HARVARD
Office of the Vice Provost for Advances in Learning

MODULE 3 UNIT 1
Information processing for financial services

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Table of contents

Learning outcomes:

LO1: Explain how data can be used in the financial services industry.

LO2: Discuss some of the problems associated with monetizing data for financial services.

1. Introduction

The FinTech revolution has disrupted how data is gathered and used in the financial sector. A methodology that has promoted the growth of this revolution is machine learning, which refers to a field of artificial intelligence (AI) that allows computer algorithms or models to progressively improve the performance of data-driven predictions or decisions without static program instructions from a human (Sarker, 2022). For many years, AI has been used to spot patterns in the stock exchange and to flag fraudulent transactions. The data explosion of the 21st century means that a wealth of information on collective human behavior is stored on the World Wide Web. Advancements in internet technology have vastly improved the processing and understanding of information, which has generated a range of novel applications for data in financial services. For example, the volume and tone of messages posted on social media platforms such as Facebook and Twitter have been shown to have some value in informing trading strategies and investment decisions.

Deep learning and artificial neural networks use computer algorithms to process masses of historical information on publicly traded stocks to predict trends in the market. Statements released by publicly traded companies can also be a source of insight into the financial health of public firms and can help investors make investment decisions. However, the application of information processing in the financial sector is not without its complications. These complications include a lack of consensus about the reliability of historical data and data based on company statements the reliance on retrospective analysis of strategies and events for data processing, which may be less useful in predicting the future (Ranco et al., 2015; Zheludev, Smith & Aste, 2014).

This casebook will provide details on how companies specializing in utilizing data processing in the financial sector have entered the market, and what the challenges are that such companies face. This casebook will include details from Recorded Future, BIA and Opendoor.

2. Data and the search for alpha

In finance, alpha is defined as the measure of the active return on and the performance of an investment, above and beyond some type of benchmark (Ferson and Lin, 2014). Recorded Future and BIA believe that information is the key to building investment strategies that yield positive alpha. Both firms have ties to the US Central Intelligence Agency (CIA) and employ methods and tools originally developed for national security. They offer a range of products and services that help investors leverage information on different stocks and companies in financial markets. As their business models have evolved, Recorded Future and BIA have had to contend with software and research company competitors looking to establish themselves

in this space. They have also had to try and resolve tensions in providing web-based information to clients wanting to remain the sole owners of that information.

2.1 Recorded Future

Recorded Future Inc. was founded in 2009 by Christopher Ahlberg, a Swedish expatriate with a PhD in computer science from Chalmers University of Technology. The company was founded as a predictive analytic software company. Its business model was based on the ability to extract and aggregate information from multiple internet platforms and resources, using this information to make predictions about future events.

Figure 1 shows the different sources of information used by Recorded Future for its predictive analyses. This graphic categorizes these sources by geographic location and media type.

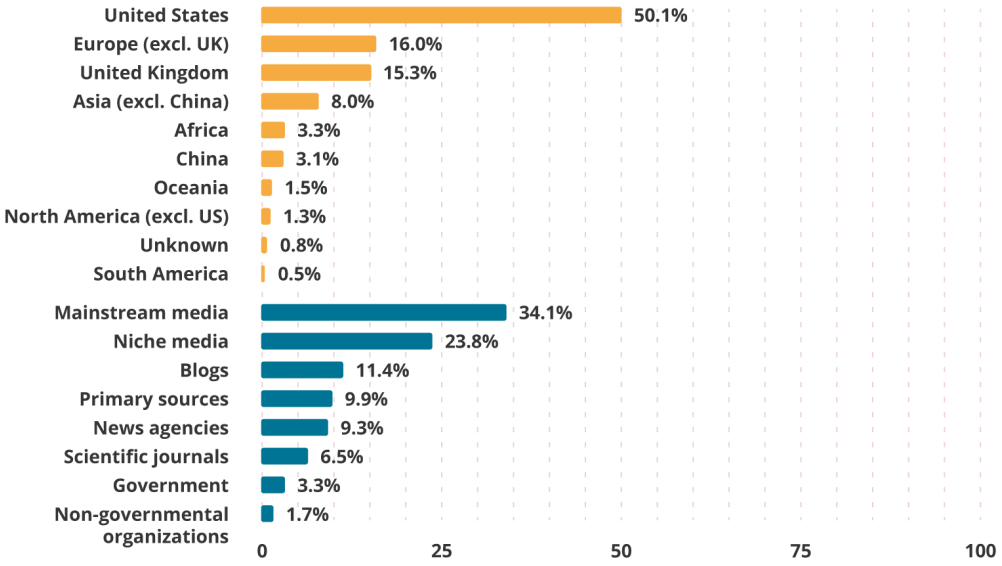

Figure 1: Data sources used by Recorded Future. (Adapted from: Recorded Future company analysis).

Most of Recorded Future's data is harvested from US-based websites. Additionally, the largest sources of data are from media outlets that publish their content online.

In the following video, Lauren Cohen discusses the relationship between LXE Capital (a company whose name has been changed for the purpose of this video) and Recorded Future, both of which had an interest in predicting the financial future. Recorded Future established itself in the defense industry through its ability to predict terrorist attacks using data from the internet and it branched out into the finance industry by using the same approach and technology to create new trading strategies.

Video 1: Recorded Future's use of data to create new trading strategies. (Access this casebook on the Online Campus to watch this video).

Recorded Future and LXE Capital show how data sourced from the internet can be applied to the financial sector. Additionally, Recorded Future specializes in providing threat intelligence to retail companies such as Gap and Target, finding the retail sector easier to penetrate than that of the financial services.

Explore further:

Recorded Future is one of the largest and most successful threat intelligence software companies in the world with over 900 clients. It was bought by Insight Venture Partners, a private equity firm, for a total of US$780 million (Ahlberg, 2019). The acquisition also allowed the company to strengthen its threat-intelligence development and global expansion goals.

In 2021, Recorded Future acquired Gemini Advisory in a US$52 million deal (Osborne, 2021). Gemini Advisory's specialization in fraud and Dark Web activities allows Recorded Future to offer a more comprehensive intelligence platform for its customers. In 2022, Recorded Future purchased Security Trails, a startup that helps companies maintain and organize their internet-facing assets. This acquisition gives Recorded Future the ability and technology to provide their customers with real-time visibility into networks and servers that are exposed to harmful actors (Naraine, 2022). The purchase of Security Trails places Recorded Future in the Attack Surface Management (ASM) cybersecurity market.

Carefully consider the range of products and services offered by Recorded Future, most of which are enabled through numerous acquisitions, before participating in Poll 1.

Poll 1: Recorded Future's strategic decisions (Access this casebook on the Online Campus to engage with this poll and view your peers responses).

Do you think Recorded Future has made the right strategic call by pursuing the acquisitions for the firm going forward?
Yes
No

2.2 Business Intelligence Advisors

BIA was founded in 2001 by a group of individuals with backgrounds in polygraph, interrogation techniques, and financial compliance. Their objective was to create a tool based on techniques originally developed by the CIA that would allow investors to detect deception in high-stakes communication settings (e.g., corporate earnings calls), so as to make better investment decisions. Their proprietary Tactical Behavior Assessment™ (TBA) methodology differs from other investment-advisory firms and provides a lens for investors to use to better interpret all investment-related information.

BIA relies on the analysis of verbal and nonverbal cues to make informed deductions about various communications, including unscripted statements and carefully crafted corporate correspondence (BIA, n.d). According to BIA's founders, these behavioral cues in corporate communications serve as a valuable source of insight into the future of particular firms (Cohen & Malloy, 2011).

Explore further:

BIA's proprietary TBA™ methodology has been beneficial to institutional investors by providing behaviour-based insights that inform high-value decision making. This has proven meaningful during various processes, including coaching and professional development.

By capitalizing on proprietary method, BIA began to offer an array of customized products and services in 2011. Figure 2 illustrates the revenue and earnings before the deduction of interest, taxes, depreciation, and amortization (EBITDA) for BIA since the company was founded. As you can see, the company has grown rapidly, although revenue dropped following the 2008 credit crisis.

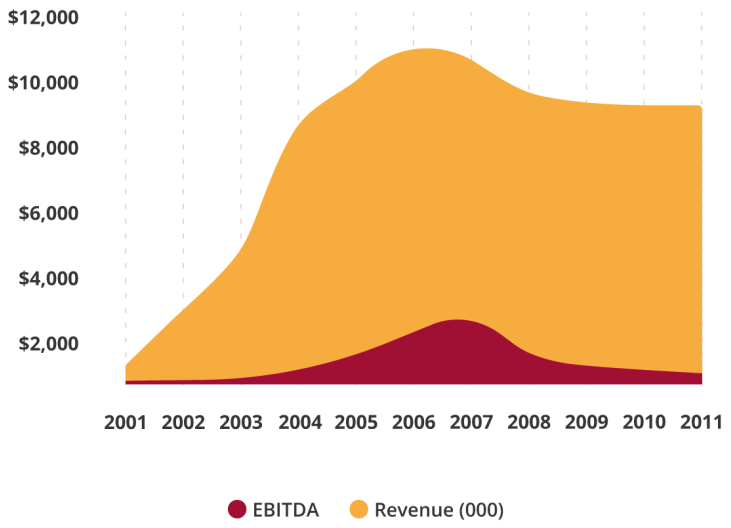

Figure 2: BIA revenue and EBITDA numbers (2001–2011). (Adapted from: BIA company documents).

As an investment-advisory firm operating in a crowded market, BIA faced a number of challenges in charting their way forward. Additionally, budget cuts and losses incurred by the research and development arms of many institutional investment firms during the financial crisis of 2008 made competition between research companies even fiercer. Some of BIA's rivals, including Morningstar, Value Line, and Zacks, also developed a suite of automated online stock and fund selection tools (Cohen & Malloy, 2011). Other smaller players chose to distribute their research via general outlets such as Thomson Reuters and Bloomberg. BIA's struggle to establish and maintain a specialist niche in this climate was intensified by clients unwillingness to help them grow their business, as BIA selling information to competitors would be disadvantageous and could even hurt their returns.

Considering the companies trajectory following the 2008 financial crises and increased competition in the investment community, BIA had four potential courses for development that lay open in 2011 as illustrated in Figure 3.

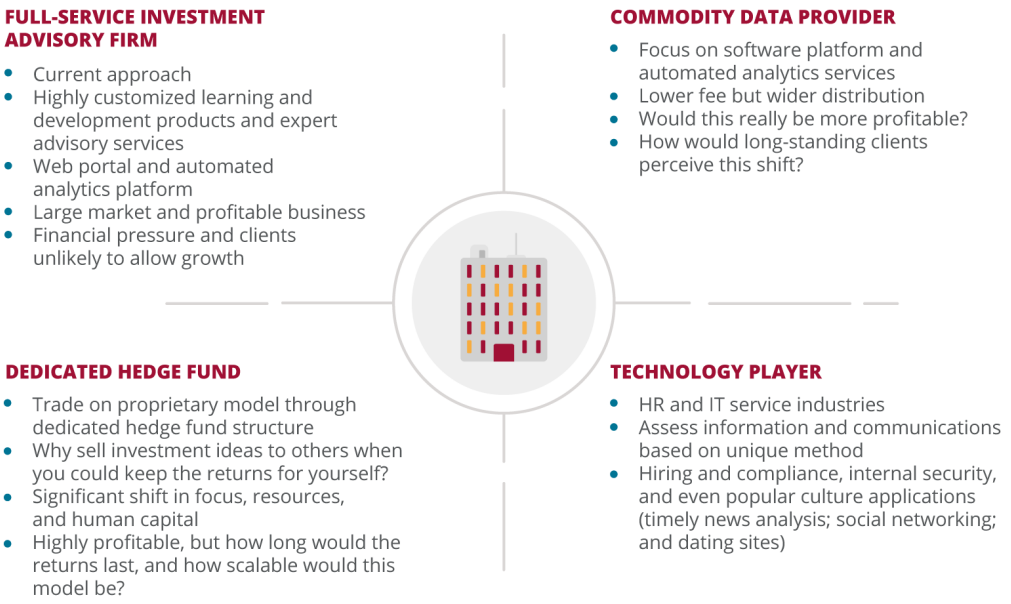

Figure 3: Business development strategies for BIA. (Adapted from: Cohen & Malloy, 2011).

Which BIA development strategy would you have chosen? Reflect on your decision by engaging in Poll 2.

Poll 1: BIA's four business development strategies. (Access this casebook on the Online Campus to engage with this poll and view your peers' responses).

If you were the then CEO of BIA, which of these four strategies would you have chosen?
Full-service investment-advisory firm
Commodity data provider
Dedicated hedge fund
Technology player

2.2.1 BIA today

Ten years after BIA was founded, its former president Cheryl Cooke faced difficult decisions concerning the company's trajectory. However, it continued to operate as an advisory firm, providing clients with investment intelligence, tools for learning and development, and expert advice. In Video 2, David Nydam, BIA's current CEO and director, discusses the evolution of BIA and the TBA™ methodology in action.

Video 2: The evolution of BIA and its proprietary TBA™ methodology. (Access this casebook on the Online Campus to watch this video).

Explore further:

The use of AI and machine learning continue to revolutionize the financial services industry. AI, in particular, is impacting FinTech companies through the creation of digital advisors, visualization and transaction search, profile of customer risk, and pricing and credit risk evaluation.

3. Opendoor: Transforming the US real estate market

Opendoor Technologies is a digital real estate platform for consumers to buy and sell property. The company was founded in March 2014 and it began operations after raising nearly US$10 million in venture capital in May 2014 (Cutler, 2014; Tibbits, 2016). Keith Rabois, one of the company's three founders, explained his vision by saying, "my belief is that if you added a frictionless, convenient, simple process, more people would sell their homes" (Novet 2014). As an iBuyer (i.e., instant buyer), Opendoor planned to use computer algorithms to purchase and resell homes by using a wealth of property data to estimate property value.

An iBuyer company is one that works with consumers directly to buy and sell their homes, as opposed to going through a real estate agent or broker. An iBuyer helps reduce the costs of

maintenance, warranties, costs to close deals or concessions, as well as the overall commission for real estate agents or brokers at an extra cost to consumers (Brumer, 2021). Some examples of large iBuyer companies in the US other than Opendoor include Zillow, Redfin, and Offerpad.

Explore further:

iBuyers cut the costs for consumers in selling their family homes but do they renovate them and sell them for a significant profit by undercutting real estate agents and automating other costs? In Los Angeles, for example, where the cost of houses is significantly high, iBuyers such as Opendoor and Zillow could further aggravate an existing housing crisis. This has led the LA City Council to consider prohibiting iBuyers and other institutional investors from purchasing single-family homes.

Zillow dramatically exited the iBuyer market, but its competitors show no signs of slowing down. Their persistence demonstrates the need to consider the impact of iBuyers on the real estate market and their future profitability. As iBuyers grow in size, will their profitability increase? Furthermore, for cities already struggling with affordable housing, who benefits and how much of a threat do iBuyers and automated residential real estate transactions pose to first-time home buyers? Will these externalities change as the industry grows?

Opendoor uses machine learning to crunch information provided by the home seller, such as the property address, features, conditions, and any upgrades, as well as public and proprietary data on residential real estate markets, such as construction age, expected appreciation, and school systems, to build multiple models of home value (Opendoor, n.d). Their software uses a process called “ensembling” to compute a weighted average of the models’ estimates to arrive at a split-second value estimation to offer a quote to homeowners looking to sell their properties (Opendoor, 2022). To minimize risk, Opendoor limits its purchases to houses priced between US$100,000–US$500,000, built after 1960, and located in specific markets.

In August 2019, the company launched its in-house mortgage services business – Opendoor Home Loans. By September 2019, it also acquired OS National, a title and escrow company, which allowed it to integrate title, escrow, and closing services into an end-to-end customer experience (Rosenbaum, 2019). Eric Wu, co-founder of Opendoor, saw this deal as crucial to Opendoor’s future, saying, “[homebuyers and sellers] are confused about the status of the close and timeline, overwhelmed by hundreds of documents to understand and sign, and frustrated by the delays due to multiple parties coordinating ” (OS National, 2019). After the company suspended service between March and May of 2020, it launched a contact-free platform for buying and selling homes, where buyers or sellers don’t need to be in physical contact with an Opendoor representative to process relevant service. By 2020, Opendoor had sold 50,000 homes across 20 US markets with plans to continue growing (Okland, 2021).

Opendoor went public in December of 2020 and raised approximately US$1 billion via a special purpose acquisition company (SPAC) deal, also merging with a publicly traded blank-check company created for the sole purpose of acquiring a private company to take it public (Kawamoto, 2020). Shortly after, Opendoor’s share price increased to US$39 in February 2021 from US$31.47. Whereas many SPAC-listed companies have failed to measure up to optimistic

expectations, Opendoor continued its growth by doubling its market footprint at the end of 2021 with 17,000 homes worth US$6.1 billion in 44 markets (Forman, 2021).

However, Opendoor has since encountered investor headwinds with low trust and concern regarding the iBuyer model. For example, in November 2021, Zillow announced that it would be winding down Zillow Offers, its home-buying unit, to exit the iBuyer market after only three years. Zillow cited unpredictability in forecasting home prices and supply constraints for on-the-ground workers as the reasons behind its exit. One postmortem analysis found that hundreds of Zillow's listed houses were being sold for less than their original purchase prices (Nicoll et al., 2021).

However, since Zillow's exit, Opendoor's share price has continuously declined to new lows from US$24.75 in November 2021 to US$6.47 in March 2022. Bearish investors have shared concerns that, perhaps, the AI revolution may not extend to the real estate market where 99% of sales are still transacted using traditional means, property inventories are illiquid, and property values remain volatile (Alpert, 2021). Although Opendoor co-founder Ian Wong has argued that customers want an alternative to the traditional way of buying a home, can Opendoor convince investors that this is the case (Alpert, 2021)? Was Zillow Offer's failure a one-off mistake or a symptom of the iBuyer model's endemic risk?

4. Conclusion

Over the last decade, two trends have occurred simultaneously. One is the rise of FinTech solutions and the other is the increase in data and the advancement in technological solutions to process data. These trends have presented numerous FinTech companies with profitable opportunities through predictive data analysis to offer valuable insights to clients in the financial services industry. Nevertheless, in the competitive investment industry, the information that can deliver these advantages is closely guarded, which could pose a challenge for companies looking to monetize these services.

Pause and reflect:

How can companies offering data-analysis services apply their technology, including the use of AI and machine learning, to the financial sector? What are some of the limitations and benefits of applying them?

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