	\$61,500
\$10,000,000	0.74%	\$74,000
\$20,000,000	0.71%	\$142,000
\$30,000,000	0.65%	\$195,000

These numbers also roughly correspond to a 2014 report from Bloomberg and Cerulli Associates that said that most clients with more than \$100,000 pay less than 1.25% a year, while those with just \$100,000 in assets pay more than 1.50% a year (Steverman, 2015).

Additionally, these fees are not considered to be "wrap" or "all-in-one" fees, and investors would still pay trading costs and a fee to the mutual funds and exchange traded funds (ETFs) that make up their portfolio. Depending on how the investment advisor structures a portfolio, these fund management fees could range from 0.10% for a passively managed index fund to over 1.00% a year for an actively managed fund. According to Bloomberg News, average fees are (Steverman, 2015):

- 0.65% per year for actively managed bond funds
- 0.89% per year for actively managed equity funds
- 0.11% per year for indexed bond funds
- 0.12% per year for indexed equity funds
- 0.50% per year for non-leveraged exchange-traded funds

By contrast, here are the fees from some of the most popular robo-advisors.

Figure 4.2. Popular Robo-advisors and their Fee Structures

Robo-Advisor	Average Fees (% / Annual)	Annual ETF Costs
Betterment	0.35% up to \$10,000 0.25% for \$10,000 to \$100,000 0.15% for over \$100,000	0.05% to 0.35%
Charles Schwab Intelligent Portfolios	None; makes money through maintaining a cash position, investing in Charles Schwab ETFs, and a trade flow agreement with UBS	0.04% to 0.48%
Fidelity Investments Portfolio Builder	\$7.95 per trade	0.07% to 0.45%
FutureAdvisor	0.5% plus trading fees of \$7.95 to \$9.99 per trade	0.05% to 0.59%
Hedgeable	0.75% up to \$100,000 0.65% for over \$100,000	0.05% to 0.88%
Motif Investing	None; \$9.95 to buy, sell or rebalance a motif or \$4.95 to buy or sell securities	0.05% to 0.75%
Personal Capital	0.89% up to \$1,000,000 For clients with more than \$1 MM, the first \$3 MM is 0.79%, the next \$2 MM is 0.69%, the next \$5 MM is 0.59%, and anything over that is 0.49%	0.06% to 0.10%
TradeKing Advisors	Free for first year, 0.25% afterwards	0.12% to 0.2%
Vanguard Personal Advisor	0.30%	0.05% to 0.19%
Wealthfront	None up to \$10,000 0.25% above \$10,000	0.05% to 0.75%

Many of these robo-advisors are aggressively marketing to new clients and trying to claim as much market share as possible in their emerging space, and so it would make sense that they are charging less than human advisors, perhaps in an attempt to undercut them. The other take on it is that they essentially are offering a simpler service and, as such, are charging a lower fee. However, I believe that it is clear that as robo-advisors continue to become more prevalent, they will exhibit downward pricing pressure on traditional investment advisors.

Let's take the example of several fictional accounts of differing sizes and see how their fee structure would differ between a traditional investment advisor and some of the most popular robo-advisors:

Figure 4.3. Percentage fee comparison between traditional advisor firm and robo-advisors

Account Size	Traditional Advisor	Betterment	Personal Capital	Vanguard Personal Advisor	Wealthfront
\$50,000	1.61%	0.25%	0.89%	0.30%	0.25%
\$100,000	1.53%	0.15%	0.89%	0.30%	0.25%
\$250,000	1.24%	0.15%	0.89%	0.30%	0.25%
\$500,000	1.20%	0.15%	0.89%	0.30%	0.25%
\$1,000,000	1.14%	0.15%	0.79%	0.30%	0.25%
\$5,000,000	0.88%	0.15%	0.75%	0.30%	0.25%
\$10,000,000	0.74%	0.15%	0.67%	0.30%	0.25%
\$30,000,000	0.65%	0.15%	0.55%	0.30%	0.25%

On a per-year basis, this works out to fees of:

Figure 4.4. Dollar-amount fee comparison between traditional advisor firm and robo-advisors

Account Size	Traditional Advisor	Betterment	Personal Capital	Vanguard Personal Advisor	Wealthfront
\$50,000	\$805	\$125	\$445	\$150	\$100
\$100,000	\$1,530	\$150	\$890	\$300	\$225
\$250,000	\$3,100	\$375	\$2,225	\$750	\$600
\$500,000	\$6,000	\$750	\$4,450	\$1,500	\$1,225
\$1,000,000	\$11,400	\$1,500	\$7,900	\$3,000	\$2,475
\$5,000,000	\$44,000	\$7,500	\$37,500	\$15,000	\$12,475
\$10,000,000	\$74,000	\$15,000	\$67,000	\$30,000	\$24,975
\$30,000,000	\$195,000	\$45,000	\$165,000	\$90,000	\$74,975

It's worth mentioning that the two most expensive robo-advisors in this table are Personal Capital and Vanguard Personal Advisor, and both of these services, while built upon technology platforms, utilize human advisors to talk with clients for financial planning and goal-setting purposes. The other services, such as Betterment and Wealthfront, do offer human support through their call centers, but the portfolio management is driven from an algorithmic perspective.

However, the biggest difference between these services would come from the compounding effects over time. So as a final hypothetical, let's assume a 7% market return and a frictionless market, which

includes no costs for trading or fees for funds, and see how these portfolios would perform over a 30-year time period with only investment management fees withdrawn from the accounts.

Figure 4.5. Impact of fee differential over 30 years

Original Account Size	Traditional Advisor	Betterment	Personal Capital	Vanguard Personal Advisor	Wealthfront
Today	After 30 years				
\$50,000	\$241,519	\$354,819	\$296,251	\$349,867	\$354,819
\$100,000	\$494,161	\$729,854	\$592,501	\$699,733	\$709,637
\$250,000	\$1,341,477	\$1,824,634	\$1,481,254	\$1,749,333	\$1,774,094
\$500,000	\$2,713,564	\$3,649,268	\$2,962,507	\$3,498,667	\$3,548,187
\$1,000,000	\$5,520,224	\$7,298,537	\$6,094,839	\$6,997,334	\$7,096,374
\$5,000,000	\$29,708,946	\$36,492,683	\$30,820,393	\$34,986,668	\$35,481,871
\$10,000,000	\$61,815,067	\$72,985,367	\$63,048,450	\$69,973,337	\$70,963,742
\$30,000,000	\$190,215,578	\$218,956,100	\$195,655,125	\$209,920,010	\$212,891,227

This is a bit of an unfair comparison because the traditional investment managers have the largest fees, so they are certain to underperform the robo-advisors in this example. However, while a traditional investment advisor may provide more benefit to their clients than today's robo-advisors, this does show the quantifiable gap in terms of what a human advisor must overcome to be competitive with a robo-advisor from an investment performance perspective.

For example, a \$250,000 account managed by the average traditional investment advisor would pay 1.24% a year compared to Betterment's 0.15%. Over the next 30 years, which could represent a client's entire working life, they would end up at retirement with \$1,341,477 with a human advisor or \$1,824,634 with Betterment, using the previous assumptions. This difference of \$483,157 spread out over 30 years averages out to \$16,105 per year, which is obviously weighted toward the latter years, but nonetheless, it would require a human advisor to create over \$16,105 worth of value per year to reach parity.

Also, robo-advisors are evolving to offer more and more services that used to be available only through a traditional advisor. So the notion that a human advisor will always present more value than a robo-advisor might not always be true, but because of their cost structure, it's almost a certainty that a human advisor will always need to charge more than an automated one.

4.a.ii. Lower Minimum Account Sizes

Wealth management firms normally require a minimum account size, which can vary widely depending on the firm and their target client. In general, these account minimums range from \$250,000 to several

million dollars. In the 2012 Fidelity RIA Benchmarking Study, which was conducted in collaboration with Quantuvis Consulting, Fidelity collected responses from 308 RIA firms, which broke down their number of clients and assets (Fidelity Investments and Quantuvis Consulting, 2012).

Figure 4.6. Average client size for traditional wealth management firms

Firm Assets Under Management (AUM)	Participating Firms	Average # of Clients	Average \$ of AUM	Average Client Size
All Firms	308	157	\$126M	\$802,548
Less than \$50M	71	56	\$29M	\$517,857
\$50M - \$99M	43	122	\$67M	\$549,180
\$100M - \$249M	83	181	\$140M	\$773,481
\$250M - \$499M	33	323	\$362M	\$1,120,743
\$500M - \$999M	31	441	\$705M	\$1,598,639
\$1B +	31	554	\$1.9B	\$3,429,603

In general, an RIA firm may take or keep a client that is below their minimum required account size if those clients are:

- "HENRY" accounts (high earning, not rich yet)
- relatives of either the advisor or client, including children
- clients that met the minimum account size, but are now old enough that they are distributing their wealth and have fallen below that number either absolutely or because they are in the process of distributing it to younger generations

So it seems reasonable to assume that most RIAs have a minimum account size ranging from the low \$100,000s to several million dollars.

To contrast this with the robo-advisors that were previously mentioned:

Figure 4.7. Minimum account size for robo-advisors

Robo-Advisor	Minimum Account Size
Betterment	None
Charles Schwab Intelligent Portfolios	\$5,000
Fidelity Investments Portfolio Builder	\$2,500
FutureAdvisor	\$10,000
Hedgeable	\$5,000
Motif Investing	\$250
Personal Capital	\$100,000
TradeKing Advisors	\$5,000
Vanguard Personal Advisor	\$100,000
Wealthfront	\$500

Similar to the previous analysis, the two services that offer human advisors, Personal Capital and Vanguard Personal Advisor, have the highest minimums, which seem to be on the low end of the traditional advisor spectrum. Meanwhile, the other robo-advisors have a minimum account size of \$0 to \$10,000.

These lower account minimums have several implications: the first of which is that the services are accessible by a wider range of clients that may not be currently addressable by traditional wealth managers. With more than two-thirds of Americans living paycheck to paycheck (American Payroll Association, 2012), making these services more widely available to the public is a key benefit. Second, these low minimums allow people to try out the service on a smaller scale, even if they have a human financial advisor. Lastly, there's a demographic wealth shift as baby boomers are passing along their accumulated wealth to younger generations.

A 2012 study from Accenture showed that baby boomers were at the beginning stages of transferring wealth to their heirs, and while this transfer will take place over the next few decades, it will result in \$30 trillion being transferred to younger people (Pigliucci, 2015), who are the target clients of robo-advisors, which offer easy online interfaces and low account minimums.

4.a.iii. No Trading Costs to Clients

While a traditional investment advisor will hold their assets under management with a custodian, such as Charles Schwab or Fidelity, many robo-advisors either hold their assets in their own custody or with a lesser-known custodian. This has several implications, one of which is to make sure that your robo-advisor is trustworthy, lest they run off with your assets in a Ponzi scheme and you have to solicit the Securities Investors Protection Corporation (SIPC) for their reimbursable funds of up to \$500,000.

However, the main implication is that a traditional investment advisor will have to pass along trading costs for assets that move through Charles Schwab or Fidelity's system. These costs can range from \$7 to \$50 per trade depending on the assets being traded and, in some cases, on the notification system that a client has elected to alert them of the trade.

For example, Fidelity may charge a client \$17.95 for a trade if they are receiving notifications through regular mail, but they may only charge that client \$7.95 if they are receiving electronic notifications (Fidelity Institutional Wealth Services, 2015).

Some robo-advisors, such as E*Trade Financial's Build Your Own and Fidelity Investment's Portfolio Builder, still adhere to this structure and charge a fee per trade of \$9.99 and \$7.95, respectively. Others have done creative variations on this, such as Motif Investing, which doesn't charge a management fee on assets under management but does charge for trades involving their "motifs."

These frictional transaction costs can become costly for smaller portfolios. For example, a \$10,000 portfolio that holds 10 ETFs may be rebalanced throughout the course of the year by their advisor or robo-advisor. Wealthfront, for example, makes an average of 25 trades a year to implement their tax-

loss harvesting service (Rachleff, 2013). If the trading fees of \$7.95 applied to every trade, that would equal nearly \$200 per year spent on trading costs, which for a \$10,000 portfolio is an additional 2.0% loss every year due to fees.

A major disruptive advantage that some robo-advisors, such as Betterment and Wealthfront, have created is that by structuring themselves to either be their own custodians or by establishing partnerships with lesser-known custodians, such as Apex Clearing, which offers fully automated online and technical integrations, they are able to virtually eliminate their trading costs.

These robo-advisors are able to avoid passing along their trading costs because of a few different mechanisms. First, they only hold a set list of approved investments, generally around a dozen different ETFs. Second, they only trade these ETFs when money is moved into or out of an account or when periodic rebalancing or tax-loss harvesting is necessary. Lastly, they hold all of their own account records on positions because of their custody relationships, which allows them to net trades against each other.

For example, Betterment has 115,000 customers that have invested over \$3 billion with them (Betterment, 2015). Yet, they only hold 13 positions across all of those accounts spread among 6 equity ETFs and 7 bond ETFs (Betterment, 2015). So when it comes time to buy or sell a position, they are able to essentially net all of a security's positions across all of their accounts and make one purchase for that security and then spread it into each of those 115,000 customers' accounts. If done on an optimal level, assuming market liquidity, this means that, even with \$3 billion in assets under management, they could make just 13 trades a day. To take the example to an extreme, rather than spending \$7.95 per trade across 115,000 accounts, which would result in over \$900,000 in fees, Betterment could simply place one trade for the net amount required to balance all of the accounts or if that net amount was zero, they might not even have to place a trade at all.

While real-world conditions will necessitate making more than a dozen or so trades a day due to liquidity and pricing preferences, it becomes clear that this type of structure makes a robo-advisor much more competitive in terms of trading fees, especially in smaller accounts. In the above example, a \$10,000 account simply can't spend \$200 a year to rebalance itself as that 2% drag on the account, plus the advisor's management fee and the underlying fund management fees, will basically make it impossible for the account to ever grow.

For traditional RIAs with larger account sizes, this effect would be less pronounced, but it is still a constant concern. For example, even if a client has \$5 million and they experience negligible trading costs, if that client decided to open a college saving account for their newborn and put \$10,000 into it, those trading costs would still be relevant to that particular account and its performance.

Startup companies such as Robinhood, which is a broker-dealer, allow investors to trade stocks without a transaction fee by instead taking interest from un-invested cash balances and from margin accounts (Robinhood, 2015). However, these services don't currently cater to investment advisors, and the traditional custodians that investment advisors have access to are not going to be eliminating their trading costs anytime soon. So there is no realistic way that a traditional wealth management firm can compete against a robo-advisor on these terms at the moment.

4.a.iv. Target-Based Rebalancing

As a portfolio is invested in a number of securities over time, the underlying prices of those securities will change. After a while, the portfolio will be more heavily invested in securities that have gone up and less invested in securities that have gone down. When compared to the original allocation set on the portfolio, the current portfolio could look quite different, and this is called "style or allocation drift." The act of rebalancing an account brings the portfolio back in line with the original asset allocation by selling securities that have gone up and buying back securities that have gone down. In essence, rebalancing acts as a forced mechanism to ensure that an investor "buys low and sells high."

In an analysis performed by David Swensen, Chief Investment Officer of Yale University's endowment, he found that rebalanced portfolios earned an average of 0.4% more per year with less volatility over a 10-year period than portfolios that were not rebalanced (Swensen, 2015). And in a similar study, Burt Malkiel and Charley Ellis found similar results over a different 10-year period (Malkiel & Ellis, 2013).

So there are tangible benefits to rebalancing a client's portfolio, and most investment advisors will periodically rebalance their clients' portfolios back to an agreed-upon asset allocation, which is usually based on the client's risk constraints, return objectives, and near-term liquidity needs. Periodically, the investment advisor may need to change the asset allocation based on the client's changing life stage or some other reason, but this is considered different from the tactical rebalancing that Swensen, Malkiel, and Ellis showed to improve investment returns.

When an advisor needs to rebalance a portfolio, they will take either a time-based or a threshold-based approach to it, such that they either: i) check the accounts at regular intervals, such as every quarter, and then bring their positions back into alignment by buying or selling them back to their original percentage allocation or ii) going through the list of securities in each account to see which ones have either gone up or down past their predefined thresholds and needs to be rebalanced.

The time-based approach is the most common as most advisors don't use software to rebalance their portfolios, which was discussed in section 3.b.vii Portfolio Rebalancing Tools. It is easiest for them to check on the portfolios at set times and make the trades to bring them back into alignment. However, the advisor must also pay attention to the trades that are recommended to bring the portfolio back into alignment to make sure they are worth the costs associated with them. For example, a \$1,000 position may have drifted to \$1,020 over the course of the quarter, but the advisor will need to consider if it is worth selling \$20 worth of the stock if it will incur a \$7.95 trading fee, which would eliminate nearly 40% of the securities' gain in fees. Further, if the account is small and rarely worth rebalancing, the advisor would then need to communicate to the client that they are still monitoring the account even though there is no visible activity.

The second method, the threshold-based approach, looks to rebalance a portfolio when an asset has drifted from its targeted allocation by a certain percentage regardless of the time that has elapsed since it was last rebalanced. The key benefit to this approach is that uncharacteristically large price movements might happen between the regularly scheduled rebalancing intervals. While threshold-

based rebalancing generally outperforms time-based rebalancing, it does require significantly more time and attention as an investor has to define a threshold percentage change that must be exceeded before rebalancing. Also, that threshold number should differ for each asset based on its historic volatility. This would then have to be checked against the account's size and the ensuing trading costs that would be incurred, while also considering the tax implications from the trade.

Regardless of the method used, a client's tax situation should be considered, and not only from within the context of the portfolio but from within the context of their entire financial life. This is an advantage that is generally considered to go to the human advisor because, through their phone calls and meetings with a client, they should have a better idea of the client's tax situation for a year than a robo-advisor. For example, if the client has just sold a house or a business resulting in a significant capital gain, the advisor may wish to take more losses than usual to help offset the tax burden created by the capital gain. The underlying idea here is that a human advisor has access to richer data than a robo-advisor and, as such, is able to make better-informed decisions about a client's tax situation. We'll examine this assumption further in a later section.

However, this idea that human advisors have access to better quality data is not inherently a structural limitation for a robo-advisor, and in fact, it is one that could be easily circumvented by sending the client an email or text asking if they either had or were planning to have a large capital event in the current tax year.

Once the information problem is solved, a robo-advisor has the clear advantage, especially when coupled with their ability to eliminate trading costs. This is because a robo-advisor can continuously monitor a portfolio as well as any rebalancing software can do, and use their automated trading functionality to rebalance a portfolio based on percentage changes, along with portfolio changes from deposits, withdrawals, or cash flows from dividends or coupon payments. This is something that a traditional advisor would be unable to do without incurring a fee for each small transaction that came into the account.

For example, if a client had an account and they wanted to contribute \$50 a week to it, how long would a traditional advisor have to wait before they were able to invest that money? The advisor would have to consider the amount of stock that the investor was able to buy compared to the fees it would cost to buy that amount of stock. With the previous example of a \$7.95 trading fee, if the advisor invested every week, the client would start each transaction down nearly 16% because of the money lost from simply placing the trade.

The tradeoff would be that the advisor could simply wait until the end of the month when the client had put in \$200, and then they could make the trade incurring only a 4% drag on the position. However, if you were to consider that the market may only return 7% to 10% a year, losing 4% simply to place the trade is still an undesirable position. Yet waiting even longer, such as 6 months or a year, runs the risk of the accumulated cash position dragging down the performance of the account as well.

However, through a robo-advisor, that client could have those same trades made for them automatically without incurring a trading fee or the performance drag from holding too much cash while waiting to

place the trade. This allows robo-advisor clients to invest more efficiently than a traditional advisor regardless of whether they are adding additional funds to an account or the account is rebalancing itself based on its own internal metrics or cash flows.

4.a.v. Efficient Tax-loss Harvesting

The last robo-advisor advantage is tax-loss harvesting, which is a process that traditional advisors have used for years to help clients minimize and defer taxes from their investment accounts. It works by taking advantage of securities that have declined in value by selling a security at a loss, which generates a tax deduction lowering the investor's taxes. However, the process doesn't stop once that investment is sold.

Instead, when the security is sold and the tax deduction is generated, the account will have raised cash from selling the security, and that money is used to buy a similar security. This means that the account has effectively generated a tax break while simultaneously keeping the same asset allocation and market exposure. For the average investor, this means that they could use these harvested losses to offset their future capital gains and up to \$3,000 in ordinary income per tax year, and if the losses are particularly large and aren't fully used up in any particular tax year, they can be carried through indefinitely to offset future income and tax gains.

If done properly, tax-loss harvesting can defer tax liabilities, which can compound and enhance the value of a portfolio beyond a simple buy-and-hold strategy. Wealthfront estimates that their tax-loss harvesting increases after-tax returns by 1.55% a year (Wealthfront, 2015), while Betterment claims that their tax-loss harvesting program generates 0.62% of alpha per year, but depending on the time period and circumstances, could generate an annual tax offset of 1.94% (Betterment, 2015).

These numbers vary widely depending on the investor's circumstances, such as their asset allocation, their tax bracket, their marital status, and their location, which matters for state taxes. Wealthfront, for example, only offers tax-loss harvesting on accounts over \$100,000. However, tax-loss harvesting does still provide a net benefit for every investor if done properly.

The manually intensive part of this is that the investor must manage "wash sales," which happen if the same security or one that is "substantially identical" is purchased within 30 days of the initial sale resulting in the initial tax deduction being lost. This is referred to as the "wash rule" and is in place to keep someone from continuously buying and selling a stock on the way down to generate tax deductions.

Buying and selling individual securities would be fairly simple because buying and selling the same company would be an identical trade, and it would be hard to argue that two different companies could be considered "substantially identical." However, it is harder when dealing with ETFs as they could be found to violate the wash rule by holding "substantially identical" securities yet be two different ETFs. However, the industry is developed enough that most ETFs based around an asset class have numerous alternatives.

Here are the alternatives that Wealthfront uses:

Figure 4.8. Tax-loss harvesting ETF alternatives

Primary ETFs					
Asset Class	Symbol	Vendor	Underlying Index	Expense Ratio	
US Stocks	VTI	Vanguard	CRSP US Total Market	0.05%	
Foreign Stocks	VEA	Vanguard	FTSE Developed Markets Ex-North America	0.09%	
Emerging Markets	VWO	Vanguard	FTSE Emerging Markets	0.15%	
Dividend Stocks	VIG	Vanguard	NASDAQ US Dividend Achievers Select Index	0.10%	
Natural Resources	XLE	State Street	S&P Energy Select Sector Index	0.15%	
TIPS	SCHP	Schwab	Barclays Capital US TIPS	0.07%	
Municipal Bonds	MUB	iShares	S&P National Municipal	0.25%	
Secondary ETFs					
Asset Class	Symbol	Vendor	Underlying Index	Expense Ratio	Correlation to Primary ETF
US Stocks	SCHB	Schwab	DJ Broad US Market	0.04%	99%
Foreign Stocks	SCHF	Schwab	FTSE Developed Markets Ex-US	0.08%	99%
Emerging Markets	IEMB	iShares	MSCI Emerging Markets	0.18%	99%
Dividend Stocks	SCHD	Schwab	DJ US Dividend 100	0.07%	97%
Natural Resources	VDE	Vanguard	MSCI Energy	0.14%	73%
TIPS	VTIP	Vanguard	Barclays Capital US TIPS 0-5 Years	0.10%	83%
Municipal Bonds	TFI	State Street	Barclays Capital Municipal	0.23%	83%

A further complication is that while these investments would not be considered "substantially identical," the advisor would still need to be careful that they don't tax-loss harvest a position twice within the same 30-day period as that would violate the wash rule. Additionally, the advisor would have to be careful that, in the course of normal rebalancing, they don't accidentally repurchase a security that they are supposed to be avoiding in that 30-day window as that too would violate the wash rule. Lastly, the

wash rule applies across all of an investor's accounts, including their spouses if they file taxes jointly and even if it happens in a non-taxable account; so the advisor would also need to monitor all of a client's accounts to make sure they don't violate the wash rule. For example, if an investor sold a security for a loss in their individual account but immediately purchased it in their spouse's IRA account, it would be considered a wash sale.

Needless to say, this can become a complicated situation very quickly, and historically, it was further compounded by the trading costs associated with entering and exiting these various positions. These costs include both the explicit trading costs but also include the implicit opportunity costs by harvesting a tax-loss now rather than waiting for a security to decline further in price, which would result in a better tax-loss.

For all of these reasons, tax-loss harvesting was traditionally only available to wealthy clients with high levels of income or a high tax bracket because of the manual effort that was required to successfully coordinate a tax-loss harvest. Even then, it was unlikely that a wealth manager would have dozens of these trades going on at the same time because, without software to coordinate such an effort, the effort required would be herculean.

This has all changed through the rise of robo-advisors, which have negligible trading costs and are able to algorithmically examine a client's portfolios for tax-loss harvesting opportunities. They can examine both their own explicit costs for executing the trade, which are negligible, along with the implicit opportunity costs, which are based on historic volatility and expected returns for a given asset class. Furthermore, they can do this every hour of every day and never lose track of which securities are eligible to harvest or restricted from investment.

Today, there is software available to assist traditional advisors with tax-loss harvesting, such as Total Rebalancing Expert (tRx), which was acquired by Morningstar in 2015. As long as the advisor invests the time and effort to implement it into their practice, they can capture most of the same functionality as a robo-advisor, just without the automated trading aspects. However, the costs are higher for the advisor in terms of time and money, as tRx sells for nearly \$20,000 a year, and the costs are higher for the client as they have to pay twice the trading costs, which cuts down on the number of opportunities to successfully harvest a tax-loss.

4.a.vi. Less Emotional Decision Making

A study by Vanguard showed that a financial advisor can outperform a regular retail investor by up to 3% (Kinniry, Jaconetti, DiJoseph, & Zilbering, 2014). There were several reasons for this, such as using low-cost funds and rebalancing regularly, but one of the reasons is based on a financial advisor having better emotional control than the average investor. Also known as "behavioral coaching," it is the largest single contributing factor to the total value of Vanguard's Advisor's Alpha strategy, and it is said to add up to 1.5% of value per year.

After all, without professional help, the average investor may incorrectly build their portfolio and get spooked at a market downturn, which in turn forces them to sell all of their investments. Then, once the market begins to rise again, the average investor may decide to get back into the market, just in time to see the cycle happen again. This habit of "buying high and selling low" is one major reason that the average retail investor underperforms a professional.

However, professional investors also carry their own emotional and cognitive biases. It's just that they are better at recognizing and controlling these impulses.

It would stand to reason that a robo-advisor would then be able to outperform a professional investor on the basis of having fewer or no emotional biases. It could also be said that a robo-advisor more purely represents the intentions of its clients because it cannot introduce any of its own internal biases toward building and implementing the client's portfolio. It would simply look at the underlying data and compare that to what it is currently seeing in the market before making a decision based on what the client has specified.

4.a.vii. Miscellaneous Benefits

There are a host of other benefits that have been cited for robo-advisors, but most of them are too anecdotal to examine or to attach any significance to. For example, it's probably safe to say that robo-advisors have better websites than traditional advisors, but does this represent a sustainable and quantifiable advantage over traditional advisors? I don't believe so—especially since a traditional advisor could simply improve their website, thereby negating the robo-advisor's advantage.

Other benefits, such as robo-advisors being either "more convenient" or "requiring less time" than a human advisor, are also too hard to quantify. While you could say that a robo-advisor is probably more easily accessible through a smart phone or a website, that does not necessarily mean that they are more convenient for the client. Likewise, a robo-advisor may or may not require less time than a human advisor, depending on the person and the situation. A person with a complex situation may find they have to spend more time working through a robo-advisor's website to fully customize and annotate their profile, whereas it could have been fully captured and implemented by a human advisor in less time.

Even if an investor didn't have a complex situation, they may still find that they have to spend more time interacting with and updating a robo-advisor's online interface than a semi-annual phone call with their investment advisor.

It is clear that more commerce is happening online and that people are increasingly interacting through their smart phones and, in this case, robo-advisors are better positioned than human advisors. Also, it seems safe to assume that robo-advisors, as tech-centric companies, are better at adopting new technology. Nevertheless, traditional investment advisors are also constantly improving their websites and mobile applications.

For these reasons, I have chosen to focus only on what I consider to be the robo-advisor's six main structural advantages, which were previously described in Section 4.a., rather than the entire laundry list of potential benefits.

5. SUSTAINABILITY OF ADVANTAGES FOR TRADITIONAL WEALTH MANAGERS

Today's robo-advisors are very good at the investment management portion of being an investment advisor, and that has historically been a large part of the experience of having a wealth manager. However, over the past decade, the investment management experience has been increasingly commoditized through the rise of passive- and index-based investing.

While much of the value of a wealth manager historically has been derived from their insights and their ability to outperform the markets, this aspect of the job is less important now. This isn't to suggest that a wealth manager does not provide value to the investment portion of money management. In fact, a study by Vanguard showed that wealth managers add over 3% to returns per year over individual retail investors (Kinniry, Jaconetti, DiJoseph, & Zilbering, 2014), but much of the value from a wealth manager comes from additional aspects, such as financial planning, client education, and reinforcing good financial behavior.

These benefits are important to all wealth management clients regardless of their level of wealth. While a wealthier family may have more complex financial dynamics, many of the emotions involved are still the same across wealth levels. Indeed, sometimes a poorer client may have more emotional needs because the reliance on a smaller asset base increases the relative importance to the client and their beneficiaries.

So being a successful wealth manager requires a great deal of emotional intelligence regardless of client demographics. Historically, this has meant that human advisors have had a huge advantage over services offered by robo-advisors, which are unable to gauge and appropriately respond to a human's emotional state. However, as was shown in the romantic science-fiction movie *Her* in 2013 (IMDb, 2014), in which a lonely writer develops a relationship with an intelligent computer operating system personified through a female voice, it's conceivable that at some point in the future humans could form meaningful, emotional attachments to a computer.

Yet, many of these aspects are at the center of why an investor would choose a human advisor over an automated one, and the larger question is whether human advisors will be able to maintain that edge. In an interview with Sam Swift, a data scientist at Betterment, he was asked why he thought a person would use a human advisor—both now and in fifteen years (Swift, 2015).

- Interviewer: When do you think [people] need a human advisor?
- Swift: Taxes and estate strategies. Wills and inheritances. Family planning. When you should have a trust. What risk you should limit given your assets and how they could be at risk to various events[...]. These are mostly high net-worth [problems].
- Interviewer: And when do you think [people] will need a human advisor in 15 years?

- Swift: Engineering solutions are best done by computers. Life planning questions, for example, "should I start a company or stay with my current job?" [...] should be a discussion with a person.

Swift was quick to point out though that Betterment does not view human advisors as being outdated, especially since Betterment has an institutional platform to serve human advisors. However, in his view, there will be fewer financial advisors in the future, and they will increasingly focus on complicated problems.

While that may be the case eventually, there are still a number of hurdles that robo-advisors will have to clear if they are going to universally provide a better user experience than a human advisor. Here are the top reasons why clients typically choose an advisor, according to the 2015 Economics of Loyalty survey by Dimensional Fund Advisors (Krause, 2015):

- | | |
|----------------------------------------------------------------------|-----|
| 1. Demonstrated that he/she understood my needs | 69% |
| 2. Helped me understand the value he/she could bring to me/my family | 57% |
| 3. Educated me about investing | 45% |
| 4. Discussed typical investment performance of his/her clients | 41% |

And from the same study, the firm or personal characteristics that contributed to a client's decision to select their current advisor (Krause, 2015):

- | | |
|---------------------------------------------------|-----|
| 1. Experience in working with clients like you | 55% |
| 2. Demonstrated client service process/philosophy | 47% |
| 3. Demonstrated investment performance | 46% |
| 4. Share values | 46% |
| 5. Compensation model | 30% |

There's a lot of overlap from these two surveys, but a few commonalities stick out. First, it's important that a client work with an advisor that clearly understands their needs and has worked with similar clients in the past. This would seem especially important with clients who strongly identify with a group, such as successful tech entrepreneurs, recent divorcees, or families with multi-generational wealth. Each of these groups has a strong incentive to use an advisor that very clearly understands their needs, and in some cases, an advisor that might also be able to help them with other aspects of life, such as social or networking functions.

Secondly, it's important for the client to understand what they will get from their interaction with an advisor. This could be described in several ways, but whether it's peace of mind, sound financial planning, or superior investment performance, it's important that an advisor be able to demonstrate value.

Lastly, client education, a fair compensation model, and shared values seem to round out the list. These last three items seem like they could apply to either a human or a robo-advisor. Whether clients are educating themselves through a conversation or materials provided by their financial advisor or they are

researching something on a robo-advisor's website, the only material difference would seem to be one of delivery preference. As for a fair compensation model, within asset management, there is still a wide range of compensation structures and many of them involve hidden fees and commissions. Whether a robo-advisor or a human advisor is billing clients on a "fee-only" basis of a set percentage of assets under management, there would be little difference aside from a robo-advisor generally charging less. As for shared values, this could apply to either a likeable, relatable advisor or an ethical business, and in either case, this could apply to either the robo-advisor or the human advisor. However, it's probably more important that a human advisor be likeable as they will be their client's main touch point for sensitive financial discussions, whereas a robo-advisor simply needs to have a clean user interface and easily understood descriptive text.

From the emphasis placed on these qualities and the roles described in Figure 1.1. Seven Roles of a Financial Advisor, you can see that there are several areas in which a human advisor would still trump a robo-advisor.

5.a. Difficult Financial Conversations

A financial advisor often assists clients in planning for college, retirement, or estate purposes, and while many clients will reach these goals, some will not. It could be for a multitude of reasons that a person falls short of their planned goals, but these conversations are delicate and require great emotional sensitivity.

For a corporate defined-benefit pension plan that falls short of its obligation, it will have to submit a request to the sponsoring company to notify them of their shortfall and to request additional funds to make the pension plan whole. However, for individuals and families, sometimes this isn't possible, and a shortfall for retirement could mean delaying retirement for several years, selling off precious assets, or downsizing to live with relatives or an affordable assisted-living community.

For clients that have saved for years and put their faith and trust in an investment advisor, these conversations can be difficult for everyone involved.

Sometimes, these difficult conversations can also involve complex financial logistics, such as the establishment of a trust or will. Indeed, a common type of trust is a "spendthrift trust," which is created for the benefit of a person unable to control spending. The client gives an independent trustee full authority to make decisions as to how the trust funds may be spent for the benefit of the beneficiary. While these types of structures are generally used for high-net-worth families, complications can arise for any family when it comes to parents deciding how to split an inheritance across multiple siblings and extended family members.

Since most people will deal with these situations only once in their lives, it's important to have a trusted advisor, whether human or robot, to smoothly guide them through the steps necessary to achieve their goals. Could a robo-advisor navigate a client through emotionally troubling times as well as an advisor that the client has a personal relationship with?

As natural language processing advances over the next several decades, it will allow machines to interact with humans in a less robotic manner. It's certainly possible that a human could carry on a normal conversation with a robot. That robot may even have a physical presence such as in the 2012 movie *Robot & Frank*, which featured an old ex-con in the early stages of dementia and his adventures with his robot caretaker.

Once a robo-advisor is able to offer all of the quantitative aspects of a financial advisory experience, such as investment management and financial planning, picking the type of advisor would just be a matter of personal preference. A robo-advisor would be cheaper yet offer less emotional sensitivity, but for the majority of people struggling with these issues, they may find that they either aren't able to afford a financial advisor or that their problems are simple enough that they feel comfortable handling them through an automated service.

5.b. Evaluating Client Priorities with Limited Data

Often, a client may wish to engage in "socially responsible investing" to avoid certain investment segments, such as gambling, firearms, or religiously conflicted companies. Other times, a client may wish to account for charitable giving through their account, or in perhaps the most common example, a client with a deeply concentrated source of income may wish to hedge their investment savings from the same type of exposure.

For example, in the Financial Crisis of 2008, when Lehman Brothers filed for bankruptcy on September 15, 2008, many senior executives not only lost their incomes but also their savings, which had been heavily invested in the company's stock. These executives, who had been wealthy up to this point, found that they lost their multimillion-dollar incomes and their nest eggs on the same day. This same story has been repeated dozens of times across recent history and touched virtually every industry from construction, to mining, to oil and gas, and so on.

For a human financial advisor, where a client works and how much they make are among the first questions asked, but while a robo-advisor may know how much a client makes, will they be able to hedge against a client's employment risk? Or understand the other nuanced risks that a client is exposed to? Or preferences that the client hasn't explicitly stated?

In many cases, this is a non-issue if the person has no deeply held investment preferences or concentrated sources of wealth or assets, and in most other cases, yes, a robo-advisor could address these concerns.

Through a broadly diversified portfolio, a robo-advisor client may hold tens of thousands of securities, each of which only make up a fraction of a client's overall portfolio. This would effectively limit a client's exposure to an approximate market weighting for their company, which could be further reduced in the context of the portfolio once other asset classes, such as emerging market stocks or bonds, are included.

Or, a robo-advisor could hold any of the large ETFs that exist to address various environmental, social, or governance (ESG) criteria. The larger concern is if a robo-advisor could know a client well enough to inform them about potential risks to their portfolio even if those risks exist outside of the portfolio itself.

In these cases, the robo-advisor may never even know about the client's assets if they've never had a conversation with the client about where they work, what the client's balance sheet looks like, or what investments they hold in their retirement plan. Similarly, without collecting data on ESG investment restrictions, a robo-advisor may not be able to adequately serve socially responsible investors, which account for \$5.7 trillion as of 2014 and represent nearly one of every six dollars under professional management (The Forum for Sustainable and Responsible Investments, 2014).

Knowledge of personal information is seen as an advantage for traditional investment advisors. After all, will your robo-advisor know that you got married? Or that you just gave birth to a new child?

However, when you look at how data is increasingly integrated and connected in our lives, I believe that technology will solve this problem. For example, in a modern grocery store, I can be tracked through my cell phone signal, the grocery store's installed app, and my loyalty or rewards program. By combining these bits of information, a grocery store can know: i) how long I'm in the store, ii) what aisles I visit and for how long, and iii) what purchases I make. From this data, it could make inferences that I am relatively indecisive about what beer I purchase but that I choose cereal with very little hesitation. They could then push me targeted ads for beer the next time I arrive in the store and then test to see how that affects my shopping behavior. Most companies already have considerable access to personal data and the tools required to analyze it.

Given this, I find it hard to believe that an online service, especially if integrated into a mobile device or social media, would have a great deal of trouble accessing information about a client's preferences, marital activity, or other major life events.

For example, through an app on a mobile phone, a robo-advisor could know if you were traveling abroad, or through integration with Facebook Connect, it could know about pictures that you uploaded, locations that you checked into, new friends that you added, or any changes to marital or parental status. If current trends continue, more and more sensitive personal data will be accessible online.

For example, with the birth of a new child, a person may call their immediate family and a few friends, but it's very likely that the bulk of that person's social network will find out about the birth through a post on social media. As an investment advisor, while you may have known that someone was pregnant through previous conversations, it's likely that you would find out about the birth of the child through social media, which is exactly what a robo-advisor could do.

5.c. Optimizing Across Several Accounts

At the core of a traditional investment advisory experience is the ability for a client's wealth manager to oversee all aspects of their financial lives. This could include incorporating multiple bank accounts,

investment accounts, or insurance policies—any of which could be spread between multiple organizations. Then an advisor would assimilate all of this data and develop a coherent, holistic financial plan from them.

While robo-advisors have made progress toward this level of investment planning, most of them fall short. The exceptions are Betterment, which launched RetireGuide in early 2015 to help clients build and execute a financial plan to save for retirement, and Wealthfront, which does tax-loss harvesting across multiple accounts. However, most robo-advisors are still focused on account-level investment management. The newest wave of robo-advisors, such as Motif Investing and Hedgeable, are focused on offering their own flavor of account-level investment management rather than providing clients with comprehensive financial advice.

However, it's important to remember that robo-advisors are treading the same path that RIAs went down decades ago. Historically, people went to a wealth manager for their expertise in picking investments and not for financial planning, market education, or emotional support. It's only as the industry has developed and people have grown comfortable with the investing aspect of the relationship that they began to seek something more. As for robo-advisors, it would make sense that they would seek to build technological solutions on the most calculation-heavy portion of a wealth manager's business. After all, it's only after an advisor, human or robot, holds a client's assets that they can begin building enough trust with the client to offer financial advice.

Through API integrations with account aggregation services, such as Yodlee, which have been built into many products, such as eMoney or Mint.com, either a human or a robo-advisor could aggregate a client's personal data from a variety of sources. After that, it would be a simple math problem to figure out the best way to optimize a client's account holdings, while accounting for the client's preferences, such as ESG, and constraints, such as taxes.

5.d. Resiliency

Over the past several decades, investment managers have become increasingly prevalent and today there are hundreds of large wealth management firms that are profitable with healthy margins and strong growth prospects. These firms have built their businesses both in up markets and down markets. By contrast, most robo-advisors have been around for less than a decade. The earliest robo-advisors, Betterment and Wealthfront, were founded in August 2008 (Crunchbase, 2015) and December 2011 (Crunchbase, 2015), respectively. They have yet to see a full market cycle, and many people wonder if investors will flee robo-advisors at the first sign of market trouble.

Many robo-advisors are unprofitable businesses that have raised large amounts of venture capital funding to chase growth. If the market were to take a downturn, which resulted in clients leaving and funding drying up, could robo-advisors simply disappear from the market?

According to Betterment's latest Form ADV filed with the US Securities and Exchange Commission, they manage just over \$3 billion across 142,939 accounts and have 85 employees (Securities and Exchange

Commission, 2015). This results in an average account size of \$21,008.54, which would be billed at their higher rate of 0.25% per year rather than the 0.15% they charge for accounts over \$100,000. So it seems like a high estimate for Betterment's income would be their \$3 billion in AUM billed at a 0.25% fee per year, which results in just over \$7.5 million in top-line revenue.

Now, it's worth mentioning that not all robo-advisors get all of their revenue from clients. Some, like Charles Schwab's Intelligent Portfolios, also get revenue from the funds they invest in and the companies they place trades with. However, for Betterment, all of their revenue comes from their client fees. So that \$7.5 million in revenue represents all of the money that Betterment is bringing in every year.

Spread across all of their employees, it works out to \$88,321 in revenue per employee. While some employees certainly make more and some make less, this seems like a fair number even though there will be additional costs associated with the business. In my interview with Sam Swift, he mentioned that Betterment felt that they had proven that they were a viable business model, and I think these numbers confirm the company's viability.

In a recent interview, Jon Stein, the CEO of Betterment, said, "we're already profitable on a per-customer basis [...] already [in 2015], we've added 50,000 new customers on the platform, and we'll add another 50,000 before the end of the year." Furthermore, Stein said that their average client only has \$25,000 invested with Betterment while having a net worth of \$230,000. So with the average client having only about 10% of their wealth listed on the platform, there is also room for Betterment's AUM to grow among its existing client base (Hurley, 2015).

Similarly, according to IARD filings, Wealthfront has \$2.612 billion in AUM spread across 42,338 accounts and 100 employees. Wealthfront charges 0.25% per year on accounts over \$10,000, and with an average account size of \$61,713.10, it seems reasonable to estimate a maximum revenue of \$6.532 million by applying that fee to all of the AUM. At 100 employees, this still equates to \$65,320 in revenue per employee, which once again seems fair, though the number could be higher as Wealthfront has disclosed that it may receive revenue from some of its partners.

For a comparison, using the 2013 Dimensional Fund Advisors Benchmarking Survey of 809 firms, the average RIA firm with over \$2 billion under management employs 50.5 full-time employees and manages just over \$50 million in assets per full-time employee (Krause, 2015).

Figure 5.1. Average assets under management comparison

	RIA with >\$2b AUM	Betterment	Wealthfront
Employees	50.5	85	100
AUM / Employee	\$50 million	\$35.3 million	\$26.1 million

The main difference between a traditional advisory firm and these robo-advisors is that the traditional RIA would have employees that are much more richly compensated because of their higher fees and lower staff numbers, while Betterment and Wealthfront appear to be investing more heavily in growth.

Still, while Betterment and Wealthfront have raised \$105 million (Crunchbase, 2015) and \$129.5 million (Crunchbase, 2015), respectively, from venture capitalists, they are reliant upon outside funding to grow as aggressively as they have been.

However, even if venture capital dries up, it is unlikely that robo-advisors would disappear. This is especially evident when looking at the robo-advisors that have come from large financial institutions, such as E*Trade, Charles Schwab, Fidelity, and Vanguard. There is also a fair amount of mergers-and-acquisitions interest in the space as BlackRock acquired FutureAdvisor for \$150 million in August 2015.

So even if venture capital dried up, I think robo-advisors would still find a home either on their own or within one of the larger financial institutions that are looking at going further into the space.

A more interesting argument is that if the market tanks, clients might leave robo-advisors in droves because a robo-advisor isn't as good at "handholding" a client and easing their fears. A robo-advisor can't call a client on a particularly volatile day and tell them that everything is going to be OK.

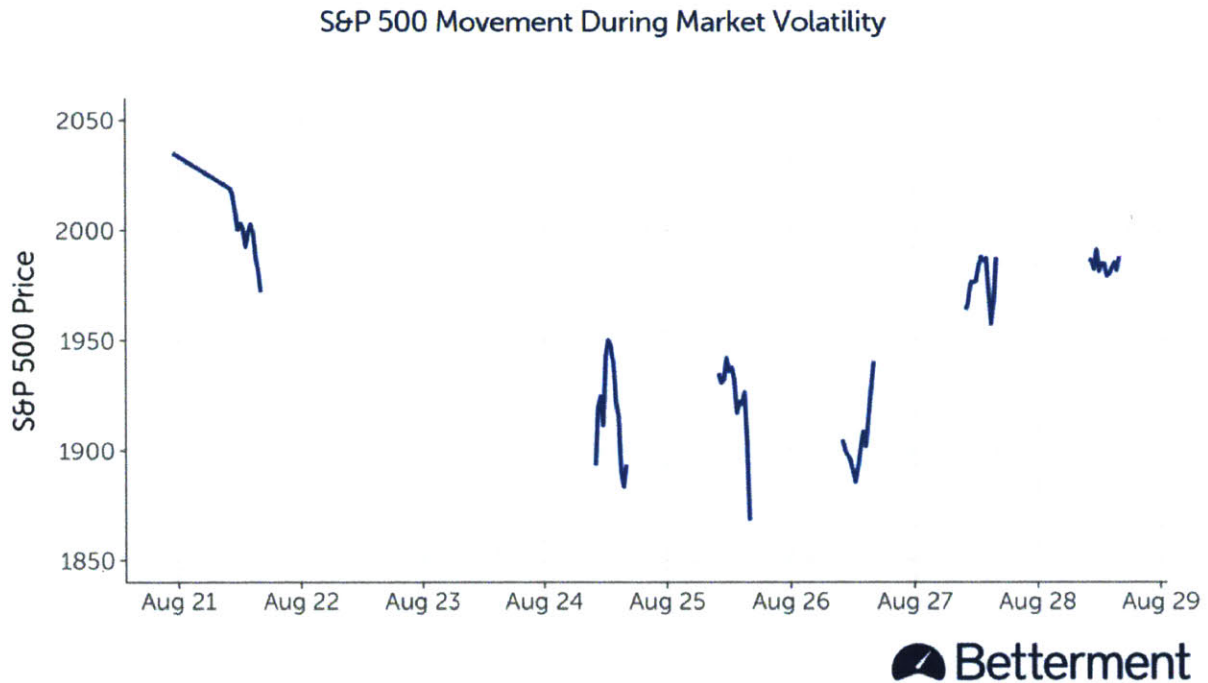
However, for the first time, we're now able to gather data on how clients react to handholding through robo-advisors' interactions with them. In my conversation with Sam Swift, a data scientist for Betterment, he talked about Betterment's efforts to understand investor behavior. "Every quote says, 'they're not going to call you if the market crashes,'" Swift said. "As if that is the cornerstone of the human advisor experience, [but no one knows] if that actually improves results."

During a downturn a few years ago, Betterment sent an email to all of their clients to reassure them, but what they found was that an "overwhelming" number of people hadn't been paying attention to the markets and were now frightened. Since then, they've decided to never "push stress towards people" and now they will only reassure customers if they log into their Betterment accounts.

In a 2015 letter to the Department of Labor, which was seeking public comments on a fiduciary rule, Betterment wrote in to describe the support that they are able to provide for their clients and furthermore, they were able to describe how clients reacted to that support (Department of Labor, 2015).

As the letter describes, "on Monday, August 24[, 2015], markets opened 5% down from their Friday close, and over 10% down from recent peaks. While this was far from the worst drawdown investors have, or eventually will experience, it was significant nonetheless, and press coverage through the day was pervasive."

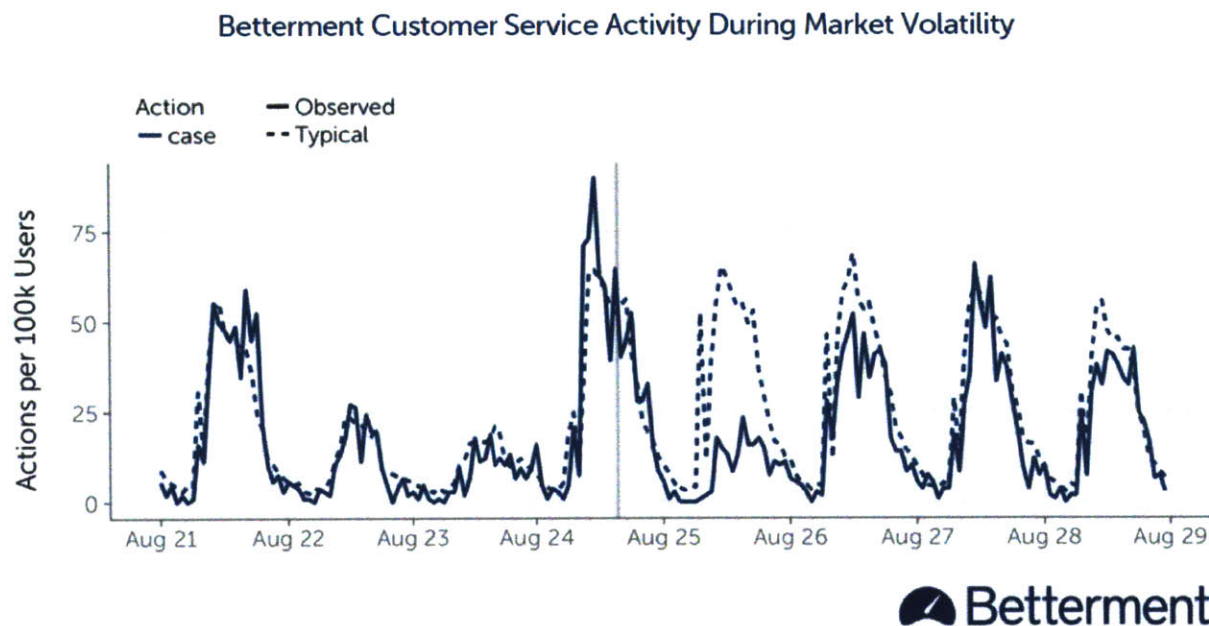
Figure 5.2 The chart included in Betterment's letter to the Department of Labor



Betterment noted that during this period, it experienced a small uptick in the number of customer logins, and they did show messages to "put the volatility into context, and encourage [customers] to focus on their long-term goals." Interestingly, the data showed that less than 1% of the customers reacted to the market activity with a negative action, such as an allocation change or withdrawal.

Aside from increased customer logins, customer service received just a modest increase in requests with Monday, August 24 showing a 5.58% increase, Tuesday showing a 25.6% decrease below normal volume, and the rest of the week looking about average. Still, Betterment employs only one customer support person for every 10,000 clients (Hurley, 2015), and it was easily able to handle this market volatility.

Figure 5.3. Betterment customer service activity as enclosed in their letter to Department of Labor



In an interview with Swift, he elaborated on this time period beyond what was disclosed in the letter to the Department of Labor. He noted that Betterment actually ran a split test to see if showing or not showing a reassuring message had any effect on customer behavior. So some users saw a short message describing the market's recent movements along with a short link to more content if the customer wanted to learn more. What they found was that showing a reassuring message decreased "negative" client behavior by around 10%, which was statistically significant. In this case, "negative" behavior was recorded as making a reactionary allocation change, such as fleeing to cash or moving from stocks to bonds due to the market's movements, or withdrawing money from the account to "get out of the market" (Swift, 2015).

If these results were to be applied to the traditional advisor approach of calling clients when the market goes down, you'd find that the traditional advice actually increases the client's stress level rather than calming them. Furthermore, Betterment can begin to test different aspects of the message, such as the wording, the tone, the format, and so on to discover what seems to resonate best with clients.

Given how much folk wisdom is built into how a wealth manager should behave, it seems that robo-advisors, especially as a class of service providers, are at least as resilient as a traditional investment advisor.

6. CONCLUSION

So who wins? That's the big question. Will robo-advisors replace human advisors? Or will human advisors remain isolated from the changes that robo-advisors are bringing to the industry?

Today, we see this question manifested through our daily interactions with technology, whether it's going to the bank, using an automated teller machine (ATM), or checking in to a flight through a mobile app or kiosk rather than an airline representative. Many, including President Barack Obama, have labeled these technological advances as roadblocks to job creation (Fox Nation, 2011), and many others have gone to great lengths to disprove the notion that machines create unemployment.

The debate on "technological unemployment" has taken many forms and is the subject of great media interest. Articles such as "How Technology Killed Kodak" from Forbes (Kain, 2012) or "Jaron Lanier: The Internet Destroyed the Middle Class" from Salon (Timberg, 2013) talk about how Instagram, with 13 employees, managed to kill Kodak, a company with 140,000 employees. However, as Tim O'Reilly, founder of O'Reilly Media, pointed out, it wasn't just Instagram that killed Kodak. Instead, he points out that it was Apple, Samsung, and other smartphone makers that replaced the camera, alongside network providers, data centers, equipment suppliers, and so on. In these cases, Apple employed 72,000 people, Samsung employed 270,000 people, and Comcast employed 126,000 people (O'Reilly, 2014).

So while it is true that Instagram was acquired by Facebook for \$1 billion in 2012 and it only employed 13 people at the time, it's not the case that Instagram singlehandedly destroyed Kodak or their 140,000 jobs.

Another common question is whether ATMs have destroyed bank teller jobs. This issue highlights the complex relationship between automation technology and workforce dynamics. President Obama talked about this example in 2011, and ATMs have become more prevalent, yet bank tellers have not gone away. In a 2004 article in Fast Company, Charles Fishman wrote that "at the dawn of the self-service banking age in 1985,[...] the United States had 60,000 ATMs and 485,000 bank tellers. In 2002, the [US] had 352,000 ATMs and 527,000 bank tellers (Fishman, 2004). According to the Bureau of Labor Statistics, in 2012, there were 545,300 bank tellers (United States Department of Labor, 2014), and the Economist cited the Bureau of Labor Statics as saying there were an additional 152,900 "computer, automated teller, and office machine repairers" in 2008 (W.W., 2011).

With the rise of ATMs, much of the banking employment transformation has been in the back office, which in 1972 made up 70% of the banking workforce, according to the Bureau of Labor Statistics. As ATMs automated a major customer service task, this reduced the number of employees required per location to 75% of previous levels. ATMs did not replace the highly visible, customer-facing bank tellers, but instead eliminated thousands of less-visible clerical jobs (Markoff, 2015).

This preservation of client-facing roles is seen even when looking at the future of the package delivery business with the rise of self-driving cars. Even if all of the aspects of package delivery were automated, from the shipping logistics and routing to cars that could drive themselves, it would still be difficult to

remove the last-mile delivery driver. This is because it involves diverse and complex interactions with business and residential customers.

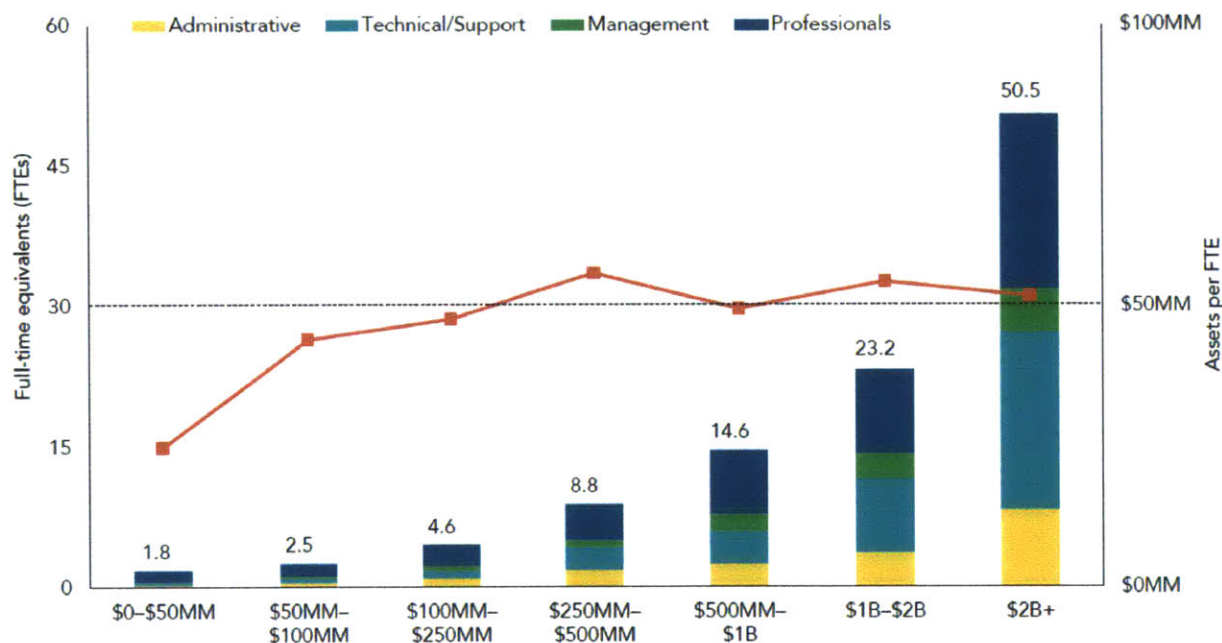
6.a. Adopt Technology and Replace Back Office

Compared to something like the travel industry, where travel agents were increasingly replaced by online competitors, the experience of working with a financial management firm would be harder to commoditize, though it will face pressure from robo-advisors.

When considering the future of the wealth management industry, it may be useful to look at the path paved before in traditional "technological unemployment" scenarios, in which back office and administrative roles were increasingly relegated, but customer-facing roles, such as an investment advisor, retained the same status.

We are already seeing this back-office compression with third-party services that serve to automate compliance, reporting, and HR/accounting needs for RIA firms. Additionally, I believe there is further room for this compression to take place. According to the US Dimensional 2013 Advisor Benchmarks Survey of 809 firms, nearly half of all people employed by a wealth manager are employed in either an "administrative" or "technical/support" role.

Figure 6.1. Human capital in an RIA firm (Krause, 2015)



Through an increased usage of technology, RIA firms should be able to not only offer a better user experience for their clients, but they will also be better positioned to handle fee compression from new entrants by running a leaner cost structure.

6.b. Create Customer Value Outside of Investments

Secondly, advisors must focus on their unique selling propositions. This could include a strong brand identity and a relatable story, but it should go beyond that. Tomorrow's financial advisor will need to define and focus on their target clients, which could be in a niche related to the advisor's own background or interests. By making this focus known, advisors will be better able to address a client's two most important questions when selecting an advisor, "does the advisor understand my needs?" and "has the advisor worked with clients like me?"

6.c. Financial Custodians Need to Evolve

Third, the industry needs to evolve to remove trading frictions from advisors. Robo-advisors are able to make rebalancing and tax-loss harvesting strategies available to the masses because they invest in ETFs and are able to spread commission costs out across all of their accounts. In a blog post from 2013, Wealthfront talks about their decision to use DFA's mutual funds or Vanguard's ETFs, and while Wealthfront liked both products, they chose Vanguard's ETFs because of their low commissions and the ability to implement tax-loss harvesting. One sticking point is that Charles Schwab, as a custodian, typically charges a \$25 commission per DFA trade, and that Fidelity charges a \$50 commission per DFA trade. According to a Fidelity spokesman, these custodians charge such high fees because DFA does not compensate them for "administrative and shareholder services" that are performed on their behalf (Rachleff, 2013).

This harms the end client and creates negative incentives for an investment advisor to properly service an account because they must be mindful of the fees they are going to incur. It is also a bit hypocritical because both Charles Schwab and Fidelity have launched their own robo-advisors, while simultaneously hamstringing the RIAs that use them as custodians for their clients' assets.

The only option currently available to RIAs if they wish to compete on this level is to enroll in Betterment Institutional, an advisor-branded online platform that allows an advisor to white-label Betterment's technology product. In exchange for paying 0.25% on client assets, an advisor essentially gets to offload all aspects of their business concerning investment management, on par with what Betterment offers for individual investors.

However, much of this functionality could be replicated through financial planning software tools, such as MoneyGuide Pro or eMoney, which would also offer an online client portal and mobile access. Additionally, a CRM program, such as Redtail could track and record all of the client's interactions, and a portfolio reporting tool, such as Black Diamond, could handle rebalancing. These services don't charge a set fee based on the assets listed with them, though some like Black Diamond do tier their pricing based on the number of accounts listed.

eMoney charges \$324 per month for their emX Pro package, which includes an online client portal, account aggregation, cloud document storage, alongside advanced financial planning tools (eMoney

Advisor, 2015). Redtail charges \$65 per month for their CRM (Redtail Technology, 2015), and Black Diamond charges a discretionary amount roughly based on the number of accounts listed, but it generally falls between \$1,500 and \$2,000 a month (Southall, 2013).

Figure 6.2 Estimated annual technology costs

	RIA with \$25M in AUM		RIA with \$100M in AUM	
	(SELF-TECH)	(BETTERMENT)	(SELF-TECH)	(BETTERMENT)
Average Full-time Employees	1.8	0.25% of AUM	4.6	0.25% of AUM
eMoney (emX Pro)*	\$3,888		\$3,960	
Redtail CRM	\$780		\$780	
Advent Black Diamond	\$24,000		\$30,000	
TOTAL	\$28,668	\$62,500	\$34,740	\$250,000

* eMoney charges a small additional monthly fee based on the number of people accessing their platform; this estimate is based on the number of average full-time employees for a typical RIA firm.

While there are tangible benefits for an RIA firm to use Betterment, such as the elimination of trading costs, there is a material difference in the price of using them versus building out an in-house technology stack from various third parties. There are also potentially negative consequences, such as giving up all control of managing a client's investments, which could negatively affect an investment manager's reputation. For these reasons, I don't believe there is a compelling argument for an RIA to enroll in Betterment Institutional as a reason to escape paying trading fees, nor do I believe that there is a good alternative for an RIA to eliminate their trading costs, short of the creation of a new custodian to cater to RIA firms.

6.d. Closing Words

In many ways, I find the comparison between traditional and robo-advisors trivial because, ultimately, I believe that all wealth management firms will be technology-centric. The main difference will be that one service will focus heavily on client interactions through a physical investment advisor and one will try to blend into the background of your life through technological automation.

I've argued here that traditional wealth managers need to adapt to keep pace with the changing times, whether that's client preferences, regulatory changes, or technological advancement, but innovation was always going to be the course of action for a financial services company. Undoubtedly, robo-advisors too will continue to innovate and grow, and ultimately, the investment advisory business will become more transparent and more competitive. The end result, though, is that clients will achieve better results, have more access to financial advice, and, all else being equal, have a better chance at realizing their financial goals.

BIBLIOGRAPHY

- Abromovitz, L. (2012, January 1). *Think Advisor | Scope of the Fiduciary Duty Owed by Investment Advisors*. Retrieved September 29, 2015, from Think Advisor: <http://www.thinkadvisor.com/2012/01/01/scope-of-the-fiduciary-duty-owed-by-investment-adv>
- AdvisoryHQ. (2015, October 11). *Financial Advisor Fees - Wealth Managers, Planners, and Fee-Only Advisors*. Retrieved November 14, 2015, from AdvisoryHQ: <http://www.advisoryhq.com/articles/financial-advisor-fees-wealth-managers-planners-and-fee-only-advisors/>
- American Payroll Association. (2012). *National Payroll Week 2012*. Retrieved December 8, 2015, from National Payroll Week: http://www.nationalpayrollweek.com/documents/2012SurveyResults_nodemo.pdf
- Betterment. (2015, November 3). *Betterment | Investing Made Better*. Retrieved November 3, 2015, from Betterment: <https://www.betterment.com/>
- Betterment. (2015, December 8). *Our Portfolio - Betterment*. Retrieved December 8, 2015, from Betterment: <https://www.betterment.com/portfolio/>
- Betterment. (2015, November 28). *White Paper: Tax Loss Harvesting+ - Betterment*. Retrieved November 28, 2015, from Betterment: <https://www.betterment.com/resources/research/tax-loss-harvesting-white-paper>
- Caplan, M. H. (2015, July 22). *Reality of the robo invasion isn't what advisers think*. Retrieved September 28, 2015, from InvestmentNews: <http://www.investmentnews.com/article/20150722/BLOG09/150729960/reality-of-the-robo-invasion-isnt-what-advisers-think>
- Charles Schwab. (2015, February 20). *Schwab Wealth Investment Advisory, Inc. Schwab Intelligent Portfolios Disclosure Brochure*. Retrieved November 12, 2015, from Charles Schwab: <https://www.schwab.com/public/file/SIP-SCHWAB-WEALTH-ADVISORY-DISCLOSURE-BROCHURE>
- Clark, B. (2015, October 21). *5 Reasons Most Robo-Advisors Are Not, in Fact, Advisors*. Retrieved November 15, 2015, from Think Advisor: <http://www.thinkadvisor.com/2015/10/21/5-reasons-most-robo-advisors-are-not-in-fact-advis>
- Crunchbase. (2015, December 8). *Betterment | Crunchbase*. Retrieved December 8, 2015, from Crunchbase: <https://www.crunchbase.com/organization/betterment#/entity>

- Crunchbase. (2015, December 8). *Wealthfront | Crunchbase*. Retrieved December 8, 2015, from Crunchbase: <https://www.crunchbase.com/organization/wealthfront#/entity>
- Department of Labor. (2015, September 24). *Betterment Letter to Department of Labor*. Retrieved November 28, 2015, from United States Department of Labor: <http://www.dol.gov/ebsa/pdf/1210-AB32-2-03108.pdf>
- Egan, M. (2015a, March 11). *Crisis hangover: Millennials are scared to invest*. Retrieved September 18, 2015, from CNN Money: <http://money.cnn.com/2015/03/11/investing/investing-millennials-stocks-markets/index.html?iid=EL>
- Egan, M. (2015b, June 18). *Robo advisors: The next big thing in investing*. Retrieved October 9, 2015, from CNN Money: <http://money.cnn.com/2015/06/18/investing/robo-advisor-millennials-wealthfront/>
- eMoney Advisor. (2015, December 8). *Product Pricing*. Retrieved December 8, 2015, from eMoney: <http://emoneyadvisor.com/Pricing>
- Fein, M. L. (2015). *Robo-Advisors: A Closer Look*. Rochester, NY: Social Science Electronic Publishing. Retrieved from http://papers.ssrn.com/sol3/papers.cfm?abstract_id=2658701
- Fidelity Institutional Wealth Services. (2015). *Transaction Fee-Based Schedule*. Boston: Fidelity Investments.
- Fidelity Investments and Quantuvis Consulting. (2012). *The 2012 Fidelity RIA Benchmarking Study*. Boston: Fidelity Investments.
- Fishman, C. (2004, May 1). *The Toll of a New Machine*. Retrieved December 8, 2015, from Fast Company Magazine: <http://www.fastcompany.com/49359/toll-new-machine>
- Forbes. (2012, April 18). *Michael Chipman - Forbes*. Retrieved December 12, 2013, from Forbes: <http://web.archive.org/web/20090516184756/http://people.forbes.com/profile/michael-a-chipman/12618>
- Fowler, W. F. (1933). *Fishermen and fish: A sequel to For America, an interpretation and plan*. Lynbrook, NY: W.F. Fowler.
- Fox Nation. (2011, June 14). *Obama Blames ATMs for High Unemployment*. Retrieved November 13, 2015, from Fox Nation: <http://nation.foxnews.com/president-obama/2011/06/14/obama-blames-atms-high-unemployment>
- Hurley, M. (2015, November 2). *The Role of the Robo-Advisor*. Retrieved November 28, 2015, from Financial Advisor Magazine: <http://www.fa-mag.com/news/the-role-of-the-robo-advisor-23704.html>

- IMDb. (2014, January 10). *Her (2013)* - IMDb. Retrieved December 8, 2015, from Internet Movie Database: <http://www.imdb.com/title/tt1798709/>
- Investment Management Consultants Association. (2012). *Defining Wealth Management: Serving High-Net-Worth Clients with a Distinct Body of Knowledge*. Retrieved September 9, 2015, from IMCA: https://www.imca.org/sites/default/files/cpwa/IMCA_Defines_Wealth_Management.pdf
- InvestmentNews. (2013, July 7). *Top 25 technology products used by advisers*. Retrieved October 8, 2015, from InvestmentNews: <http://www.investmentnews.com/article/20130707/CHART/130709971?issuedate=20130707&sid=TECH0707>
- Janowski, D. (2013, July 7). *The tech survey says...* Retrieved October 23, 2015, from Investment News: <http://www.investmentnews.com/article/20130707/REG/130709988?issuedate=20130707&sid=TECH0707>
- Kain, E. (2012, January 19). *How Technology Killed Kodak*. Retrieved December 8, 2015, from Forbes Magazine: <http://www.forbes.com/sites/erikkain/2012/01/19/how-technology-killed-kodak/>
- Kinniry, F. M., Jaconetti, C. M., DiJoseph, M. a., & Zilbering, Y. (2014, March). *Putting a value on your value: Quantifying Vanguard Advisor's Alpha*. Retrieved December 8, 2015, from Vanguard: <http://www.vanguard.com/pdf/ISGQVAA.pdf>
- Krause, K. (2015). Dimensional Advisor Benchmarking. *Dimensional Conference* (pp. 0-32). Santa Monica: Dimensional Fund Advisors.
- Lazaro, J. C. (2015, March 25). *Major Investor Losses Due to Conflicted Advice: Brokerage Industry Advertising Creates the Illusion of a Fiduciary Duty*. Retrieved November 14, 2015, from Public Investors Arbitration Bar Association: <https://piaba.org/system/files/pdfs/PIABA%20Conflicted%20Advice%20Report.pdf>
- Lins, L. a. (2014). Chapter 1. In L. a. Lins, *Regulation of Investment Advisers*. Thomson West.
- Malkiel, & Ellis. (2013). *The Elements of Investing: Easy Lessons for Every Investor*. John Wiley & Sons.
- Markoff, J. (2015). *Machines of Loving Grace: The quest for common ground between humans and robots*. San Francisco: HarperCollins.
- Mergers and Inquisitions. (n.d.). *Private banking: Make bank and have a great lifestyle*. Retrieved September 17, 2015, from Mergers and Inquisitions: <http://www.mergersandinquisitions.com/private-banking/>
- Moyer, L. (2015, April 24). *Putting Robo Advisers to the Test*. Retrieved October 18, 2015, from The Wall Street Journal: <http://www.wsj.com/articles/putting-robo-advisers-to-the-test-1429887456>

- Office of Information and Regulatory Affairs. (2015, Spring). *View Rule (RIN: 1210-AB32)*. Retrieved November 5, 2015, from Office of Information and Regulatory Affairs: <http://www.reginfo.gov/public/do/eAgendaViewRule?pubId=201504&RIN=1210-AB32>
- O'Reilly, T. (2014, January 9). *Google+ Post*. Retrieved December 8, 2015, from Google+: <https://plus.google.com/+TimOReilly/posts/F85gaWoBp3Z>
- Peiffer, J. C. (2015, July 23). *Separating fiction and facts in the conflicted-advice debate*. Retrieved November 12, 2015, from The Hill: <http://thehill.com/blogs/congress-blog/economy-budget/248866-separating-fiction-and-facts-in-the-conflicted-advice>
- Pigliucci, A. (2015). *The "Greater" Wealth Transfer: Capitalizing on the Intergenerational Shift in Wealth*. Accenture Wealth and Asset Management Services. New York: Accenture Wealth and Asset Management Services.
- Porter, E. P. (1994). Tax expert systems and future development. *The CPA Journal Online*.
- Rachleff, A. (2013, December 17). *The Unexpected Impact of Commissions*. Retrieved December 8, 2015, from Wealthfront Blog: <https://blog.wealthfront.com/unexpected-impact-of-commissions/>
- Redtail Technology. (2015, December 8). *Pricing*. Retrieved December 8, 2015, from Redtail: <http://corporate.redtailtechnology.com/products/pricing-2/>
- RIA in a Box. (2014, June 10). *A Guide to RIA CRM Software for Investment Adviser Firms of all Sizes*. Retrieved November 13, 2015, from RIA in a Box: <http://www.riainabox.com/blog/a-guide-to-ria-crm-software-for-investment-adviser-firms-of-all-sizes>
- RIA in a Box. (2014, January 30). *The RIA in a Box RIA Systems and Operational Best Practices White Paper*. Retrieved October 21, 2015, from RIA in a Box: <http://www.riainabox.com/blog/the-ria-in-a-box-ria-systems-and-operational-best-practices-white-paper>
- Robinhood. (2015, November 28). *How Robinhood Makes Money*. Retrieved December 8, 2015, from Robinhood FAQ Center: <https://support.robinhood.com/hc/en-us/articles/202853769-How-Robinhood-Makes-Money>
- Securities and Exchange Commission. (1997, January 31). *RIN 3235-AF91*. Retrieved September 27, 2015, from Securities and Exchange Commission: <https://www.sec.gov/rules/final/34-38245.txt>
- Securities and Exchange Commission. (2015, November 29). *Betterment LLC Form ADV. CRD# 149117. SEC# 801-701171*. Retrieved November 29, 2015, from IAPD - Investment Adviser Search: <http://adviserinfo.sec.gov>
- Shidler, L. (2014, December 18). *Cerulli's new numbers buttress the RIAs-supplant-brokers theorem with 40% market share jump seen by 2018*. Retrieved November 8, 2015, from RIABiz: <http://www.riabiz.com/a/5035740136210432/cerullis-new-numbers-buttress-the-rias-supplant-brokers-theorem-40-market-share-jump-seen-by-2018>

- Southall, B. (2013, March 15). *How Black Diamond is working out -- or not -- as Advent's agent of deliberate cannibalization*. Retrieved December 8, 2015, from RIABiz: <http://www.riabiz.com/a/20606288/how-black-diamond-is-working-out---or-not---as-advents-agent-of-deliberate-cannibalization>
- Steverman, B. (2015, October 27). *Don't Get Ripped Off: An investor's guide to fees and expenses*. Retrieved December 8, 2015, from BloombergBusiness: <http://www.bloomberg.com/news/articles/2015-10-27/an-investor-s-guide-to-fees-and-expenses>
- Supreme Court of the United States. (2015, May 18). http://www.supremecourt.gov/opinions/14pdf/13-550_97be.pdf. Retrieved October 3, 2015, from Supreme Court of the United States: http://www.supremecourt.gov/opinions/14pdf/13-550_97be.pdf
- Supreme Court of the United States Blog. (2015, June 19). *Tibble v. Edison International : SCOTUSblog*. Retrieved October 2, 2015, from SCOTUSblog: <http://www.scotusblog.com/case-files/cases/tibble-v-edison-international/>
- Swensen, D. F. (2015). *Unconventional Success: A Fundamental Approach to Personal Investment*. Free Press.
- Swift, S. (2015, November 18). Data and Behavioral Scientist, Betterment. (J. Traff, Interviewer)
- The Forum for sustainable and Responsible Investments. (2014). *US Sustainable, Responsible, and Impact Investing Trends*. USSIF Foundation.
- Timberg, S. (2013, May 12). *Jaron Lanier: The internet destroyed the middle class*. Retrieved December 8, 2015, from Salon: http://www.salon.com/2013/05/12/jaron_lanier_the_internet_destroyed_the_middle_class/
- Touryalai, H. (2013, April 10). *The Biggest, Fastest Growing and Emerging Talent - Forbes*. Retrieved October 3, 2015, from Forbes: <http://www.forbes.com/sites/halahtouryalai/2013/04/10/the-biggest-fastest-growing-and-emerging-talent/>
- United States Department of Labor. (2014, January 8). *Tellers: Occupational Outlook Handbook: US Bureau of Labor Statistics*. Retrieved December 8, 2015, from US Bureau of Labor Statistics: <http://www.bls.gov/ooh/office-and-administrative-support/tellers.htm>
- W.W. (2011, June 15). *Are ATMs stealing jobs?* Retrieved December 8, 2015, from The Economist: <http://www.economist.com/blogs/democracyinamerica/2011/06/technology-and-unemployment>
- Wealthfront. (2015, November 28). *Automated Daily Tax-Loss Harvesting | Wealthfront*. Retrieved November 28, 2015, from Wealthfront: <https://www.wealthfront.com/tax-loss-harvesting>

- Wealthfront. (2015, November 4). *Investment Management, Online Financial Advisor | Wealthfront*. Retrieved November 4, 2015, from Wealthfront Inc: <https://www.wealthfront.com/>
- Wealthfront. (2015, May 9). *Wealthfront Client Account Agreements*. Retrieved November 12, 2015, from Wealthfront: <https://www.wealthfront.com/static/documents/client-agreements/WEALTHFRONT-CLIENT-ACCOUNT-AGREEMENT.pdf>
- Wong, B. K., & Monaco, J. A. (1995). Information and Management. In Monaco, *Expert system applications in business: a review and analysis of the literature* (pp. 141-152). New York, NY: Elsevier. doi:10.1016/0378-7206(95)00023-P
- Yeske Buie. (2015, December 8). *Fees & Minimums*. Retrieved December 8, 2015, from Yeske Buie Services Fees and Minimums | YeBu.com: <http://www.yebu.com/services/fees-minimums/>