FUNDAMENTAL ANALYSIS OF DUOLINGO: SHOULD INVESTORS BUY, HOLD OR SELL?

by

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LIST OF ABBREVIATIONS

AI - Artificial Intelligence

API - Application Programming Interface

B2C - Business-to-Consumer

CAPM - Capital Asset Pricing Model

CEO - Chief Executive Officer

CoD - Cost of Debt

CoE - Cost of Equity

COPPA - Children's Online Privacy Protection Rule

D2C - Direct-to-Consumer

ERP - Equity Risk Premium

ESG - Environmental, Social, and Governance

FCFE - Free Cash Flow to Equity

FCFF - Free Cash Flow to the Firm

FinA - Financial Assets

FLEV - Financial Leverage

GAAP - Generally Accepted Accounting Principles

GDPR - General Data Protection Regulation

IBD - Interest-Bearing Debt

IPO - Initial Public Offering

MAU - Monthly Active Users

ML - Machine Learning

MVP - Minimum Viable Product

NGO - Non-Governmental Organization

NIBD - Net Interest-Bearing Debt

NOA - Net Operating Assets

NOAT - Net Operating Asset Turnover

NOPLAT - Net Operating Profit Less Adjusted Tax

OperA - Operating Assets

OPEX- Operating Expenses

OperL - Operating Liabilities

OPM - Operating Profit Margin

Q - Quarter

R&D - Research and Development

RFR - Risk Free Rate

RI - Residual Income

RNIBD - Return on Net Interest-Bearing Debt

RNOA - Return on Net Operating Assets

ROE - Return on Equity

UI - User Interface

USD - United States Dollar

WACC - Weighted Average Cost of Capital

YoY - Year-Over-Year

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Chapter 1. Introduction

The company Duolingo was founded in 2011 by Luis von Ahn and Severin Hacker. The Duolingo language learning app was launched to the general public on June 19, 2012. Offering free access to its app, Duolingo quickly gained worldwide popularity across language learners of all ages and skill levels and became a leader in the online language learning niche, with over 800 million downloads and 116.7 million active monthly users as of the end of the fourth quarter of 2024 (Duolingo, Inc., “Shareholder Letter Q4 / FY 2024”). The company has transformed the language-learning landscape by creating interactive, gamified, and personalized learning experiences. Building on its success, Duolingo went public on July 28, 2021, and continues to operate as a dominant player in the EdTech industry. As of the end of 2024, the company has offices in New York, Detroit, Seattle, Beijing, and Berlin and is headquartered in Pittsburgh, Pennsylvania.

1.1 PROBLEM FRAMING

Duolingo went public on July 28, 2021, and almost immediately experienced rapid growth. The company's stock opened at 141.40 USD per share - markedly higher than its initial public offering price (IPO) of 102 USD, allowing it to cross into its target range's top end. Shares closed up 36% at 139.01 USD apiece, giving Duolingo a market capitalization of nearly 5 billion USD (De León).

Since the company has been public for only four years, the market’s perceptions of its long-term profitability and competitive resilience remain uncertain for potential long-term stockholders. Duolingo is a high growth tech company and thus it is always harder to predict the future performance and evaluate the business compared to companies in more stable industries. Additionally, investors seek portfolio diversification, and Duolingo presents an opportunity to gain exposure to a rapidly growing sector like EdTech. However, to make an investment decision, market participants require a detailed, data-driven comprehensive valuation analysis - incorporating strategic analysis of a company's external environment (frameworks such as Porter's Five Forces), internal resources (VRIO); accounting and financial analysis (e.g., financial statements analysis, ratio analysis, pro forma statements), and fundamental valuation models - to evaluate Duolingo's long-term investment outlook, perpetual growth and associated risks.

The primary objective is to offer a comprehensive assessment of Duolingo as a potential investment opportunity. This analysis aims to provide investors with a detailed understanding of Duolingo's business model, financial performance, competitive positioning, long-term growth prospects, business value, and investment risks. The goal of this project is to synthesize all findings to develop well-founded, actionable investment recommendations.

Chapter 2. Business Description

This section provides a comprehensive business description to prepare the reader with a foundational understanding of Duolingo as a company. This includes a detailed breakdown of Duolingo's history and evolution, its founders, IPO, and product description, the core business model and revenue streams, including the revenue distribution. This section is the starting point for the deeper investigation presented later in the paper.

2.1 HISTORY AND EVOLUTION OF DUOLINGO

Before Duolingo, its founder and current CEO, Luis von Ahn was already known for his verification system distinguishing humans from robots online CAPTCHA and reCAPTCHA, which were sold to Google in 2009 (“Luis Von Ahn”). Later on, Von Ahn`s recognition in the tech industry helped to raise fundings for his new project - Duolingo.

Duolingo's journey started back in 2011 when professor Luis von Ahn and his postgraduate student Severin Hacker decided to focus on the idea of creating a language learning platform that would serve two purposes - providing free language learning opportunities to its users and depending on the same users to do translations. This is how the name “Duolingo” was created, where “Duo,” which means “two,” stands for two purposes of the app, while “lingo” means “language” (Adams). The first versions of the app used to work this way: learners had an opportunity to translate English texts into their mother language and gain additional practice while expanding the existing Web base, which consisted of mostly English text, and making the internet accessible to everyone, no matter what language they speak (TEDx Talks). The prototype used Spanish speakers to translate Wikipedia articles into English while learning English simultaneously.

To create their first courses, Hacker and Von Ahn studied language learning books, such as "Spanish for Dummies". They collected the 3000 most used words in each language to compose simple sentences, developed an algorithm to generate lessons, and designed simple courses for English speakers to learn Spanish and German. Duolingo was officially launched in 2012, and the app began gaining popularity. However, only two clients, media organizations CNN and BuzzFeed, signed up for its translation services. Consequently, seeing no opportunity for scaling, Hacker and Von Ahn abandoned the idea of a two-purpose app in 2014. Later on, the founders brought in linguists and second-language acquisition researchers and decided to focus on gamified and personalized lessons (Adams).

Venture capital financing allowed Duolingo to invest heavily in R&D and expand its content, even though user-generated revenue was still insufficient to cover operating costs. Thus, Duolingo's team started wondering how they could make a profit while keeping their education free for everybody. In 2017, in-app Google and Facebook ads were introduced, followed by ad-free subscriptions (Tim Ferriss). By implementation of the freemium model, the company was able to expand and build a user base, and as a result, Duolingo ended the year 2017 with revenue of 13 million USD.

Until July 2021, the company has reached several tremendous milestones, such as a team of over 400 people, courses in over 40 languages, and around 40 million monthly active learners. In addition, the Duolingo app has become the top-grossing app in the education category on both Google Play and the Apple App Store, meaning it generates high revenue through in-app purchases and subscriptions. Luis von Ahn believed that being public would help Duolingo grow into a company that would further the mission of developing the best education in the world and making it universally available (Von Ahn). Duolingo became a publicly traded company on July 28, 2021, trading on Nasdaq under the ticker symbol DUOL. Company's initial public offering stood at 102 USD per share and later opened at a price of 141.4 USD per share. Duolingo was able to raise about 521 USD million in the IPO by selling 5.1 million shares (Wang and Nishant). As of February 2025, Duolingo's Market Capitalization has exceeded 16.5 billion USD, compared to 4.83 billion USD at the IPO, and continues its rapid growth (“DUOL”; *Duolingo (DUOL) - Market Capitalization*).

2.2 PRODUCT DESCRIPTION

Duolingo has evolved from a simple language-learning app into a diverse educational platform, offering products that extend beyond language learning. The breakdown of the company's products includes Duolingo, Duolingo for Schools, Duolingo English Test, Duolingo ABC, Duolingo Math, and Duolingo Music.

Language-learning app

Duolingo's main product is a user-friendly language-learning app available on Google Play and AppStore for Android and iOS devices, in addition to the web version. As of 2025, Duolingo offers 40 complete courses to study 40 languages, from Spanish to Yiddish, although if the user is a non-English speaker, they have fewer options. The app features various exercises, including translation, matching, pairing, listening, and speaking tasks, with a progress bar tracking completion. Learners set daily practice goals (ranging from 5 to 20 minutes) and can take a placement test if they have prior knowledge of a foreign language.

Other learning apps: Duolingo ABC / Math / Music

Aside from the main language learning app, the company has launched three additional mobile and web applications: Duolingo ABC, Duolingo Math, and Duolingo Music in 2020, 2022, and 2023, respectively. Duolingo ABC is a literacy-focused app designed to help young children develop reading skills through interactive phonics-based lessons and engaging stories (*Duolingo ABC*). Duolingo Math applies the company's signature gamified learning approach to teaching foundational and everyday math skills, helping users build confidence in numeracy ("Duolingo Launches a New Math App for Students and Adults"). Duolingo Music provides a method for learners to develop music literacy, including sight-reading, rhythm, and basic piano skills—all without requiring a physical instrument ("Duolingo Music Is Here - Learn More About the New Subject"). These products expand Duolingo's mission of making education accessible and enjoyable across multiple fields.

Duolingo English Test & Duolingo for Schools

The other two products, Duolingo for Schools and Duolingo English Test, are utterly different from the learning applications. Duolingo for Schools is a free learning management system that enables teachers to monitor student progress, assign tasks, and integrate Duolingo into structured lesson plans. It provides real-time progress tracking, detailed reports, and curriculum alignment with language proficiency standards like CEFR (Common European Framework of Reference for Languages) (*Duolingo for Schools | Help Center*). Duolingo English Test is an online, AI-driven English proficiency assessment designed to provide an accessible, affordable, and secure alternative to traditional standardized tests. It uses computer-adaptive technology and human-in-the-loop AI proctoring to ensure accurate evaluation while offering a flexible, 24/7 testing option at a lower cost than competitors such as TOEFL and IELTS (Langenfeld et al.). As stated on its website, the Duolingo English Test is officially accepted by over 5,500 universities and institutions worldwide, with more joining daily (*Duolingo English Test*).

Duolingo continues redefining digital education across multiple domains by leveraging AI-driven personalization, gamification, and adaptive learning. Furthermore, this cross-disciplinary diversification not only enhances the brand's competitive advantage and market presence but also uncovers new opportunities for user engagement, retention, and revenue growth.

2.3 CORE BUSINESS MODEL AND REVENUE STREAMS

The Company has a freemium business model: the app and the website are accessible free of charge, although Duolingo offers premium services for a subscription fee of 12.99 USD per month. Duolingo's business model integrates multiple variations of the freemium strategy, leveraging different approaches to maximize user engagement and revenue generation. The primary one is the Ad-Based Freemium Model (which offers free access to a product while generating revenue through advertisements). However, they also incorporated the Unlimited Free Trial Strategy, which provides indefinite free access with limited functionality, encouraging users to upgrade for a complete experience. Based on these models, Duolingo provides its core language-learning services for free, monetizing through advertisements displayed between lessons; ultimately, users can remove ads by subscribing to Duolingo Super (premium version). Additionally, while providing free access to the complete courses, Duolingo limits certain functionalities, such as the number of mistakes a user can make before waiting or watching an ad, offline mode, unlimited hearts (lives), and enhanced practice exercises also require a paid subscription. Moreover, while the freemium model has its challenges; such as high maintenance costs, low conversion rates from non-paying user to paying user, and the risk of brand devaluation; Duolingo stated in its Q1 2024 shareholder letter that this model has positioned them as the category leader and enabled them to scale to the point where users complete over one billion exercises daily.

Duolingo's revenue streams are tied to its freemium business model. Its revenue primarily relies on advertising and premium subscriptions. The ultimate goal of the freemium model is to convert as many users to paying customers as possible. Duolingo's paid subscriber base increased from 6.6 million in Q4 2023 to 9.5 million in Q4 2024, a 43% year-over-year growth (Duolingo, Inc., “Shareholder Letter Q4 / FY 2024” 3). Importantly, the conversion rate also improved, rising from approximately 7.5% to 8.1% over the same period. This growth suggests that Duolingo is effectively converting free users to paid subscribers.

In 2024, Duolingo's total revenue reached 748 million USD (see Table 1), with premium subscriptions contributing the largest share, at 81% of total revenue. In-app advertising generated almost 55 million USD, accounting for 7% of total revenue. The Duolingo English Test represented 6% of revenue, while in-app purchases, such as Gems, accounted for 5% (see Table 2). These figures highlight Duolingo's reliance on direct user monetization through subscriptions, supplemented by advertising, testing services, and in-app purchases.

Table 1. Revenue by Products (in USD, thousand)

	FY 2019	**FY 2020**	**FY 2021**	**FY 2022**	**FY 2023**	**FY 2024**
Subscription	54,848	117,501	180,698	273,507	404,684	607,531
Advertising	14,118	27,043	38,501	44,731	49,858	54,907
Duolingo english test	1,022	15,155	24,658	32,718	41,212	45,640
In-App purchases			6,836	17,914	34,673	38,653
Other	772	1,997	79	625	682	1,293
Total revenues	**70,760**	**161,696**	**250,772**	**369,495**	**531,109**	**748,024**

Source: Duolingo Inc., Form S-1 Registration Statement (2021) and Form 10-K Annual Reports (2022–2024), U.S. Securities and Exchange Commission.

Table 2. Revenue by Products (as % of total revenue)

	FY 2019	FY 2020	FY 2021	FY 2022	FY 2023	FY 2024
Subscription	77.51%	72.67%	72.06%	74.02%	76.20%	81.22%
Advertising	19.95%	16.72%	15.35%	12.11%	9.39%	7.34%
Duolingo english test	1.44%	9.37%	9.83%	8.85%	7.76%	6.10%
In-App purchases	0.00%	0.00%	2.73%	4.85%	6.53%	5.17%
Other	1.09%	1.24%	0.03%	0.17%	0.13%	0.17%

Source: Authors' calculations based on data from Duolingo Inc., Form S-1 Registration Statement (2021) and Form 10-K Annual Reports (2022–2024), U.S. Securities and Exchange Commission.

Chapter 3. Strategic Analysis

3.1 MARKET OVERVIEW

In the latest Form 10-K: Annual Report for the Fiscal Year Ended December 31, 2024 Duolingo states that according to HolonIQ, in January 2024, consumer spending on both online and offline language learning is expected to reach about 123 billion USD by 2027 (6).

Language learning has never been more convenient and accessible than it is now. With the rise of the Internet, the number of people willing to learn new languages online has also increased. In response to the increased demand, new educational companies have started to launch, and the market is growing rapidly. The broader D2C language learning market was valued at 60 billion USD in 2023 (HolonIQ Education Intelligence Unit). Within this, the global online language learning market, which includes online, hybrid, or entirely visual lessons, has shown a growth from 11.52 billion USD in 2023 to 13.61 billion USD in 2024 and is expected to grow to 52.16 billion USD by 2032, with a CAGR of 18.1% during the forecast period (Business Research Insights). Language learning apps represent a significant and fast-growing segment, generating 1.08 billion USD in revenue, reflecting a 28% YoY increase (Curry).

Some of the key factors driving growth include:

- **Smartphone and Internet Penetration:** The worldwide rise of digitalization, which includes increased popularity of smartphones and accessibility to the internet has made language education more convenient and accessible to people in all parts of Earth.
- **Globalization and Cross-Border Communication:** Globalization has resulted in extended cross-border communication. People need to improve their language skills to travel, study, and

work internationally, ensuring communication across cultures. Then, a lot of information is available online in languages like English, Spanish, or Mandarin, making language proficiency necessary for accessing global knowledge. Additionally, wanting to expand their businesses abroad, employers prioritize multilingual candidates who can communicate in various languages.

- **Technological Advancements:** New technological opportunities and trends, such as AI, gamification and personalization enhance learning experiences, increasing engagement and retention of existing users, while playing a part in attracting new customers.

Since 2019, Duolingo has maintained a strong leadership position as the number one player in the language learning app market. Duolingo generated 531 million USD in revenue in 2023, with 49% market share. In 2024, the company reported 748 million USD in gross revenue, showing growth of 41% YoY. Duolingo is growing much faster than the market and its competitors. For comparison, Babbel, which holds second place among language learning apps, achieved revenue of approximately 330 million USD in 2023, a 20% YoY increase (Curry). Given this, Duolingo is trying to expand its operations to the broader “education” market, not only language learning, as they state in their goal.

3.2 MISSION, VISION AND GOAL

A company’s vision, mission, and goals are fundamental and inseparable components that are the backbone of all business operations and decision-making. In today’s highly competitive environment, having a well-defined vision, mission, and goals is essential for adapting to change and maintaining long-term success.

In their first letter to shareholders for Q4 2021, Duolingo clearly outlined the company's mission, vision, and goal. Duolingo's mission is to develop the best education in the world and make it universally available. The company's vision is to build a future in which, through technology, every person on this planet has access to the best quality of education.

In 2021, Duolingo set a strategic goal to leverage its market-leading position to expand beyond the narrow "language learning" market to the whole "education" market. This meant creating new products to help people learn in new areas. By 2024, it was evident that Duolingo successfully achieved this objective through product diversification.

3.3 EXTERNAL ENVIRONMENT ANALYSIS

For strategic analysis of the external environment, this paper uses Porter's Five Forces framework. Porter's Five Forces framework analyzes the competitive drivers in an industry and how they are divided among industry actors. The father of the framework, Michael Porter, described them in his 1979 Harvard Business Review article, revolutionizing the strategy field (Harvard Business School). This framework will help analyze the external pressures and competitive dynamics within the language learning industry that shape Duolingo's strategic environment.

Threat of new entrants: strong

The threat of new entrants in the field of online language learning remains strong. The barriers to enter the market are low, especially given that creating a MVP can be done without any coding skills. Research by Orok et al. (2024) highlights that no-code platforms like FlutterFlow and Adalo enable rapid development of educational apps, reducing the need for venture capital or technical expertise. This means that entrepreneurs can enter the language-learning app market relatively cheaply, increasing the likelihood of new entrants challenging Duolingo. On the other hand, various Software & App Development companies mention that the cost of developing a language learning app like Duolingo, adopting similar functionalities, varies from 100,000 USD to 300,000 USD or more (Brunton; Sharma; Srivastava). Duolingo features, such as AI personalization, gamification, adaptive learning and availability on different platforms, make it stand out among competitors.

Because of the freemium model, mostly adopted by language learning applications, the switching cost for users is usually zero, or almost zero. However, Duolingo enjoys high brand loyalty due to its gamification features. The study by Mattke and Maier demonstrates that Duolingo's gamification features - immersion (avatars, mascots), achievement (experience points, streaks, badges), and social-related elements (friend challenges, discussion boards) - significantly enhance user engagement and retention. When users interact with these features, psychological attachments to the app are formed, making it less likely for a user to switch to a new competitor. Therefore, even given that barriers to enter the market are low, new entrants can hardly compete with Duolingo.

Bargaining power of suppliers: moderate

Duolingo's suppliers are mainly represented by two groups: human capital and technology providers. As of December 31, 2024, Duolingo has 830 employees, including more than 380 engineers (Duolingo, Inc., "Form 10-K: Annual Report" 6). In 2023, Evan Data Corporation, a market research firm specializing in software development, released the Worldwide Developer Population Survey Report, which stated that the worldwide developer population grew to 26.4 million in 2023, with the expectancy to grow further, lowering the relative bargaining power of individual developers. Duolingo has several offices (Pittsburgh, Beijing, Berlin, Detroit, Seattle, and New York City). Therefore, they are hiring from multiple locations and are less likely to face a lack of human resources. Additionally, according to Glassdoor, an American website where current and former employees anonymously review companies, the median annual salary of a Duolingo Software Engineer is 200,000 USD

("Duolingo Software Engineer Salaries"), while the average annual salary for a software developer, according to the U.S. Bureau of Labor Statistics, is 130,000 USD ("Software Developers, Quality Assurance Analysts, and Testers"). Making Duolingo a desirable workplace, suggesting that human capital's bargaining power as a supplier is weak.

As its technology suppliers Duolingo identifies the Apple App Store, the Google Play Store, Amazon Web Services and Google Cloud. The cloud computing services could be substituted, for example with Microsoft Azure, IBM Cloud, or Oracle Cloud Infrastructure, however such shifts will be costly. While it is impossible to calculate the exact number, additional required changes such as re-writing applications and infrastructure spin-up suggest that shifting cloud infrastructures is not an easy change. Duolingo however lowers the power of the cloud suppliers by using multiple hosting and cloud computing providers. Company works with Amazon Web Services and Google Cloud, as well as Alibaba Cloud to reduce API latency and improve content delivery and to better serve users in China ("Duolingo: Cloud Technology Empowers Education APP").

For an app like Duolingo, which operates on a subscription-based freemium model, the App Store and Google Play both charge a 15% commission on subscriptions and up to 30% on in-app purchases (Apple Inc.; *Service Fees - Play Console Help*). This heavy reliance on third-party platforms for distribution and payment processing gives Apple and Google significant bargaining power over Duolingo. With 59% of revenue coming from the Apple App Store and 20% from Google Play in 2023, nearly 80% of Duolingo's total revenue depends on these two companies. Their non-negotiable commission fees (15% on subscriptions and up to 30% on in-app purchases) directly impact Duolingo's profitability. Additionally, Duolingo recognizes that third party control over app distribution, updates, monetization policies, and access to user data limits the company's strategic flexibility (Duolingo, Inc., "Form 10-K: Annual Report" 22).

Overall, Duolingo faces weak supplier power from human resources, moderate power from cloud providers due to switching costs, and strong power from Apple and Google, which control its primary distribution and monetization channels.

Bargaining power of buyers: weak

Buyers' bargaining power is weak, primarily because Duolingo's product is mostly B2C, which means that the customer base is very diversified, and thus, holds almost no bargaining power. Duolingo generates revenue through video advertising and paid subscriptions, which minimizes individual users' ability to influence pricing. While switching costs for users are close to zero, Duolingo continues to expand its customer base. In Q4 2024, the company reported 116.7 million MAUs—a 32% YoY increase—and 9.5 million paid subscribers, growing 43% from Q4 2023 (Duolingo, Inc., “Shareholder Letter Q4 / FY 2024” 3).

Threat of substitutes: strong

Duolingo faces a high threat of substitutes due to the wide range of alternative language-learning methods available. Aside from the direct competitors, which include any other language learning application, Duolingo’s services can be substituted through offline language learning schools, universities, social media blogs, and even media streaming services, such as Netflix, that provide an opportunity for learners to watch movies and TV shows in a foreign language with subtitles. Additionally, Duolingo itself states that as free online translation services improve and become more widely available and used, people may generally become less interested in language learning (Duolingo, Inc., “Form 10-K: Annual Report” 18).

The cost of these alternatives varies significantly. Some substitutes, such as social media and AI translation services, are free, while others, like tutoring platforms (e.g., Preply, where the average tutor price is 30 USD per month), require a financial commitment. This range of options allows users to select a learning method that best suits their budget and preferences, reinforcing the substantial substitution threat.

Rivalry among existing competitors: moderate

The rivalry among existing competitors in the online language learning market is moderate to high, with a few dominant players leading the industry. According to the service for mobile app market intelligence AppMagic, used by Statista, there are 688 applications on Google Play and Apple App Store ("Top Apps"). The leading players in the industry are Duolingo, Babbel, Rosetta Stone, Busuu, Cake, Mondly, LingoDeer HelloTalk, Memrise, ELSA Speak (Statista).

However, as noted earlier, Duolingo is growing faster than the industry. Language learning apps showed a 28% YoY increase last year, while Duolingo had 43% YoY growth. Competition is not fragmented in a way that suggests equal market shares among all participants. Duolingo holds a revenue-based market share of approximately 50%, making it the number one player in the industry, making it challenging for others to overtake it. Therefore, although rivalry among existing competitors is generally intense in the industry, it is relatively moderate to weak for Duolingo.

3.4 INTERNAL ENVIRONMENT ANALYSIS

For strategic analysis of the internal environment, this paper uses the VRIO framework. The VRIO framework is an essential model used in strategic analysis, enabling firms to assess their internal resources and capabilities. Resources must be valuable, rare, costly to imitate, and properly organized (VRIO) to yield sustained competitive advantage to deal with threats and leverage opportunities (Barney). This paper implements VRIO (see Table 3) to identify Duolingo's key resources and assess whether the company provides a sustained competitive advantage.

Table 3. VRIO Analysis

Resource	Valuable	Rare	Inimitable	Organized	
High-Quality Structured Learning Content	+	+	+	+	Sustainable competitive advantage
Brand	+	+	+	+	Sustainable competitive advantage
Research and Development Capabilities	+	+	-	+	Temporary competitive advantage
User Base	+	+	-	+	Temporary competitive advantage
Technological Infrastructure and Platform	+	-	+	+	Competitive parity
Human Capital	+	-	-	+	Competitive parity

Source: Authors' analysis.

Sustainable Competitive Advantage

As a result of a VRIO analysis, two resources were allocated as a sustainable competitive advantage that reflect the company's strengths, which distinguish Duolingo from the competitors and allow it to maintain a leading position in the market. These resources include: (1) High-Quality Structured Learning Content, and (2) Brand.

(1) Duolingo's high-quality structured learning content is a sustainable competitive advantage that delivers language proficiency outcomes comparable to traditional academic programs. A study by Jiang et al. found that learners who completed Duolingo's beginner-level Spanish and French courses achieved reading and listening proficiency, similar to U.S. university students after four semesters of study. This research demonstrates the effectiveness and accuracy of the content Duolingo provides, reinforcing its advantage in the edtech market. Duolingo secures a long-term competitive edge in digital language education by offering university-equivalent language training. Additionally, Duolingo stands out from competitors due to its large selection of languages - the list consists of 40 languages, from English or Spanish to lesser-spoken ones, such as Esperanto, Navajo, and even High Valyrian.

(2) Duolingo's brand is a resource, meaning that people can easily recognize Duolingo based on its colors, visuals, and logos. Duolingo uses a variety of methods to increase its brand recognition and maintain it as a synonym to gamified learning (Duolingo, Inc., “Shareholder Letter Q1 / FY 2024” 5). A team of professionals has developed unique visuals, which represent the app and enhance Duolingo's playful, fun and engaging mood. Such visuals include bright color schemes, memorable fonts and minimalistic characters. A green owl Duo has become a face of the app and accompanies people both inside and outside the app itself. This owl is one of the main characters in the social media of the company, such as Tiktok and Instagram, that have more than 16 million and 4 million of worldwide subscribers respectively (“Duolingo on TikTok”; “Duolingo on Instagram”). At the same time Babbel, a second player on the language learning market, has more than 400 thousand Tiktok subscribers and 380 thousand Instagram subscribers - much less than Duolingo (“Babbel on TikTok”; “Babbel on Instagram”).

One more thing that differentiates Duolingo from competitors is brand recognition. According to a survey by Statista, Duolingo's brand awareness is 62% in the United States. The survey was conducted using the concept of aided brand recognition, showing respondents both the brand's logo and the written brand name. The study highlighted that 62% of U.S. respondents know Duolingo, and 60% of people like the brand (Statista, “Duolingo Brand Profile in the United States 2022”). To compare, among the 58% of the respondents who know Babbel, only 36% of people like the brand (Statista, “Babbel Brand Profile in the United States 2022”).

The brand Duolingo has become a huge part of pop culture, their official social media accounts have generated more than ten billion impressions and have been highlighted by numerous press outlets. The company's viral marketing campaigns, such as Super Bowl ad, Duolingo on Ice, and “Owl Game” partnership with Netflix contributed to the user growth and the growth of the iconic Duolingo brand (Duolingo, Inc., “Shareholder Letter Q4 / FY 2024” 5). As the company mentioned itself, all of this has allowed us to grow our business organically, primarily relying on word-of-mouth and brand buzz rather than paid user acquisition (Duolingo, Inc., “Form 10-K: Annual Report” 11).

Temporary Competitive Advantage

Temporary competitive advantage arises when a company's resources or capabilities are valuable and rare but can also be imitated. In the case of Duolingo, we identify (1) Research and Development, and (2) User Base as resources that produce temporary competitive advantage.

(1) Research and development is Duolingo's largest operating expense; the company continuously experiments with and refines new products and features while enhancing existing ones to boost engagement and efficiency, creating massive value for the company. In 2024, the company allocated 235.3 million USD to R&D, a 21% increase from the previous year (Duolingo, Inc., “Form 10-K: Annual Report” 72).

Moreover, Duolingo benefits from economies of scale in R&D. With a more extensive user base, Duolingo can collect more data, improving AI models and personalization at minimal additional cost. Additionally, due to the company's huge user base, the cost per innovation is reduced. This is reflected in the decline of R&D expenses from 41.41% of revenue in 2021 to 31.46% in 2024, illustrating the effect of economies of scale (see Table 4). These scaling advantages make Duolingo's R&D rare because it involves a unique combination of expertise, data, and proprietary technology.

At the same time, Duolingo's R&D is not inimitable because most of its innovations, such as app features, UI design, and AI-driven learning models, lack strong intellectual property protection. The accessibility of AI technologies and gamification strategies further reduces barriers to imitation, allowing rivals to replicate Duolingo's advancements.

Table 4. R&D Expenses as a Percentage of Revenue

Year	**2020**	**2021**	**2022**	**2023**	**2024**
Research and development	32.79%	41.41%	40.72%	36.59%	31.46%

Source: Authors' calculations based on data from Duolingo Inc., Form 10-K Annual Reports (2022–2024), U.S. Securities and Exchange Commission.

(2) Duolingo's user base is key to its profitability and research capabilities. Duolingo leads the market with the highest MAU (e.g., 16.5 million more than Babbel in 2022) (Statista, "Global Babbel iOS MAU 2019-2021"; Statista, "Global Duolingo iOS MAU 2019-2021"). While user bases in the language-learning industry might seem to not be rare, as multiple competitors continue to grow and attract users, Duolingo's scale is unique. According to Duolingo, 10 million of their users now maintain streaks of one year or longer (Duolingo, Inc., "Form 10-K: Annual Report" 8).

Competitive Parity Advantage

Competitive parity refers to maintaining a comparable level of performance and competitiveness with industry rivals. In the case of Duolingo, those valuable but not rare resources are (1) Technological Infrastructure and Platform, and (2) Human Capital.

(1) Technological infrastructure and platforms are valuable but not rare, as they drive enterprise efficiency, scalability, and innovation and are widely accessible across industries. The "McKinsey Technology Trends Outlook 2024" report highlights that cloud computing, advanced connectivity, cybersecurity, AI and industrialized machine learning have reached large-scale adoption, supporting other emerging technologies (Yee et al.). The broad adoption of these technologies across sectors and their standardization through major tech providers like Amazon Web Services, Microsoft Azure, and Google Cloud indicates that while they enhance competitive positioning, they do not inherently create sustained differentiation.

(2) Duolingo's human capital is not a rare resource under the VRIO framework due to the abundance of skilled software developers in the global labor market. As was mentioned in Porter's 5 Analysis, the worldwide developer population reached 26.4 million in 2023 and is expected to grow further. The high supply of developers weakens their bargaining power, reinforcing that human capital, while valuable, is not rare in Duolingo's case.

3.5 SWOT

SWOT is used to summarize the findings from Porter’s Five and VRIO to conclude Duolingo’s main strengths and weaknesses of the internal environment, and opportunities and threats of the external environment.

Strengths

- Company’s size

Duolingo`s industry (Software - Application) combined with the company's huge size result in a major strength due to the economies of scale, which allow the company to operate more efficiently. Duolingo`s huge size results in decreasing cost per user (as fixed costs like app development, content creation, etc are spread across a massive user base), improved algorithms and stronger brand power.

- Strong brand loyalty

Gamification features, such as experience points, streaks, AI personalization, cross-platform availability, and social-related features, which make whole friend groups compete in Duolingo, helped to build emotional attachments to the app. Even though switching cost in a freemium model still remains zero for users, Duolingo’s user retention, evidenced by 116.7 million MAUs in the last quarter of 2024, remains high due to constant app improvements that compound over time (Duolingo, Inc., “Shareholder Letter Q4 / FY 2024” 4).

- Extensive language content and diversity

Duolingo offers one of the widest selections of language courses in around 40 languages. At the same time Duolingo`s biggest competitor, Babbel, offers only 13 language options for its users (Babbel). This vast content library, built up since 2012, is valuable and hard for competitors to replicate in a short period of time, giving Duolingo a resource that provides a sustainable advantage in content diversity.

Weaknesses

- Low switching costs undermine user growth advantage

Although the company's user base is the largest on the online language learning market and encounters 116.7 million MAUs, low switching costs between the different apps mean that Duolingo’s present users can be lured away by competitors. This highlights the urgent need of continuing increasing the brand loyalty of Duolingo’s customers.

- High focus on English-speaking users.

Even though Duolingo`s course base covers 40 different languages, those materials are fully available only to English speakers. At the same time those whose first language is not English, have a much more limited course selection, which creates unequal opportunities for people of different language backgrounds.

Opportunities

- Advancements in AI & personalization

Implementing AI technologies and personalization has created an opportunity for any language learning application to enhance user engagement. For instance, AI-powered tools have been shown to improve second-language acquisition by providing real-time feedback, tailored exercises, and speech recognition (Almelhes 1261-67). Through R&D, Duolingo can integrate relevant tools to differentiate itself from traditional methods and attract new user segments.

- Growing market, weak buyer power

Duolingo app had more than fourteen million downloads in 2024 (Statista, "Most Popular Language Learning Apps Worldwide 2024, by Downloads"). This enormous pool of users, combined with weak bargaining power of individual customers, meaning that no single user can influence pricing, gives Duolingo an opportunity to scale up aggressively. It can convert more of this audience into users and paying subscribers without facing pushback from concentrated buyers.

Threats

- High threat of new entrants & substitutes

The language learning application industry is growing rapidly, with a low entry barrier due to the rise of no-code development platforms and the possibility of entering with minimal capital requirements. All new players can leverage existing technologies, AI-driven content creation, and freemium models to attract users, making it challenging for Duolingo to maintain its dominant position.

The language learning industry also has a massive pool of substitutes (e.g. offline schools, social media content, AI translation tools). This high availability of alternatives forces Duolingo to innovate and invest continuously in user engagement strategies.

- Dependence on key distribution channels

Duolingo distributes its products through Apple and Google's app stores, which not only impacts the company's profitability due to non-negotiable commission rates (up to 30% on in-app purchases) but also strategic flexibility due to the absence of alternative distribution channels. This creates a huge threat for the company as any changes in app store regulations, fees, or ranking algorithms could severely impact user acquisition and revenue growth.

3.6 STRATEGIC ANALYSIS CONCLUSION

Duolingo's strategic positioning is strong. The company has several competitive advantages that differentiate it from its competitors, such as an extensive user base, strong brand recognition, research and development capabilities, and a vast pool of human capital. Duolingo's economy of scale benefits the company significantly by spreading its high fixed R&D and AI development costs across a vast user base, reducing per-user costs and reinforcing its competitive position.

However, the strategic risk still remains due to low entry barriers, intense rivalry among existing competitors, and high dependence on distribution platforms. To maintain a sustainable advantage and keep the number one position on the market, Duolingo should address its limitations, for example, develop a direct web-based subscription model to shift users away from App Store dependence, thereby reducing reliance on Apple/Google commissions, expand non-English-first courses to attract new user segments. Additionally, given that AI-driven learning models lack strong intellectual property protection, the company must continuously innovate, differentiate, and expand its personalized AI technologies.

Chapter 4. Financial Statement Analysis

As Duolingo Inc. is registered in Pittsburgh, United States of America, the company reports under Generally Accepted Accounting Principles (GAAP) - accounting standards used by public companies based in the United States. The company has experienced a strong revenue growth from 161 million USD in 2020 to 748 million USD in 2024 , reaching net profitability in 2024, which was mainly driven by decreased operating expenses (OPEX) as % of revenue from 96% in 2021 to 64% in 2024 (see Table 5), caused by company's scale effect.

Table 5. Operating Expenses as % of Revenue

Year	**2020**	**2021**	**2022**	**2023**	**2024**
Revenue, thousands, USD	161,696	250,772	369,495	531,109	748,024
Operating expenses, thousands, USD	- 131,720	- 241,593	- 335,259	- 402,263	- 481,784
OPEX as % of Revenue	81.46%	96.34%	90.73%	75.74%	64.41%

Source: Authors' calculations based on data from Duolingo Inc., Form 10-K Annual Reports (2022–2024), U.S. Securities and Exchange Commission.

Following the operating expenses discussion, it is important to note that R&D became the dominant operating expense with almost 50% of all OPEX in 2024 (see Table 6), while selling and marketing expenses have declined proportionally, reflecting Duolingo`s investments in new products and features and a shift toward organic growth.

Table 6. Operating Expenses, distribution in %

Year	**2020**	**2021**	**2022**	**2023**	**2024**

Research and development	40.26%	42.98%	44.87%	48.31%	48.84%
Sales and marketing	26.56%	24.49%	19.97%	18.84%	18.78%
General and administrative	33.19%	32.53%	35.15%	32.84%	32.38%

Source: Authors' calculations based on data from Duolingo Inc., Form 10-K Annual Reports (2022–2024), U.S. Securities and Exchange Commission.

Duolingo's balance sheet is characterized by a high share of cash and cash equivalents (60% of all assets), as well as a high level of accounts receivable. The company carries no long-term debt and is financed primarily through equity, with lease obligations being its main form of liability. This equity-based capital structure, along with deferred revenues from subscriptions, provides Duolingo with strong liquidity and financial flexibility.

4.1 FINANCIAL STATEMENTS REARRANGEMENTS AND ADJUSTMENTS

Rearranging the financial statements allows us to distinguish between operating and financing activities, helping to clarify what the company does to generate value through its operations versus how it finances those activities. This separation helps assess the core profitability and efficiency of the business, independent of its capital structure. (See *Appendix 1, Appendix 2*)

Reclassified Balance Sheet

Operating assets (OperA) include all resources essential to generating revenue, such as property and equipment, intangible assets, right-of-use assets, and working capital items like accounts receivable and prepaid expenses. Restricted cash and deferred tax assets are also classified as operating assets, as they support core business activities. Cash and cash equivalents are classified into Monetary assets and are divided into normal and excess monetary assets. Considering the startup nature of Duolingo, which requires fast financial decisions and costs to fund operations, we estimate the normal level of monetary assets to be equal to 30% of revenue, which is a higher level than commonly accepted 3-5% for companies in a stable growth phase, and therefore be classified as operating assets. The rest of monetary assets are classified as financial assets (FinA), including short-term and long-term investments, and are excluded from operations as they do not relate to operational activities of the company. On the liabilities side, deferred revenues, accounts payable, accrued expenses, income tax payable, and deferred tax liabilities are categorized as operating liabilities (OperL), since they arise from regular business operations. Although there is no traditional interest-bearing debt, long-term lease obligations are treated as interest-bearing debt to reflect their financial nature and the contractual obligation to make future payments. Accrued expenses and other current liabilities includes current lease expenses, which we identify as a part of debt, thus we have separated current lease from accrued expenses and subtracted this value from the sum. Shareholders' equity is classified as equity (EQ). (See *Appendix 3).*

Reclassified Income Statement

The income statement was reclassified into operating, financial, and non-normal activities to isolate the company's core value-generating performance. Normal operating activities include revenues and associated costs such as cost of revenues, R&D, sales and marketing, and general and administrative expenses, reflecting the company's day-to-day business operations. The normal tax expense (operating) is applied to pre-tax operating income to assess net operating profit less adjusted tax (NOPLAT). Normal financial activities include interest income from the company's investments, interest paid on lease, and the related tax expense (financial), representing returns on financial activities. Non-normal activities, such as one-off items recorded as other income or other expenses, are excluded from core performance analysis to avoid distortions in valuation. (See *Appendix 4)*.

As a result of the reclassifications, we calculated main building blocks of the valuation-focused accounting system:

Net Operating Assets (NOA)

NOA represents the capital invested in a company's core operations, excluding financial assets and liabilities, calculated as calculated as OperA minus OperL.The company's NOA have grown consistently from 110.8 million USD in 2020 to 466.9 million USD in 2024, indicating continued reinvestment into core operations such as product development, infrastructure, and working capital.

Net Interest-Bearing Debt (NIBD)

NIBD captures the company's net borrowing position by offsetting financial assets against interest-bearing liabilities, calculated as IBD minus FinA. NIBD is significantly negative from 2021 onward, reaching negative 357.7 million USD in 2024, indicating that Duolingo holds substantially more financial assets than debt. This strong liquidity position on one hand reflects a low-risk financial structure and potential flexibility for future strategic investments, however, on the other hand, it also shows inefficient use of resources as returns the company earns on cash is much lower than from operating activities. In the long-run, such a behavior is value-destroying for shareholders.

Net Operating Profit Less Adjusted Taxes (NOPLAT)

NOPLAT is the after-tax profit from core operations, excluding interest and non-operating items. It reflects returns from investments in product markets - NOA. Duolingo's NOPLAT values range from large losses in early years to a positive value in 2024, indicating that the company has gradually moved toward operating profitability.

Net Financial Expenses (NetFinExp)

Net financial expenses represent the net expense or income from financing activities—i.e., interest income minus interest expense, after tax. These values are positive and growing, showing increasing returns from financial assets.

4.2 HISTORICAL PERFORMANCE ANALYSIS

Sales Growth (YoY)

The company has experienced high but decelerating growth, which is typical for a company maturing out of its early explosive phase. While still strong, the consistent decline suggests future growth assumptions should be more conservative, likely stabilizing under 30% in the near term, then aligning with the market growth 18% as predicted up to 2032, and then converge to 2-3%, global economy growth rate, in the long-run.

Operating Profit Margin (OPM)

Normal operating margins were negative from 2020 to 2023, ranging from -23,9% to -2,7% (see Table 7), but the company turned profitable in 2024. This indicates improving cost discipline and economy of scale, especially in operating expenses. The margin turnaround reflects a path toward sustainable profitability. Non-normal OPM are slightly negative and remain minor, not exceeding -0,7% (see Table 7), so NOPLAT is reliable and mostly reflects the company's core profitability from actual business activities, rather than one-off expenses.

Table 7. Operating Profit Margins (OPM)

	2020	**2021**	**2022**	**2023**	**2024**
NOPLAT, thousands, USD	- 15,947	- 59,827	- 64,152	- 14,532	54,207
Non-normal operating profit/loss, thousands, USD	- 59	- 327	- 2,541	- 3,477	- 2,609
Revenue, thousands, USD	161,696	250,772	369,495	531,109	748,024
OPM, normal	-9.9%	-23.9%	-17.4%	-2.7%	7.2%
OPM, non-normal	0.0%	-0.1%	-0.7%	-0.7%	-0.3%

Source: Authors' calculations based on data from Duolingo Inc., Form 10-K Annual Reports (2022–2024), U.S. Securities and Exchange Commission.

Net Operating Assets Turnover (NOAT)

NOAT measures how efficiently a company uses its operating assets to generate revenue. NOAT has improved steadily from 1.46 in 2020 to 1.87 in both 2023 and 2024, indicating increasing efficiency in generating revenue from operating assets. This upward trend shows that Duolingo is becoming more effective at leveraging its invested capital to drive sales, likely due to scalability of its digital platform and better utilization of operational resources.

Return on Net Operating Assets (RNOA)

RNOA shows the profitability of a company's operations relative to the capital invested in those operations, calculated as NOPLAT divided by average NOA. RNOA improved from a low of –41.7% in 2021 to 12.9% in 2024, driven by stronger operating profits and more efficient use of invested capital. The positive RNOA in 2024 indicates Duolingo is now generating value from its operating investments.

Financial Leverage (FLEV)

Financial leverage quantifies the extent to which a company finances its operations through net debt rather than equity, calculated as NIBD divided by equity. FLEV was positive (0.09) in 2020 but turned negative from 2021 onward, reaching –0.46 in 2024. This negative leverage indicates that Duolingo's financial assets consistently exceed its financial liabilities, meaning the company operates with more financial assets than debt.

Return on Net Interest-Bearing Debt (RNIBD)

RNIBD captures the effective cost of financing by comparing net financial expenses to net debt. Duolingo has consistently held a net financial asset position, meaning its financial assets exceed its interest-bearing liabilities. RNIBD increased from 0.4% in 2020 to around 6% in both 2023 and 2024, indicating it is earning a return on its excess cash and investments.

Return on Equity (ROE)

ROE mirrors the company's journey from losses to profitability, and evaluates how efficiently a company generates profit from its shareholders' invested capital. Negative in early years, ROE becomes positive in 2024, indicating that the company is finally generating returns above its book equity base. This milestone supports forecasting rising profitability. (See *Appendix 5)*

Chapter 5. Valuation

5.1 VALUATION MODELS

Valuation is the analytical process of determining a company's current or future worth. There are various approaches to valuation, and the three main ones are benchmark models, technical analysis, and fundamental analysis. Benchmark models relate a company’s value to its key financial metrics and compare resulting multiples with peer companies to rank investment opportunities, rather than estimate intrinsic value of a business. Technical analysis studies patterns in past stock prices and trading volume to predict future price movements, without relying on company fundamentals. Fundamental analysis estimates a company's intrinsic value by forecasting its future performance based on its financial and strategic position and finding the present value of resulting cash flows.

This paper performs a fundamental analysis of Duolingo. A company generates value by producing future cash flows, and the core objective of valuation is to estimate what those future cash flows are worth today by discounting them to their present value. To do so, several discounted cash flow (DCF) models were used: the Free Cash Flow to the Firm (FCFF) model, the Free Cash Flow to Equity (FCFE) model, and the Residual Income (RI) model (see Table 8). These models divide the valuation into two key parts: the forecasted (explicit) period, during which financial performance is projected in detail year by year, and the terminal value, which captures the remaining value of the company beyond the forecast horizon. The forecasted period reflects the company’s expected growth and margin trajectory, while the terminal value represents its long-term, steady-state performance.

Table 8. Overview of Fundamental Valuation Models

Model	**Description**	**Discount Rate**	**Valuation Focus**
Free Cash Flow to the Firm (FCFF)	Estimates the total value of a company by discounting cash flows available to all capital providers.	Weighted Average Cost of Capital (WACC)	Entire firm (debt + equity)
Free Cash Flow to Equity (FCFE)	Calculates the value of equity by discounting cash flows available to shareholders after debt payments.	Cost of Equity (CoE)	Equity only
Residual Income (RI)	Values equity by adding book value to the present value of residual income, profits exceeding the cost of equity.	Cost of Equity (CoE)	Equity only

5.2 WEIGHTED AVERAGE COST OF CAPITAL

To build the valuation models, it is necessary to calculate both the expected cash flows and the appropriate discount rates. The discount rate reflects the risk associated with future cash flows. In the FCFF model, this rate is the Weighted Average Cost of Capital (WACC); in the FCFE and Residual Income models, the discount rate equals the cost of equity (CoE). Cost of equity is the return expected by shareholders for bearing the risk of owning the company's equity. It is typically estimated using the Capital Asset Pricing Model (CAPM), which accounts for the risk-free rate, the equity risk premium, and the company’s beta, an indicator of relative market risk. WACC, on the other hand, represents the average rate of return required by all capital providers (equity holders, debt holders, and minority interest holders) based on their proportional contribution to the company’s capital structure. The cost of equity reflects only the risk borne by equity investors, whereas WACC accounts for the blended cost of all sources of capital.

We used standard valuation components tailored to industry and market conditions to estimate Duolingo’s WACC. As the company operates in the United States, the selected risk-free rate is equal to the U.S. 10-year Treasury yield as of April 1, 2025 (4.3%). We applied an adjusted equity risk premium of 5.18%, which takes into account Duolingo`s revenue distribution be regions and the corresponding ERPs; and an unlevered beta of 1, which reflects the fact that Duolingo is growing and turning to a more mature company, and thus, operating risks decrease, which lowers beta and makes it closer to 1. Using the CAPM formula, this yields a CoE of 9.48%.

In their reports, Duolingo indicates a pre-tax cost of debt of 7.16%, which is the discount rate the company uses for operating lease obligations. Given Duolingo`s startup nature, we assume that this rate reflects the company’s actual borrowing cost. After applying the tax rate of 30%, which includes U.S. corporate tax rate of 21% and Pennsylvania's corporate tax rate of 9%, the after-tax cost of debt comes out to 5.01%, implying the expected debt risk premium of 2.86% (pre-tax CoD minus RFR).

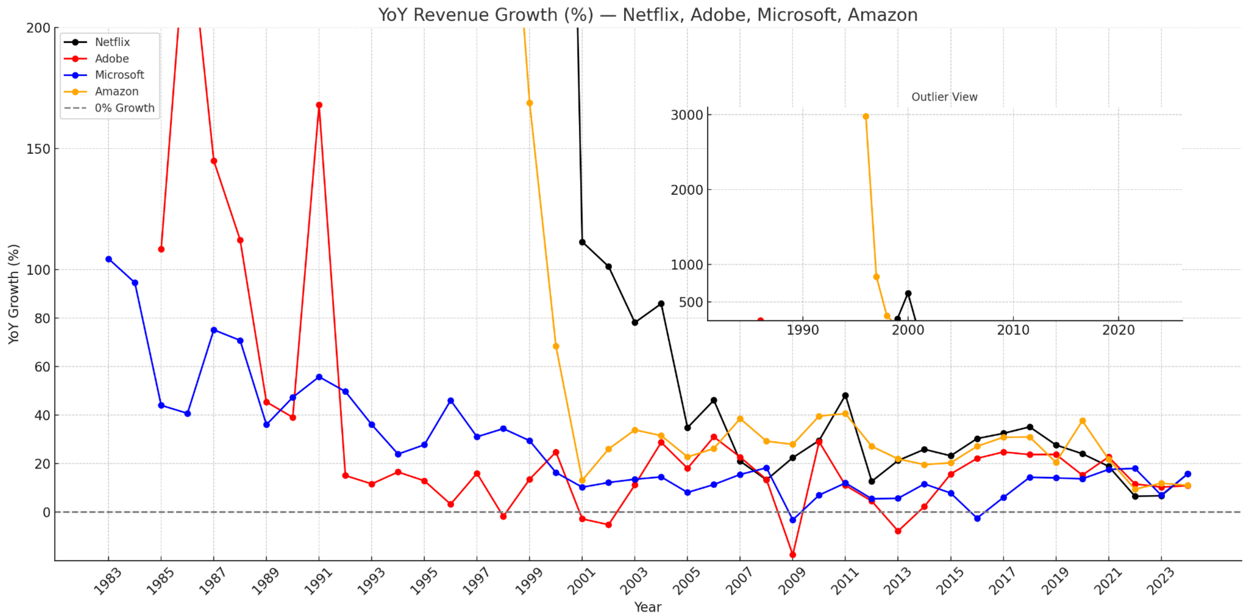
Given the capital structure, right now Duolingo has extremely small debt, the weight of debt is 0.39%, therefore, the weight of equity is 99.61%. We expect the company to take on some debt in the future; however, given the company nature - an asset-light services-oriented business model with a large focus on human capital the amount of future debt is expected to be low - around 3% (based on the average software industry debt-to-equity ratio of 4%). The resulting WACC is 9.34%, which will be used as the discount rate for valuation of the forecasted period. (See Appendix 6)

5.3 MODEL PARAMETERS

In fundamental valuation models such as FCFF, FCFE, and Residual Income, accurate estimation of future financial performance relies on a set of key model parameters. These include sales growth, NOPLAT margin, asset turnover, financial leverage, return on net interest-bearing debt (RNIBD), and tax rate. Each parameter is selected based on industry benchmarks, Duolingo's historical performance, and expectations regarding the company's strategic development.

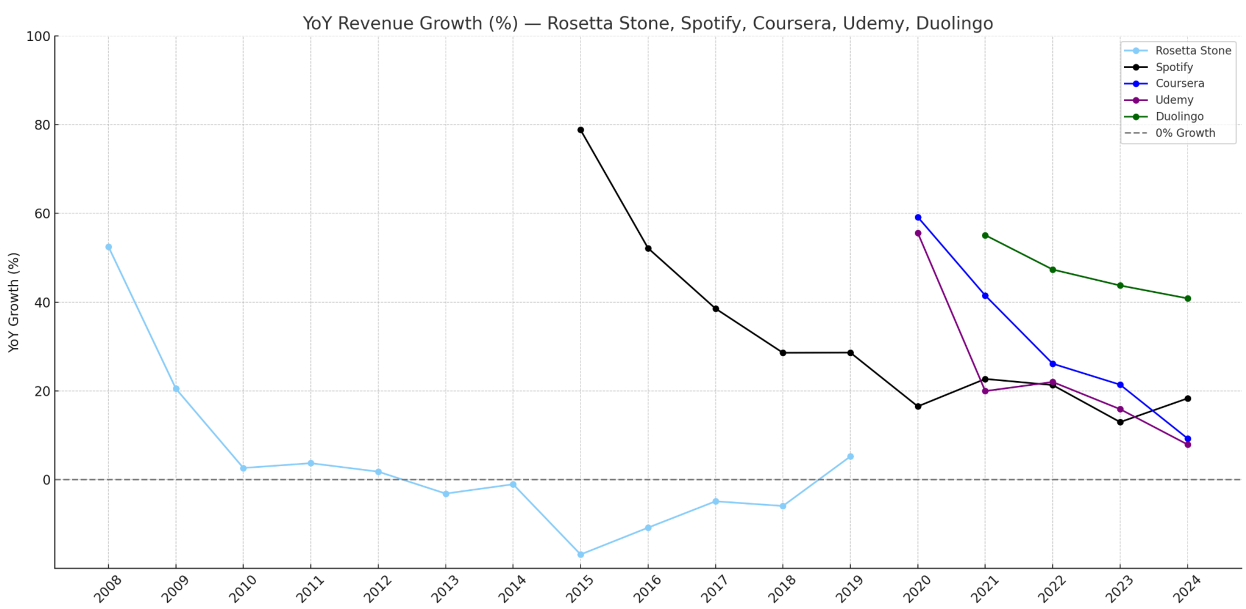
Sales YoY growth: Over the last two years Duolingo shows a rapid growth. However, such accelerated expansion is typical of the high-growth phase in a company's lifecycle and cannot be sustained forever. After analyzing the growth trends on the market (see Fig.1, 2), we have come to the next conclusion: the majority of the tech companies enter IPO with fast growth, then decline in YoY growth and stabilize at low positive growth rates due to mean reversion. Right now, the company is already overperforming its competitors by showing a slower decline in growth rates. Given the company strategy, which includes product diversification and investments in R&D, we believe that the same trend will be held for the future. Thus, we have estimated that in 15 years the company will gradually slow down its growth to the global economy level of 3%.

Fig. 1. Industry growth rates (Part 1).



Source: Graph created with assistance from ChatGPT (OpenAI) by the authors using personal calculations based on data from annual reports of Netflix (1999–2024), Microsoft (1983–2024), Amazon (1996–2024), and Adobe (1985–2024).

Fig. 2. Industry growth rates (Part 2).



Source: Graph created with assistance from ChatGPT (OpenAI) by the authors using personal calculations based on data from annual reports of Rosetta Stone (2008–2019), Spotify (2015–2024), Coursera (2020–2024), Udemy (2020–2024), Duolingo (2022–2024); and Duolingo Inc., Form S-1 Registration Statement (2021).

NOPLAT margin: The IT industry is characterized by the high NOPLAT margin due to low marginal costs. After having analyzed the market by calculating operating margin for the companies in the stable growth phase (see Table 9), we have concluded that the net income margin may vary from 10% to over 40% depending on the company, with the rates of around 22-26% being more common. In addition, according to Prof. Aswath Damodaran, the after-tax operating margin for the Software (System & Application) industry is around 27% (Damodaran, "Margins by Sector (US)"). As a result, we expect Duolingo to slowly reach the NOPLAT margin of ~27% in the future, slightly dropping toward the end of the forecasting period due to the intensifying competition.

Table 9. Industry Operating Margin, 2024 (in million, USD)

	Revenue	Operating Income	Operating Margin
Netflix	39,001	10,418	26.71%
Microsoft	245,122	109,433	44.64%
Amazon	637,959	68,593	10.75%
Adobe	21,505	7,741	36.00%

Source: Authors` personal calculations based on data from annual reports of Netflix (1999–2024), Microsoft (1983–2024), Amazon (1996–2024), and Adobe (1985–2024).

NOAT: Duolingo's NOAT has increased significantly, rising from 4.25 to 6.72 between 2020 and 2024. This trend is expected to continue as the company scales without proportionally increasing its operating asset base. Therefore, a gradually increasing NOAT is applied in the forecast, rising from 6.90 to a peak of 7.50, where it stabilizes over the long term.

FLEV: We believe that in the near future, around 2028, Duolingo will take more debt, which will set the FLEV value to 0.05. Prior to that, we expect company to slowly decrease its debt-to-equity ratio, without dramatic changes.

RNIBD: Will acquire positive values with the increase of the debt value and will be equal to CoD 5%.

Tax rate: As Duolingo has become profitable in recent years, the tax rate is expected to increase to the federal level plus the local Pennsylvanian tax (as the company is registered there) - respectively making it 30% (21%+9%). (See *Appendix 7)*

5.4 VALUATION RESULTS

To estimate Duolingo's intrinsic share price, three fundamental valuation models were applied: the Free Cash Flow to Equity model, the Residual Income model, and the Free Cash Flow to Firm model (see Table 10). The FCFE and RI models produced the same valuation results of 344.34 USD per share, which is expected given their mathematical equivalence when applied correctly. The FCFF model resulted in a slightly higher valuation of 354.43 USD per share, reflecting the total enterprise value adjusted for the company's low debt level.

Table 10. Valuation Results

Valuation Model	Estimated Share Price (USD)
Free Cash Flow to Equity (FCFE)	344.34
Residual Income (RI)	344.34
Free Cash Flow to Firm (FCFF)	354.43

Source: Authors' calculations. (See Appendix 8.1, 8.2, 8.3).

Chapter 6. Risk Assessment

Like any other business, Duolingo is subject to various risks and uncertainties that could materially adversely affect the company's business, financial condition, operating results, and the trading price of common stock. An effective risk management strategy is critical for Duolingo's continued growth and resilience in a rapidly evolving digital and educational technology landscape. This section outlines key risks that could materially impact the company's business model, financial performance, and valuation. Each risk is evaluated in terms of its nature, potential impact, mitigation strategies, and sensitivity analysis.

6.1 REPUTATIONAL RISK

Nature of the Risk

Reputational risk refers to the danger of a company's poor public image because its actions don't meet people's expectations, leading to loss of trust and value. Strong reputations attract talent, loyal customers, and lower capital costs (Eccles et al.). In an intangible-asset-heavy economy, reputational risk is a significant threat to market value. Duolingo’s brand is one of its competitive advantages, and losing it because of reputational damage will harm the company's financials and strategy.

Impact Assessment

In their report, Duolingo states that reasons for reputational damage to occur are: negative media coverage or influencer misconduct, failure to uphold their mission and values, data privacy or security breaches, non-compliance with laws and regulations, failure to moderate inappropriate content, product issues or outages, social media missteps, misconduct by employees or partners, challenges with AI/ML technologies, and Environmental, Social, and Governance-related reputational risk (ESG-risk).

If this risk materializes, it could harm Duolingo's user growth, engagement levels, brand loyalty, ability to attract and retain paying subscribers, relationships with partners and regulators, and ultimately impact their revenue and profitability. Additionally, a study on ESG reputation risk showed that ESG-risk events captured through social media lead to a statistically significant decline in stock prices, with firms experiencing an average abnormal return reduction of approximately 0.29%, particularly driven by Social and Governance-related issues (Nicolas et al.). Duolingo is ranked as a "medium risk" company, placing 613th out of 961 in the ESG Risk Ratings for the Software & Services industry suggesting that ESG-risk remains (Sustainalytics).

Mitigation Strategies

Duolingo outlines several strategies to manage reputational risks. Duolingo emphasizes adherence to data privacy laws such as GDPR and COPPA; the company has implemented security protocols to protect user data and prevent breaches. Efforts are made to minimize biases in AI/ML models. Duolingo strives for transparency in AI-driven decisions to maintain user trust. The company monitors influencer partnerships to ensure alignment with brand values. Mechanisms are in place to moderate user-generated content and prevent the spread of inappropriate material.

Duolingo has also recently published an Environmental Statement detailing its commitment to sustainability and reducing its operational footprint, and a Social Impact Report showcasing its commitment to ESG initiatives. They contributed over 500,000 USD of community investment since 2021 via sponsorships, donations, and grants, pledged one million USD annually for early childhood education; supports nine childcare centers and will begin offering tuition grants in fall 2024; funded local artists and institutions, for instance, Kelly Strayhorn Theater) that was launched with 150,000 USD and includes public art in East Liberty. Additionally, the company collaborates with NGOs (e.g., International Rescue Committee, United Nations High Commissioner for Refugees, Ukraine Global Scholars) to expand access to education for refugees and migrants worldwide (Ross).

6.2 MARKET SATURATION

Nature of the Risk

Market saturation occurs when the supply of a product or service exceeds the demand. The online language learning industry is highly competitive, with low switching costs and a consistent stream of new products and entrants. This environment poses a risk of market saturation, where the stream of alternatives could cut Duolingo's market share.

Impact Assessment

As of 2024, Duolingo captures 49% of the language learning applications market. The company has been growing faster than the industry; however, that does not reflect the future growth — at some point Duolingo will synchronize with the market. Therefore, the company cannot rely on current growth in predicting their financial and strategic future. If market saturation occurs or user trends shift toward competitors or alternative formats, lowering Duolingo's market share, the company could face a slowdown in user acquisition, reduced engagement from existing users, and increased churn. These effects would hit its revenue, as fewer users convert to or maintain paid subscriptions. The need to spend more on user acquisition and marketing could also compress margins. Additionally, a stagnant or shrinking user base would reduce the volume of data needed to power Duolingo's AI models, weakening their competitive advantage and innovation cycle.

Mitigation Strategies

The company's primary mitigation strategy is underlined in its strategic goal—to expand beyond the narrow "language learning" market to the whole "education" market. Duolingo is already executing this strategy through product diversification, offering math and music learning in addition to its core language content, which allows the company to enter new markets and reduce reliance on a single domain. Duolingo also constantly invests in R&D, AI, machine learning, and gamification to enhance user experience and maintain a competitive advantage. However, Duolingo's diversification efforts alone may not offset the loss if the online language learning market through apps stagnates completely. Currently, the company does not publicly disclose user metrics for Duolingo Math, Music, or ABC, making it difficult to assess the effectiveness of mitigation strategies and the company's viability. Duolingo would face significant challenges in maintaining its current scale, profitability, and long-term growth expectations in such a scenario.

6.3 SHIFTS IN LANGUAGE LEARNING TRENDS

Nature of the Risk

With the rapid advancement of generative AI, conversational chatbots like ChatGPT and Claude are increasingly capable of providing personalized, real-time language practice. This trend risks reducing the perceived value of structured language learning platforms like Duolingo. For example, a study by Annamalai et al. found that chatbots significantly enhanced students' language skills, boosted learning autonomy, and provided flexible, 24/7 language practice in higher education settings. Similarly, Bin-Hady et al. demonstrated that ChatGPT helps develop core language abilities such as speaking, writing, and grammar, while also offering personalized feedback and acting as a conversational partner.

Impact Assessment

If learners increasingly turn to generative AI chatbots like ChatGPT and Claude for personalized, on-demand language learning, Duolingo could face a decline in user engagement and new user acquisition, which will lead to declines in sales and profitability.

Mitigation Strategies

As said earlier, Duolingo invests heavily in AI and machine learning to enhance its learning experience. In 2023, it launched Duolingo Max, a premium tier incorporating generative AI features to provide personalized feedback and explain answers, directly addressing user expectations shaped by tools like ChatGPT.

However, to strengthen resilience, Duolingo should consider accelerating the integration of conversational AI to simulate language dialogues in-app. Duolingo can market itself as a "trusted AI tutor", leveraging its brand and pedagogical credibility to combine real-time practice with verified, curriculum-aligned language scaffolding, in contrast to ChatGPT’s open-ended and potentially inaccurate outputs. Additionally, the company could consider offering classroom tools that allow educators to monitor and guide AI interactions to position Duolingo as the preferred hybrid solution for both individual and institutional learners.

6.4 SENSITIVITY ANALYSIS

A sensitivity analysis based on the FCFF model results was conducted to assess the valuation results. The sensitivity analysis examines how changes in key assumptions, such as the weighted average cost of capital and terminal value growth, impact the estimated intrinsic value of the company. By varying these inputs within a reasonable range, we evaluate the impact of uncertainty and determine which variables the valuation is most sensitive to. This analysis identifies the conditions under which the valuation outcome might significantly change.

The results (see Table 11) indicate that the intrinsic value per share is more sensitive to changes in the WACC than to changes in the terminal growth rate. The inherent value declines significantly as the WACC increases, indicating high sensitivity. For example, at a 3.0% terminal growth rate, a WACC of 8.34% yields a value of 433.15 USD, and with a WACC of 10.34%, the value drops to 297.84 USD. This represents a decrease of over 31%, underscoring the significant impact of capital cost assumptions on valuation. At the same time, at a fixed WACC, increasing the terminal growth rate also raises the valuation. For instance, at a fixed 9.34% WACC, a 2.5% terminal growth rate gives 341.68 USD, and a 3.5% terminal growth rate gives 361.74 USD. That's an 8.3% increase, suggesting moderate sensitivity to growth assumptions.

These findings underscore the importance of carefully assessing the cost of capital when estimating intrinsic value. Investors should be aware that shifts in macroeconomic conditions, changes in the US tax or risk-free rate, or changes in a company's risk profile, as reflected in WACC adjustments, can materially affect the investment outlook.

Table 11. Sensitivity Analysis

		WACC				
	354.43	**8.34%**	**8.84%**	**9.34%**	**9.84%**	**10.34%**
Terminal growth rate	**2.5%**	412.65	374.27	341.68	313.68	289.39
	2.8%	422.44	382.00	347.86	318.68	293.48
	3.0%	433.15	390.39	354.52	324.04	297.84
	3.3%	444.91	399.53	361.74	329.81	302.51

3.5%	457.89	409.52	369.57	336.04	307.52

Source: Authors' calculations

Chapter 7. Conclusions and Recommendations

Based on our fundamental analysis, Duolingo's intrinsic value per share lies in the range of 344.34–357.43 USD, with the FCFE and Residual Income models both estimating 344.34 USD, and the FCFF model showing a slightly higher result at 354.4 USD. In comparison, over the past six months (November 5, 2024 – May 23, 2025), Duolingo's stock has traded within a range of 272.77 USD to more than 520 USD per share (Yahoo Finance). (See Appendix 9). The latest large spike of the share prices could be seen at the beginning of May 2025, when that prices went up by 21.61% in just one day (from 400 USD on May 1 to 486.42 USD on May 2). Such a huge change in share prices was caused by the newly released first-quarter financial report, as Duolingo was able to top its revenue, profit, and user estimates. This highlights the company's high dependance on its performance results, which is natural for high-growth companies, such as Duolingo.

The company's shares are currently trading at 44-50% premium to the estimated price range of 347-61 USD. As of May 23 2025, Duolingo's current market price is 520.21 USD (Yahoo Finance) .The company appears to be overvalued at the moment. Therefore, we recommend for the current holders to consider selling at present market levels, as the stock is trading above its estimated intrinsic value range.

Several underlying assumptions are contributing to Duolingo's current overvaluation. Duolingo is a fast-growing company that has only recently become profitable, which excites the market and leads to assumptions that its growth will continue to accelerate. However, in the long term, this view overlooks the natural progression of startups as they transition from rapid expansion to sustainable performance. Duolingo is entering the late-stage startup phase, where investors shift focus from potential to proven performance metrics, such as stable user monetization, margin optimization, and long-term scalability. Duolingo has been following its strategic goal to enter other education markets, not only the language learning market. However, the success of these new products remains uncertain. Duolingo does not state in the letters to shareholders, nor the 10-K filing forms, how the revenue is distributed between the products, which leaves the shareholders uncertain. Additionally, although Duolingo has integrated AI features, such as Duolingo Max with GPT-4, to enhance user experience and keep the innovations part of the company, there is skepticism about whether AI advancements can sustain long-term growth and compete with other AI tools. If Duolingo fails to meet the high-performance expectations priced into its stock, especially in monetizing new verticals like math and music, the market will eventually adjust its valuation to reflect a more realistic and steady growth trajectory.

WORKS CITED

Adams, Susan. "Game of Tongues: How Duolingo Built a $700 Million Business With Its Addictive Language-Learning App." *Forbes*, 16 July 2019, www.forbes.com/sites/susanadams/2019/07/16/game-of-tongues-how-duolingo-built-a-700-million-business-with-its-addictive-language-learning-app.

Adobe. "SEC Filings and Fiscal Documents." *Adobe Investor Relations*, www.adobe.com/investor-relations/financial-documents.html.

Almelhes, Sultan A. "A Review of Artificial Intelligence Adoption in Second-Language Learning." *Theory and Practice in Language Studies*, vol. 13, no. 5, May 2023, pp. 1259–69. https://doi.org/10.17507/tpls.1305.21.

Amazon.com. "Annual Reports, Proxies and Shareholder Letters." *Amazon Investor Relations*, ir.aboutamazon.com/annual-reports-proxies-and-shareholder-letters/default.aspx.

Annamalai, Nagaletchimee, Radzuwan Ab Rashid, Umair Munir Hashmi, Misrah Mohamed, Marwan Harb Alqaryouti, and Ala Eddin Sadeq. "Using Chatbots for English Language Learning in Higher Education." *Computers and Education Artificial Intelligence*, vol. 5, Jan. 2023, p. 100153. https://doi.org/10.1016/j.caeai.2023.100153.

Apple Inc. *Commissions, Fees, and Taxes - App Store Connect - Help - Apple Developer*. developer.apple.com/help/app-store-connect/distributing-apps-in-the-european-union/commissions-fees-and-taxes.

Babbel. "Available Languages." *Babbel*, support.babbel.com/hc/en-gb/articles/205600508-Available-languages.

"Babbel Brand Profile in the United States 2022." *Statista*, 3 Apr. 2025, www.statista.com/forecasts/1338180/babbel-online-education-brand-profile-in-the-united-states

"Babbel on Instagram." *Instagram*, www.instagram.com/babbel/?hl=en.

"Babbel on TikTok." *TikTok*, www.tiktok.com/@babbel?lang=en.

Barney, Jay. "Firm Resources and Sustained Competitive Advantage." *Journal of Management*, vol. 17, no. 1, 1991, pp. 99–120. https://doi.org/10.1177/014920639101700108.

Bin-Hady, Wagdi Rashad Ali, Abdu Al-Kadi, Abduljalil Hazaea, and Jamal Kaid Mohammed Ali. "Exploring the Dimensions of ChatGPT in English Language Learning: A Global Perspective." *Library Hi Tech*, July 2023, https://doi.org/10.1108/lht-05-2023-0200.

Brunton, James. "How Much Does It Cost to Build an App Like Duolingo." *Declone.io*, 3 Feb. 2025, declone.io/blogs/how-much-does-it-cost-to-develop-an-app-like-duolingo.

Business Research Insights. *Online Language Learning Market Size, Share, and Industry Analysis, 2024–2032*. 14 Apr. 2025, www.businessresearchinsights.com/market-reports/online-language-learning-market-101287.

Coursera Inc. "SEC Filings." *Coursera Investor Relations*, investor.coursera.com/financials/sec-filings/default.aspx.

Curry, David. "Language Learning App Revenue and Usage Statistics (2025) - Business of Apps." *Business of Apps*, 22 Jan. 2025, www.businessofapps.com/data/babbel-statistics.

Curry, David. "Language Learning App Revenue and Usage Statistics (2025) - Business of Apps." *Business of Apps*, 27 Feb. 2025, www.businessofapps.com/data/language-learning-app-market.

"DUOL." *Nasdaq*, www.nasdaq.com/market-activity/stocks/duol.

Damodaran, Aswath. "Margins by Sector (US)." *NYU Stern School of Business*, 2024, pages.stern.nyu.edu/~adamodar/New_Home_Page/datafile/margin.html.

De León, Riley. "Duolingo Closes up 36% in Nasdaq Debut, Valuing Company at Nearly $5 Billion." *CNBC*, 28 July 2021, www.cnbc.com/2021/07/28/language-learning-app-duolingo-pops-35percent-in-public-debut-on-the-nasdaq.html.

Duolingo (DUOL) - Market Capitalization. companiesmarketcap.com/duolingo/marketcap.

Duolingo ABC. abc.duolingo.com.

"Duolingo Brand Profile in the United States 2022." *Statista*, 3 Apr. 2025, www.statista.com/forecasts/1338192/duolingo-online-education-brand-profile-in-the-united-states.

Duolingo English Test. englishtest.duolingo.com/institutions/accepting_institutions.

Duolingo for Schools | Help Center. duolingoschools.zendesk.com/hc/en-us/articles/6830454446093-What-is-Duolingo-for-Schools.

"Duolingo Launches a New Math App for Students and Adults." *Duolingo Blog*, 16 Jan. 2025, blog.duolingo.com/duolingo-launches-math-app.

"Duolingo Music Is Here - Learn More About the New Subject." *Duolingo Blog*, 16 Jan. 2025, blog.duolingo.com/music-course.

"Duolingo on Instagram." *Instagram*, www.instagram.com/duolingo.

"Duolingo on TikTok." *TikTok*, www.tiktok.com/@duolingo?lang=en.

"Duolingo Software Engineer Salaries." *Glassdoor*, www.glassdoor.com/Salary/Duolingo-Software-Engineer-Salaries-E629348_D_KO9,26.htm.

"Duolingo: Cloud Technology Empowers Education APP." *AlibabaCloud*, www.alibabacloud.com/en/customers/duolingo?_p_lc=1.

"Duolingo, Inc. ESG Risk Rating." *Sustainalytics*, www.sustainalytics.com/esg-rating/duolingo-inc/2003472792.

Duolingo, Inc. *Form 10-K: Annual Report for the Fiscal Year Ended December 31, 2024*. U.S. Securities and Exchange Commission, 2025, investors.duolingo.com/static-files/8f01b324-2c4b-4460-a499-6f364340eff7.

Duolingo, Inc. *Shareholder Letter Q1 / FY 2024*. investors.duolingo.com/static-files/f781ccbe-115a-43ee-90fe-d3db784220e5.

Duolingo, Inc. *Shareholder Letter Q4 / FY 2024*. investors.duolingo.com/static-files/99006c40-d8cf-41ca-b5b1-c5cb1fa5ba88.

Eccles, Robert G., Scott C. Newquist, and Roland Schatz. "Reputation and Its Risks." *Harvard Business Review*, Feb. 2007, hbr.org/2007/02/reputation-and-its-risks.

Evans Data Corporation. *Worldwide Developer Population Grows to 26.4 Million | Press Release*. 2023, evansdata.com/press/viewRelease.php?pressID=350.

"Global Babbel iOS MAU 2019-2021." *Statista*, Feb. 2022, www.statista.com/statistics/1259443/babbel-worldwide-ios-mau.

"Global Duolingo iOS MAU 2019-2021." *Statista*, 2 Jan. 2023, www.statista.com/statistics/1240227/duolingo-mau-worldwide-ios.

Harvard Business School. *The Five Forces - Institute for Strategy and Competitiveness*. www.isc.hbs.edu/strategy/business-strategy/Pages/the-five-forces.aspx.

HolonIQ Education Intelligence Unit. "$60B D2C Language Learning Market to Double by 2025, Led by Digital Delivering 3X Growth." *HolonIQ*, 11 May 2021, www.holoniq.com/notes/60b-d2c-language-learning-market-to-double-by-2025-led-by-digital-delivering-3x-growth.

Jiang, Xiangying, et al. "Evaluating the Reading and Listening Outcomes of Beginning‐level Duolingo Courses." *Foreign Language Annals*, vol. 54, no. 4, Dec. 2021, pp. 974–1002. https://doi.org/10.1111/flan.12600.

Langenfeld, Thomas, et al. "Digital-First Learning and Assessment Systems for the 21st Century." *Frontiers in Education*, vol. 7, May 2022, https://doi.org/10.3389/feduc.2022.857604.

"Luis Von Ahn." *Forbes*, www.forbes.com/profile/luis-von-ahn.

Mattke, Jens, and Christian Maier. "Gamification : Feature-Rich Mobile Applications, Brand Awareness and Loyalty." *ECIS 2020 Research Papers*, 120, 2020, aisel.aisnet.org/ecis2020_rp/120.

Microsoft. "Microsoft Investor Relations - Annual Reports." *Microsoft*, www.microsoft.com/en-us/investor/annual-reports.

"Most Popular Language Learning Apps Worldwide 2024, by Downloads." *Statista*, 29 Aug. 2024, www.statista.com/statistics/1239522/top-language-learning-apps-downloads.

Netflix, Inc. "Annual Reports and Proxies." *Netflix Investor Relations*, ir.netflix.net/financials/annual-reports-and-proxies/default.aspx.

Nicolas, Maxime L.D., Adrien Desroziers, Fabio Caccioli, and Tomaso Aste. "ESG Reputation Risk Matters: An Event Study Based on Social Media Data." *Finance Research Letters*, vol. 59, Nov. 2023, p. 104712. https://doi.org/10.1016/j.frl.2023.104712.

Nushi, Musa, and Mohamad Hosein Eqbali. "Duolingo: A Mobile Application to Assist Second Language Learning (App Review)." *Teaching English With Technology*, vol. 17, no. 1, 2017, pp. 89–98. files.eric.ed.gov/fulltext/EJ1135889.pdf.

Orok, David, et al. "Minimum Viable Products Launching for Start-Ups and Vocational Training Using No-Code Tools Learning Resources." *IntechOpen eBooks*, 2024, https://doi.org/10.5772/intechopen.114917.

ResearchAndMarkets. "Online Language Learning Market Trends Analysis Report 2024: A $44.9 Billion Industry by 2031, Growing at a CAGR of 19.5%, Driven by Globalization and the Growing Need for Cross-Border Communications." *GlobeNewswire*, 16 Sept. 2024, www.globenewswire.com/news-release/2024/09/16/2946445/28124/en/Online-Language-Learn ing-Market-Trends-Analysis-Report-2024-A-44-9-Billion-Industry-by-2031-Growing-at-a-CAGR-of-19-5-Driven-by-Globalization-and-the-Growing-Need-For-Cross-Border-.html.

Rosetta Stone Inc. “Annual Reports.” *AnnualReports.com*, www.annualreports.com/Company/rosetta-stone-inc.

Ross, Kendra. “The 2024 Duolingo Social Impact Report.” *Duolingo Blog*, 2 Dec. 2024, blog.duolingo.com/social-impact-report-2024.

Service Fees - Play Console Help. support.google.com/googleplay/android-developer/answer/112622?hl=en&sjid=1183453041568512531-EU.

Sharma, Vikash. “Cost of Developing a Language Learning App Like Duolingo.” *Sparx IT Solutions Blog*, 26 Feb. 2024, www.sparxitsolutions.com/blog/cost-of-developing-a-language-learning-app-like-duolingo.

“Software Developers, Quality Assurance Analysts, and Testers.” *Bureau of Labor Statistics*, 18 Apr. 2025, www.bls.gov/ooh/computer-and-information-technology/software-developers.htm.

Spotify Technology S.A. “Financials.” *Spotify Investor Relations*, investors.spotify.com/financials/default.aspx#annual.

Srivastava, Sudeep. “How Much Does Duolingo Like App Development Cost?” *Appinventiv*, 25 Apr. 2025, appinventiv.com/blog/duolingo-like-app-development-cost.

TEDx Talks. “Duolingo -- the Next Chapter in Human Computation | Luis Von Ahn | TEDxCMU 2011.” *YouTube*, 26 Apr. 2011, www.youtube.com/watch?v=cQl6jUjFjp4.

Tim Ferriss. “Luis Von Ahn, Co-Founder of Duolingo — How to Be (Truly) Mission-Driven, 10x Growth, and More.” *YouTube*, 13 July 2022, www.youtube.com/watch?v=JwiswTQkvew.

“Top Apps.” *AppMagic.rocks*, 1 Jan. 2025, appmagic.rocks/top-charts/apps?tag=36&aggregation=year&date=2025-01-01.

Udemy, Inc. “Annual Reports and Proxies.” *Udemy Investor Relations*, investors.udemy.com/financial-information/annual-reports.

Von Ahn, Luis. “Duolingo IPO: A Note From CEO Luis Von Ahn.” *Duolingo Blog*, 24 Sept. 2024, blog.duolingo.com/duolingo-ipo.

Wang, Echo, and Niket Nishant. “Duolingo Enters ‘major Leagues’ With $6.5 Bln Valuation in Strong Debut.” *Reuters*, 28 July 2021, www.reuters.com/technology/duolingo-valued-65-bln-shares-soar-debut-2021-07-28.

Yahoo Finance. “Duolingo, Inc. (DUOL) Stock Price, News, Quote and History - Yahoo Finance.” Yahoo Finance, 22 May 2025, finance.yahoo.com/quote/DUOL/?guccounter=1.

Yee, Lareina, et al. “McKinsey Technology Trends Outlook 2024.” *McKinsey & Company*, 16 July 2024, www.mckinsey.com/capabilities/mckinsey-digital/our-insights/the-top-trends-in-tech.

APPENDIXES

APPENDIX 1. Balance Sheet

Year	Units	Source	Classification	2020	2021	2022	2023	2024
Beginning of period				01/01/20	01/01/21	01/01/22	01/01/23	01/01/24
End of period				31/12/20	31/12/21	31/12/22	31/12/23	31/12/24
Consolidated Statement of Financial Position (Balance Sheet)								
ASSETS	USDk	Duolingo						
Current Assets								
Cash and cash equivalents			Monetary Asset	120,490	553,922	608,180	747,610	785,791
Short-term investments			Financial Asset	-	-	-	-	91,854
Accounts receivable			Operating Asset	20,450	33,163	46,728	88,975	128,923
Deferred cost of revenues			Operating Asset	13,585	24,219	35,041	53,931	80,162
Prepaid expenses and other current assets			Operating Asset	3,855	7,967	7,234	7,282	14,858
Total current assets				**158,380**	**619,271**	**697,183**	**897,798**	**1,101,588**
Non-current Assets								
Operating lease right-of-use assets			Operating Asset	8,073	28,369	22,508	19,103	47,495
Intangible assets, net			Operating Asset	2,296	4,566	8,497	15,995	19,899
Long-term investments			Financial Asset	-	-	-	-	98,292
Property and equipment, net			Operating Asset	6,428	8,211	12,969	11,792	18,943
Goodwill			Operating Asset	-	-	4,050	4,050	10,538
Restricted cash			Operating Asset	-	-	-	2,735	2,735
Deferred tax assets, net			Operating Asset	-	-	633	766	675
Other assets			Operating Asset	562	894	1,507	1,718	1,563
Total non-current assets				**17,359**	**42,040**	**50,164**	**56,159**	**200,140**
Total assets				**175,739**	**661,311**	**747,347**	**953,957**	**1,301,728**
EQUITY & LIABILITIES								
Common stock			Equity	1	4	4	4	4
Additional paid-in capital			Equity	30,087	683,966	772,562	869,918	950,393
Accumulated deficit			Equity	- 110,779	- 170,914	- 230,488	- 214,421	- 125,847
Total equity				**- 80,691**	**513,056**	**542,078**	**655,501**	**824,550**
Commitments and contingencies								
Convertible preferred stock			Equity?	182,609	-	-	-	-
Deferred revenues			Operating Liability	54,792	98,267	157,550	249,192	372,884
Accounts payable			Operating Liability	2,196	7,818	1,177	2,447	6,381
Income tax payable			Operating Liability	68	113	1,069	792	6,591
Accrued expenses and other current liabilities			Operating Liability	8,634	11,822	18,634	20,987	33,794
Current lease			Debt	-	1,111	3,336	3,944	2,581
Total current liabilities				**65,690**	**119,131**	**181,766**	**277,362**	**422,231**
Long-term obligation under operating leases			Debt	8,131	29,124	23,503	21,094	54,656
Deferred tax liabilities, net			Operating Liability	-	-	-	-	291
Total non-current liabilities				**8,131**	**29,124**	**23,503**	**21,094**	**54,947**
Total equity and liabilities				**175,739**	**661,311**	**747,347**	**953,957**	**1,301,728**

APPENDIX 2. Income Statement

	Year	Units	Source	Classification	2020	2021	2022	2023	2024
	Beginning of period				01/01/20	01/01/21	01/01/22	01/01/23	01/01/24
	End of period				31/12/20	31/12/21	31/12/22	31/12/23	31/12/24
	Consolidated Income Statement								
	Revenues	**USDk**	**Duolingo**	OperAct	**161,696**	**250,772**	**369,495**	**531,109**	**748,024**
	Cost of revenues			OperAct	- 45,987	- 69,186	- 99,431	- 142,105	- 203,645
	Gross profit			OperAct	**115,709**	**181,586**	**270,064**	**389,004**	**544,379**
	Operating expences								
	Research and development			OperAct	- 53,024	- 103,833	- 150,444	- 194,352	- 235,298
	Sales and marketing			OperAct	- 34,983	- 59,170	- 66,967	- 75,788	- 90,494
	General and administrative			OperAct	- 43,713	- 78,590	- 117,848	- 132,123	- 155,992
	Total other expenses			OperAct	**- 131,720**	**- 241,593**	**- 335,259**	**- 402,263**	**- 481,784**
	Income (loss) from operations			**OperAct**	**- 16,011**	**- 60,007**	**- 65,195**	**- 13,259**	**62,595**
	Other income			FinAct/Non-norma	157	318	131	590	1,267
	Other expense			FinAct/Non-norma	- 85	- 288	- 807	- 645	- 4,253
	Other (expense) income, net				**72**	**30**	**- 676**	**- 55**	**- 2,986**
	Income (loss) before interest income and income taxes			FinAct	- 15,939	- 59,977	- 65,871	- 13,314	59,609
	Interest income			FinAct	231	19	7,235	31,091	42,697
	Income (loss) before income taxes			FinAct	**- 15,708**	**- 59,958**	**- 58,636**	**17,777**	**102,306**
	Provision for income taxes			OperAct	- 68	- 177	- 938	- 1,710	- 13,732
	Net income (loss) and comprehensive income (loss)				**- 15,776**	**- 60,135**	**- 59,574**	**16,067**	**88,574**
	Attributable to:								
Actual	Net income (loss) per share attributable to Class A and Class B common stockholders, basic				(1,24)	(2,57)	(1,51)	0,39	2,04
Actual	Net income (loss) per share attributable to Class A and Class B common stockholders, diluted				(1,24)	(2,57)	(1,51)	0,35	1,88

APPENDIX 3. Reclassified Balance Sheet

Year	Units	Source	Mapping	2020	2021	2022	2023	2024
Beginning of period				01/01/20	01/01/21	01/01/22	01/01/23	01/01/24
End of period				31/12/20	31/12/21	31/12/22	31/12/23	31/12/24
	Units	Source	Mapping					
Reclassified Balance Sheet								
RECLASSIFIED ASSETS	USDk							
Operating assets:								
Operating lease right-of-use assets		BS	OperA	8,073	28,369	22,508	19,103	47,495
Intangible assets, net		BS	OperA	2,296	4,566	8,497	15,995	19,899
Property and equipment, net		BS	OperA	6,428	8,211	12,969	11,792	18,943
Goodwill		BS	OperA	-	-	4,050	4,050	10,538
Restricted cash		BS	OperA	-	-	-	2,735	2,735
Deferred tax assets, net		BS	OperA	-	-	633	766	675
Other assets		BS	OperA	562	894	1,507	1,718	1,563
Accounts receivable		BS	OperA	20,450	33,163	46,728	88,975	128,923
Deferred cost of revenues		BS	OperA	13,585	24,219	35,041	53,931	80,162
Prepaid expenses and other current assets		BS	OperA	3,855	7,967	7,234	7,282	14,858
Total operating assets		**Calculation**		**55,249**	**107,389**	**139,167**	**206,347**	**325,791**
Monetary assets:								
Cash and cash equivalents		BS	MonetA	120,490	553,922	608,180	747,610	785,791
Long-term investments		BS	FinA	-	-	-	-	98,292
Short-term investments		BS	FinA	-	-	-	-	91,854
Total monetary assets		**Calculation**		**120,490**	**553,922**	**608,180**	**747,610**	**975,937**
Total assets		**Calculation**		**175,739**	**661,311**	**747,347**	**953,957**	**1,301,728**
Analysis of monetary assets								
Monetary assets		Calculation		120,490	553,922	608,180	747,610	975,937
Revenue		IS		161,696	250,772	369,495	531,109	748,024
Normal level of monetary assets	% of Revenue	Input		30.0%	30.0%	30.0%	30.0%	30.0%
Normal monetary assets (operating asset)		**Calculation**	OperA	**48,509**	**75,232**	**110,849**	**159,333**	**224,407**
Excess monetary assets (financial asset)		**Calculation**	FinA	**71,981**	**478,690**	**497,332**	**588,277**	**751,530**
Adjusted asset values								
Adjusted operating assets		Calculation	OperA	103,758	182,621	250,016	365,680	550,198
Financial assets		Calculation	FinA	71,981	478,690	497,332	588,277	751,530
Total assets		**Calculation**		**175,739**	**661,311**	**747,347**	**953,957**	**1,301,728**
RECLASSIFIED EQUITY & LIABILITIES								
Equity:								
Shareholders' equity		BS	EQmaj	- 80,691	513,056	542,078	655,501	824,550
Convertible preferred stock		BS	EQmin	182,609	-	-	-	-
Total equity		**Calculation**	**EQ**	**101,918**	**513,056**	**542,078**	**655,501**	**824,550**

Year			2020	2021	2022	2023	2024
Interest-bearing debt:							
Current lease		IBD	-	1,111	3,336	3,944	2,581
Long-term obligation under operating leases	BS	IBD	8,131	29,124	23,503	21,094	54,656
Total interest bearing debt	**Calculation**		**8,131**	**30,235**	**26,839**	**25,038**	**57,237**
Operating liabilities:							
Deferred revenues	BS	OperL	54,792	98,267	157,550	249,192	372,884
Accounts payable	BS	OperL	2,196	7,818	1,177	2,447	6,381
Income tax payable	BS	OperL	68	113	1,069	792	6,591
Accrued expenses and other current liabilities	BS	OperL	8,634	11,822	18,634	20,987	33,794
Deferred tax liabilities, net	BS	OperL	-	-	-	-	291
Total operating liabilities	**Calculation**		**65,690**	**118,020**	**178,430**	**273,418**	**419,941**
Total equity and liabilities	**Calculation**		**175,739**	**661,311**	**747,347**	**953,957**	**1,301,728**
Check			-	-	-	-	-
Reclassified balance sheet (short):							
Operating assets	Calculation		103,758	182,621	250,016	365,680	550,198
Financial assets	Calculation		71,981	478,690	497,332	588,277	751,530
Total assets	**Calculation**		**175,739**	**661,311**	**747,347**	**953,957**	**1,301,728**
Equity	Calculation		101,918	513,056	542,078	655,501	824,550
Interest-bearing debt			8,131	30,235	26,839	25,038	57,237
Operating liabilities	Calculation		65,690	118,020	178,430	273,418	419,941
Total equity and liabilities	**Calculation**		**175,739**	**661,311**	**747,347**	**953,957**	**1,301,728**
Check			-	-	-	-	-
Calculation of Net Operating Asset:							
Operating assets	Calculation	OperA	103,758	182,621	250,016	365,680	550,198
Operating liabilities	Calculation	OperL	65,690	118,020	178,430	273,418	419,941
Net operating assets	**Calculation**	**NOA**	**38,068**	**64,601**	**71,586**	**92,262**	**130,257**
Calculation of Capital Employed:							
Equity	Calculation	EQ	101,918	513,056	542,078	655,501	824,550
Interest-bearing debt			8,131	30,235	26,839	25,038	57,237
Capital employed	**Calculation**	**CE**	**101,918**	**513,056**	**542,078**	**655,501**	**824,550**
Calculation of Net Interest-Bearing Debt:							
Interest-bearing debt	Calculation		8,131	30,235	26,839	25,038	57,237
Financial assets	Calculation		71,981	478,690	497,332	588,277	751,530
Net Interest-Bearing Debt	**Calculation**		**- 63,850**	**- 448,455**	**- 470,493**	**- 563,239**	**- 694,293**

APPENDIX 4. Reclassified Income Statement

Year	Units	Source	Mapping	2020	2021	2022	2023	2024
Beginning of period				01/01/20	01/01/21	01/01/22	01/01/23	01/01/24
End of period				31/12/20	31/12/21	31/12/22	31/12/23	31/12/24
	Units	Source	Mapping					
Reclassified Income Statement								
NORMAL OPERATING ACTIVITIES								
Revenues	**USDk**	**IS**	OperAct	**161,696**	**250,772**	**369,495**	**531,109**	**748,024**
Cost of revenues		IS	OperAct	- 45,987	- 69,186	- 99,431	- 142,105	- 203,645
Gross profit		**IS**	OperAct	**115,709**	**181,586**	**270,064**	**389,004**	**544,379**
Research and development		IS	OperAct	- 53,024	- 103,833	- 150,444	- 194,352	- 235,298
Sales and marketing		IS	OperAct	- 34,983	- 59,170	- 66,967	- 75,788	- 90,494
General and administrative		IS	OperAct	- 43,713	- 78,590	- 117,848	- 132,123	- 155,992
Total operating expenses		**IS**	OperAct	**- 131,720**	**- 241,593**	**- 335,259**	**- 402,263**	**- 481,784**
Income (loss) from operations	**USDk**	**IS**		**- 16,011**	**- 60,007**	**- 65,195**	**- 13,259**	**62,595**
Adjusted operating profit (before tax)		**Calculation**		**- 16,011**	**- 60,007**	**- 65,195**	**- 13,259**	**62,595**
Normal tax expense (operating)		Calculation	OperAct	64	180	1,043	- 1,273	- 8,388
Net operating profit less adjusted taxes		**Calculation**	**NOPLAT**	**- 15,947**	**- 59,827**	**- 64,152**	**- 14,532**	**54,207**
NORMAL FINANCIAL ACTIVITIES								
Interest income		IS	FinAct	231	19	7,235	31,091	42,697
Income (loss) before income taxes		IS		**231**	**19**	**7,235**	**31,091**	**42,697**
Adjusted net financial expense (before tax)		**Calculation**		**231**	**19**	**7,235**	**31,091**	**42,697**
Normal tax expense (financial)		Calculation	FinAct	- 1	- 0	- 116	2,985	- 5,721
Net financial expense		**Calculation**	**NetFinExp**	**230**	**19**	**7,119**	**34,076**	**36,976**
NON-NORMAL ACTIVITIES - non-existant								
Other income		IS	NonNorm	157	318	131	590	1,267
Other expense		ADJ	NonNorm	- 85	- 288	- 807	- 645	- 4,253
Non-normal tax expense				- 131	- 357	- 1,865	- 3,422	377
Non-normal operating and financial items		**Calculation**	**NonNormal**	**- 59**	**- 327**	**- 2,541**	**- 3,477**	**- 2,609**
Comprehensive net profit		**Calculation**	**CompNP**	**- 15,776**	**- 60,135**	**- 59,574**	**16,067**	**88,574**

Allocation of tax expense						
Total income tax expense	IS	- 68	- 177	- 938	- 1,710	- 13,732
Net operating profit (before tax)	Calculation	- 16,011	- 60,007	- 65,195	- 13,259	62,595
Net financial expense (before tax)	Calculation	231	19	7,235	31,091	42,697
Total taxable profit	**Calculation**	**- 15,780**	**- 59,988**	**- 57,960**	**17,832**	**105,292**
Effective income tax rate	Input	-0.4%	-0.3%	-1.6%	9.6%	13.4%
Normal tax expense (operating)	Calculation	64	180	1,043	- 1,273	- 8,388
Normal tax expense (financial)	Calculation	- 1	- 0	- 116	2,985	- 5,721
Total normal tax expense	**Calculation**	**63.120**	**179.964**	**927.360**	**1,711.872**	**- 14,109**
Non-normal tax expense	**Calculation**	**- 131**	**- 357**	**- 1,865**	**- 3,422**	**377**

APPENDIX 5. Ratio Analysis

Year	Units	Source	2019	2020	2021	2022	2023	2024
Beginning of period				01/01/20	01/01/21	01/01/22	01/01/23	01/01/24
End of period				31/12/20	31/12/21	31/12/22	31/12/23	31/12/24
	Units	Source						
Analysis of historical performance								
OPERATING PERFORMANCE								
Sales growth								
Sales	USDk	Reclass_IS	70,760	161,696	250,772	369,495	531,109	748,024
Sales growth, YoY	%	Calculation		129%	55%	47%	44%	41%
Sales CAGR 2019-24	%	Calculation	60%					
Comprehensive Operating Profit (Normal + NonNorm)								
NOPLAT (t)	USDk	Reclass_IS		- 15,947	- 59,827	- 64,152	- 14,532	54,207
Non-normal operating profit (t)				- 59	- 327	- 2,541	- 3,477	- 2,609
Comprehensive operating profit (t)	**USDk**	**Calculation**		**- 16,006**	**- 60,154**	**- 66,693**	**- 18,009**	**51,598**
Operating Profit Margin (OPM)								
NOPLAT (t)	USDk	Reclass_IS		- 15,947	- 59,827	- 64,152	- 14,532	54,207
Revenue (t)	USDk	Reclass_IS		161,696	250,772	369,495	531,109	748,024
OPM, normal	**%**	**Calculation**		**-9.9%**	**-23.9%**	**-17.4%**	**-2.7%**	**7.2%**
Non-normal operating profit/loss (t)	USDk	Reclass_IS		- 59	- 327	- 2,541	- 3,477	- 2,609
Revenue (t)	USDk	Reclass_IS		161,696	250,772	369,495	531,109	748,024
OPM, non-normal	**%**	**Calculation**		**0.0%**	**-0.1%**	**-0.7%**	**-0.7%**	**-0.3%**
OPM, normal	%	Calculation		-9.9%	-23.9%	-17.4%	-2.7%	7.2%
OPM, non-normal	%	Calculation		0.0%	-0.1%	-0.7%	-0.7%	-0.3%
OPM, comprehensive	**%**	**Calculation**		**-9.9%**	**-24.0%**	**-18.0%**	**-3.4%**	**6.9%**
Net Operating Assets Turnover (NOAT)								
Revenue (t)	USDk	Reclass_IS		161,696	250,772	369,495	531,109	748,024
Net Operating Assets (t)	USDk	Reclass_BS		38,068	64,601	71,586	92,262	130,257
Net Operating Assets (t-1)	USDk	Reclass_BS			38,068	64,601	71,586	92,262
Net Operating Assets (average)	USDk	Calculation		38,068	51,334	68,093	81,924	111,259
NOAT	**x**	**Calculation**		**4.25**	**4.89**	**5.43**	**6.48**	**6.72**
Return on Net Operating Assets (RNOA), indirect method								
ROA, comprehensive								
OPM, comprehensive	%	Calculation		-9.9%	-24.0%	-18.0%	-3.4%	6.9%
NOAT	x	Calculation		4.25	4.89	5.43	6.48	6.72
RNOA	**%**	**Calculation**		**-42.0%**	**-117.2%**	**-97.9%**	**-22.0%**	**46.4%**
RNOA, normal								
OPM, normal	%	Calculation		-9.9%	-23.9%	-17.4%	-2.7%	7.2%
NOAT	x	Calculation		4.25	4.89	5.43	6.48	6.72
RNOA, normal	**%**	**Calculation**		**-41.9%**	**-116.5%**	**-94.2%**	**-17.7%**	**48.7%**
RNOA, non-normal								
OPM, non-normal	%	Calculation		-0.04%	-0.1%	-0.7%	-0.7%	-0.3%
NOAT	x	Calculation		4.25	4.89	5.43	6.48	6.72
RNOA, non-normal	**%**	**Calculation**		**-0.2%**	**-0.6%**	**-3.7%**	**-4.2%**	**-2.3%**
Check				*0%*	*0%*	*0%*	*0%*	*0%*

Return on Net Operating Assets (RNOA), direct method								
Comprehensive operating profit (t)	USDk	Calculation		- 16,006	- 60,154	- 66,693	- 18,009	51,598
Net Operating Assets (average)	USDk	Calculation		38,068	51,334	68,093	81,924	111,259
RNOA	**%**	**Calculation**		**-42.0%**	**-117.2%**	**-97.9%**	**-22.0%**	**46.4%**
Check				*0.00%*	*0.00%*	*0.00%*	*0.00%*	*0.00%*

Year			2019	2020	2021	2022	2023	2024
FINANCIAL LEVERAGE EFFECT								
Financial Leverage (FLEV)								
NIBD (t)	USDk	Reclass_BS		- 63,850	- 448,455	- 470,493	- 563,239	- 694,293
NIBD (t-1)	USDk	Reclass_BS			- 63,850	- 448,455	- 470,493	- 563,239
NIBD (average)	USDk	Calculation		- 63,850	- 256,153	- 459,474	- 516,866	- 628,766
Equity (t)	USDk	Reclass_BS		101,918	513,056	542,078	655,501	824,550
Equity (t-1)	USDk	Reclass_BS			101,918	513,056	542,078	655,501
Equity (average)	USDk	Calculation		101,918	307,487	527,567	598,790	740,026
FLEV	**x**	**Calculation**		**-0.63**	**-0.83**	**-0.87**	**-0.86**	**-0.85**
Return on Net Interest-bearing Debt (RNIBD)								
Net Financial expense [+] / Income [-] (t)	USDk	Reclass_IS		- 230	- 19	- 7,119	- 34,076	- 36,976
NIBD [+] / Net FinA [-] (average)	USDk	Calculation		- 63,850	- 256,153	- 459,474	- 516,866	- 628,766
RNIBD	**%**	**Calculation**		**0.4%**	**0.0%**	**1.5%**	**6.6%**	**5.9%**
RNOA-RNIBD Spread								
RNOA	%	Calculation		-42.0%	-117.2%	-97.9%	-22.0%	46.4%
RNIBD	%	Calculation		0.4%	0.0%	1.5%	6.6%	5.9%
Spread	**%**	**Calculation**		**-42.4%**	**-117.2%**	**-99.5%**	**-28.6%**	**40.5%**
Leverage effect (FLEV x Spread)								
FLEV	x	Calculation		-0.63	-0.83	-0.87	-0.86	-0.85
Spread	%	Calculation		-42.4%	-117.2%	-99.5%	-28.6%	40.5%
Leverage effect	**%**	**Calculation**		**26.6%**	**97.6%**	**86.7%**	**24.7%**	**-34.4%**
ROE CALCULATION								
Return on Equity (ROE), indirect method								
RNOA	%	Calculation		-42.0%	-117.2%	-97.9%	-22.0%	46.4%
Leverage effect	%	Calculation		26.6%	97.6%	86.7%	24.7%	-34.4%
ROE	**%**	**Calculation**		**-15.5%**	**-19.6%**	**-11.3%**	**2.7%**	**12.0%**
Return on Equity (ROE), direct method								
Comprehensive net profit (t)	USDk	Reclass_IS		- 15,776	- 60,135	- 59,574	16,067	88,574
Equity (average)	USDk	Calculation		101,918	307,487	527,567	598,790	740,026
ROE	**%**	**Calculation**		**-15.5%**	**-19.6%**	**-11.3%**	**2.7%**	**12.0%**
Check				*0.00%*	*0.00%*	*0.00%*	*0.00%*	*0.00%*
MROE CALCULATION								
Book-to-market (BTM)								
Share price (t)	USD	Input		-	106.11	71.13	226.85	324.23
Shares outstanding (t)	thousand	Input		-	38,272	40,361	42,526	44,936
Market capitalization (t)	USDk	Calculation		-	4,061,042	2,870,878	9,647,023	14,569,599
Share price (t-1)	USD	Input		-	134	106	71	227
Shares outstanding (t-1)	thousand	Input		-	12,794	38,272	40,361	42,526
Market capitalization (t-1)	USDk	Calculation		-	1,720,025	4,061,042	2,870,878	9,647,023
Market capitalization (average)	USDk	Calculation		-	2,890,534	3,465,960	6,258,951	12,108,311
Equity (average)	USDk	Calculation		101,918	307,487	527,567	598,790	740,026
BTM	**x**	**Calculation**		**-**	**0.11**	**0.15**	**0.10**	**0.06**
ROE	%	Calculation		-15.5%	-19.6%	-11.3%	2.7%	12.0%
MROE	**%**	**Calculation**		**-**	**-2.1%**	**-1.7%**	**0.3%**	**0.7%**

APPENDIX 6. Weighted Average Cost of Capital (WACC)

Components - Duolingo	Value	Source
Risk-free rate (RFR)	4.30%	US government 10Y bond yield as of Apr 1, 2025
Equity-risk premium (ERP)	5.18%	Implied ERP adjusted for country risks
Unlevered beta	1.00	Industry-average: Software (System & Application)
Cost of equity (CoE)	**9.48%**	**CAPM: CoE = RFP + Beta * ERP**
Debt-risk premium (DRP)	2.86%	DRP = CoD (pre-tax) - RFR
Pre-tax cost of debt	7.16%	CoD (pre-tax) = RFP + DRP
Tax rate (T)	30.00%	US corporate tax rate
After-tax cost of debt (CoD)	**5.01%**	**CoD = CoD (pre-tax) * (1 + T)**
Weight of equity (We)	97.00%	
Weight of debt (Wd)	3.00%	
WACC (Forecasted)	**9.34%**	**WACC = CoE * We + CoD * Wd**

APPENDIX 7. Forecast

Year		2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030
Model parameters												
Sales YoY growth	%	129%	55%	47%	44%	41%	38%	35%	32%	30%	27%	25%
NOPLAT margin	%	-10%	-24%	-17%	-3%	7%	12%	16%	19%	22%	24%	25%
NOAT	x	4.25	4.89	5.43	6.48	6.72	6.90	7.00	7.10	7.17	7.24	7.32
FLEV	x	- 0.63	- 0.83	- 0.87	- 0.86	- 0.85	- 0.70	- 0.70	- 0.40	0.05	0.05	0.05
RNIBD	%	0.4%	0.0%	1.5%	6.6%	5.9%	4.0%	4.0%	4.0%	4.0%	4.0%	4.0%
Tax rate	%	-0.4%	-0.3%	-1.6%	9.6%	13.4%	16.0%	21.0%	26.0%	30.0%	30.0%	30.0%
Minority equity share	%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Minority income margin	%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
RNOA	%	-42.0%	-117.2%	-97.9%	-22.0%	46.4%	82.8%	112.0%	134.9%	157.7%	173.8%	183.0%
ROE	%	-15.5%	-19.6%	-11.3%	2.7%	12.0%	27.6%	36.4%	82.5%	165.8%	182.7%	192.4%
Pro Forma Financial Statements												
Income Statement												
Sales revenue	USDk	161,696	250,772	369,495	531,109	748,024	1,031,090	1,390,342	1,833,053	2,382,969	3,026,371	3,782,964
Operating expences and taxes	USDk	- 177,643	- 310,599	- 433,647	- 545,641	- 693,817	- 907,360	- 1,167,887	- 1,484,773	- 1,858,716	- 2,300,042	- 2,837,223
NOPLAT	USDk	- 15,947	- 59,827	- 64,152	- 14,532	54,207	123,731	222,455	348,280	524,253	726,329	945,741
Net financial expenses	USDk						29,445	18,807	24,441	8,950	- 844	- 1,045
NP (minority)	USDk						-	-	-	-	-	-
NP (majority)	**USDk**	**- 15,947**	**- 59,827**	**- 64,152**	**- 14,532**	**54,207**	**153,176**	**241,261**	**372,721**	**533,203**	**725,485**	**944,696**
Balance Sheet												
Net operating assets (NOA)	USDk	38,068	64,601	71,586	92,262	130,257	201,499	261,865	335,629	422,088	522,509	630,494
NIBD(+) / Net FinA(-)	USDk	- 63,850	- 322,351	- 483,040	- 582,090	- 736,129	- 470,164	- 611,018	- 223,753	21,104	26,125	31,525
Equity (total)	USDk	101,918	386,951	554,626	674,352	866,386	671,663	872,883	559,382	400,984	496,383	598,969
Equity (minority)	USDk						-	-	-	-	-	-
Equity (majority)	**USDk**	**101,918**	**386,951**	**554,626**	**674,352**	**866,386**	**671,663**	**872,883**	**559,382**	**400,984**	**496,383**	**598,969**
Creation of free cash flows												
NOPLAT	USDk	- 15,947	- 59,827	- 64,152	- 14,532	54,207	123,731	222,455	348,280	524,253	726,329	945,741
Change in NOA	USDk	- 38,068	- 26,533	- 6,985	- 20,676	- 37,996	71,242	60,366	73,765	86,459	100,421	107,985
Free cash flow to firm (FCFF)	**USDk**	**22,121**	**- 33,294**	**- 57,167**	**6,144**	**92,203**	**52,489**	**162,089**	**274,515**	**437,795**	**625,908**	**837,756**
Distribution of free cash flows to majority equityholders												
NP (majority)	USDk	- 15,947	- 59,827	- 64,152	- 14,532	54,207	153,176	241,261	372,721	533,203	725,485	944,696
Change in Equity (majority)	USDk	- 101,918	- 285,033	- 167,674	- 119,726	- 192,034	- 194,723	201,220	- 313,500	- 158,399	95,400	102,586
Free cash flow to equity (FCFE)	**USDk**	**85,971**	**225,207**	**103,522**	**105,194**	**246,242**	**347,899**	**40,042**	**686,221**	**691,602**	**630,085**	**842,110**
Distribution of free cash flows to debtholders												
Net financial expenses	USDk						- 29,445	- 18,807	- 24,441	- 8,950	844	1,045
Change in NIBD / Net FinA	USDk						265,965	- 140,854	387,265	244,857	5,021	5,399
Free cash flow to debtholders (F	**USDk**						**- 295,410**	**122,047**	**- 411,705**	**- 253,808**	**- 4,177**	**- 4,354**
Summary of all free cash flows												
FCFE	USDk	85,971	225,207	103,522	105,194	246,242	347,899	40,042	686,221	691,602	630,085	842,110
FCFEmin	USDk						-	-	-	-	-	-
FCFD	USDk						- 295,410	122,047	- 411,705	- 253,808	- 4,177	- 4,354
FCFF	**USDk**	**85,971**	**225,207**	**103,522**	**105,194**	**246,242**	**52,489**	**162,089**	**274,515**	**437,795**	**625,908**	**837,756**

Year		2031	2032	2033	2034	2035	2036	2037	2038	2039	2040	
Model parameters												
Sales YoY growth	%	22%	19%	17%	15%	12%	9%	7%	5%	4%	3%	3%
NOPLAT margin	%	25%	27%	26%	25%	24%	22%	22%	20%	19%	18%	
NOAT	x	7.40	7.45	7.50	7.50	7.50	7.50	7.50	7.50	7.50	7.50	
FLEV	x	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	
RNIBD	%	4.0%	4.0%	4.0%	4.0%	4.0%	4.0%	4.0%	4.0%	4.0%	4.0%	
Tax rate	%	30.0%	30.0%	30.0%	30.0%	30.0%	30.0%	30.0%	30.0%	30.0%	30.0%	
Minority equity share	%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	
Minority income margin	%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	
RNOA	%	185.0%	201.2%	195.0%	187.5%	180.0%	165.0%	165.0%	150.0%	142.5%	135.0%	
ROE	%	194.5%	211.5%	205.1%	197.2%	189.3%	173.5%	173.5%	157.7%	149.8%	141.9%	
Pro Forma Financial Statements												
Income Statement												
Sales revenue	USDk	4,615,216	5,492,107	6,425,765	7,389,630	8,276,385	9,021,260	9,652,748	10,135,385	10,540,801	10,857,025	11,182,736
Operating expences and taxes	USDk	- 3,461,412	- 4,009,238	- 4,755,066	- 5,542,222	- 6,290,053	- 7,036,583	- 7,529,143	- 8,108,308	- 8,538,049	- 8,902,760	
NOPLAT	USDk	1,153,804	1,482,869	1,670,699	1,847,407	1,986,332	1,984,677	2,123,605	2,027,077	2,002,752	1,954,264	
Net financial expenses	USDk	- 1,261	- 1,484	- 1,725	- 1,971	- 2,207	- 2,406	- 2,574	- 2,703	- 2,811	- 2,895	
NP (minority)	USDk	-	-	-	-	-	-	-	-	-	-	
NP (majority)	**USDk**	**1,152,543**	**1,481,384**	**1,668,974**	**1,845,437**	**1,984,125**	**1,982,271**	**2,121,030**	**2,024,374**	**1,999,941**	**1,951,369**	
Balance Sheet												
Net operating assets (NOA)	USDk	742,177	862,519	985,284	1,103,518	1,202,835	1,287,033	1,351,385	1,405,440	1,447,603	1,491,031	
NIBD(+) / Net FinA(-)	USDk	37,109	43,126	49,264	55,176	60,142	64,352	67,569	70,272	72,380	74,552	
Equity (total)	USDk	705,068	819,393	936,020	1,048,342	1,142,693	1,222,681	1,283,815	1,335,168	1,375,223	1,416,480	
Equity (minority)	USDk	-	-	-	-	-	-	-	-	-	-	
Equity (majority)	**USDk**	**705,068**	**819,393**	**936,020**	**1,048,342**	**1,142,693**	**1,222,681**	**1,283,815**	**1,335,168**	**1,375,223**	**1,416,480**	
Creation of free cash flows												
NOPLAT	USDk	1,153,804	1,482,869	1,670,699	1,847,407	1,986,332	1,984,677	2,123,605	2,027,077	2,002,752	1,954,264	
Change in NOA	USDk	111,683	120,342	122,765	118,234	99,317	84,198	64,352	54,055	42,163	43,428	
Free cash flow to firm (FCFF)	**USDk**	**1,042,121**	**1,362,527**	**1,547,934**	**1,729,173**	**1,887,016**	**1,900,479**	**2,059,253**	**1,973,022**	**1,960,589**	**1,910,836**	
Distribution of free cash flows to majority equityholders												
NP (majority)	USDk	1,152,543	1,481,384	1,668,974	1,845,437	1,984,125	1,982,271	2,121,030	2,024,374	1,999,941	1,951,369	
Change in Equity (majority)	USDk	106,098	114,325	116,627	112,322	94,351	79,989	61,134	51,353	40,055	41,257	
Free cash flow to equity (FCFE)	**USDk**	**1,046,444**	**1,367,059**	**1,552,347**	**1,733,114**	**1,889,775**	**1,902,283**	**2,059,896**	**1,973,022**	**1,959,886**	**1,910,113**	
Distribution of free cash flows to debtholders												
Net financial expenses	USDk	1,261	1,484	1,725	1,971	2,207	2,406	2,574	2,703	2,811	2,895	
Change in NIBD / Net FinA	USDk	5,584	6,017	6,138	5,912	4,966	4,210	3,218	2,703	2,108	2,171	
Free cash flow to debtholders (F	**USDk**	**- 4,323**	**- 4,533**	**- 4,413**	**- 3,941**	**- 2,759**	**- 1,804**	**- 644**	**0**	**703**	**724**	
Summary of all free cash flows												
FCFE	USDk	1,046,444	1,367,059	1,552,347	1,733,114	1,889,775	1,902,283	2,059,896	1,973,022	1,959,886	1,910,113	
FCFEmin	USDk	-	-	-	-	-	-	-	-	-	-	
FCFD	USDk	- 4,323	- 4,533	- 4,413	- 3,941	- 2,759	- 1,804	- 644	0	703	724	
FCFF	**USDk**	**1,042,121**	**1,362,527**	**1,547,934**	**1,729,173**	**1,887,016**	**1,900,479**	**2,059,253**	**1,973,022**	**1,960,589**	**1,910,836**	
Check		- 0	-	- 0	0	-	-	-	-	-	-	

APPENDIX 8.1. Valuation - Free cash flow to equity (FCFE) model

Year	Units	Source		2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030
Direct models														
Free cash flow to equity (FCFE) model														
FCFE	USDk	Forecast							347,899	40,042	686,221	691,602	630,085	842,110
Discout rate (CoE)	%	WACC	9.48%						9.48%	9.48%	9.48%	9.48%	9.48%	9.48%
Valuation date	date	Input	31-Dec-24											
Discounting period	years	Calculation							1.00	2.00	3.00	4.00	5.00	6.00
Discount factor	x	Calculation	9.48%						0.91	0.83	0.76	0.70	0.64	0.58
Present value of forecasted FCFE	USDk	Calculation							317,788	33,410	523,017	481,495	400,700	489,184
Forecast period value	**USDk**	**Calculation**	8,335,030											
Terminal growth rate	%	Input	3.00%											
Sum of FCFE in terminal period	USDk	Calculation												
Present value of terminal FCFE	USDk	Calculation												
Terminal period value	**USDk**	**Calculation**	7,138,075											
Total value of equity	**USDk**	**Calculation**	15,473,105											
Number of shares outstanding		Inputs	44,936											

Year	Units	Source		2031	2032	2033	2034	2035	2036	2037	2038	2039	2040
Direct models													
Free cash flow to equity (FCFE) model													
FCFE	USDk	Forecast		1,046,444	1,367,059	1,552,347	1,733,114	1,889,775	1,902,283	2,059,896	1,973,022	1,959,886	1,910,113
Discout rate (CoE)	%	WACC	9.48%	9.48%	9.48%	9.48%	9.48%	9.48%	9.48%	9.48%	9.48%	9.48%	9.48%
Valuation date	date	Input	31-Dec-24										
Discounting period	years	Calculation		7.00	8.00	9.00	10.00	11.00	12.00	13.00	14.00	15.00	16.00
Discount factor	x	Calculation	9.48%	0.53	0.48	0.44	0.40	0.37	0.34	0.31	0.28	0.26	0.23
Present value of forecasted FCFE	USDk	Calculation		555,270	662,612	687,297	700,917	698,125	641,922	634,946	555,530	504,069	448,748
Forecast period value	**USDk**	**Calculation**	8,335,030										
Terminal growth rate	%	Input	3.00%										
Sum of FCFE in terminal period	USDk	Calculation											30,383,507
Present value of terminal FCFE	USDk	Calculation											7,138,075
Terminal period value	**USDk**	**Calculation**	7,138,075										
Total value of equity	**USDk**	**Calculation**	15,473,105										
Number of shares outstanding		Inputs	44,936										
Share price	**USD**	**Calculation**	344.34										

APPENDIX 8.2. Valuation - Residual income model

Year				2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030
Residual income model														
Net profit	USDk	Forecast							153,176	241,261	372,721	533,203	725,485	944,696
Equity (t-1), majority	USDk	Forecast							866,386	671,663	872,883	559,382	400,984	496,383
Cost of equity	%	WACC	9.48%						9.48%	9.48%	9.48%	9.48%	9.48%	9.48%
Required return on equity	USDk	Calculation							82,092	63,642	82,708	53,003	37,994	47,034
Residual income (RI)	**USDk**	**Calculation**							**71,084**	**177,619**	**290,013**	**480,200**	**687,491**	**897,662**
Discout rate (CoE)	%	WACC	9.48%						9.48%	9.48%	9.48%	9.48%	9.48%	9.48%
Valuation date	date	Input	31-Dec-24											
Discounting period	years	Calculation							1.00	2.00	3.00	4.00	5.00	6.00
Discount factor	x	Calculation							0.91	0.83	0.76	0.70	0.64	0.58
Present value of forecasted RI	USDk	Calculation							64,931	148,203	221,039	334,317	437,206	521,455
Forecast period value	**USDk**	**Calculation**	**7,801,421**											
Terminal growth rate	%	Input	3.00%											
Sum of RI in terminal period	USDk	Calculation												
Present value of terminal RI	USDk	Calculation												
Terminal period value	**USDk**	**Calculation**	**6,805,298**											
Equity (t-1), majority	USDk	Calculation	866,386											
Total value of equity	**USDk**	**Calculation**	**15,473,105**											
Number of shares outstanding		Inputs	44,936											

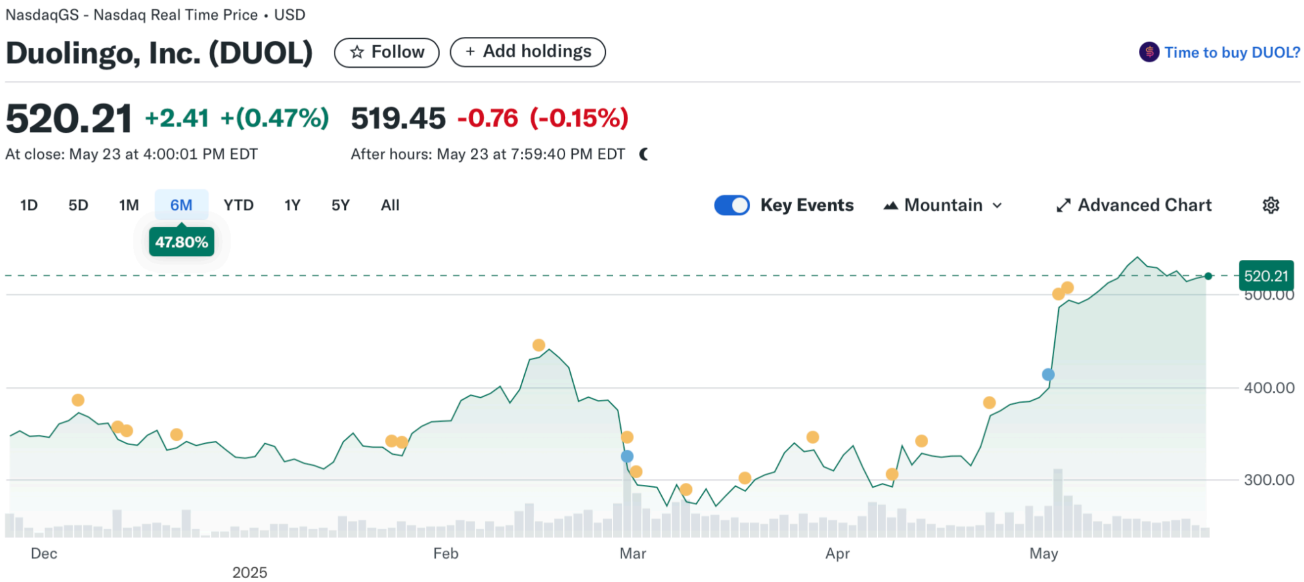
Year				2031	2032	2033	2034	2035	2036	2037	2038	2039	2040
Residual income model													
Net profit	USDk	Forecast		1,152,543	1,481,384	1,668,974	1,845,437	1,984,125	1,982,271	2,121,030	2,024,374	1,999,941	1,951,369
Equity (t-1), majority	USDk	Forecast		598,969	705,068	819,393	936,020	1,048,342	1,142,693	1,222,681	1,283,815	1,335,168	1,375,223
Cost of equity	%	WACC	9.48%	9.48%	9.48%	9.48%	9.48%	9.48%	9.48%	9.48%	9.48%	9.48%	9.48%
Required return on equity	USDk	Calculation		56,754	66,807	77,640	88,690	99,333	108,273	115,852	121,645	126,511	130,306
Residual income (RI)	**USDk**	**Calculation**		**1,095,789**	**1,414,577**	**1,591,334**	**1,756,746**	**1,884,792**	**1,873,998**	**2,005,178**	**1,902,729**	**1,873,430**	**1,821,063**
Discout rate (CoE)	%	WACC	9.48%	9.48%	9.48%	9.48%	9.48%	9.48%	9.48%	9.48%	9.48%	9.48%	9.48%
Valuation date	date	Input	31-Dec-24										
Discounting period	years	Calculation		7.00	8.00	9.00	10.00	11.00	12.00	13.00	14.00	15.00	16.00
Discount factor	x	Calculation		0.53	0.48	0.44	0.40	0.37	0.34	0.31	0.28	0.26	0.23
Present value of forecasted RI	USDk	Calculation		581,453	685,643	704,558	710,475	696,285	632,378	618,079	535,738	481,833	427,827
Forecast period value	**USDk**	**Calculation**	**7,801,421**										
Terminal growth rate	%	Input	3.00%										
Sum of RI in terminal period	USDk	Calculation											28,967,027
Present value of terminal RI	USDk	Calculation											6,805,298
Terminal period value	**USDk**	**Calculation**	**6,805,298**										
Equity (t-1), majority	USDk	Calculation	866,386										
Total value of equity	**USDk**	**Calculation**	**15,473,105**										
Number of shares outstanding		Inputs	44,936										
Share price	**USD**	**Calculation**	**344.34**										

APPENDIX 8.3. Valuation - Free cash flow to firm (FCFF) model

Year				2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030
Free cash flow to firm (FCFF) model														
FCFF	USDk	Forecast							52,489	162,089	274,515	437,795	625,908	837,756
Discout rate (WACC)	%	WACC	9.34%						9.34%	9.34%	9.34%	9.34%	9.34%	9.34%
Valuation date	date	Input	31-Jan-25											
Discounting period	years	Calculation							1.00	2.00	3.00	4.00	5.00	6.00
Discount factor	x	Calculation							0.91	0.84	0.76	0.70	0.64	0.59
Present value of forecasted FCFF	USDk	Calculation							48,005	135,576	209,997	306,290	400,487	490,242
Forecast period value	**USDk**	**Calculation**	7,754,909											
Terminal growth rate	%	Input	3.00%											
Sum of FCFF in terminal period	USDk	Calculation												
Present value of terminal FCFE	USDk	Calculation												
Terminal period value	**USDk**	**Calculation**	7,435,744											
Enterprise value	**USDk**	**Calculation**	15,190,653											
Less value of NIBD			- 736,129											
Less value of minority interest														
Equity value			15,926,782											
Number of shares outstanding		Inputs	44,936											

Year				2031	2032	2033	2034	2035	2036	2037	2038	2039	2040
Free cash flow to firm (FCFF) model													
FCFF	USDk	Forecast		1,042,121	1,362,527	1,547,934	1,729,173	1,887,016	1,900,479	2,059,253	1,973,022	1,960,589	1,910,836
Discout rate (WACC)	%	WACC	9.34%	9.34%	9.34%	9.34%	9.34%	9.34%	9.34%	9.34%	9.34%	9.34%	9.34%
Valuation date	date	Input	31-Jan-25										
Discounting period	years	Calculation		7.00	8.00	9.00	10.00	11.00	12.00	13.00	14.00	15.00	16.00
Discount factor	x	Calculation		0.54	0.49	0.45	0.41	0.37	0.34	0.31	0.29	0.26	0.24
Present value of forecasted FCFF	USDk	Calculation		557,733	666,912	692,933	707,935	706,554	650,801	644,927	565,130	513,592	457,795
Forecast period value	**USDk**	**Calculation**	7,754,909										
Terminal growth rate	%	Input	3.00%										
Sum of FCFF in terminal period	USDk	Calculation											31,036,811
Present value of terminal FCFE	USDk	Calculation											7,435,744
Terminal period value	**USDk**	**Calculation**	7,435,744										
Enterprise value	**USDk**	**Calculation**	15,190,653										
Less value of NIBD			- 736,129										
Less value of minority interest													
Equity value			15,926,782										
Number of shares outstanding		Inputs	44,936										
Share price	**USD**	**Calculation**	354.43										

APPENDIX 9. Historical share price summary of Duolingo



APPENDIX 10. *Excel Model*

Duolingo - Valuation Model.xlsx