SELL

# Investment Thesis

We issue a **SELL** recommendation with a price target of **$209** a share.

**1** Duolingo's revenue will grow at a lower rate according to our proprietary research.

**2** Duolingo will incur higher AI costs as they grow their Max userbase.
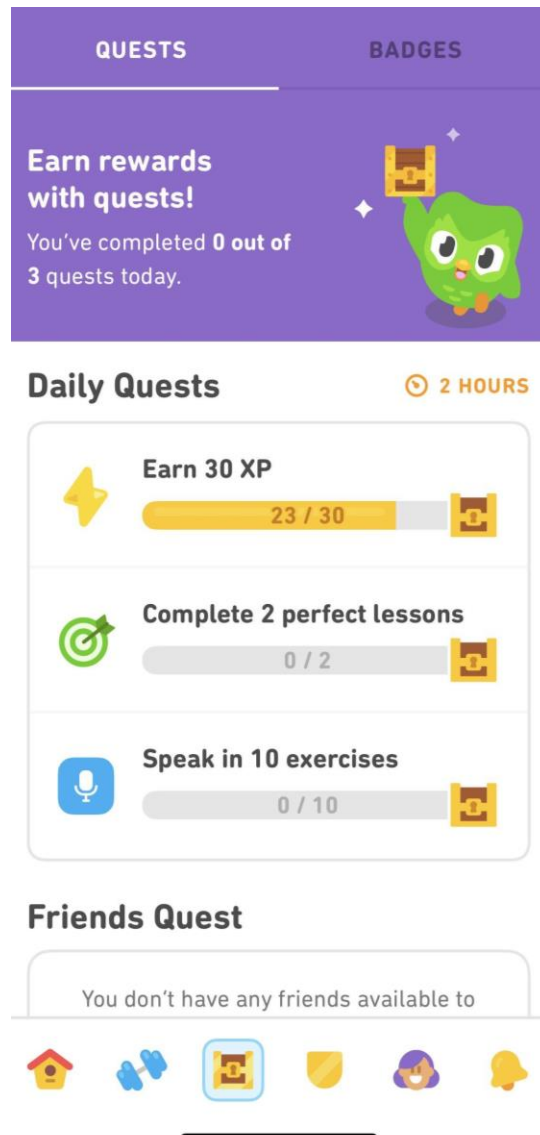
**SELL**

**29% downside from last close of $293**

**$209**

**12-Month Target Price**

# Duolingo's Value Proposition

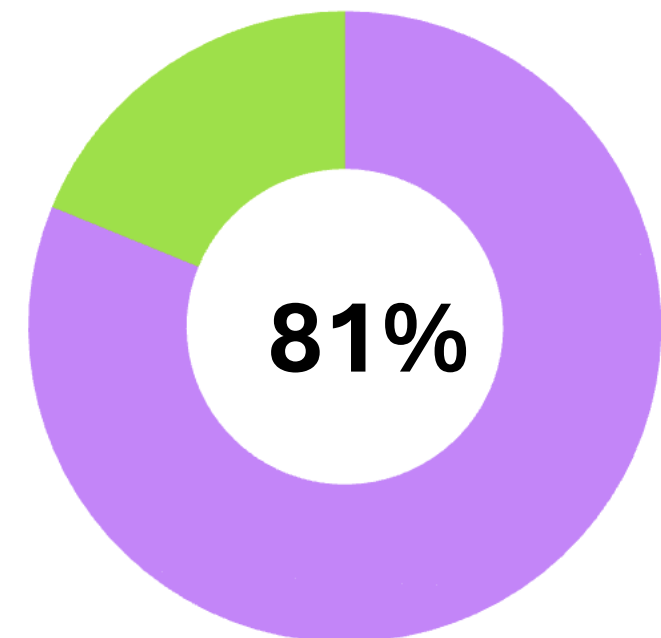**Duolingo provides a language learning mobile app that you can download and use for free.**
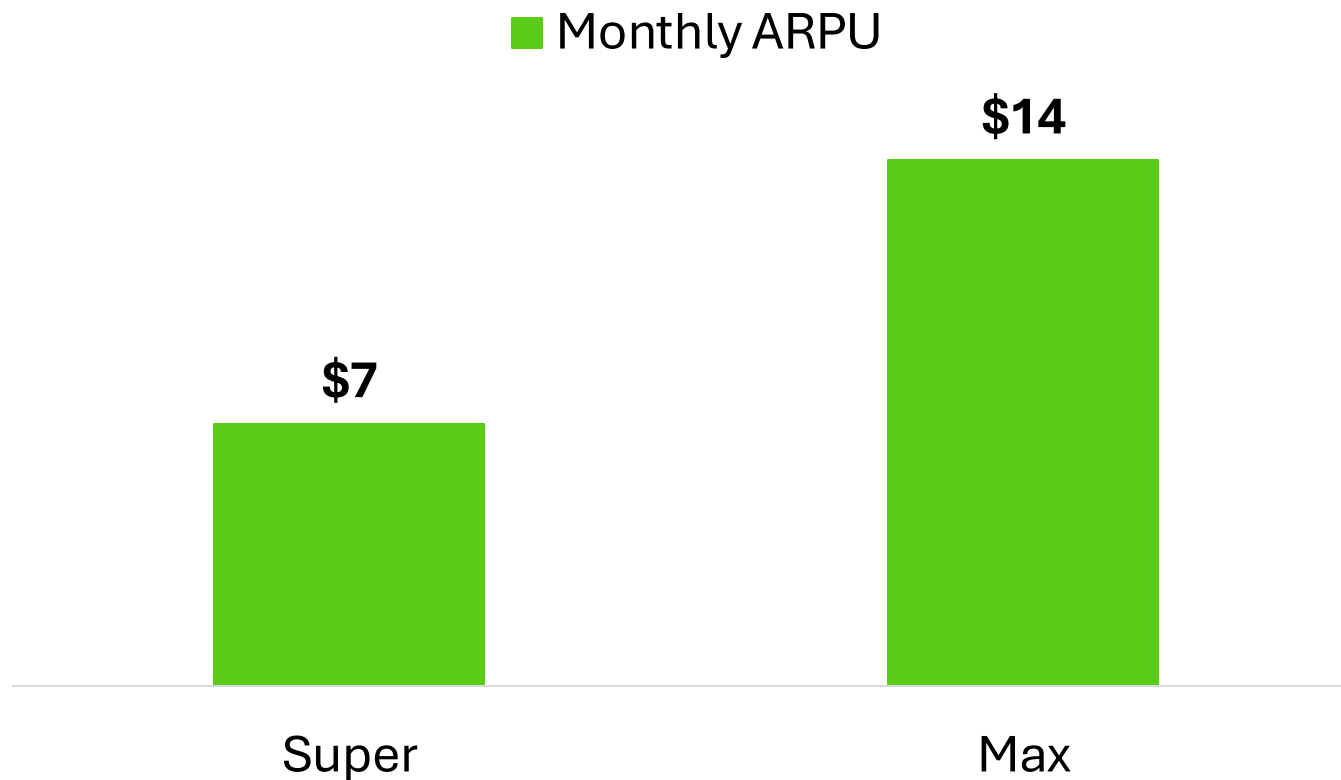


**Duolingo's App**

**Language Learning**

**+**

**Gamification**

**Subscription Revenue**

**81%**

# Why the Scaling of Max is Important

**Max could revolutionize the language learning industry if expansion is successful.**

■ Monthly ARPU

$14

$7

Super

Max

# 5%

2024 Max Userbase as % of Total Subscription Userbase
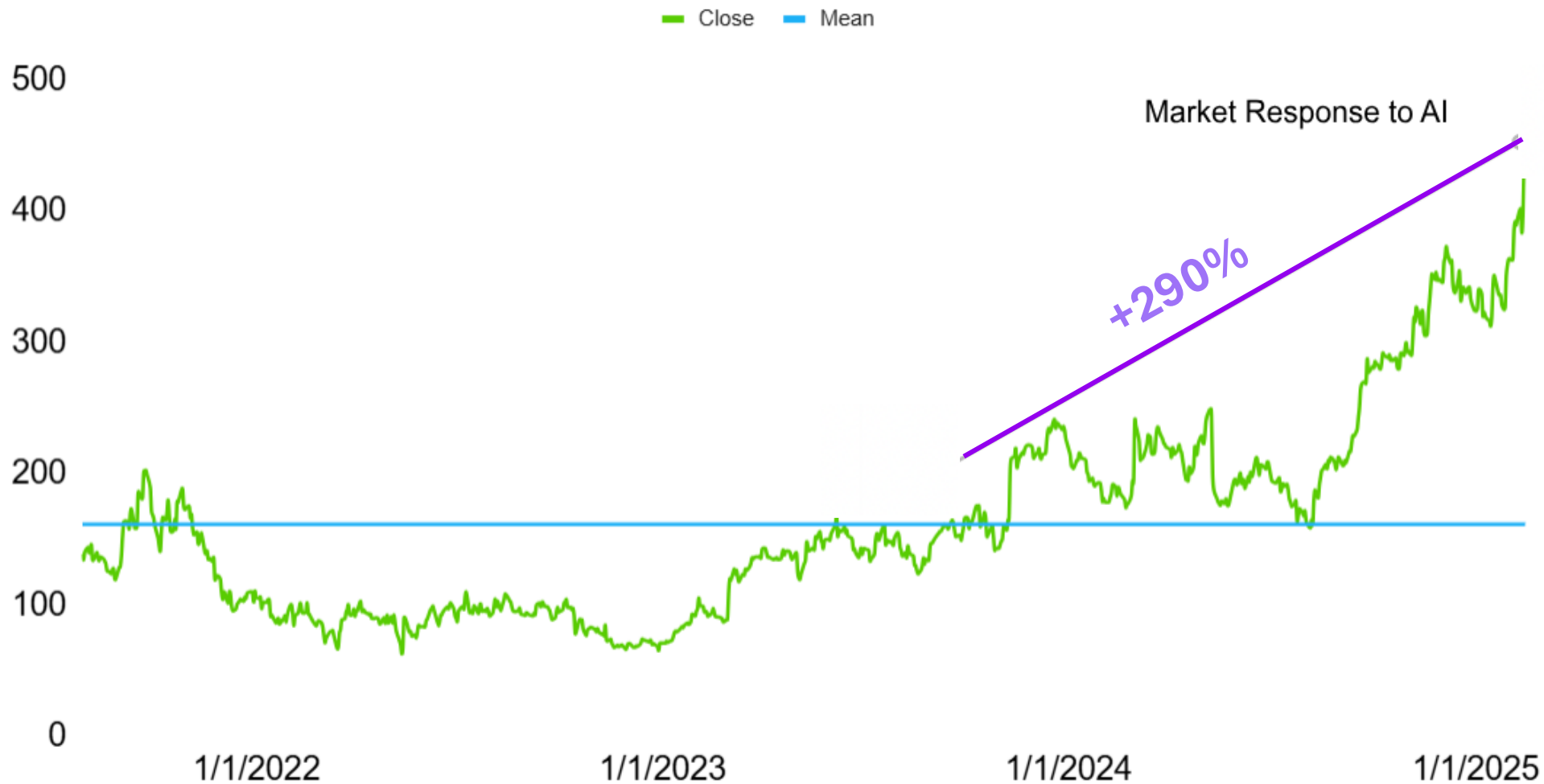
"We're still very early in driving Max monetization and believe there is a lot of room to grow." **– Duolingo CEO**

**Our proprietary research was conducted to answer a question related to Max.**

# How Will Max Perform?

**Will Lily deliver substantial shareholder returns, or is she not worth the hype?**



Stock Price History



Video Call with Lily

# Proprietary Research

# Sentiment Analysis Results

**Total #Posts:** 40,392
**Total #WTP:** 7337
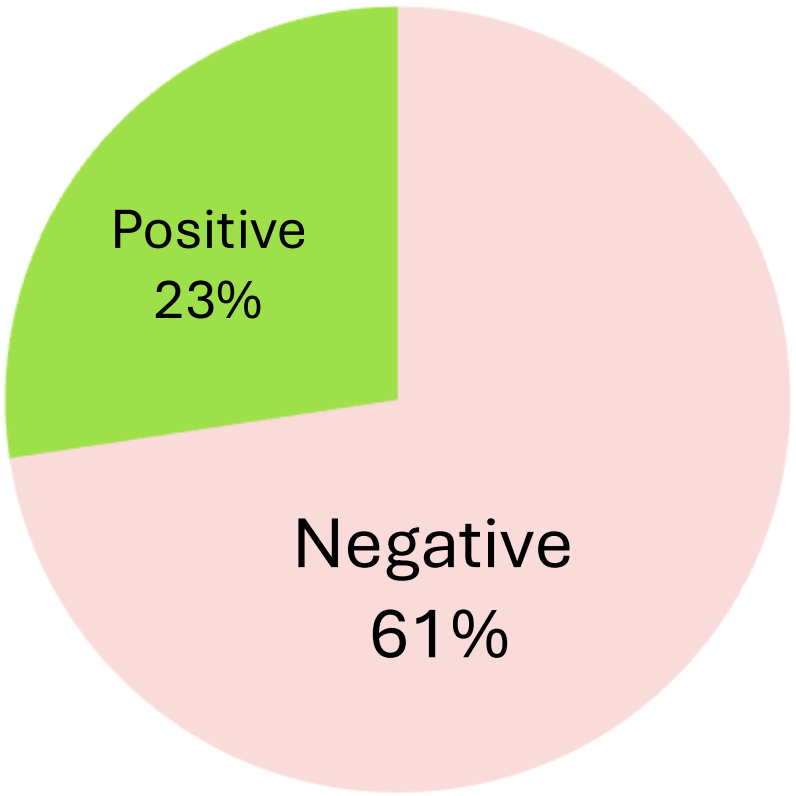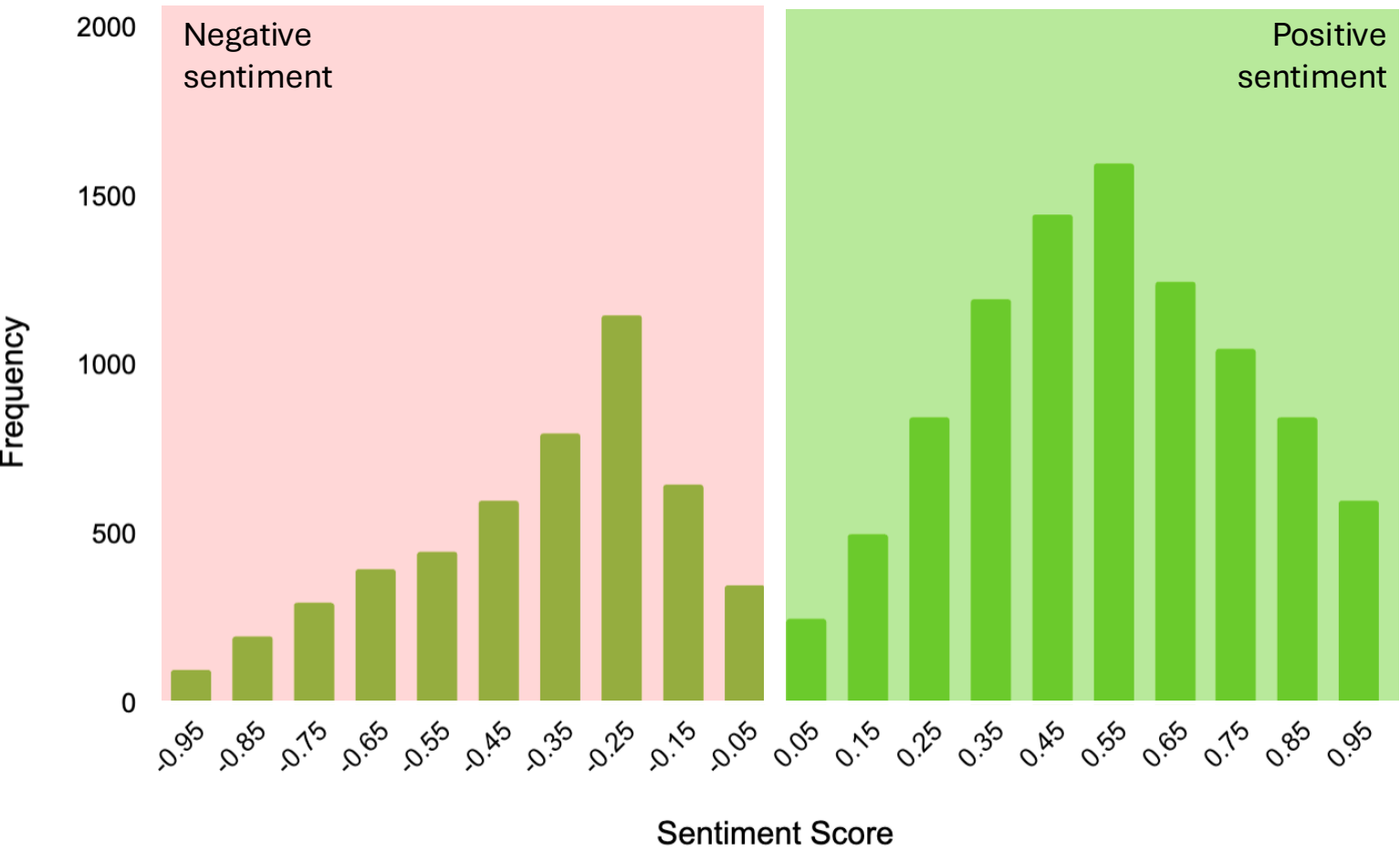


**The sentiment surrounding DUOL's AI integration is generally positive**

· · ·

**However, willingness to pay for premium feature is negative 61%**

Sources: Sentiment Analysis (Reddit Data Scraping), Team Consensus

# Survey Results



Legend:
- More than $150,000
- Less than $40,000
- $70,000 to $100,000
- $100,000 to $150,000
- $40,000 to $70,000
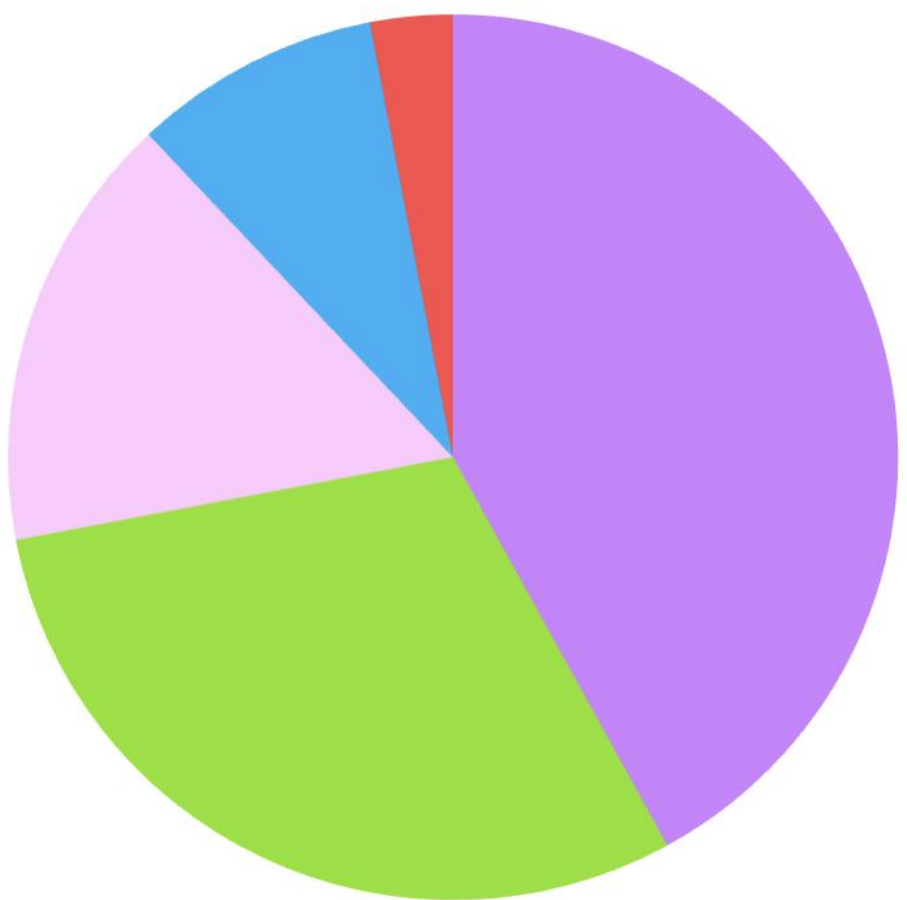
**51% of respondents had a household income of $100,000+**

Sources: Survey Responses, Team Consensus

# Survey Results



**Legend:**
- Paid user (Duolingo Max)
- Paid User (Super Duolingo)
- Free User

9%

91%
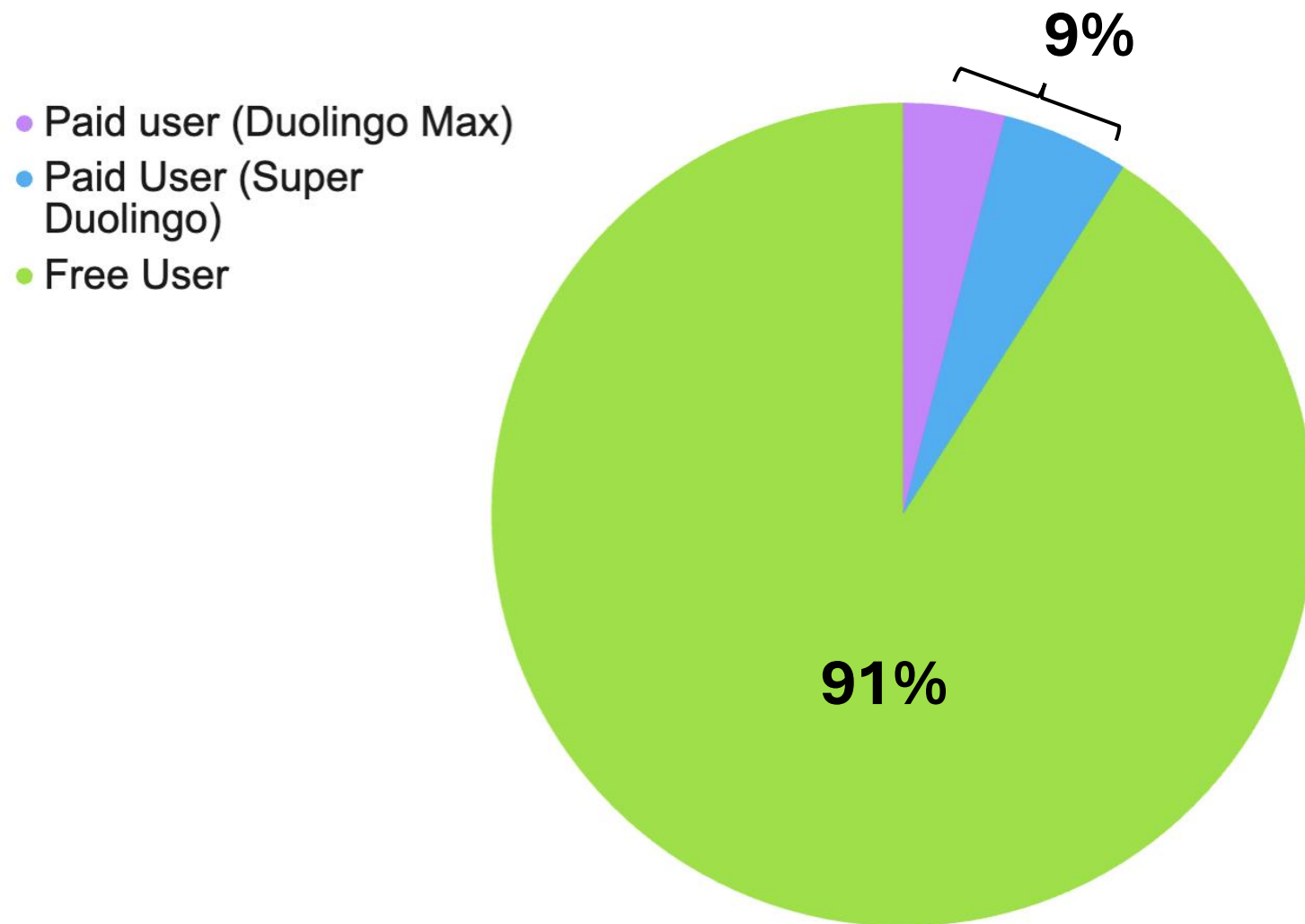
**Even with this level of financial flexibility, 91% of respondents don't pay for their premium subscription tiers**

Sources: Survey Responses, Team Consensus

# Investment Thesis

# 1. Max Will Grow at a Lower Rate

**Our proprietary research supports an average revenue growth rate of 27.1% in our base case DCF.**

## 27.1%

Base case DCF average revenue growth rate

## 22.4mm

FY2034 Max userbase

## +100bps

Annualized base case PUGF
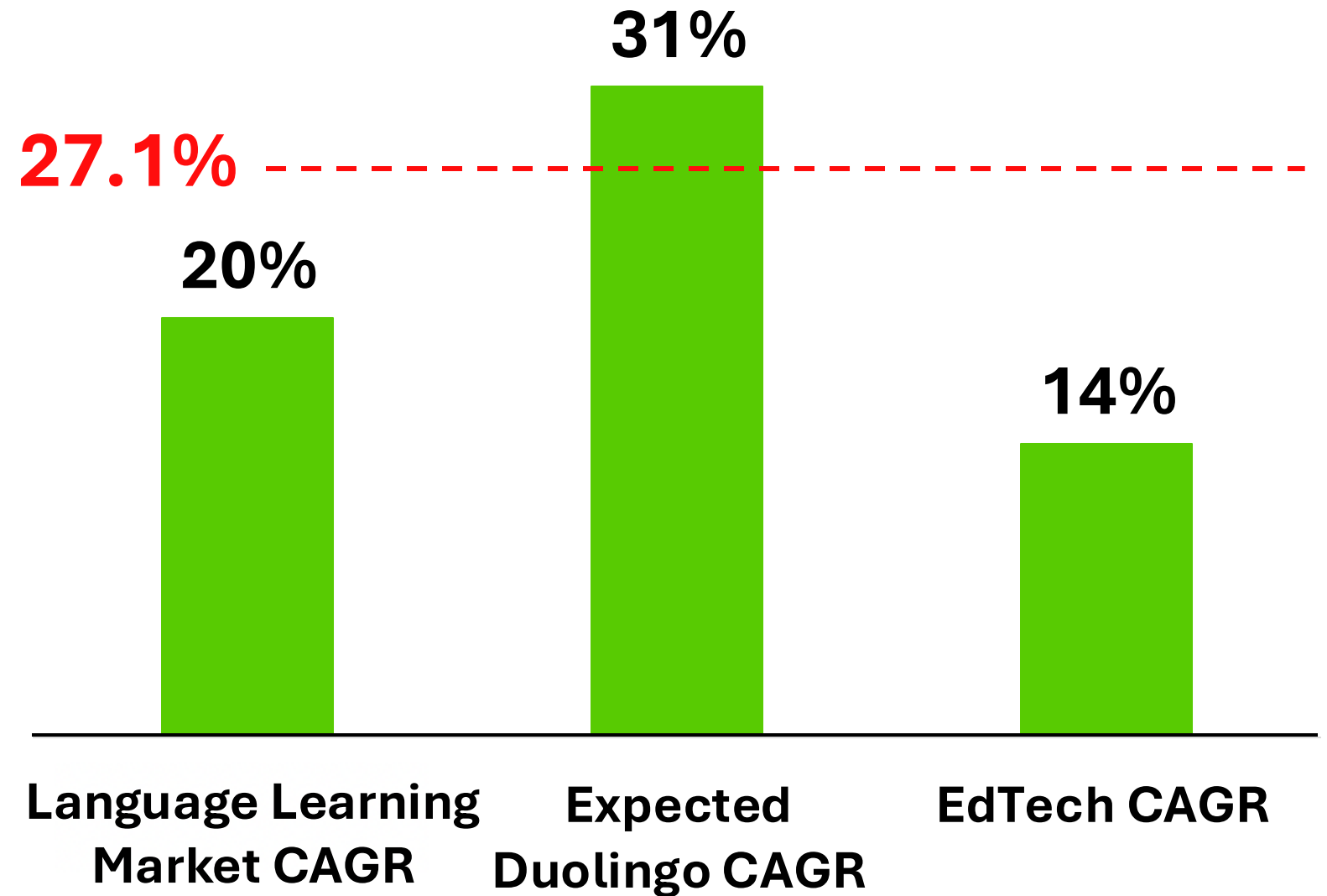


Sources: Sentiment Analysis, Survey Data, Team Consensus

# 2. AI Costs Will Grow As Max Scales

**We project higher AI costs will narrow gross margins to 68%, using DUOL's latest earnings report as guidance.**

## Increasing COGS



*All values are in thousands*

| Year | Value |
|------|-------|
| 2025E | 12,769 |
| 2026E | 23,530 |
| 2027E | 19,765 |
| 2028E | 33,616 |
| 2029E | 53,661 |
| 2030E | 81,578 |
| 2031E | 119,225 |
| 2032E | 168,588 |
| 2033E | 231,697 |
| 2034E | 310,527 |

## Gross Margin Contraction



**68%**
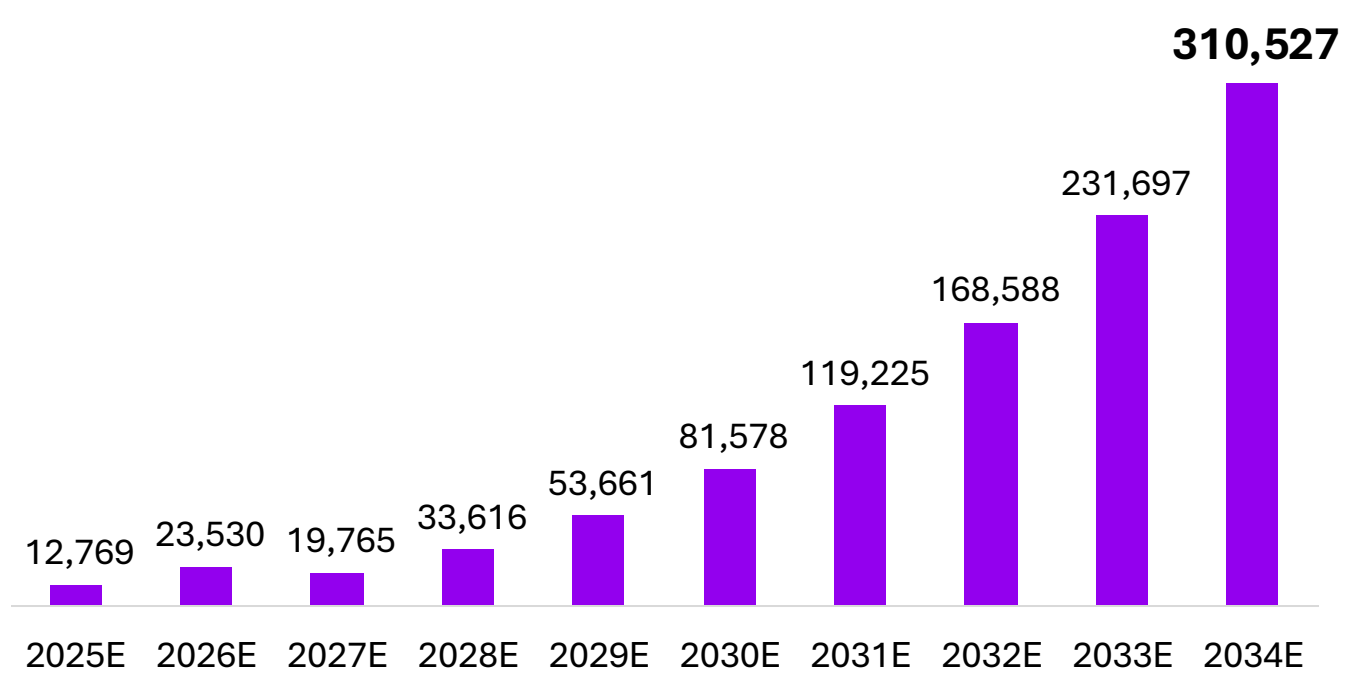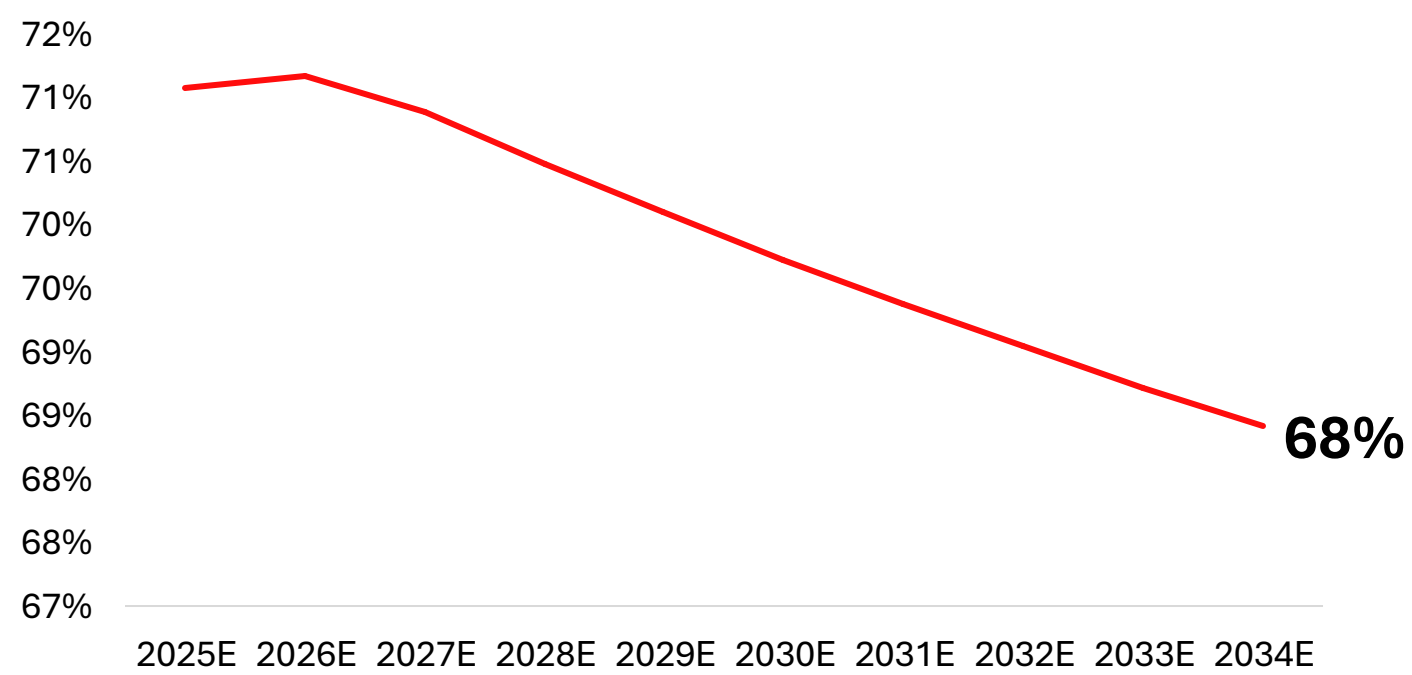
**We factor these higher AI costs into the COGS line item in our base case DCF.**

Proprietary Research | **Investment Thesis** | Overvaluation | Financial Analysis | ESG

# 2. AI Costs Will Grow As Max Scales

**AI costs used to power calls with Lily were a key driver in DUOL's big EPS miss.**

**50 Cents**

Estimated EPS

**28 Cents**

Actual EPS
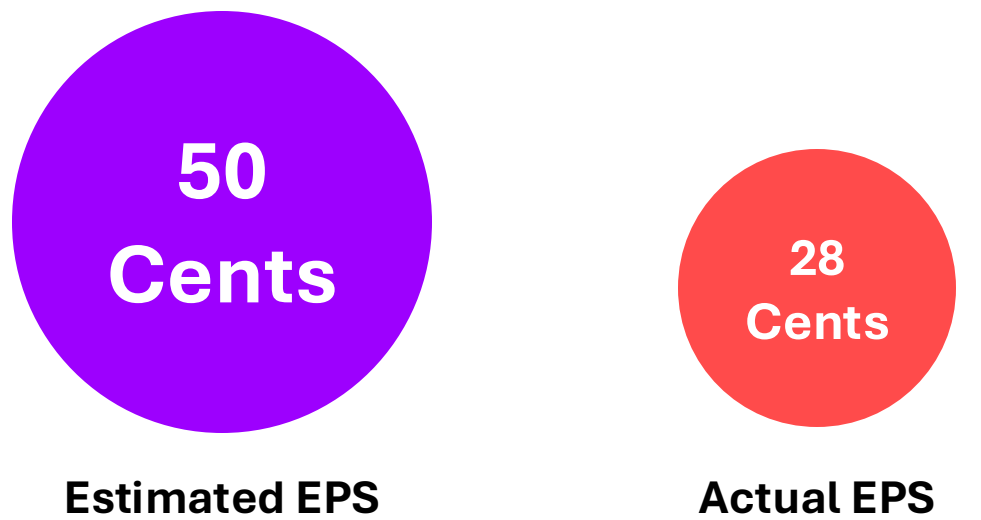
Duolingo Max is a lower gross margin business then Super Duolingo.

## YTD Price History



Market Reacts to EPS Miss
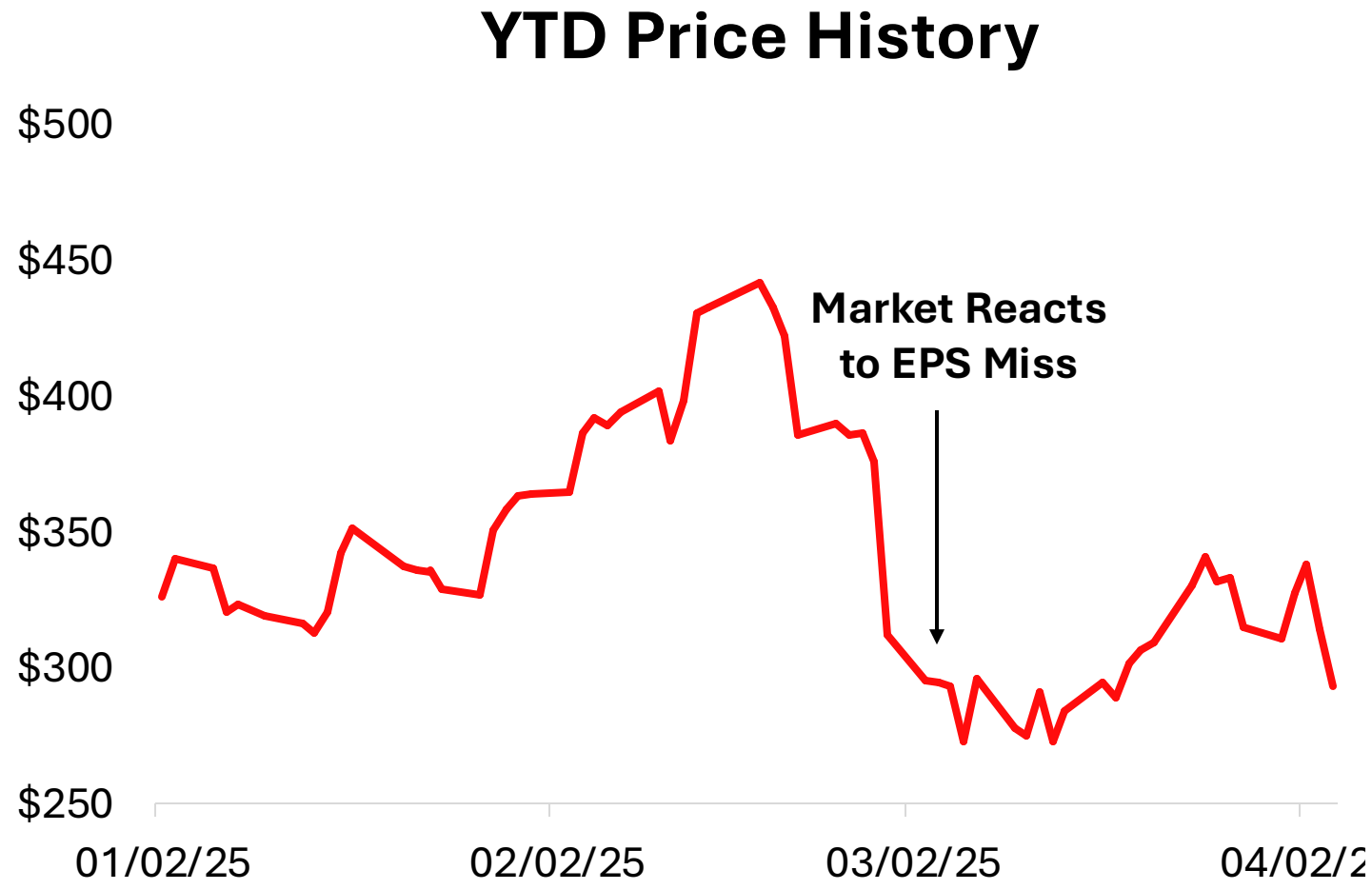
Sources: Q4 Earnings Call, FactSet

# 2. AI Costs Will Grow As Max Scales

**We believe the AI costs are variable, increasing in line with Max userbase growth.**

"Video Call feature...that adds expenses because we have to query the large language model kind of in real time."

**-CEO in Q4 Earnings Call**

**Chat GPT 4.0 API Tokens**

**1000 Prompt Tokens ($0.003)**

**1000 Completion Tokens ($0.01)**

**1 Interaction With Lily (Question & Response)**
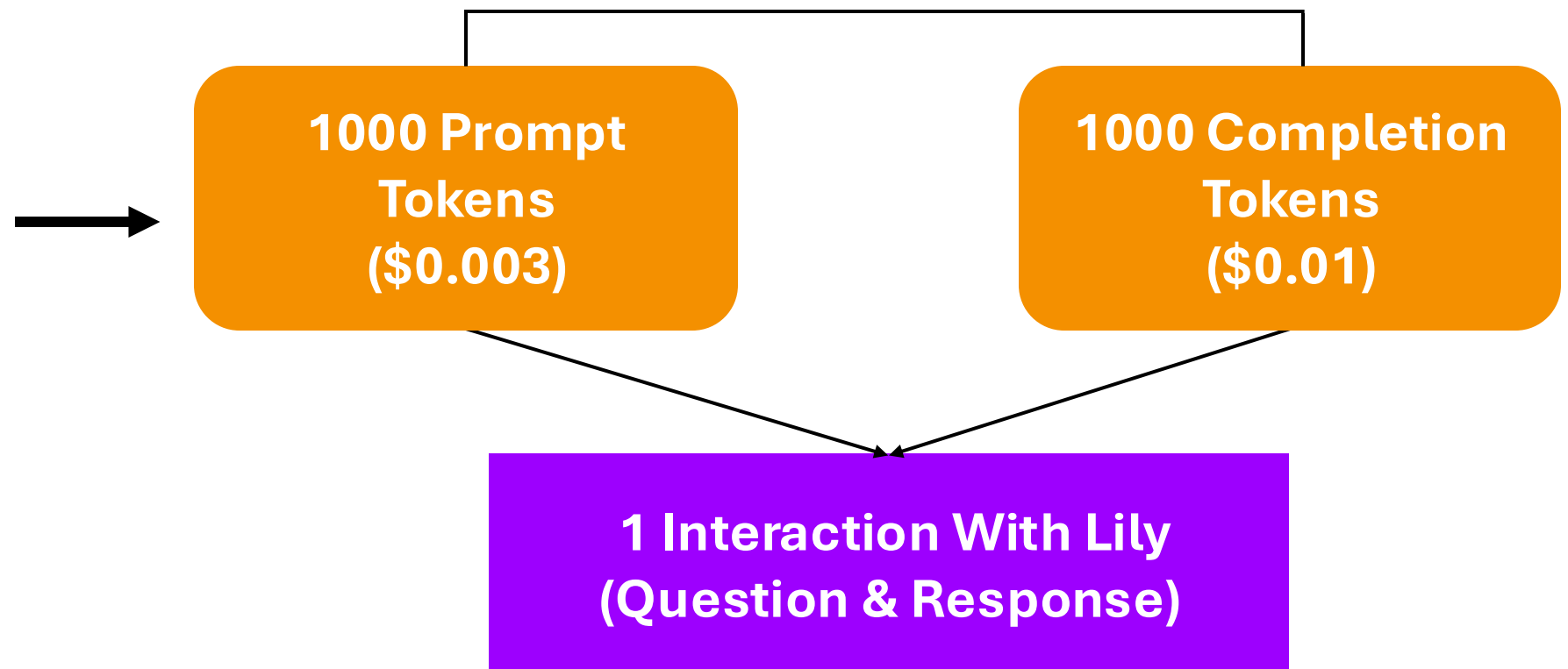
Sources: Team Consensus, Duolingo Q4 Earnings Call

# Overvaluation

# Relative Valuation

**Duolingo's paid user growth is not out of the ordinary.**

## Typical Paid User Growth
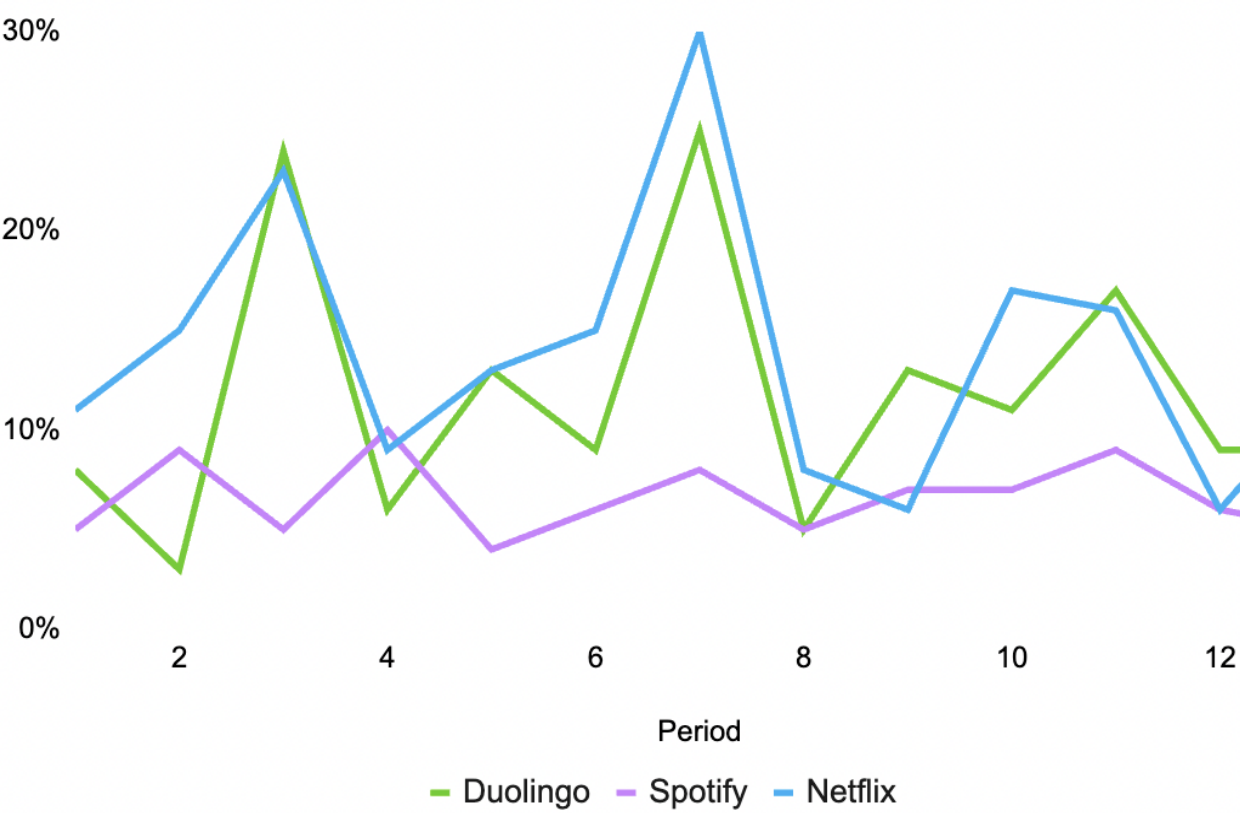


Legend: — Duolingo  — Spotify  — Netflix

X-axis: Period

## Low Paying Userbase %



Legend: — Duolingo  — Spotify

X-axis: Quarter Post-IPO
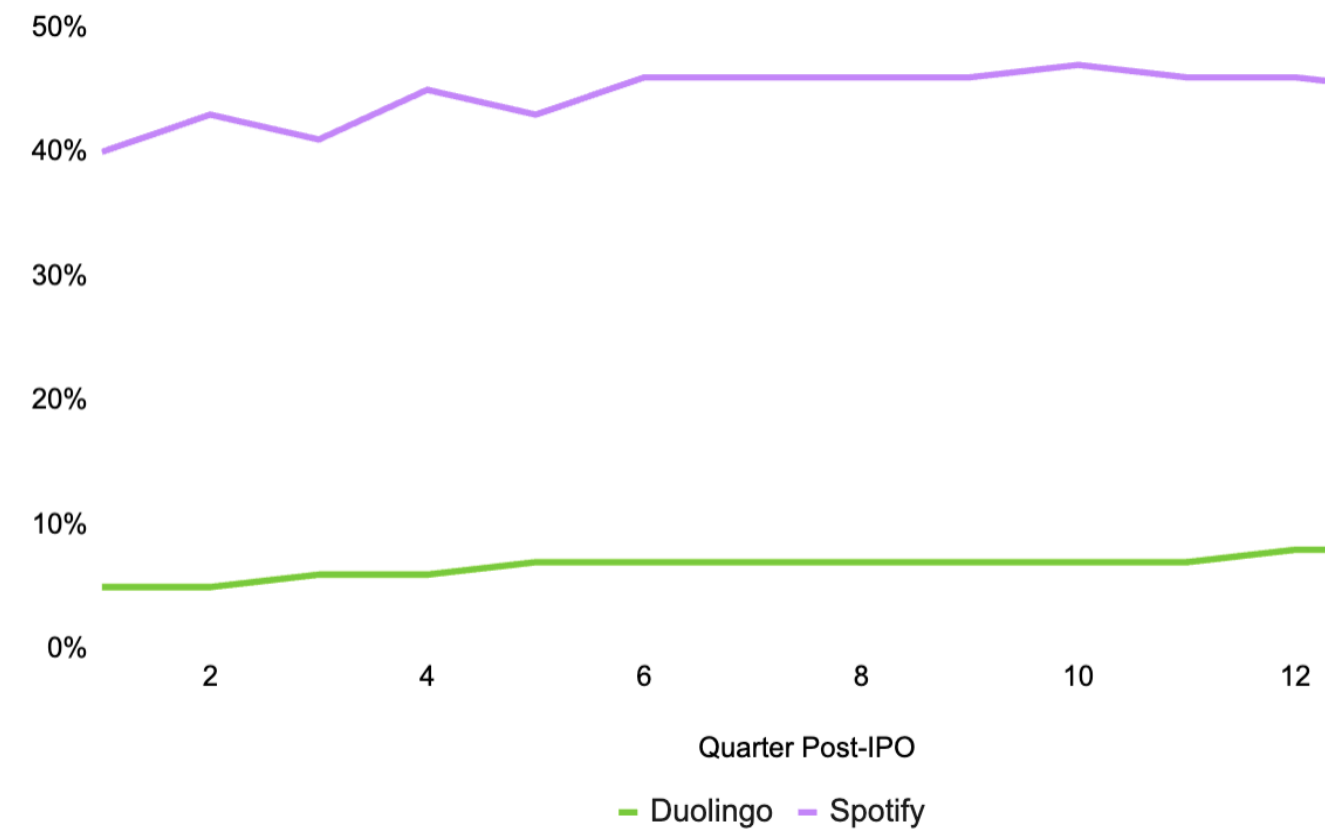
Sources: FactSet, Team Consensus

# Relative Valuation

**Relative valuation recommendation: <span style="color:red">SELL</span>**

| Company | EV/Revenue |
|---|---|
| Duolingo | 16.1 |
| Spotify (Q3 2021) | 3.8 |
| Netflix (Q4 2006) | 1.8 |

| Price Target Calculation | |
|---|---|
| 75th Percentile EV/Revenue | 9.95 |
| Current Share Price | $292.88 |
| Price Target | $187.84 |
| Implied Downside | 35.9% |

## Post IPO EV/Revenue Multiple



EV/Revenue

— Duolingo  — Spotify  — Netflix
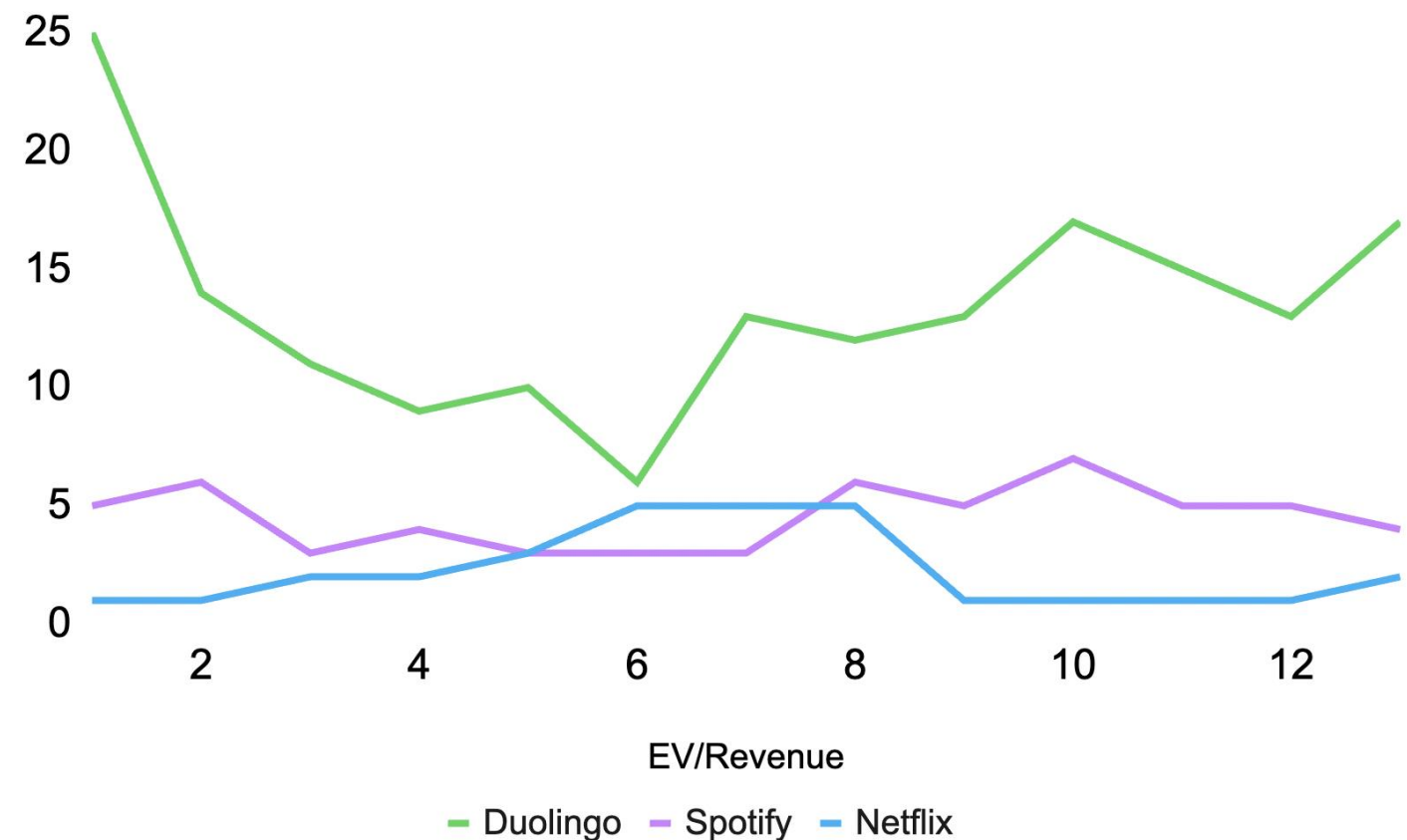
Sources: FactSet, Team Consensus

# Intrinsic Valuation

**Base Case Scenario DCF Recommendation: <span style="color:red">SELL</span>**

### Inputs

| | |
|---|---|
| Average Revenue Growth Rate | 27% |
| WACC (11yr forecasted period) | 11% |
| WACC (Terminal Value) | 9% |
| Constant growth Rate | 3% |
| Average Gross Margin Contraction | 30 bps |
| Revenue Decline in 2027 | -29% |

### Outputs

| | |
|---|---|
| Current Stock Price | 293 |
| Price Target | 220 |
| Downside | -25% |
| Recommendation | Sell |

## Sensitivity Analysis

| 219.5 | Constant Growth Rate | | | | |
|---|---|---|---|---|---|
| | 2.4% | 2.7% | 3.0% | 3.3% | 3.6% |
| **8.6%** | 239.3 | 246.5 | 255.1 | 264.7 | 276.4 |
| **9.5%** | 222.9 | 229.4 | 237.4 | 246.2 | 256.9 |
| **10.6%** | 206.3 | 212.3 | **219.5** | 227.5 | 237.2 |
| **11.6%** | 191.4 | 196.8 | 203.3 | 210.6 | 219.5 |
| **12.8%** | 176.5 | 181.4 | 187.3 | 193.9 | 201.9 |

(Left axis label: **WACC**)

Source: Team Consensus

# Financial Analysis

# High Churn Risk

**Duolingo is highly dependent on one revenue stream with a finite life cycle.**

**2024A Subscription Revenue Stream %**



**81%**
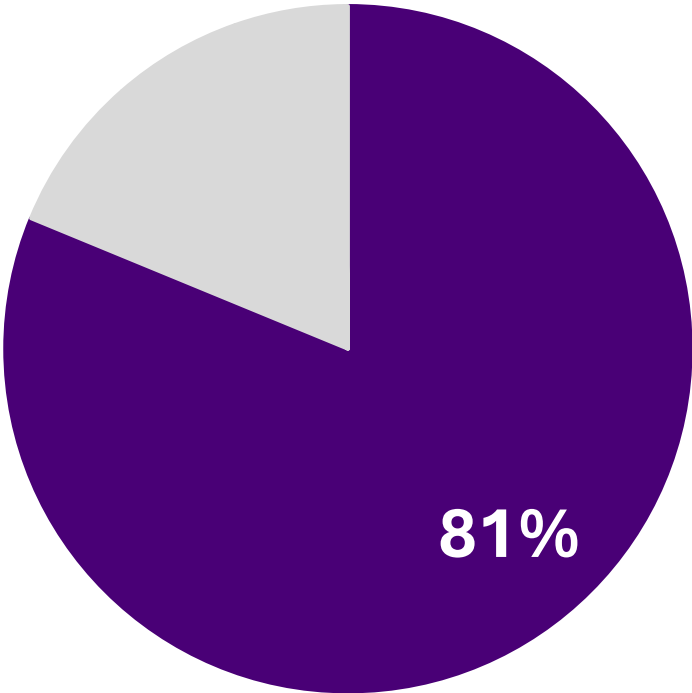
## Unit Length for 15 Longest Languages



| Language | Value |
|---|---|
| Spanish | 236 |
| French | 225 |
| Norwegian | 165 |
| German | 137 |
| Japanese | 131 |
| Dutch | 85 |
| Portuguese | 81 |
| Korean | 78 |
| Hungarian | 77 |
| Scottish | 75 |
| Welsh | 75 |
| Italian | 72 |
| Russian | 67 |
| Yiddish | 67 |
| Greek | 67 |
| Czech | 63 |
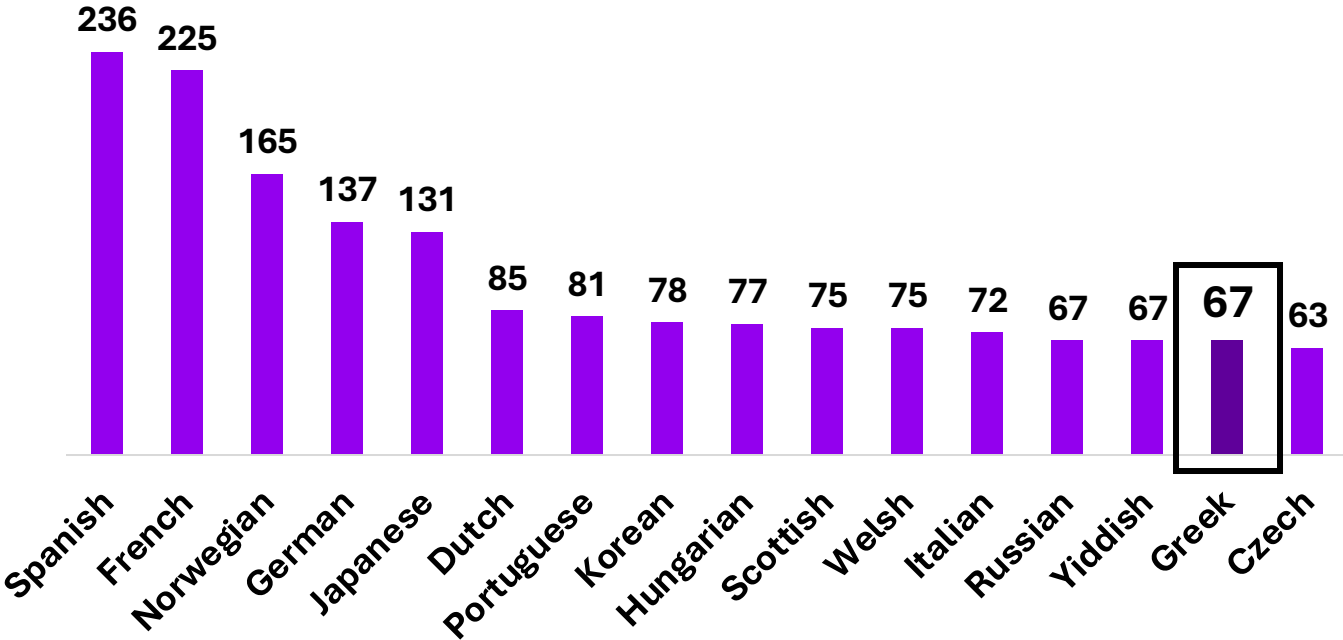
**The consumer life cycle can be short depending on the language chosen to learn.**

Sources: Lingoly.io, FactSet, Team Consensus

# High Churn Risk

**Churn risk puts pressure on Duolingo to invest in R&D to expand language unit length.**

## Churn Rate Forecast



**5.2%**

25%
20%
15%
10%
5%
0%

2025E 2026E 2027E 2028E 2029E 2030E 2031E 2032E 2033E 2034E
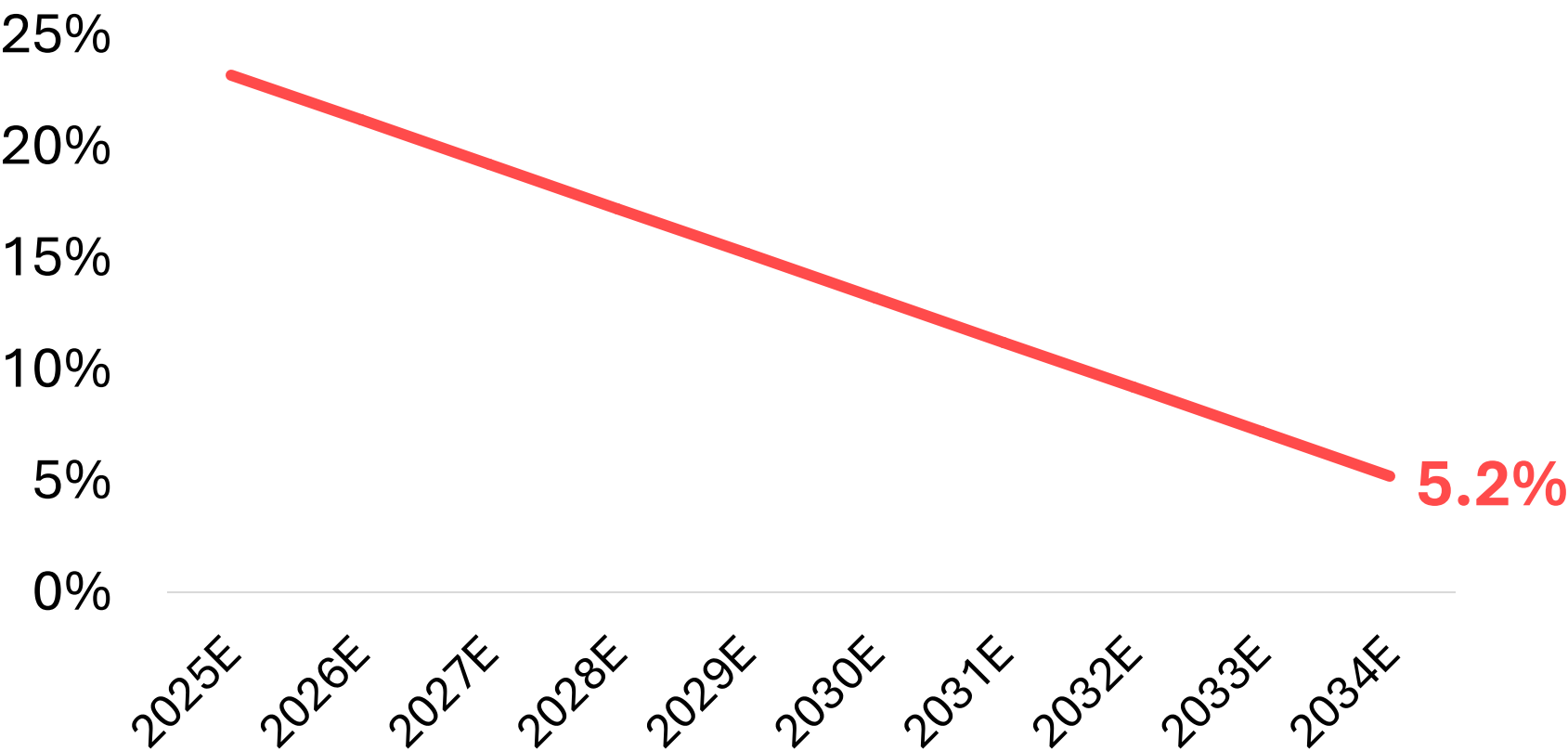
## 23.2%
Our estimated initial churn for DUOL

## 20-30%
Historical churn range for B2C SaaS

## 3.5 years
Average customer life cycle

Sources: Team Consensus, Lingoly.io, Reddit, Whop.com, Survey Data

# DET Revenue Stream Decline

**Declining immigration due to Trump-era policies poses a risk to Duolingo's DET revenue.**



% change in # of international students in U.S

7.2 | 8.1 | 10 | 7.1 | 3.4 | 1.5 | 0.1 | -1.8 | -15 | 3.8 | 11.5 | 6.6

Trump's 1st Term

2012/13  2013/14  2014/15  2015/16  2016/17  2017/18  2018/19  2019/20  2020/21  2021/22  2022/23  2023/24

**Academic Year**

-30%  -22%  -34%  -32%

-232,123  -1,925
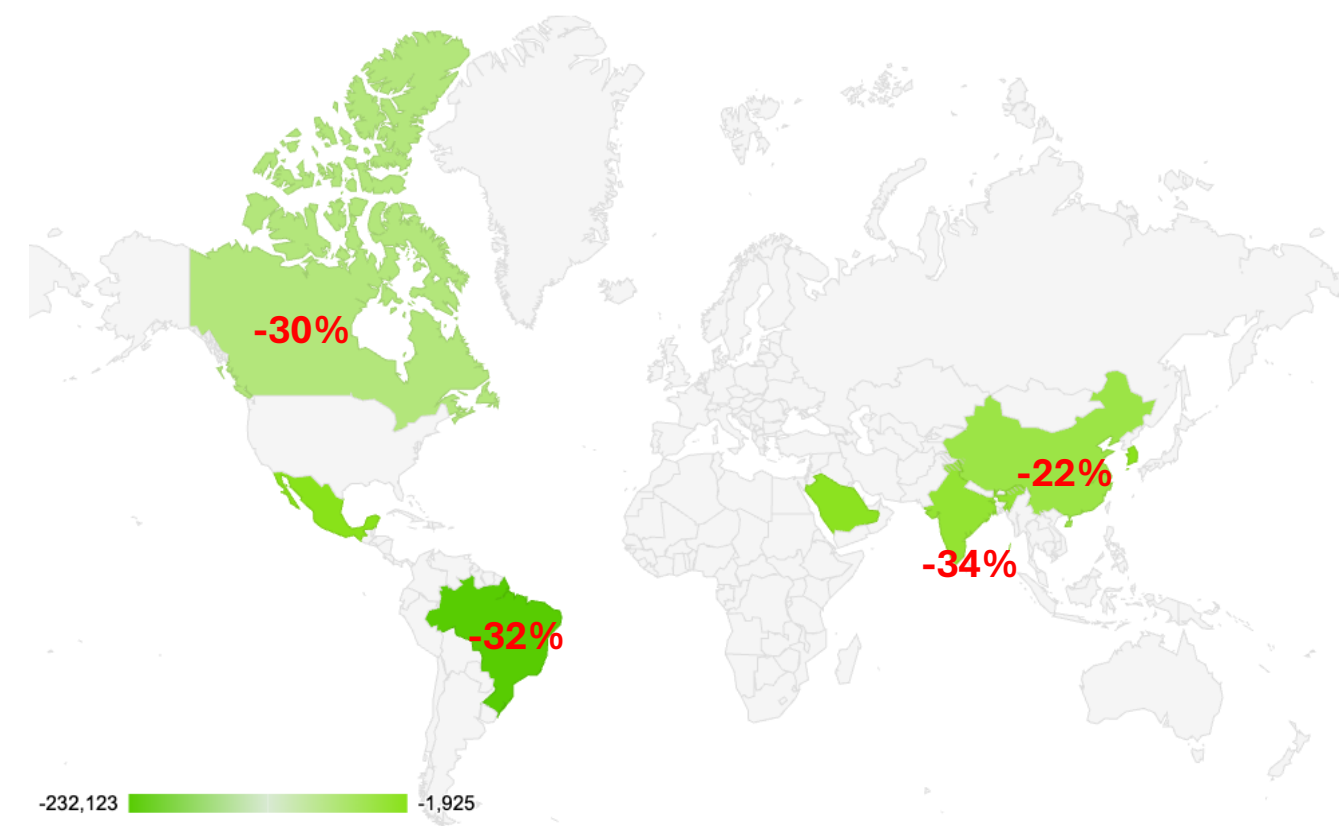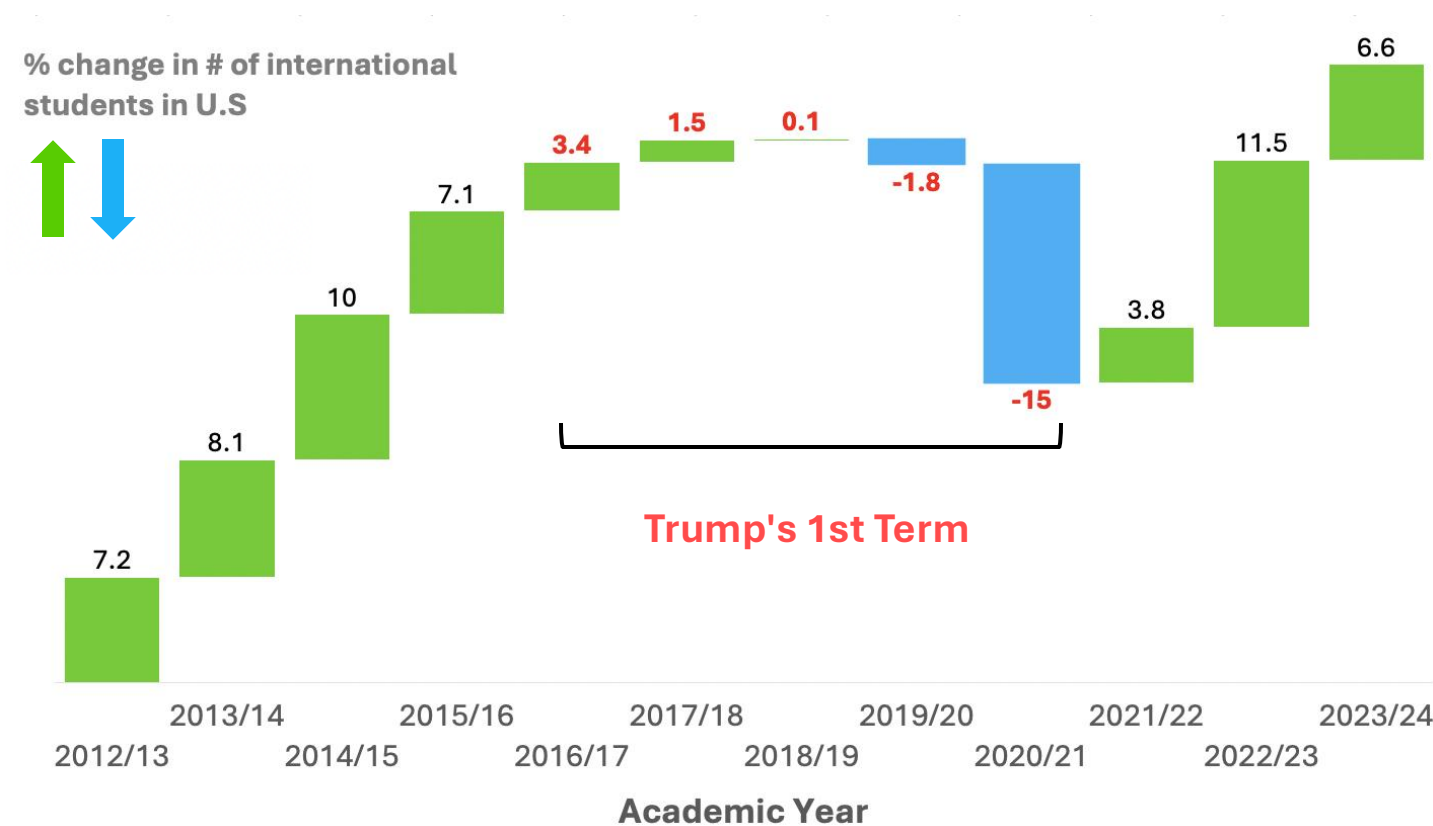
Source: Team Consensus

# Competitive Industry

**Duolingo's value proposition checks less boxes for serious learners than competitors.**

| | Duolingo | Babbel | Rosetta Stone |
|---|---|---|---|
| Cost | Free or $14/month | $8-$15/month | $10-$15/month |
| Lesson Length | 5-10 minutes | 10-15 minutes | 30 minutes |
| Verbal Practice | Light | Moderate | Heavy |
| Grammar Instruction | Minimal | Strong | Limited |
| Best For | Casual | Learners | Visual |

**Duolingo is not the best choice for serious learners.**

Sources: Rigorous Themes, Test Prep Insight, Team Consensus

# Sticky Marketing Expenses

**We don't believe marketing expenses will continue to decline for Duolingo.**

## Duolingo's Marketing as % of Sales
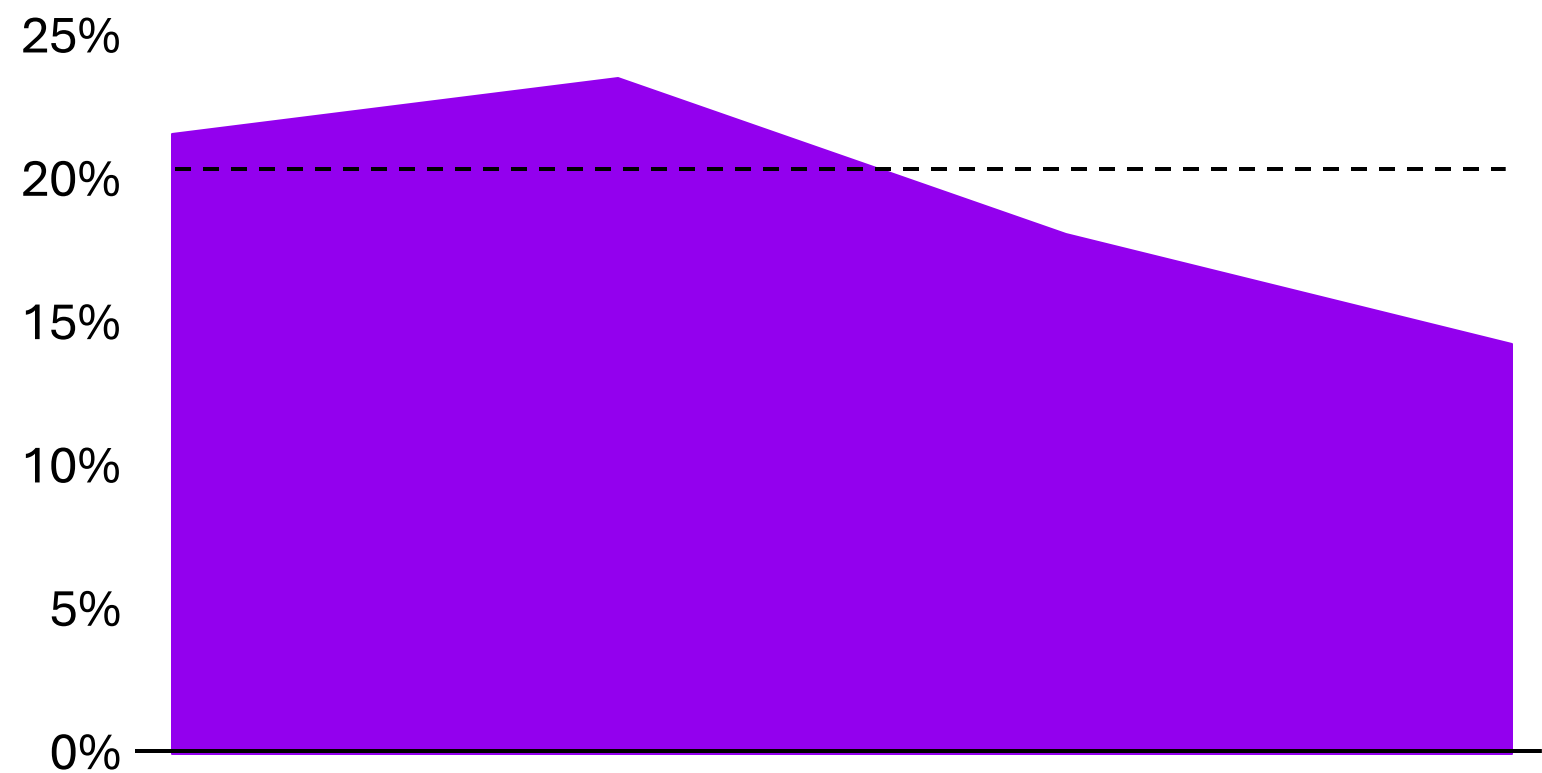


# 20%

**Typical floor for SaaS marketing expenses as percent of total revenue.**

Sources: McKinsey, DATADAB, FactSet, Team Consensus

# Risk Analysis

**These upside risks pose a threat to our thesis if they materialize.**



Impact
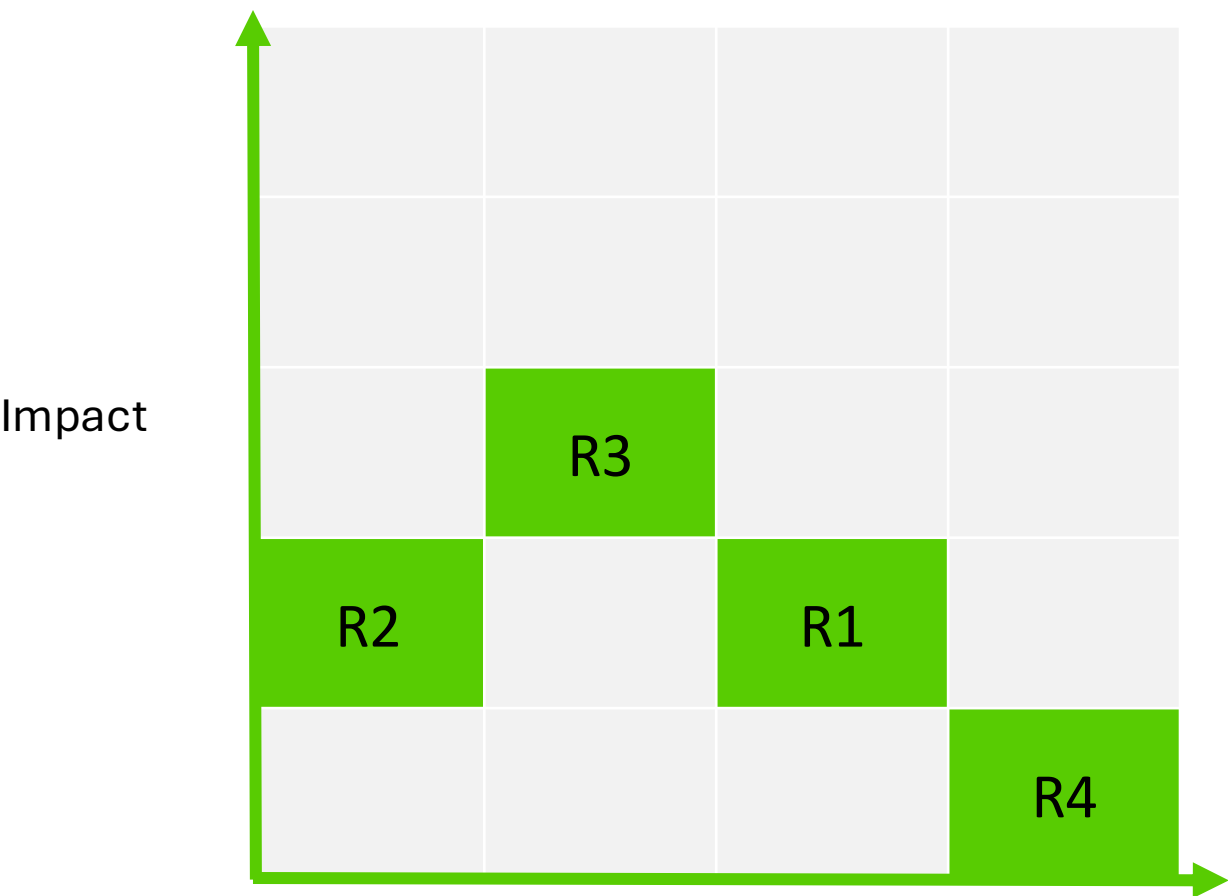
| Risk 1 | Higher Than Expected Growth of Paying Users |
|---|---|

| Risk 2 | Open Source AI Model Strategy & Margin Expansion |
|---|---|

| Risk 3 | Gaining Market share through M&A |
|---|---|

| Risk 4 | Broader Market Rally |
|---|---|

Source: Team Consensus

ESG

# ESG

## Duolingo is exposed to excessive voting power concentration and high governance risks.



- Pre-IPO Stockholders
- Class A Stockholders (Public)

78.8%

Board of Directors

CEO + Board Chairman

Control
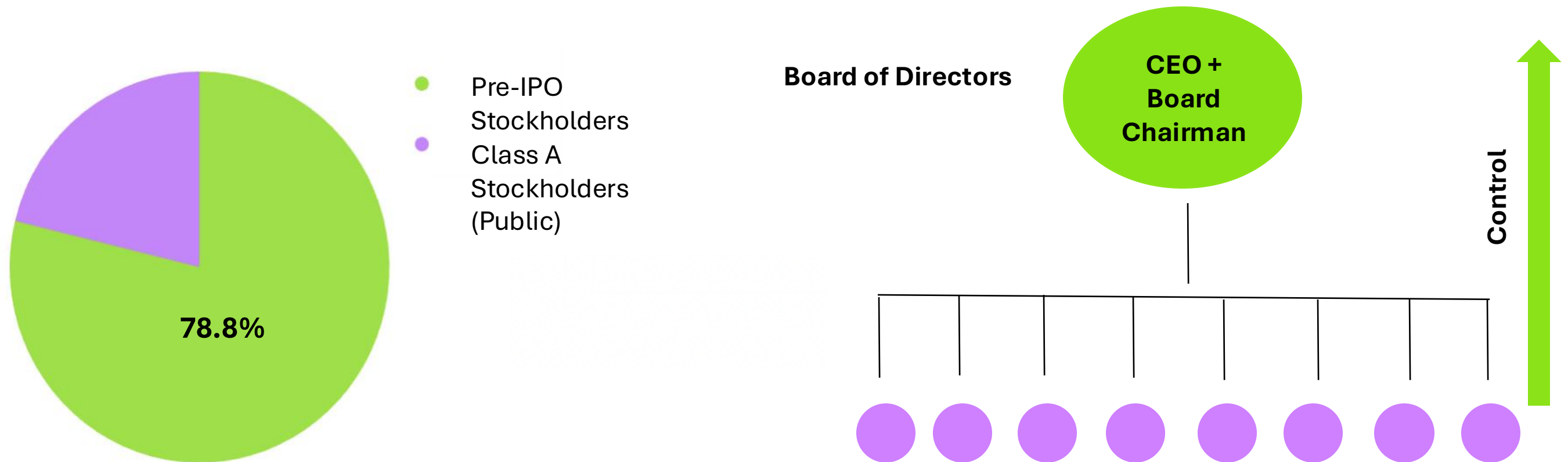
# ESG

**There is also a lack of diversity at Duolingo's leadership level.**

Legend:
- **Female** (purple)
- **Male** (green)

**Board of Directors**
- Female: 33%
- Male: 67%

**Executive Team**
- Female: 29%
- Male: 71%
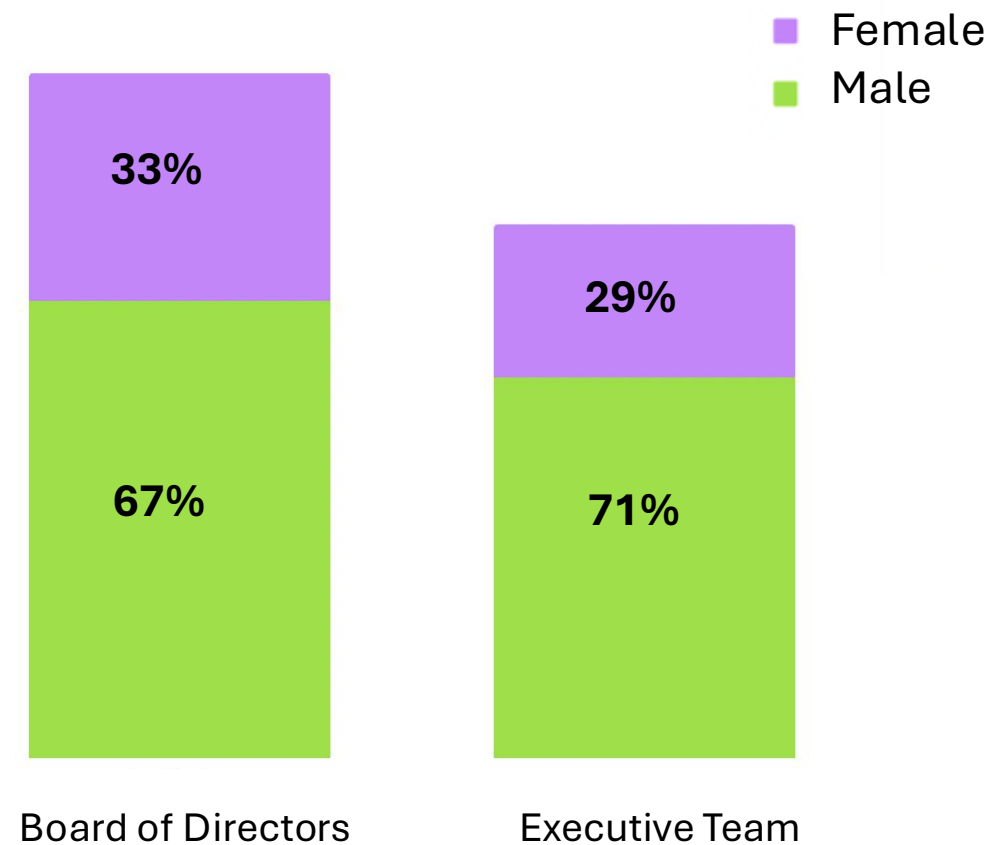
## Medium ESG Risk: 23.8

1. **Environmental**

   Lack of environmental focus

2. **Social**

   Lack of diversity in leadership

3. **Governance**

   Lack of investor influence

Sources: FactSet, Sustainalytics

# Price Target/Summary

**Our relative valuation gets 50% weight and our intrinsic gets 50% weight, arriving us at our final price target.**



Final Price Target:
**$209**

**29% downside**
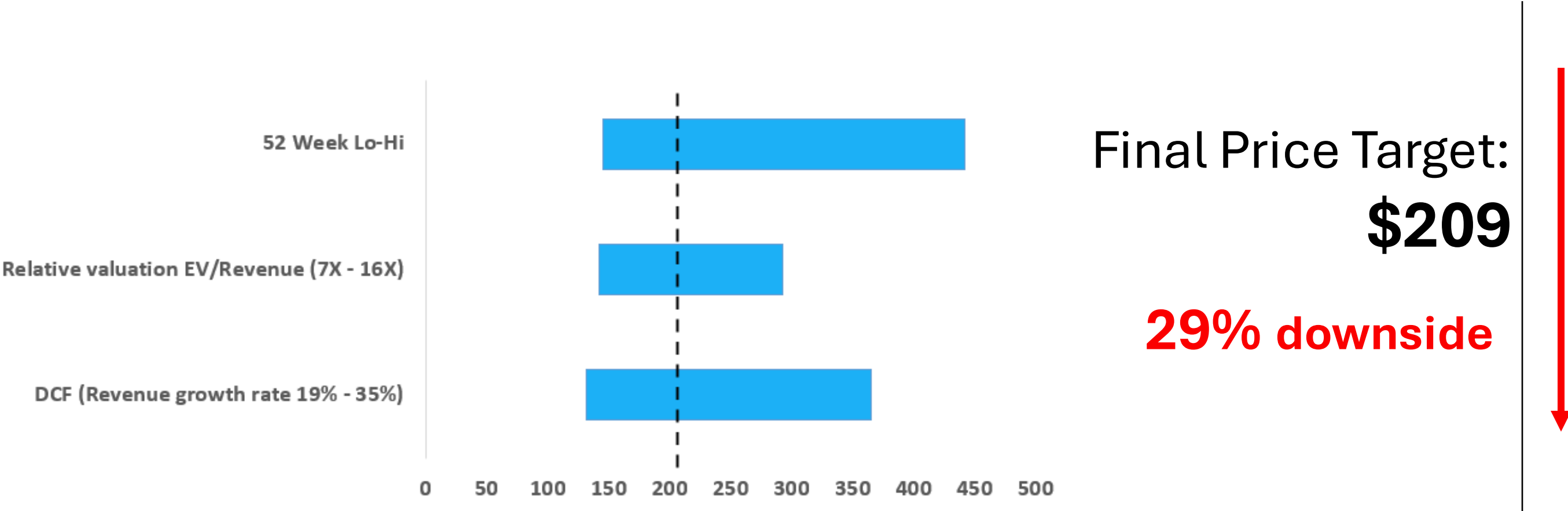
# Thank You!

# Appendix Map

# Presentation Map

# Sentiment Analysis Overview

**Objective:** Analyze Reddit user sentiments about willingness to pay (WTP) for a specific feature using sentiment analysis.

**Data Extraction:** Extracted comments from relevant subreddits (r/duolingo) using the Reddit API via the Praw library.

**Platform**: The entire process was implemented in Python and executed on Google Colab for scalability and convenience.

**Filtering Relevant Data:** Out of the extracted data, Y posts/comments were filtered based on keywords like "worth it," "too expensive," and "pricey."

**Sentiment Analysis:** Used Hugging Face's DistilBERT and FinBERT models for higher accuracy.

**Classification:** Sentiments were categorized into positive (willing to pay), negative (unwilling to pay), and neutral (indecisive).

**Output:** Created an updated dataset with a new column for opinion sentiment and markers for WTP classification.

**Findings:** Sentiment about free, paid and duo - max feature is positive, however, willingness to pay is negative. (Appendix)

Source: Team Consensus

# Sentiment Analysis Code

```python
# Install required libraries
!pip install transformers pandas torch

from transformers import AutoTokenizer, AutoModelForSequenceClassification, pipeline
import pandas as pd
import numpy as np

# Load the dataset
file_path = "/content/drive/MyDrive/Colab Notebooks/Duolingo/duolingo_sentiment_individual_opinions.csv"
opinions_df = pd.read_csv(file_path)

# Load the pretrained sentiment model and tokenizer
model_name = "cardiffnlp/twitter-roberta-base-sentiment"  # Or "yiyanghkust/finbert-tone" for financial sentiment
tokenizer = AutoTokenizer.from_pretrained(model_name)
model = AutoModelForSequenceClassification.from_pretrained(model_name)

# Initialize sentiment analysis pipeline
sentiment_pipeline = pipeline("sentiment-analysis", model=model, tokenizer=tokenizer, return_all_scores=True)

# Function to split long text into chunks
def split_text_into_chunks(text, max_tokens=512):
    words = text.split()
    chunks = [" ".join(words[i:i + max_tokens]) for i in range(0, len(words), max_tokens)]
    return chunks

# Perform sentiment analysis with aggregation
def analyze_sentiment(text):
    try:
        # Split text into manageable chunks
        chunks = split_text_into_chunks(text, max_tokens=512)

        # Analyze each chunk and aggregate probabilities
        all_scores = []
        for chunk in chunks:
            scores = sentiment_pipeline(chunk)
            all_scores.append(scores[0])  # Collect probabilities for 'positive', 'negative', 'neutral'

        # Aggregate probabilities
        aggregated_scores = {
            'positive': np.mean([score[1]['score'] for score in all_scores]),
            'negative': np.mean([score[0]['score'] for score in all_scores]),
            'neutral': np.mean([score[2]['score'] for score in all_scores]),
        }

        # Determine final sentiment based on highest aggregated score
        final_sentiment = max(aggregated_scores, key=aggregated_scores.get)
        return final_sentiment
    except Exception as e:
        print(f"Error processing text: {e}")
        return "neutral"  # Fallback in case of an error

# Apply sentiment analysis to the 'text' column
opinions_df['sentiment'] = opinions_df['text'].apply(analyze_sentiment)

# Save the dataset with the sentiment results
output_file_path = "duolingo_high_accuracy_sentiment_analysis.csv"
opinions_df.to_csv(output_file_path, index=False)

print(f"Sentiment analysis complete! Results saved to: {output_file_path}")
```

# Sentiment Analysis Word Dictionary

- Positive_keywords =   "yes", "love", "worth", "amazing", "value", "great", "good", "affordable", "reasonable", "awesome", "buying", "helpful", "convenient", "improve", "effective"

- Negative_keywords = "no", "not", "expensive", "waste", "hate", "bad", "overpriced", "unaffordable", "useless", "too much", "irrelevant", "pointless", "ridiculous", "unnecessary", "dislike"

- **Hugging Face** is a popular open-source platform that provides **pretrained machine learning models**, especially for **natural language processing (NLP)**.
- We used **cardiffnlp/twitter-roberta-base-sentiment**, which is a **fine-tuned RoBERTa model** for sentiment classification. - trained on 158M posts, accuracy 98%
- **Logistic regression** is a **statistical model** used for **binary classification**
- **Tokenization** is the process of **splitting text into smaller parts**, called **tokens**.
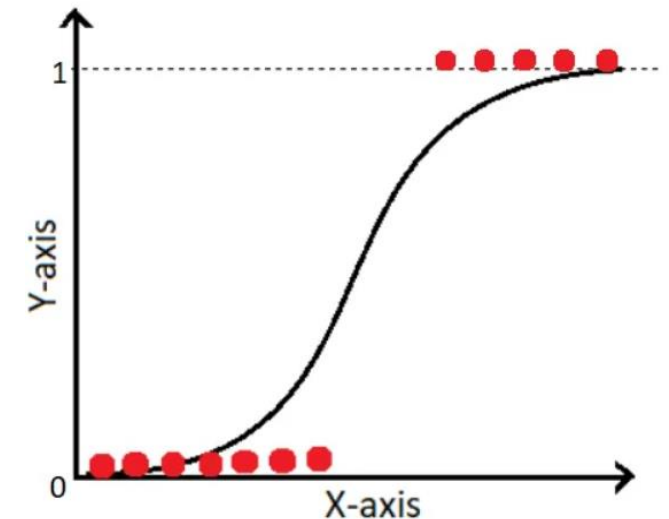
Source: Team Consensus

# List of Questions From Survey

**Section 1 – Intro Questions**

1. What is your age group?
2. What is your gender?
3. What is your annual household income?
4. Which of the following language(s) **do you speak?**
5. What language(s) would you be **most interested in learning?**
6. How long have you been using Duolingo?

**Section 2 – Duolingo App User Questions**

1. What would be your primary motivation for learning a language?
2. How often do you use Duolingo?
3. How many hours do you spend learning a language on Duolingo each week?
4. What features do you use most frequently? (Select all that apply)
5. Rate your overall satisfaction with Duolingo on a scale of 1-5
6. How likely are you to recommend Duolingo to others?
7. What challenges or frustrations have you experienced with Duolingo? (Select all that apply)
8. Are you a free or paid user of Duolingo?
9. If you are a paid user, what motivates you to pay for Duolingo? How do you perceive Duolingo's pricing for its premium subscription (Super Duolingo)? $12.99 per month or $59.99 per year
10. Which other language-learning platforms have you used or considered? (Select all that apply)
11. Why did you choose Duolingo over other platforms?
12. What do you think Duolingo could do better compared to its competitors?
13. How many languages do you think you will want to learn over the course of your life?
14. Would you be interested in Duolingo expanding into related areas? (e.g., coding, math, or other skills)
15. Do you think learning a new language is useful in today's world? Why or why not?
16. What additional feedback or suggestions do you have for improving Duolingo?

Source: Survey

# List of Questions From Survey

**Section 3 – Language Learning Perspectives**

1. Have you ever considered learning a new language?

**Section 4 – Potential Language Learners**

1. How do you prefer to learn a new skill or subject?
2. What would be your primary motivation for learning a language?
3. Which of the following language(s) **do you speak?**
4. What language(s) would you be **most interested in learning?**
5. Are you aware of Duolingo as a language-learning platform?
6. What would make you try a language-learning app like Duolingo?
7. How many languages do you think you will want to learn over the course of your life?
8. Do you think learning a new language is useful in today's world? Why or why not?

**Section 5 – Exploring Language Learning**

1. Do you think learning a new language is useful in today's world? Why or why not?

# Survey Charts

**51.1% of users rarely use Duolingo.**

How often do you use Duolingo?

47 responses



Legend:
- Daily
- Weekly once
- Weekly Twice
- Weekly thrice
- Rarely
- I used to use it weekly, several times a week. But not anymore.
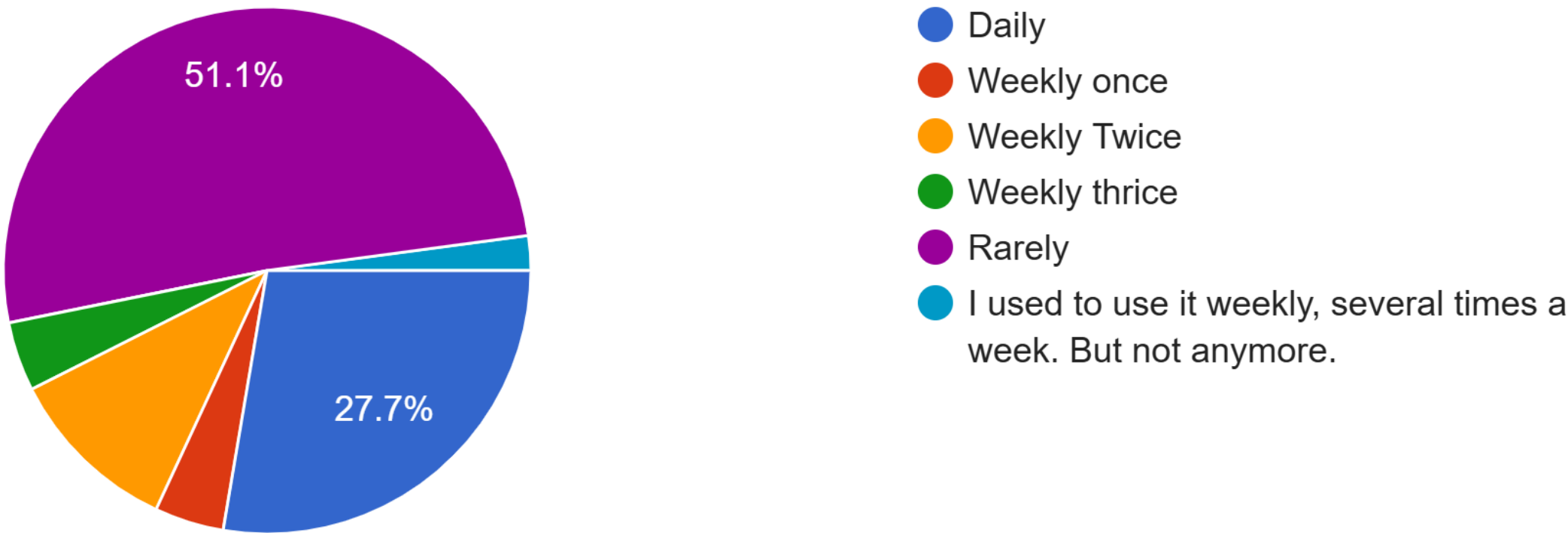
Source: Survey Responses

# Survey Charts

**66% of users use Duolingo for less then 1 hour a week, supporting our 17 minutes assumption.**

How many hours do you spend learning a language on Duolingo each week?

47 responses



Legend:
- Less than 1 hour
- 1-2 hours
- 3-5 hours
- 6-10 hours
- More than 10 hours
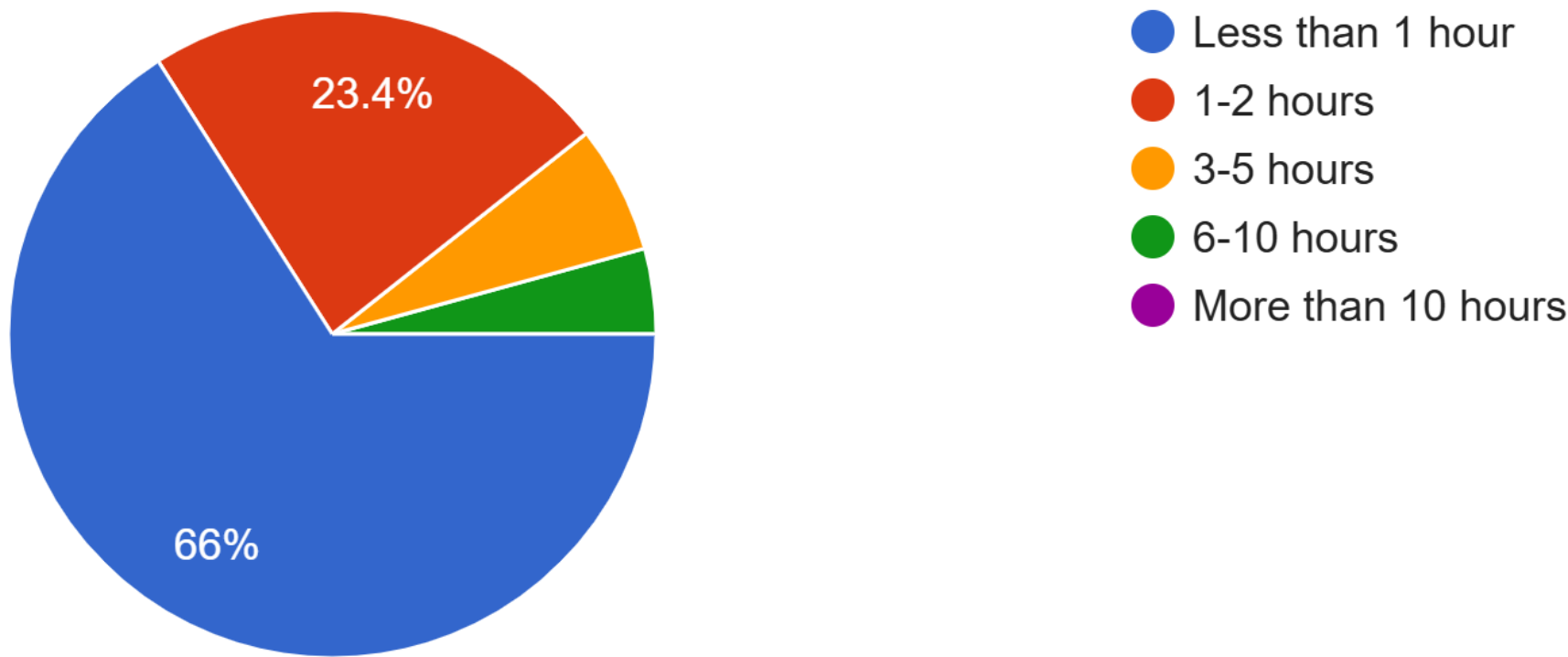
Source: Survey Responses

# Survey Charts

**39.1% of users would prefer a free trial.**

What would make you try a language-learning app like Duolingo?

23 responses
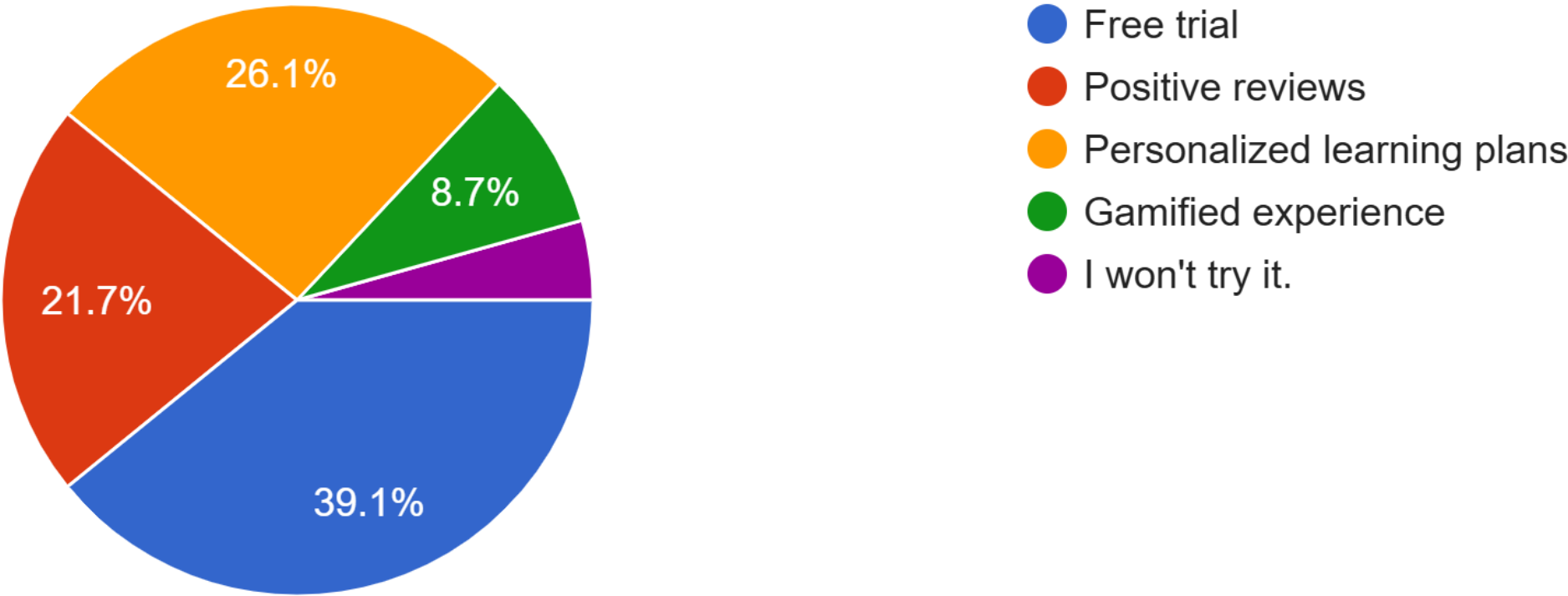


Source: Survey Responses

# Survey Charts

**63.8% of users think Duolingo is too expensive.**

How do you perceive Duolingo's pricing for its premium subscription (Super Duolingo)?  $12.99 per month or $59.99 per year

47 responses



- ● Too expensive
- ● About right
- ● Too cheap
- ● Not sure

23.4%

12.8%

63.8%
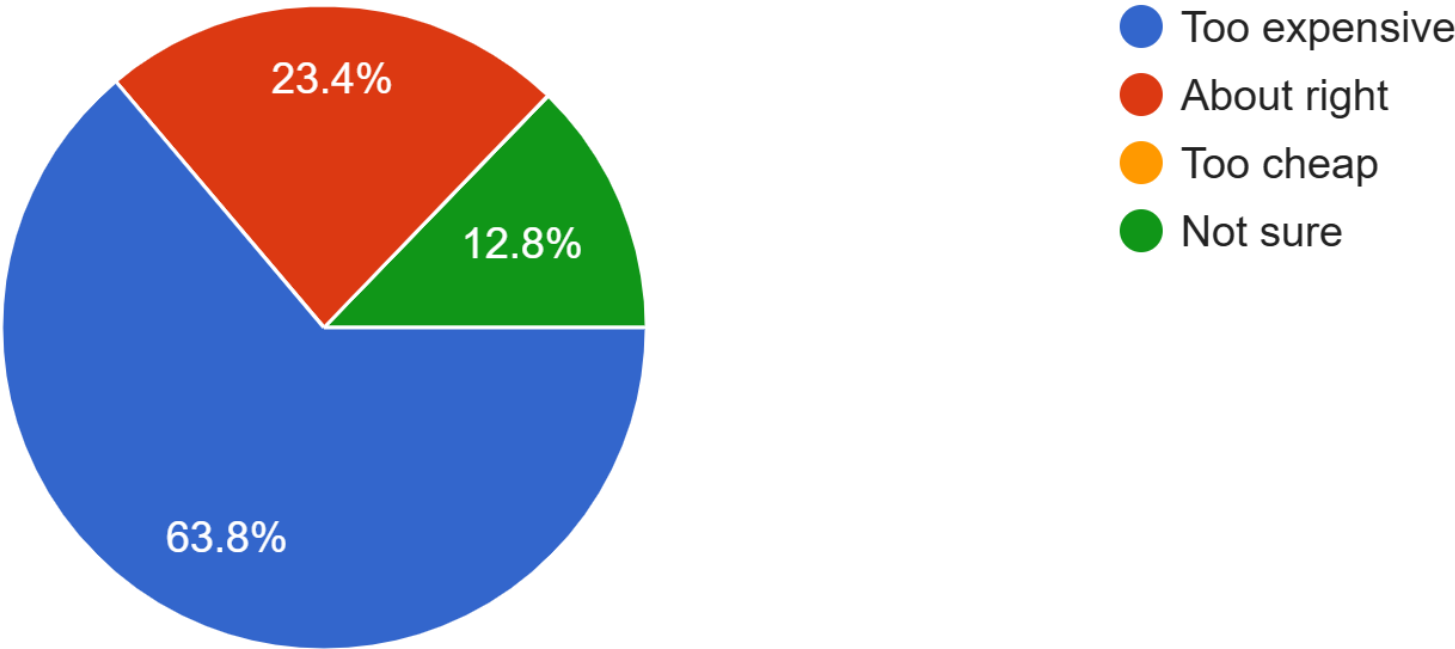
Source: Survey Responses

# Survey Responses

**There is room for improvement with Duolingo's premium tiers.**

- ❏ "Reduce basic premium to $8.99 a month and I would get it."
- ❏ "The ability to teach languagues like Japanese, Chinese, Korean is not efficient, its studying method would different from latin alphabet languages."
- ❏ "Stop with the weird sentences to learn because they make no sense and they'll never actually be used in the real world."
- ❏ "Tasks are repetitive at times or borderline basic. Focus on making content that is used daily
- ❏ "Provide some aspect of 'explain my answer' even for free users."
- ❏ "I think more advanced content, and grammatical explanations would be of great help when using the platform."
- ❏ "I think more advanced content, and grammatical explanations would be of great help when using the platform."
- ❏ "Reduce the fees."
- ❏ "Actually make a plan instead of doing repetitive exercises."
- ❏ "Better explanations of mistakes on free version. Maybe some pronunciation exercises for speaking. More advanced listening exercises that you can repeat."
- ❏ "More real life application/conversations."

Source: Survey Responses

# YouTube Quotes

**What some customers say on the ground differs from how Duolingo describes themselves.**

- ❑ "With sentence structure, you do have some problems."
- ❑ "Most of these users will never achieve even simple competency in the languages they study."
- ❑ "I am still far with native level fluency."
- ❑ "Duolingo is starting to cut corners, laying off a cool 10% of their translations staff just this year."
- ❑ "I don't like the fact that they sound very robotic."
- ❑ "Duolingo can't compete with professional instruction."
- ❑ "For the majority of the people that say I want to tackle language learning, 90% of these people mean that they want to be able to speak it in order to communicate it."
- ❑ "If you are talking to someone and they tell you they are learning a language but they just use Duolingo, just end the conversation right there.  They are never going to learn that language just using Duolingo."
- ❑ "What Duolingo is lacking is native interaction."

# Too Much Gamification

**A lot of Duolingo sentences are not used in real life.**

- ❑   Yes, I want to live, I want to die in the North
- ❑   I do not hear you since I have cinnamon rolls in my ears
- ❑   Owen is eating parsnips in the rain
- ❑   Excuse me, I am an apple
- ❑   Whose robot ate my cake?
- ❑   Does a toothbrush have feelings?
- ❑   I am crying and the onion is laughing

"Stop with the weird sentences to learn because they make no sense and they'll never actually be used in the real world."
**-Survey Respondent**

Sources: duoplanet, Team Consensus
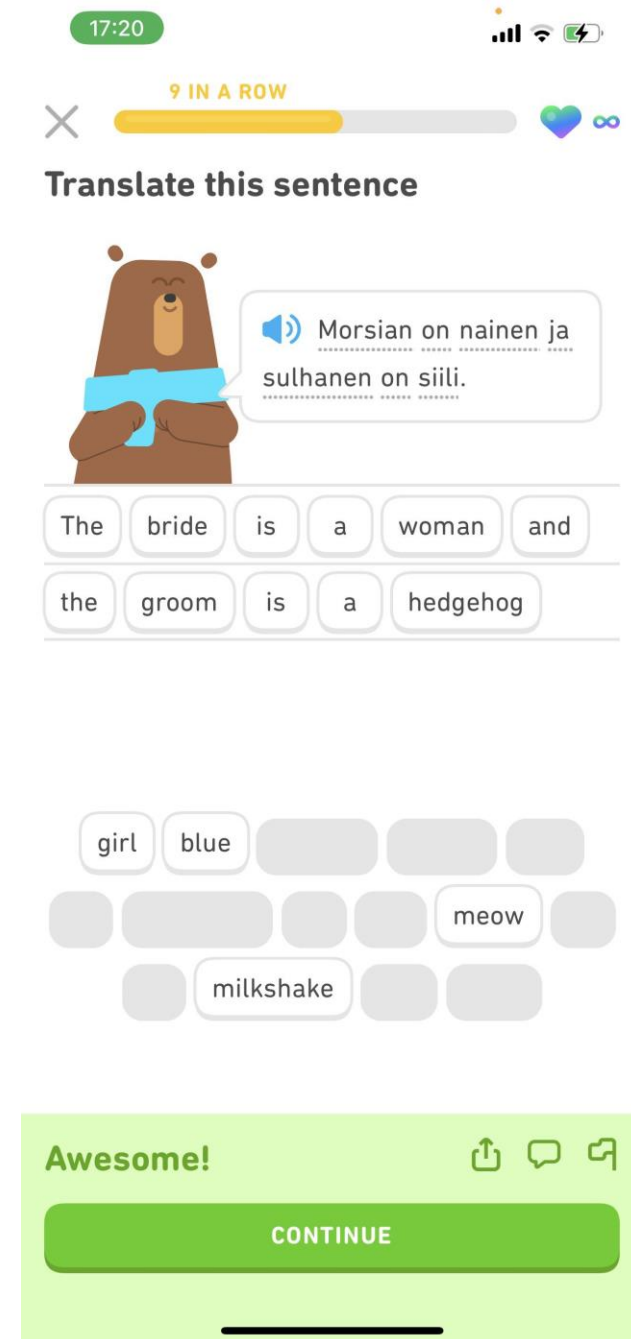
# Front Loaded Revenue Model

**Duolingo operates as an EdTech SaaS B2C company.**

**Land:** Heavy investments into marketing & R&D (cash outflows) to attract customers.

**Expand:** Make back that investment through consistent recurring revenue streams and upsells.

Source: Company Filings

# B2C Risks

**Duolingo's B2C model translates into less stable/predictable revenue.**

| | | |
|---|---|---|
| **1** | **Higher churn rates** | |
| **2** | **Low cost of replacement** | **B2C Risks** |
| **3** | **Less stable and unpredictable revenue** | |

# Distribution Margin Impacts

**Distribution through third parties leads to higher operating margins, but lower gross margins.**

COGS

**15-30% fee**

**Subscription payments and Ad Revenue**

**Duolingo**

❑ Builds the app
❑ Develops the app (R&D)
❑ Marketing for the app

**Apple, Google, Stripe**

❑ Hosts the app
❑ Makes the updates
❑ Handles reimbursements

**Duo App**

**Subscription payments and Ad Revenue**

**Customers**

❑ Use the app
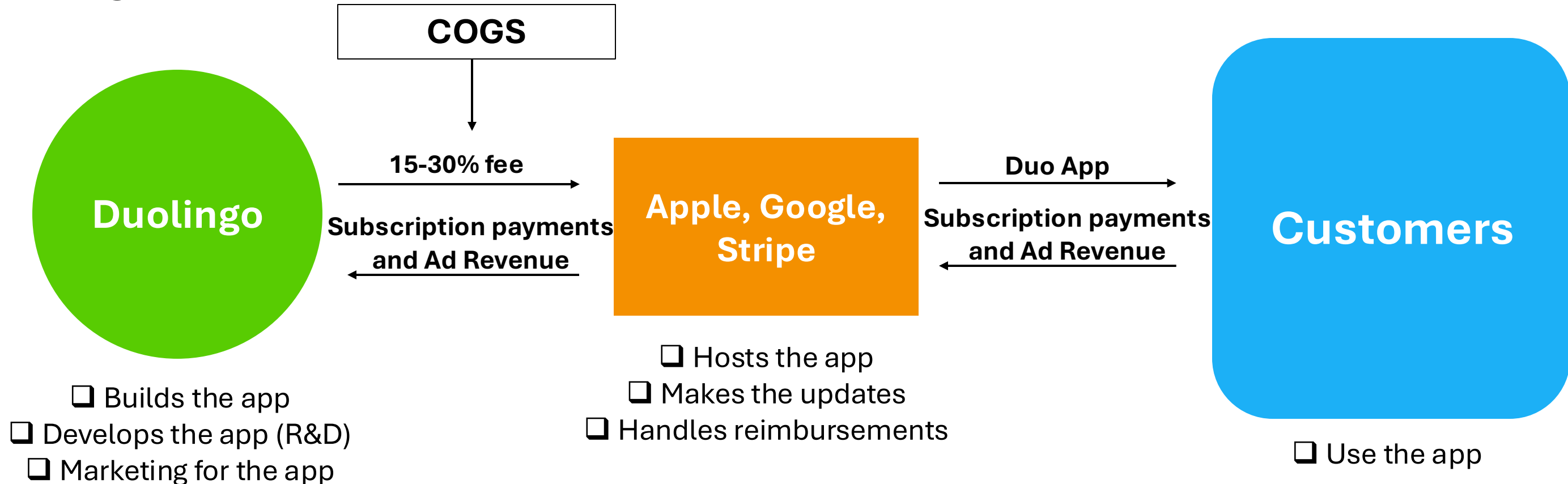
Source: Company Filings

# Revenue Dependency

**Duolingo's growth potential is highly dependent on their subscription revenue stream.**

**2024A Revenue Breakdown**

81%
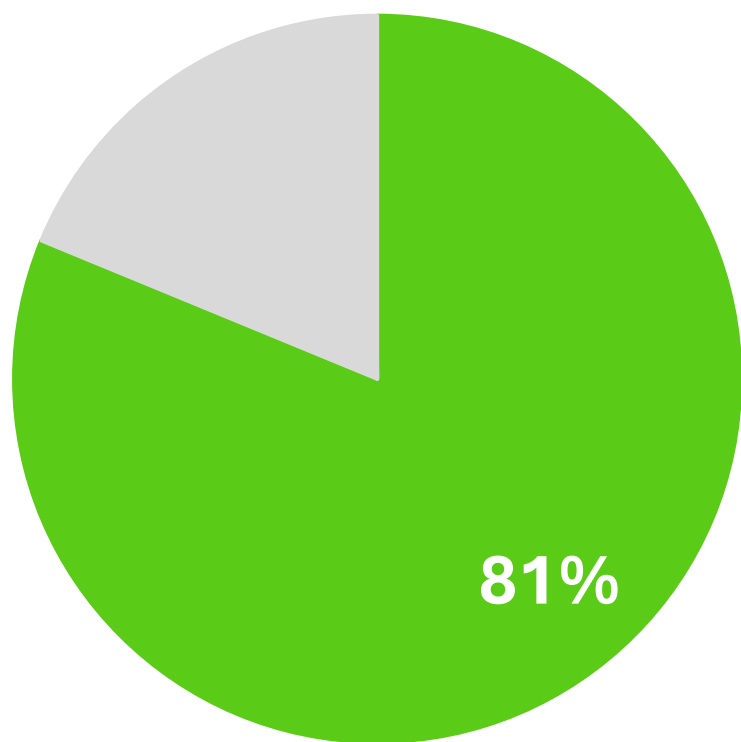
## 1. Subscription Tiers

### Super
- ✓ Ad-free
- ✓ Unlimited Lives
- ✓ Faster Progression

Monthly ARPU: $7

### Max
- ✓ All of Super's Features
- ✓ Role Play (Conversations)
- ✓ Explain my Answer

Monthly ARPU: $14

Sources: FactSet, Team Consensus

# Revenue Dependency

**Duolingo's growth potential is highly dependent on their subscription revenue stream.**

## 2024A Revenue Breakdown

8%
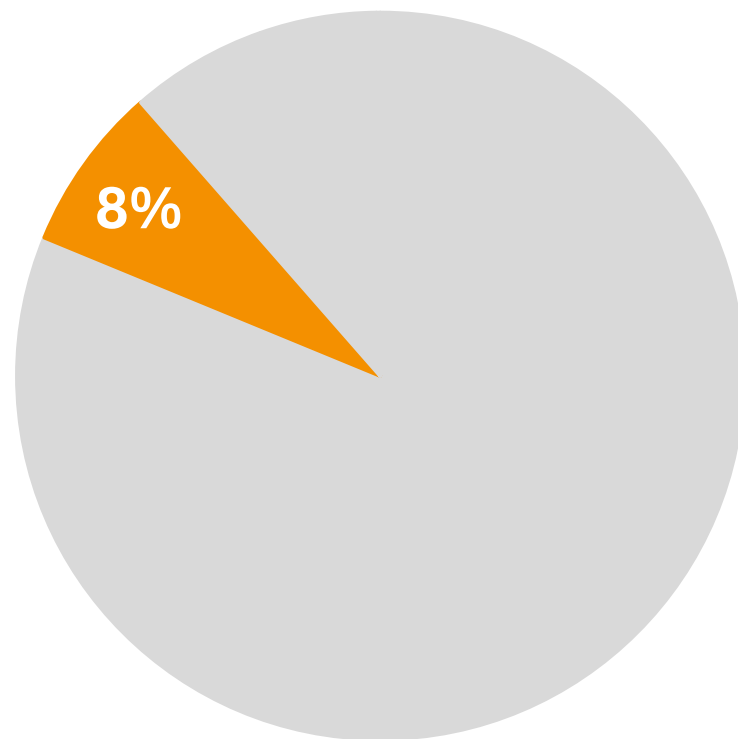
**\*Not a growth driver**

## 2. Advertisements

# Currently 2 ads per lesson

- ➤ Low ARPU
- ➤ Seasonality could lead to a potential reduction
- ➤ Dependency on advertisers

# Revenue Dependency

**Duolingo's growth potential is highly dependent on their subscription revenue stream.**

### 2024A Revenue Breakdown



6%
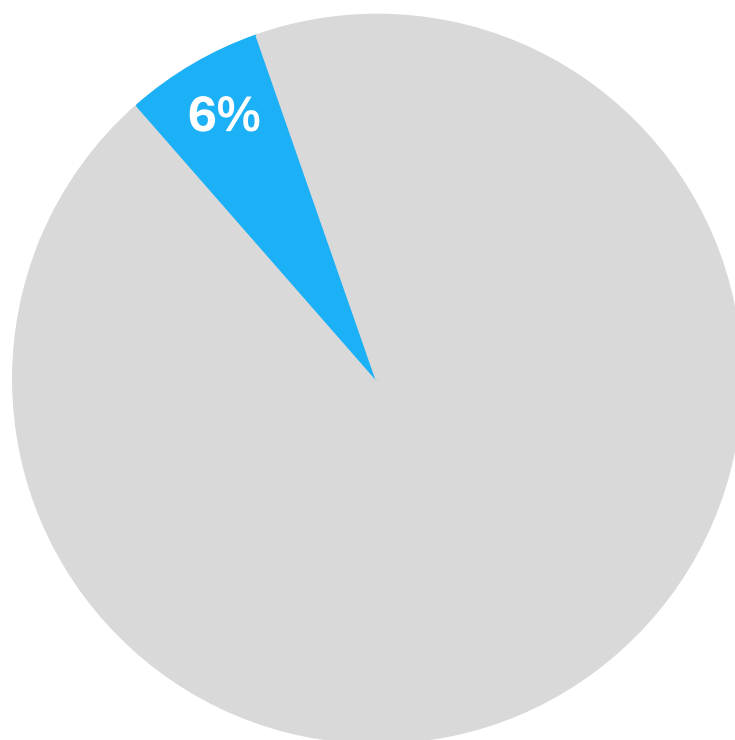
**\*Not a growth driver**

## 3. Duolingo English Test

### $118
For two tests ($59 each)

### $70
For one test

## Macro Risk Exposure

Government Policies

Geopolitical Tensions

Decline in Travel Demand

| Proprietary Research | Company Overview | Valuation | Macro | Additional Analysis |

# Revenue Dependency

**Duolingo's growth potential is highly dependent on their subscription revenue stream.**

## 2024A Revenue Breakdown



5%

**\*Not a growth driver**

## 4. In App Purchases

### Gems

- ❖ Small Chest: $4.99
- ❖ Medium Chest: $9.99
- ❖ Large Chest: $19.99

### Merch

- ❖ Plushie: $29.95
- ❖ Duolingo Piano: $249
- ❖ Merch Store

- ▪ Immaterial revenue stream
  - ▪ Discretionary nature

# Arxiv Study Background

**Arxiv conducted a study on Duolingo to analyze the potential consequences of gamification.**

## Gamification Misuse

Occurs when users fixate too much on gamification and get distracted from learning.

## Duolingo Examples of Gamification

- Experience Points (XP)
- Leaderboards
- Streaks
- XP Boosters
- Badges
- Currencies
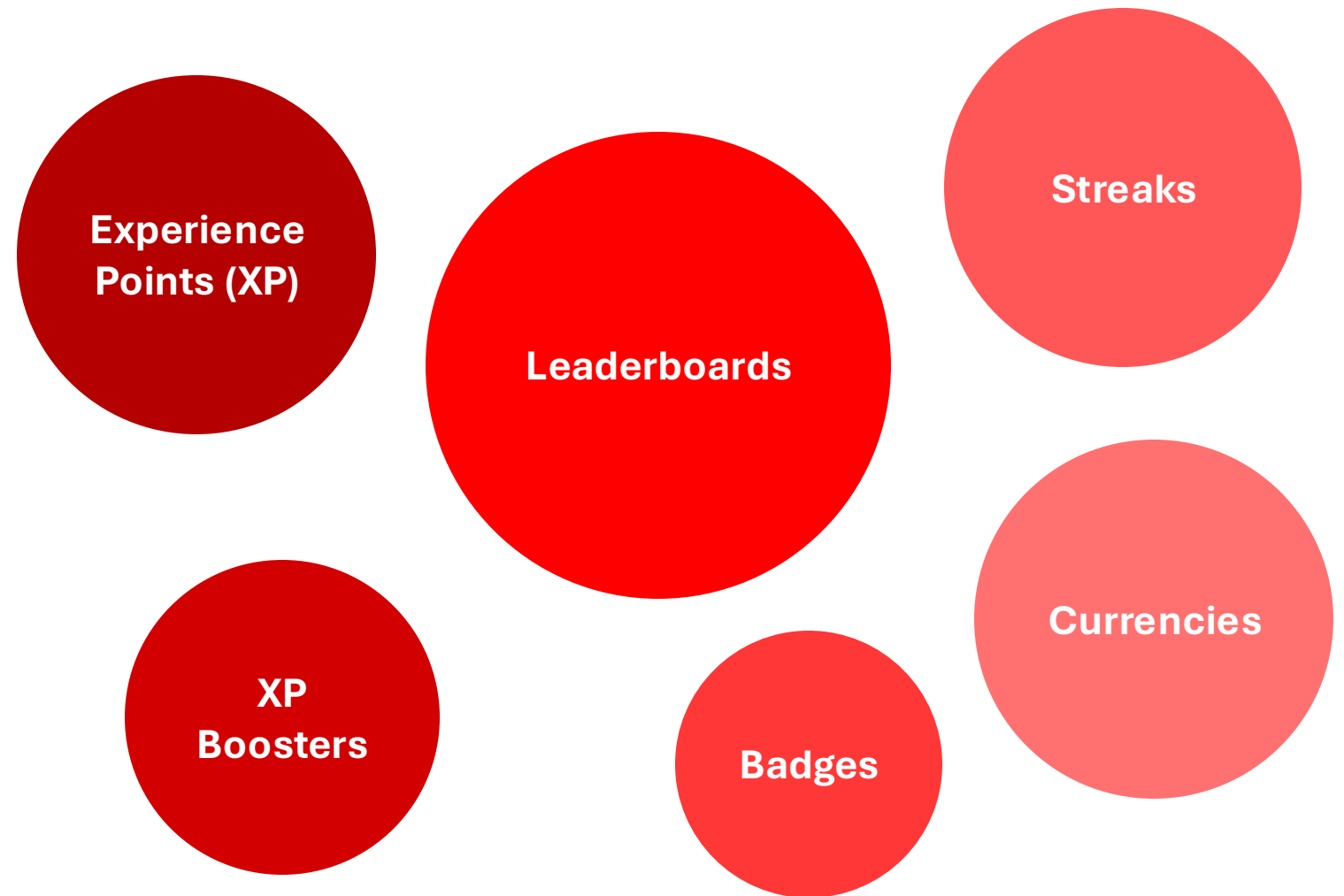
Sources: Arxiv, Company Filings

# Study Dataset/Results

**Conclusion: Gamification does not always have the best results on learning.**

## Large Array of Data

❖**30,000** pieces of texts from Duolingo's forum data

❖**357** posts and **30,618** comments on discussion forums

❖**15** semi structured interviews with international Duolingo users

## Negative Results

"The misuse of gamification can negatively impact users' learning aptitude and capacity by weakening their confidence in learning."

"The gamification misuse can lead to well-being complications such as disappointment, apprehension, self-recrimination, physical health problems, and disruption of daily life routines."

"Users believe that the misuse of gamification (if not addressed) can set a bad example for how success is defined in learning communities, allowing this unproductive behavior to become widespread among more users."

Sources: Arxiv, Survey Data, Team Consensus

# Mission vs Economics

**Duolingo's mission statement is a direct contradiction to how they grow their revenue.**

| Mission | | Economics |
|---|---|---|
| **"To develop the best education in the world and make it <u>universally available</u>."** | **Versus** → | **Convert their freemium users to paying users.** |
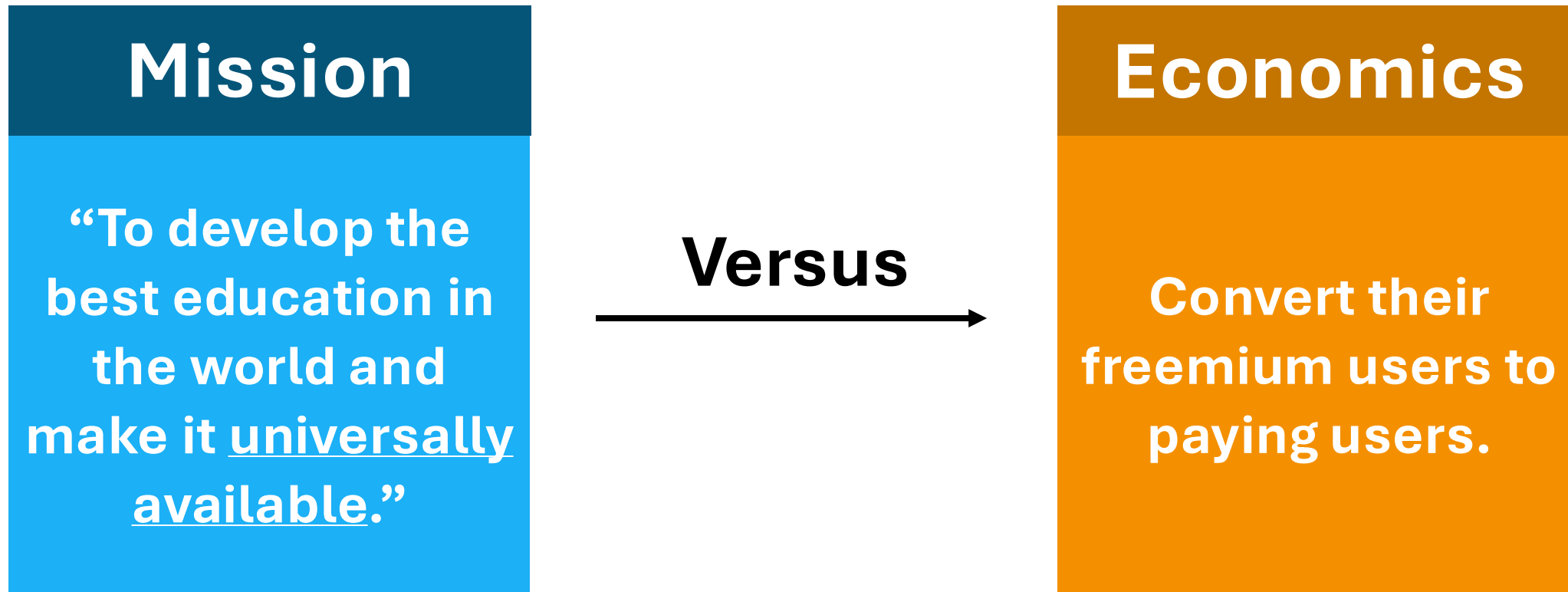
**"Their belief that true equality is when spending more can't buy you a better education is in contrast with how apps like Duolingo turn a profit. They need to sell you in app purchases."**
-YouTube Channel

# Recent Decision Making

**Duolingo fired a portion of translations staff and replaced them with artificial intelligence.**

## 10%

% of translation staff fired and replaced with AI.

"I am all for AI supporting humans but i'm not going to pay for my subscription to help them put more people out of a job," wrote Reddit user Rlokan.

"We just no longer need as many people to do the type of <u>work</u> some of these contractors were doing," a spokesperson told Bloomberg. "Part of that could be attributed to AI."

In February 2023 Duolingo announced the closure of its discussions boards, which were shuttered in March 2023.

Sources: The Standard, Team Consensus

# Relative Valuation

**LTM Multiples indicated overvalued conditions.**
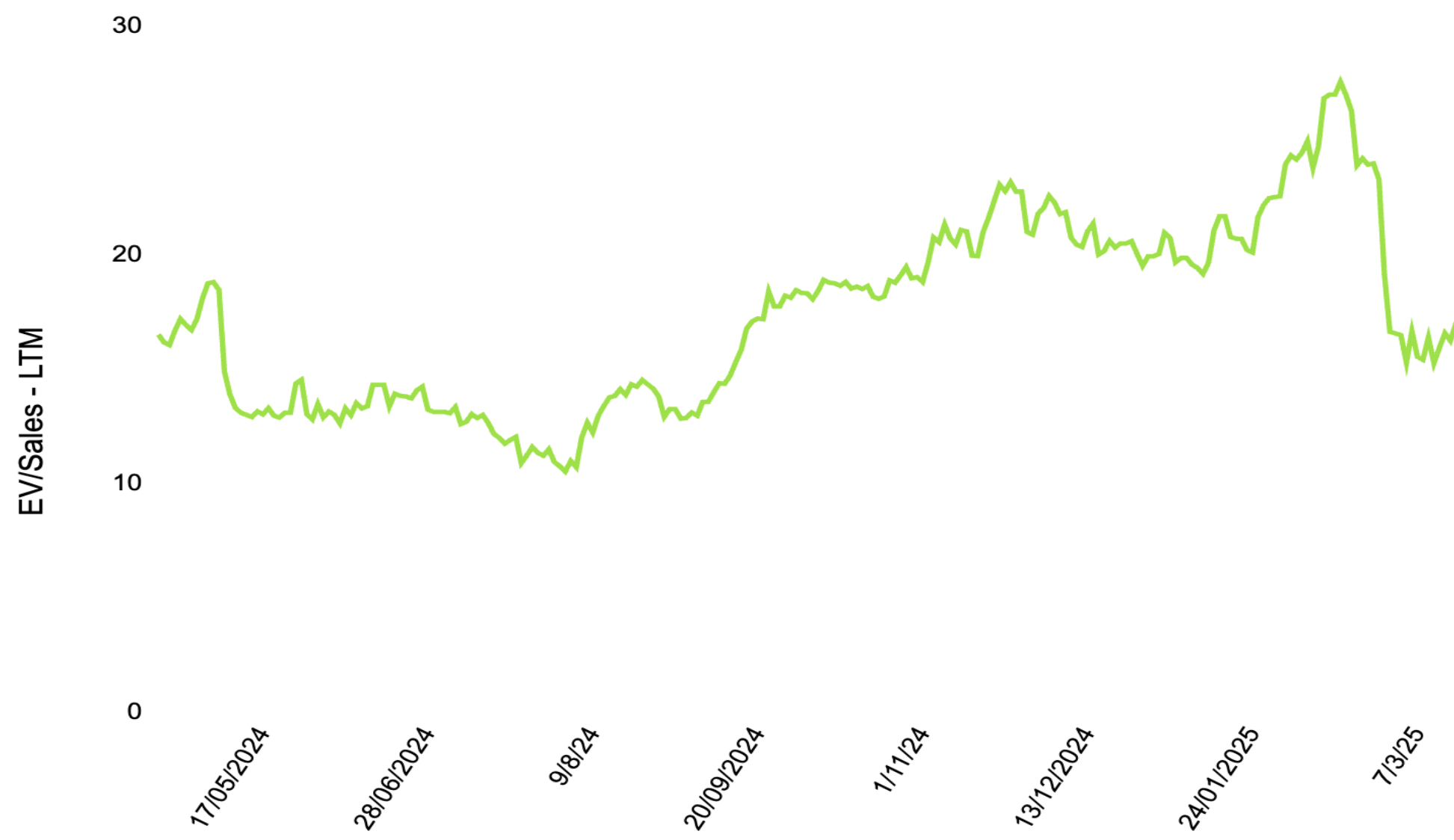
# EV/Revenue: EdTech Benchmark

**DUOL trades at a high EV/Revenue, EV/EBITDA, and P/E multiple compared with the EdTech firms listed.**



**EV/Revenue**

| Duolingo | Stride | Chegg | Pearson |
|----------|--------|-------|---------|
| 31.3x | 2.5x | 0.2x | 1.9x |

**EV/EBITDA**

| Duolingo | Stride | Chegg | Pearson |
|----------|--------|-------|---------|
| 187.3x | 12.9x | 1.5x | 12.5x |

**P/E**

| Duolingo | Stride | Chegg | Pearson |
|----------|--------|-------|---------|
| 185.6x | 21.7x | 0.2x | 20.5x |
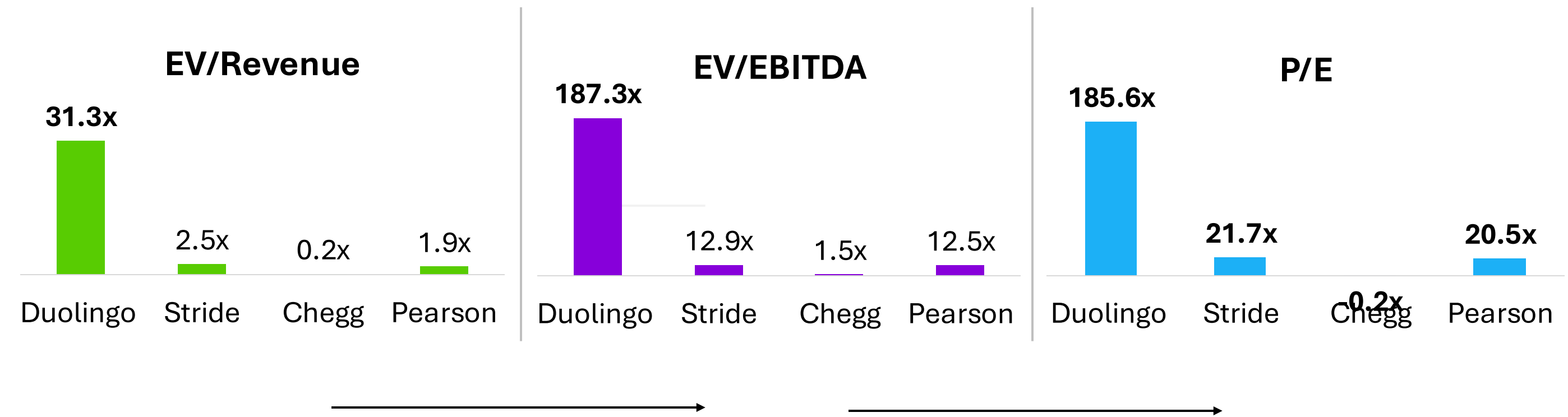
# Consistent Overvaluation

| Proprietary Research | Company Overview | **Valuation** | Macro | Additional Analysis |

# CCA Model: Rule of 40 Benchmark

**DUOL trades at an EV/Revenue multiple almost 3x higher than Microsoft's, despite Microsoft having a better Rule of 40 Score.**

## Rule of 40 Score:
❖ Revenue Growth + Operating Margins

## Choice of Revenue:
❖ 2024 LTM

## Chosen Multiple to Assign:
❖ 75% percentile EV/Revenue

## Rationale Behind Chosen Multiple:
❖ Award DUOL with a premium for high growth and dominant share within their market

| Company Name | Ticker | 2023 Revenue | 2023 Operating Margin % | Rule of 40 Score | EV/Revenue Multiple |
|---|---|---|---|---|---|
| **Duolingo** | **DUOL** | **43.7%** | **-2.4%** | **41.3%** | **27.0x** |
| Microsoft | MSFT | 15.0% | 44.6% | 59.7% | 11.6x |
| Nutanix | NTNX | 17.9% | -10.2% | 7.6% | 9.1x |
| Dropbox | DBX | 7.6% | 15.3% | 22.9% | 4.6x |
| Klaviyo | KVYO | 47.7% | -46.2% | 1.4% | 16.2x |
| Cloudfare | NET | 33.0% | -19.4% | 13.6% | 36.8x |
| Zoom | ZM | 3.1% | 5.6% | 8.7% | 4.5x |
| Netflix | NFLX | 6.7% | 20.6% | 27.3% | 12.1x |
| Nvidia | NVDA | 0.2% | 20.7% | 20.9% | 30.1x |
| Docusign | DOCU | 19.4% | -2.1% | 17.3% | 6.6x |
| Box | BOX | 13.3% | 3.7% | 17.1% | 5.9x |
| Informatica | INFA | 6.0% | 5.8% | 11.8% | 4.2x |
| HubSpot | HUBS | 25.4% | -4.8% | 20.6% | 16.3x |
| Solar Winds | SWI | 5.0% | 25.0% | 30.0% | 5.3x |
| SAP SE | SAP | 8.8% | 21.1% | 29.9% | 9.9x |
| Blackline | BKH | -8.6% | 20.6% | 12.0% | 4.1x |

| | | |
|---|---|---|
| High | | 36.8x |
| **75th percentile** | | **16.2x** |
| Average | | 12.8x |
| Median | | 9.5x |
| 25th Percentile | | 5.1x |
| Low | | 4.1x |

Sources: FactSet, Team Consensus

# CCA Model: Rule of 40 Benchmark

**Recommendation: SELL**

| Valuation | EV/Revenue |
|---|---|
| DUOL Revenue | 689.5 |
| EV/Revenue Multiple | **16.2x** |
| Implied Enterprise Value | 11,199.1 |
| Net Debt | 0.0 |
| Equity Value | 11,199.1 |
| Shares Outstanding | 44.0 |
| **Share Price** | **254.6** |

Price Target:

**$254.6**

**60.6%**
**downside**

Sources: FactSet, Team Consensus

# CCA Model: Video Game/Habit Benchmark

**DUOL trades at a premium compared to video game/habit forming companies as well.**

## Choice of Revenue:
❖ 2024 LTM

## Chosen Multiple to Assign:
❖ 75% percentile EV/Revenue

## Rationale Behind Chosen Multiple:
❖ Award DUOL with a premium for high growth and dominant share within their market

| Company Name | Ticker | EV/Revenue Multiple |
|---|---|---|
| **Duolingo** | **DUOL** | **27.0x** |
| Peloton | PTON | 2.1x |
| Planet Fitness | PLNT | 9.1x |
| Xponential Fitness | XPOF | 4.1x |
| Roblox | RBLX | 13.1x |
| Electronic Arts | EA | 4.6x |
| Take Two | TTWO | 7.7x |

| | | |
|---|---|---|
| High | | 27.0x |
| **75th percentile** | | **11.1x** |
| Average | | 9.7x |
| Median | | 7.7x |
| 25th Percentile | | 4.3x |
| Low | | 2.1x |

Sources: FactSet, Team Consensus

# CCA Model: Video Game/Habit Benchmark

**Recommendation: SELL**

| Valuation | EV/Revenue |
|---|---|
| DUOL Revenue | 689.5 |
| EV/Revenue Multiple | **11.1x** |
| Implied Enterprise Value | 7,652.7 |
| Net Debt | 0.0 |
| Equity Value | 7,652.7 |
| Shares Outstanding | 44.0 |
| **Share Price** | **174.0** |

Price Target:
**$174.0**

**42.3%
downside**

Sources: FactSet, Team Consensus

# Relative Valuation

**Relative Strength, NTM Multiples indicated overvalued/overbought conditions.**



Source: FactSet

# Language Unit Length Data

## We aggregated this data from third party sources.

| Language | Units Per Language | Lessons Per Language | Minutes it takes to Complete Language | Hours It takes to Complete Language |
|---|---|---|---|---|
| Spanish | 236 | 1180 | 4720 | 79 |
| French | 225 | 1125 | 4500 | 75 |
| Norwegian | 165 | 825 | 3300 | 55 |
| German | 137 | 685 | 2740 | 46 |
| Japanese | 131 | 655 | 2620 | 44 |
| Dutch | 85 | 425 | 1700 | 28 |
| Portuguese | 81 | 405 | 1620 | 27 |
| Korean | 78 | 390 | 1560 | 26 |
| Hungarian | 77 | 385 | 1540 | 26 |
| Scottish | 75 | 375 | 1500 | 25 |
| Welsh | 75 | 375 | 1500 | 25 |
| Italian | 72 | 360 | 1440 | 24 |
| Russian | 67 | 335 | 1340 | 22 |
| Yiddish | 67 | 335 | 1340 | 22 |
| Greek | 67 | 335 | 1340 | 22 |
| Czech | 63 | 315 | 1260 | 21 |
| Chinese | 63 | 315 | 1260 | 21 |
| Swedish | 61 | 305 | 1220 | 20 |
| Hebrew | 60 | 300 | 1200 | 20 |
| Vietnamese | 55 | 275 | 1100 | 18 |
| Swahili | 53 | 265 | 1060 | 18 |
| Indonesian | 50 | 250 | 1000 | 17 |
| Turkish | 49 | 245 | 980 | 16 |
| Polish | 49 | 245 | 980 | 16 |
| Klingon | 48 | 240 | 960 | 16 |
| Irish | 48 | 240 | 960 | 16 |
| Romanian | 46 | 230 | 920 | 15 |
| Danish | 46 | 230 | 920 | 15 |
| Esperanto | 45 | 225 | 900 | 15 |
| Ukrainian | 39 | 195 | 780 | 13 |
| Arabic | 36 | 180 | 720 | 12 |
| High Valerian | 34 | 170 | 680 | 11 |
| Finnish | 29 | 145 | 580 | 10 |
| Haitian | 29 | 145 | 580 | 10 |
| Hindi | 27 | 135 | 540 | 9 |
| Latin | 20 | 100 | 400 | 7 |
| Zulu | 19 | 95 | 380 | 6 |

| Language | # of Lessons | (1m20s per Lesson) | (2m per Lesson) | (2m30s per Lesson) | (3m20s per Lesson) | (4m per Lesson) |
|---|---|---|---|---|---|---|
| Spanish | 1068 | 23:44:00 | 35:36:00 | 44:30:00 | 59:20:00 | 71:12:00 |
| French | 1096 | 24:21:20 | 36:32:00 | 45:40:00 | 60:53:20 | 73:04:00 |
| Japanese | 597 | 13:16:00 | 19:54:00 | 24:52:30 | 33:10:00 | 39:48:00 |
| German | 429 | 9:32:00 | 14:18:00 | 17:52:30 | 23:52:00 | 28:36:00 |
| Korean | 258 | 5:44:00 | 8:36:00 | 10:45:00 | 14:22:00 | 17:12:00 |
| Italian | 405 | 9:00:00 | 13:30:00 | 16:52:30 | 22:30:00 | 27:00:00 |
| Chinese | 284 | 6:18:40 | 9:28:00 | 11:50:00 | 15:46:40 | 18:56:00 |
| Hindi | 133 | 2:56:40 | 4:26:40 | 5:32:30 | 7:23:20 | 8:52:00 |
| Russian | 510 | 11:20:00 | 17:00:00 | 21:15:00 | 28:20:00 | 34:00:00 |
| Arabic | 210 | 4:40:00 | 7:00:00 | 8:45:00 | 11:40:00 | 14:00:00 |
| Turkish | 250 | 5:33:20 | 8:20:00 | 10:25:00 | 13:53:20 | 16:40:00 |
| Portuguese | 494 | 10:57:20 | 16:28:00 | 20:35:00 | 27:32:00 | 32:56:00 |
| Dutch | 121 | 2:41:20 | 4:02:00 | 5:02:30 | 6:42:40 | 8:04:00 |
| Latin | 40 | 0:53:20 | 1:20:00 | 1:40:00 | 2:13:20 | 2:40:00 |
| Swedish | 113 | 2:30:40 | 3:46:40 | 4:43:30 | 6:18:40 | 7:33:20 |
| Irish | 96 | 2:08:00 | 3:12:00 | 4:00:00 | 5:20:00 | 6:24:00 |
| Greek | 298 | 6:37:20 | 9:56:00 | 12:25:00 | 16:28:00 | 19:52:00 |

Source: Reddit, Team Consensus

# Churn Rate Steps/Math

**This calculate gives us our initial churn rate for the DCF forecasted period, which we then reduce each year.**

1. We estimate churn rate based on the assumption that once users complete all the language units they intend to learn, they will stop using the platform, similar to finishing a game.

2. Estimate Lesson Completion Time – We assumed an average lesson takes 4 minutes to complete and that each unit consists of 5 lessons.

3. Total Time to Learn a Language – Using data from the 15 most popular languages, we calculated the total number of lessons required and thus how much time it would take to complete a language in total. We then adjusted for the average user's weekly usage (17 minutes per week).

4. Conversion to Months – This allowed us to estimate the average time required to complete a single language. At this point, we have the # of months it takes to complete the 15 most popular languages on average.

5. Multiple Language Learners – We adjusted this figure for each age group, assuming younger users tend to learn more languages over time.

6. Age-Adjusted Factor (AAF) – We further refined the estimate using an age-adjusted factor that accounts for how much time different age groups spend learning (younger people have more time to spend).

7. Weighted Demographics – We weighted these calculations by the percentage of each age group within Duolingo's total user base.

8. From this, we determined the average customer lifecycle is approximately 42 months (3.5 years). Using this figure, we derived a monthly churn rate, which led to an annual churn rate of 25.2%.

9. This result is lower than Duolingo's publicly reported churn rate (which ranges from 37% to 47%), though we also found sources suggesting it could be closer to 20%. Given our methodology, we believe our computed churn rate is a reasonable estimate.

Source: Team Consensus

# Age Adjustment Factor (AAF)

**The younger the are, the more time you will spend on Duolingo's app per week.**

## Consumer Age Demographics



Legend:
- ■ 18-24
- ■ 25-34
- ■ 35-44
- ■ 45-54
- ■ 55-64
- ■ 65+
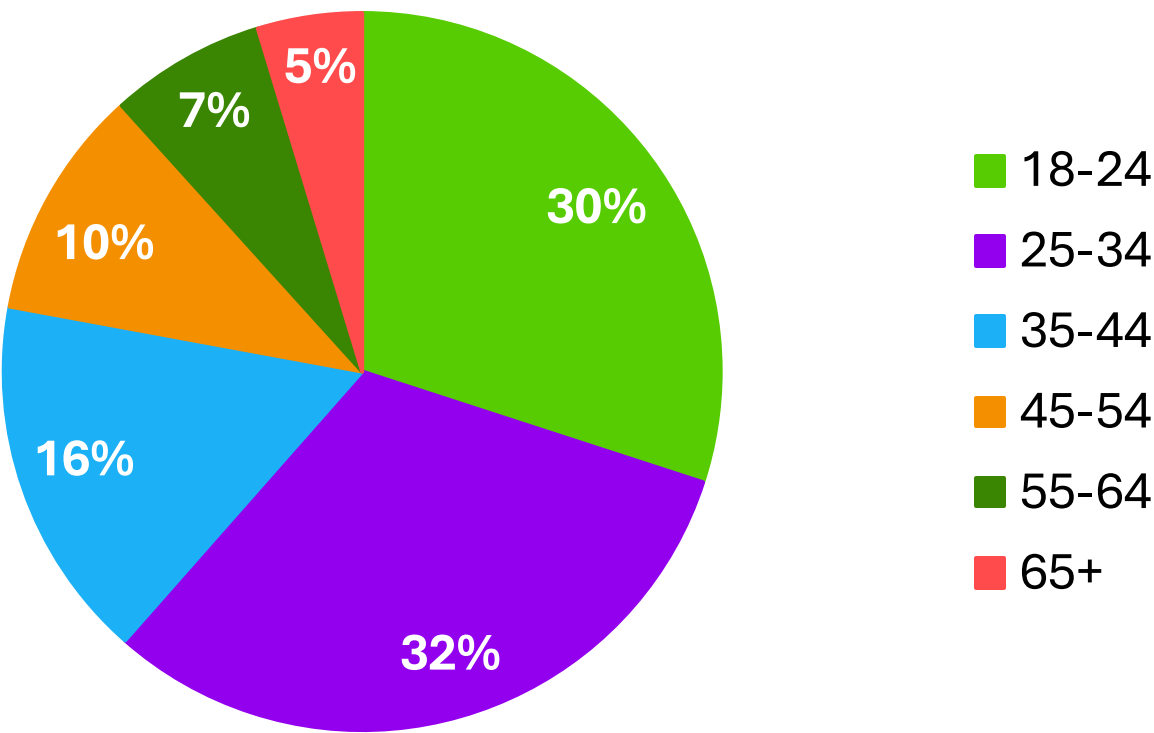
18-24 AAF – **2**

25-34 AAF – **1.25**

35-44 AAF – **1**

45-54 AAF – **1**

55-64 AAF – **1**

65+ AAF – **1**

Source: Team Consensus

# Churn Rate Steps/Math

**This gives us an initial churn rate of 25.2%.**

| Assumptions | Inputs | Formulas |
|---|---|---|
| ❖ People spend a certain amount of **minutes** per week using Duolingo | ❖ Average lessons per unit: **5 lessons** | ❖ **Total Lessons Per Language =** (# of units for specific language) * (average lessons per unit) |
| ❖ There are the same amount of **lessons** in each unit | ❖ Time it takes to complete a lesson: **4 minutes** | ❖ **# of Minutes it takes to complete a language** = (# of lessons per language) * (minutes it takes to complete a lesson) |
| ❖ Each **lesson** will take the same amount of time to complete on average | ❖ Amount of minutes spent per week on Duolingo: **17** | ❖ **Hours it takes to complete a language =** (minutes it takes to complete a language)/60 |
| ❖ **Age** affects the amount of time spent on the app | | ❖ **Average hours per language (AHpL)**= (average time it takes for top 15 languages) |
| ❖ The age **demographics** will remain unchanged overtime | | ❖ **Average months per language (AMpL) =** ((AHpL*60)/17)/4 |
| ❖ It makes more sense to use the languages that are more **popular and the longest** | | ❖ **Average Consumer Life Cycle (ACLC) =**Sum { ((AMpL)/age group specific AAF) age group % of user base) } |
| **\*All of these factors will remain unchanged overtime** | | ❖ **Monthly Churn Rate (MCR) =** 1/ACLC |
| | | ❖ **Annual Churn Rate (ACR) =** $1-(1-MCR)^{12}$ |

Sources: Team Consensus, Lingoly.io, Reddit, Whop.com, Proprietary Research

# Final Churn Rate

**Duolingo's churn rate applied is between our calculations and their publicly stated churn.**

| | | |
|---|---|---|
| ACLC (months) | | 41.8 |
| Monthly churn rate | | 2.4% |
| Annual Churn Rate | | 25.2% |

DUOL's Publicly

Median is a Better

Our Churn

25.2%

**Number of months it takes before a user in a given age group leaves the platform.**
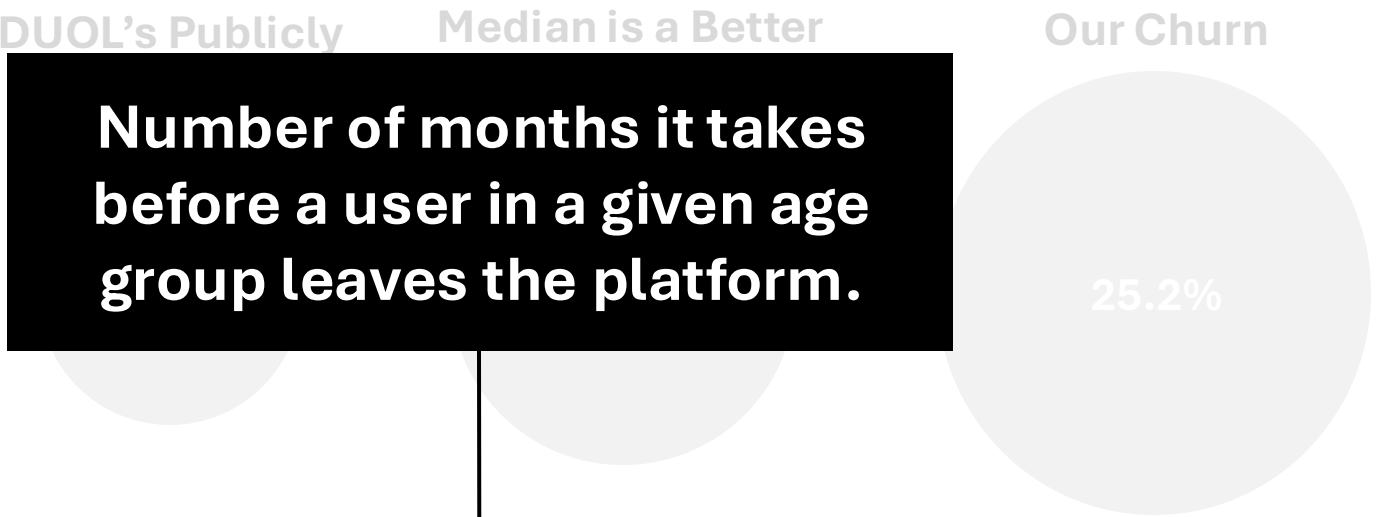
| Age Group | Languages to Learn | CLC without AAF | CLC with AAF | % of Userbase | CLC * % of userbase |
|---|---|---|---|---|---|
| 18-24 | 3 | 93.8 | 46.9 | 31% | 14.5 |
| 25-34 | 2 | 62.5 | 50.0 | 31% | 15.3 |
| 35-44 | 1 | 31.3 | 31.3 | 16% | 5.1 |
| 45-54 | 1 | 31.3 | 31.3 | 10% | 3.3 |
| 55-64 | 1 | 31.3 | 31.3 | 7% | 2.2 |
| 65+ | 1 | 31.3 | 31.3 | 5% | 1.5 |

Source: Team Consensus

# Final Churn Rate

**The churn rate we applied is between our calculations and publicly stated churn rates.**

| | |
|---|---|
| **ACLC (months)** | **41.8** |
| **Monthly churn rate** | **2.4%** |
| **Annual Churn Rate** | **25.2%** |

**DUOL's Publicly Stated Churn**

**20%**
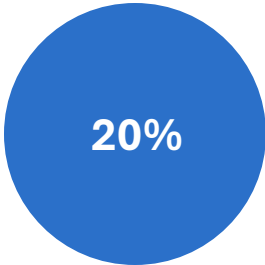
**Median is a Better Representation**
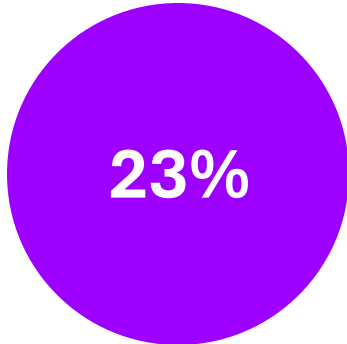
**23%**

**Our Churn**

**25.2%**
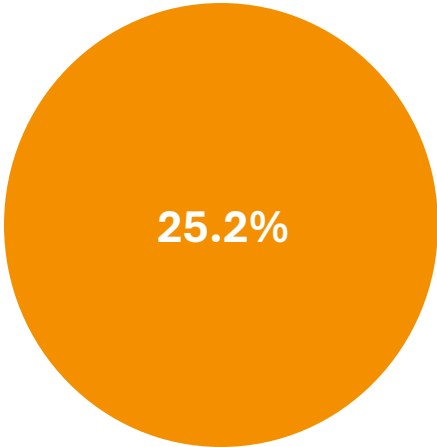
| ;e Group | Languages to Learn | CLC without AAF | CLC with AAF | % of Userbase | CLC * % of userbase |
|---|---|---|---|---|---|
| 24 | 3 | 93.8 | 46.9 | 31% | 14.5 |
| 34 | 2 | 62.5 | 50.0 | 31% | 15.3 |
| 44 | 1 | 31.3 | 31.3 | 16% | 5.1 |
| 54 | 1 | 31.3 | 31.3 | 10% | 3.3 |
| 54 | 1 | 31.3 | 31.3 | 7% | 2.2 |
| | 1 | 31.3 | 31.3 | 5% | 1.5 |

# of months it takes before users leave the platform

Source: Team Consensus

# Why Churn Matters

**DCF YoY Net MAU Base Growth Calculation**

**MAU Base YoY Growth Rate** **-** **Annual Churn Rate** **=** **Net MAU Base YoY Growth Rate**

**As the churn rate increases, MAU growth goes down, which lowers the paying userbase, which lowers revenue.**

Source: Team Consensus

# Churn Sensitivity

| Average Customer Life Cycle (Months) | **41.8** | Average # of Minutes to Complete a Lesson | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | 2.5 | 2.7 | 2.8 | 2.9 | 3.1 | 3.3 | 3.4 | 3.6 | 3.8 | **4.0** | 4.2 | 4.4 | 4.6 | 4.9 | 5.1 | 5.4 | 5.6 | 5.9 | 6.2 |
| # of Minutes users spend on average on App per week | 10.7 | 41.8 | 44.0 | 46.4 | 48.8 | 51.4 | 54.1 | 56.9 | 59.9 | 63.1 | 66.4 | 69.7 | 73.2 | 76.8 | 80.7 | 84.7 | 89.0 | 93.4 | 98.1 | 103.0 |
| | 11.3 | 39.7 | 41.8 | 44.0 | 46.4 | 48.8 | 51.4 | 54.1 | 56.9 | 59.9 | 63.1 | 66.2 | 69.5 | 73.0 | 76.7 | 80.5 | 84.5 | 88.7 | 93.2 | 97.8 |
| | 11.9 | 37.8 | 39.7 | 41.8 | 44.0 | 46.4 | 48.8 | 51.4 | 54.1 | 56.9 | 59.9 | 62.9 | 66.1 | 69.4 | 72.8 | 76.5 | 80.3 | 84.3 | 88.5 | 92.9 |
| | 12.5 | 35.9 | 37.8 | 39.7 | 41.8 | 44.0 | 46.4 | 48.8 | 51.4 | 54.1 | 56.9 | 59.8 | 62.7 | 65.9 | 69.2 | 72.6 | 76.3 | 80.1 | 84.1 | 88.3 |
| | 13.2 | 34.1 | 35.9 | 37.8 | 39.7 | 41.8 | 44.0 | 46.4 | 48.8 | 51.4 | 54.1 | 56.8 | 59.6 | 62.6 | 65.7 | 69.0 | 72.5 | 76.1 | 79.9 | 83.9 |
| | 13.8 | 32.4 | 34.1 | 35.9 | 37.8 | 39.7 | 41.8 | 44.0 | 46.4 | 48.8 | 51.4 | 53.9 | 56.6 | 59.5 | 62.4 | 65.6 | 68.8 | 72.3 | 75.9 | 79.7 |
| | 14.6 | 30.8 | 32.4 | 34.1 | 35.9 | 37.8 | 39.7 | 41.8 | 44.0 | 46.4 | 48.8 | 51.2 | 53.8 | 56.5 | 59.3 | 62.3 | 65.4 | 68.7 | 72.1 | 75.7 |
| | 15.3 | 29.2 | 30.8 | 32.4 | 34.1 | 35.9 | 37.8 | 39.7 | 41.8 | 44.0 | 46.4 | 48.7 | 51.1 | 53.7 | 56.3 | 59.2 | 62.1 | 65.2 | 68.5 | 71.9 |
| | 16.2 | 27.8 | 29.2 | 30.8 | 32.4 | 34.1 | 35.9 | 37.8 | 39.7 | 41.8 | 44.0 | 46.2 | 48.6 | 51.0 | 53.5 | 56.2 | 59.0 | 62.0 | 65.1 | 68.3 |
| | **17.0** | 26.4 | 27.8 | 29.2 | 30.8 | 32.4 | 34.1 | 35.9 | 37.8 | 39.7 | **41.8** | 43.9 | 46.1 | 48.4 | 50.9 | 53.4 | 56.1 | 58.9 | 61.8 | 64.9 |
| | 17.9 | 25.1 | 26.4 | 27.8 | 29.3 | 30.8 | 32.5 | 34.2 | 36.0 | 37.9 | 39.8 | 41.8 | 43.9 | 46.1 | 48.4 | 50.9 | 53.4 | 56.1 | 58.9 | 61.8 |
| | 18.7 | 23.9 | 25.2 | 26.5 | 27.9 | 29.4 | 30.9 | 32.5 | 34.2 | 36.1 | 37.9 | 39.8 | 41.8 | 43.9 | 46.1 | 48.4 | 50.9 | 53.4 | 56.1 | 58.9 |
| | 19.7 | 22.8 | 24.0 | 25.2 | 26.6 | 28.0 | 29.4 | 31.0 | 32.6 | 34.3 | 36.1 | 37.9 | 39.8 | 41.8 | 43.9 | 46.1 | 48.4 | 50.9 | 53.4 | 56.1 |
| | 20.7 | 21.7 | 22.8 | 24.0 | 25.3 | 26.6 | 28.0 | 29.5 | 31.1 | 32.7 | 34.4 | 36.1 | 37.9 | 39.8 | 41.8 | 43.9 | 46.1 | 48.4 | 50.9 | 53.4 |
| | 21.7 | 20.7 | 21.7 | 22.9 | 24.1 | 25.4 | 26.7 | 28.1 | 29.6 | 31.1 | 32.8 | 34.4 | 36.1 | 37.9 | 39.8 | 41.8 | 43.9 | 46.1 | 48.4 | 50.9 |
| | 22.8 | 19.7 | 20.7 | 21.8 | 22.9 | 24.2 | 25.4 | 26.8 | 28.2 | 29.7 | 31.2 | 32.8 | 34.4 | 36.1 | 37.9 | 39.8 | 41.8 | 43.9 | 46.1 | 48.4 |
| | 23.9 | 18.7 | 19.7 | 20.8 | 21.9 | 23.0 | 24.2 | 25.5 | 26.8 | 28.2 | 29.7 | 31.2 | 32.8 | 34.4 | 36.1 | 37.9 | 39.8 | 41.8 | 43.9 | 46.1 |
| | 25.1 | 17.8 | 18.8 | 19.8 | 20.8 | 21.9 | 23.1 | 24.3 | 25.6 | 26.9 | 28.3 | 29.7 | 31.2 | 32.8 | 34.4 | 36.1 | 37.9 | 39.8 | 41.8 | 43.9 |
| | 26.4 | 17.0 | 17.9 | 18.8 | 19.8 | 20.9 | 22.0 | 23.1 | 24.3 | 25.6 | 27.0 | 28.3 | 29.7 | 31.2 | 32.8 | 34.4 | 36.1 | 37.9 | 39.8 | 41.8 |

Source: Team Consensus

# Revenue Projection Thought Process

**Qualitatively, this is what our projections illustrate is happening with Duolingo's business.**

MAU growth will start at 45%, aligning with recent averages, before gradually declining as the market matures YoY.

The churn rate will gradually decline as stable R&D enhances offerings and expands language unit length.

Over time, the subscription revenue mix will shift in favor of Duolingo Max as improvements are implemented.

The paying user base percentage will start at current levels and gradually increase with enhanced premium offerings.

Source: Team Consensus

# Revenue Projection Glossary

**These acronyms are a way for us to quantify material changes that affect our projections.**

1. **Annual Churn Rate (ACR) –** the % of Duolingo's total MAU base that cease to use the platform entirely.

2. **Average Customer Life Cycle (ACLC) –** The average amount of time it takes for the average Duolingo user to learn a language in months.

3. **User Growth Rate (UGR) –** the % that the MAU base grows each year. We determined these rates based off of historical averages of their MAU base growth, industry CAGR, their competitive positioning, and several other company specific factors.

4. **Paying Userbase Growth Factor (PUGF) –** We take a % of the total MAU base to get to our subscriber base. PUGF is by how much that % changes by each year if at all. We based this factor off the data from our proprietary research. The more positive our view on their premium offerings, the higher PUGF will be.

5. **Subscription Ratio Adjustment Factor (SRAF) –** SRAF is a way for us to quantify the affects of an increase in popularity/efficacy of Duolingo Max. It is a certain number of basis points that we add to one premium offering's total % of subscription revenue while simultaneously subtracting the same amount of basis points from the other premium offering's % of total subscription revenue.

6. **Growth Decline Factor (GDF) –** GDF is the number of basis points that we subtract from UGR, and we are basing this off of historical userbase growth rates and the fact that eventually the market will mature.

7. **Churn Rate Decline Factor(CRDF) –** CRDF is a certain amount of basis points that we subtract from the churn rate per year, which we based on the idea that R&D will extend the average consumer life cycle.

# Revenue Projection Inputs

**We adjust our factors slightly on a case-by-case basis (typically by around 500-1000 basis points).**

## Base Case

- Monthly Churn rate (MCR):  2.4%
- Initial Annual Churn Rate (ACR): 23.2%
- Average customer life cycle (ACLC): 3.5 years
- Initial Userbase Growth Rate (UGR):  45%
- Paying userbase growth factor (PUGF): +1%
- Subscription ratio adjustment factor (SRAF) : 3%/300bps
- Growth decline factor (GDF):  -3%
- Churn Rate Decline Factor (CRDF): - 2%

## Upside

- Monthly Churn rate (MCR):  2.4%
- Initial Annual Churn Rate (ACR): 23.2%
- Average customer life cycle (ACLC): 3.5 years
- Initial Userbase Growth Rate (UGR):  45%
- Paying userbase growth factor (PUGF): +2%
- Subscription ratio adjustment factor (SRAF) : 3.5%/350bps
- Growth decline factor (GDF):  -2%
- Churn Rate Decline Factor (CRDF): - 2%

## Downside

- Monthly Churn rate (MCR):  2.4%
- Initial Annual Churn Rate (ACR): 23.2%
- Average customer life cycle (ACLC): 3.5 years
- Initial Userbase Growth Rate (UGR):  45%
- Paying userbase growth factor (PUGF): 0%
- Subscription ratio adjustment factor (SRAF) : 2.5%/250bps
- Growth decline factor (GDF):  -2%
- Churn Rate Decline Factor (CRDF): - 1%

# Revenue Projections: Base Case Scenario

**Base case scenario revenue projections are highly optimistic.**

| Base Case Assumptions | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Metrics | Inputs | 2024A | 2025E | 2026E | 2027E | 2028E | 2029E | 2030E | 2031E | 2032E | 2033E | 2034E |
| MAU (mm) | | 117 | 142 | 172 | 206 | 244 | 288 | 336 | 389 | 447 | 509 | 574 |
| MAU Growth (mm) | | | 25 | 30 | 34 | 39 | 43 | 48 | 53 | 58 | 62 | 65 |
| Paying User Base (mm) | | 10 | 13 | 17 | 11 | 16 | 22 | 29 | 37 | 47 | 59 | 72 |
| Revenue Per Paying User | | - | 76 | 78 | 80 | 82 | 84 | 86 | 88 | 90 | 92 | 95 |
| Userbase Growth Rate (UGR) | | | 45% | 42% | 39% | 36% | 33% | 30% | 27% | 24% | 21% | 18% |
| Churn Rate | | | 23% | 21% | 19% | 17% | 15% | 13% | 11% | 9% | 7% | 5% |
| Paying Userbase Percentage (PUP) | | 8% | 9% | 10% | 6% | 7% | 8% | 9% | 10% | 11% | 12% | 13% |
| Super Duolingo Percentage (SDP) | | 95% | 92% | 89% | 86% | 83% | 80% | 77% | 74% | 71% | 68% | 65% |
| Duolingo Max Percentage (DMP) | | 5% | 8% | 11% | 14% | 17% | 20% | 23% | 26% | 29% | 32% | 35% |
| Duolingo Max Userbase (mm) | | 0 | 1 | 2 | 2 | 3 | 4 | 7 | 10 | 14 | 19 | 25 |
| Change In Duolingo Max Userbase (mm) | | 0 | 1 | 1 | 0 | 1 | 2 | 2 | 3 | 4 | 5 | 6 |
| PUP Decline in 2027 | -34% | | 0% | 0% | 0% | 0% | 0% | 0% | 0% | 0% | 0% | 0% |
| Paying Userbase Growth Factor (PUGF) | 1% | | 1% | 1% | N/A | 1% | 1% | 1% | 1% | 1% | 1% | 1% |
| Subscription Ratio Adjustment Factor (SRAF) | 3% | | 3% | 3% | 3% | 3% | 3% | 3% | 3% | 3% | 3% | 3% |
| Churn Rate Decline Factor (CRDF) | 2% | | 2% | 2% | 2% | 2% | 2% | 2% | 2% | 2% | 2% | 2% |
| MAU Growth Decline Factor (GDF) | 3% | | 3% | 3% | 3% | 3% | 3% | 3% | 3% | 3% | 3% | 3% |
| DET Volume (mm) | 1 | | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 |

| Revenue Streams | | | | Base Case Revenue Projections | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Different Revenue Streams | Price | 2023A | 2024A | 2025E | 2026E | 2027E | 2028E | 2029E | 2030E | 2031E | 2032E | 2033E | 2034E |
| Super Duolingo | 7 | | | 837 | 1,085 | 692 | 935 | 1,223 | 1,556 | 1,934 | 2,352 | 2,805 | 3,286 |
| Duolingo Max | 14 | | | 146 | 268 | 225 | 383 | 612 | 930 | 1,359 | 1,921 | 2,640 | 3,539 |
| English Test | 65 | | | 41 | 41 | 42 | 42 | 42 | 42 | 42 | 42 | 42 | 42 |
| Advertisements | | | | 61 | 73 | 88 | 104 | 123 | 144 | 166 | 191 | 217 | 245 |
| Sale of Virtual Goods | | | | | | | | | | | | | |
| Total Revenue ($mm) | | 531 | 748 | 1,083 | 1,467 | 1,047 | 1,465 | 2,000 | 2,672 | 3,501 | 4,506 | 5,705 | 7,112 |
| % growth | | | 41% | 45% | 35% | -29% | 40% | 37% | 34% | 31% | 29% | 27% | 25% |

Source: Team Consensus

## $7.1B
Total 2034E FY Revenue

## 72.2mm
Total 2034E FY Paying Users

## 27.1%
Average Revenue Growth Rate

# Revenue Projections: Upside Scenario

## Upside scenario revenue projections are even more optimistic.

| Metrics | Inputs | 2024A | 2025E | 2026E | 2027E | 2028E | 2029E | 2030E | 2031E | 2032E | 2033E | 2034E |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Upside Revenue Assumptions** | | | | | | | | | | | | |
| MAU (mm) | | 117 | 142 | 172 | 206 | 244 | 288 | 336 | 389 | 447 | 509 | 574 |
| MAU Growth (mm) | | | 25 | 30 | 34 | 39 | 43 | 48 | 53 | 58 | 62 | 65 |
| Paying User Base (mm) | | 10 | 14 | 21 | 14 | 21 | 31 | 43 | 57 | 75 | 95 | 119 |
| Revenue Per Paying User | | 0 | 76 | 78 | 81 | 83 | 86 | 88 | 91 | 93 | 96 | 98 |
| Userbase Growth Rate (UGR) | | | 45% | 42% | 39% | 36% | 33% | 30% | 27% | 24% | 21% | 18% |
| Churn Rate | | | 23% | 21% | 19% | 17% | 15% | 13% | 11% | 9% | 7% | 5% |
| Paying Userbase Percentage (PUP) | | 8% | 10% | 12% | 7% | 9% | 11% | 13% | 15% | 17% | 19% | 21% |
| Super Duolingo Percentage (SDP) | | 95% | 92% | 88% | 85% | 81% | 78% | 74% | 71% | 67% | 64% | 60% |
| Duolingo Max Percentage (DMP) | | 5% | 9% | 12% | 16% | 19% | 23% | 26% | 30% | 33% | 37% | 40% |
| Duolingo Max Userbase (mm) | | 0 | 1 | 3 | 2 | 4 | 7 | 11 | 17 | 25 | 35 | 47 |
| Change In Duolingo Max Userbase (mm) | | 0 | 1 | 1 | 0 | 2 | 3 | 4 | 6 | 8 | 10 | 13 |
| PUP Decline in 2027 | -34% | | 0% | 0% | 0% | 0% | 0% | 0% | 0% | 0% | 0% | 0% |
| Paying Userbase Growth Factor (PUGF) | 2% | | 2% | 2% | N/A | 2% | 2% | 2% | 2% | 2% | 2% | 2% |
| Subscription Ratio Adjustment Factor (SRAF) | 4% | | 4% | 4% | 4% | 4% | 4% | 4% | 4% | 4% | 4% | 4% |
| Churn Rate Decline Factor (CRDF) | 2% | | 2% | 2% | 2% | 2% | 2% | 2% | 2% | 2% | 2% | 2% |
| MAU Growth Decline Factor (GDF) | 3% | | 3% | 3% | 3% | 3% | 3% | 3% | 3% | 3% | 3% | 3% |
| DET Volume (mm) | 1 | | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 |

| Different Revenue Streams | Price | 2023A | 2024A | 2025E | 2026E | 2027E | 2028E | 2029E | 2030E | 2031E | 2032E | 2033E | 2034E |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Revenue Streams** / **Upside Revenue Projections** | | | | | | | | | | | | | | |
| Super Duolingo | 7 | | | 923 | 1,284 | 814 | 1,204 | 1,669 | 2,210 | 2,822 | 3,499 | 4,226 | 4,986 |
| Duolingo Max | 14 | | | 172 | 350 | 299 | 565 | 969 | 1,553 | 2,362 | 3,446 | 4,858 | 6,648 |
| English Test | 65 | | | 42 | 42 | 42 | 42 | 42 | 42 | 42 | 42 | 42 | 42 |
| Advertisements | | | | 61 | 73 | 88 | 104 | 123 | 144 | 166 | 191 | 217 | 245 |
| Sale of Virtual Goods | | | | | | | | | | | | | |
| Total Revenue ($mm) | | 531 | 748 | 1,198 | 1,750 | 1,242 | 1,915 | 2,804 | 3,949 | 5,393 | 7,178 | 9,343 | 11,921 |
| % growth | | | 41% | 60% | 46% | -29% | 54% | 46% | 41% | 37% | 33% | 30% | 28% |

Source: Team Consensus

$11.9B
Total 2034E FY Revenue

118.7mm
Total 2034E FY Paying Users

34.6%
Average Revenue Growth Rate

# Revenue Projections: Downside Scenario

**Downside scenario revenue projections are still optimistic.**

| Downside Revenue Assumptions | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Metrics | Inputs | 2024A | 2025E | 2026E | 2027E | 2028E | 2029E | 2030E | 2031E | 2032E | 2033E | 2034E |
| MAU (mm) | | 117 | 142 | 172 | 206 | 244 | 288 | 336 | 389 | 447 | 509 | 574 |
| IAU Growth (mm) | | | 25 | 30 | 34 | 39 | 43 | 48 | 53 | 58 | 62 | 65 |
| Paying User Base (mm) | | 10 | 12 | 14 | 9 | 13 | 19 | 25 | 29 | 33 | 38 | 43 |
| Revenue Per Paying User | | 0 | 75 | 77 | 79 | 81 | 82 | 84 | 86 | 88 | 89 | 91 |
| Userbase Growth Rate (UGR) | | | 45% | 43% | 41% | 39% | 37% | 35% | 33% | 31% | 29% | 27% |
| hurn Rate | | | 23% | 22% | 21% | 20% | 19% | 18% | 17% | 16% | 15% | 14% |
| Paying Userbase Percentage (PUP) | 8% | 8% | 8% | 8% | 4% | 5% | 6% | 7% | 7% | 7% | 7% | 7% |
| Super Duolingo Percentage (SDP) | 95% | 95% | 93% | 90% | 88% | 85% | 83% | 80% | 78% | 75% | 73% | 70% |
| Duolingo Max Percentage (DMP) | 5% | 5% | 8% | 10% | 13% | 15% | 18% | 20% | 23% | 25% | 28% | 30% |
| uolingo Max Userbase (mm) | | 0 | 1 | 1 | 1 | 2 | 3 | 5 | 7 | 8 | 10 | 13 |
| hange In Duolingo Max Userbase (mm) | | 0 | 0 | 1 | 0 | 1 | 1 | 2 | 2 | 2 | 2 | 2 |
| UP Decline in 2027 | -34% | | 0% | 0% | 0% | 0% | 0% | 0% | 0% | 0% | 0% | 0% |
| aying Userbase Growth Factor (PUGF) | 2% | | 0% | 0% | N/A | 1% | 1% | 1% | 0% | 0% | 0% | 0% |
| Subscription Ratio Adjustment Factor (SRAF) | 3% | | 3% | 3% | 3% | 3% | 3% | 3% | 3% | 3% | 3% | 3% |
| hurn Rate Decline Factor (CRDF) | 1% | | 1% | 1% | 1% | 1% | 1% | 1% | 1% | 1% | 1% | 1% |
| IAU Growth Decline Factor (GDF) | 2% | | 2% | 2% | 2% | 2% | 2% | 2% | 2% | 2% | 2% | 2% |
| ET Volume (mm) | 1 | | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 |

| Revenue Streams | | | | Downside Revenue Projections | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| ifferent Revenue Streams | Price | 2023A | 2024A | 2025E | 2026E | 2027E | 2028E | 2029E | 2030E | 2031E | 2032E | 2033E | 2034E |
| uper Duolingo | 7 | | | 749 | 881 | 565 | 798 | 1,078 | 1,409 | 1,581 | 1,756 | 1,932 | 2,104 |
| uolingo Max | 14 | | | 121 | 196 | 161 | 281 | 457 | 705 | 918 | 1,171 | 1,466 | 1,804 |
| nglish Test | 65 | | | 42 | 42 | 42 | 42 | 42 | 42 | 42 | 42 | 42 | 42 |
| dvertisements | | | | 61 | 73 | 88 | 104 | 123 | 144 | 166 | 191 | 217 | 245 |
| ale of Virtual Goods | | | | | | | | | | | | | |
| Total Revenue ($mm) | | 531 | 748 | 974 | 1,192 | 857 | 1,226 | 1,701 | 2,300 | 2,708 | 3,161 | 3,658 | 4,196 |
| % growth | | | 41% | 30% | 22% | -28% | 43% | 39% | 35% | 18% | 17% | 16% | 15% |

## $4.2B
Total 2034E FY Revenue

## 29.7mm
Total 2034E FY Paying Users

## 18.8%
Average Revenue Growth Rate

Source: Team Consensus

# Revenue Sensitivity

**Downside scenario revenue projections are still optimistic.**

| 2034E Revenue 7112 | SRAF | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| PUGF | 1.9% | 2.0% | 2.1% | 2.2% | 2.3% | 2.4% | 2.6% | 2.7% | 2.9% | 3.0% | 3.2% | 3.3% | 3.5% | 3.6% | 3.8% | 4.0% | 4.2% | 4.4% | 4.7% |
| 7.9% | 4,235 | 4,267 | 4,300 | 4,336 | 4,373 | 4,412 | 4,453 | 4,496 | 4,541 | 4,589 | 4,637 | 4,687 | 4,740 | 4,795 | 4,853 | 4,914 | 4,978 | 5,045 | 5,116 |
| 8.4% | 4,443 | 4,477 | 4,512 | 4,549 | 4,588 | 4,629 | 4,672 | 4,717 | 4,765 | 4,815 | 4,866 | 4,918 | 4,974 | 5,032 | 5,093 | 5,157 | 5,225 | 5,296 | 5,370 |
| 8.8% | 4,662 | 4,697 | 4,734 | 4,773 | 4,814 | 4,857 | 4,902 | 4,950 | 5,001 | 5,054 | 5,106 | 5,162 | 5,220 | 5,282 | 5,346 | 5,414 | 5,485 | 5,559 | 5,637 |
| 9.3% | 4,892 | 4,929 | 4,968 | 5,009 | 5,052 | 5,098 | 5,145 | 5,196 | 5,249 | 5,304 | 5,360 | 5,419 | 5,480 | 5,545 | 5,612 | 5,684 | 5,758 | 5,837 | 5,919 |
| 9.7% | 5,135 | 5,173 | 5,214 | 5,258 | 5,303 | 5,351 | 5,401 | 5,454 | 5,510 | 5,568 | 5,627 | 5,689 | 5,753 | 5,821 | 5,893 | 5,968 | 6,046 | 6,129 | 6,215 |
| 10.3% | 5,390 | 5,431 | 5,474 | 5,519 | 5,567 | 5,617 | 5,670 | 5,726 | 5,785 | 5,846 | 5,908 | 5,973 | 6,041 | 6,113 | 6,188 | 6,267 | 6,349 | 6,436 | 6,527 |
| 10.8% | 5,658 | 5,701 | 5,747 | 5,794 | 5,845 | 5,898 | 5,954 | 6,012 | 6,074 | 6,139 | 6,204 | 6,272 | 6,344 | 6,419 | 6,498 | 6,581 | 6,668 | 6,760 | 6,856 |
| 11.4% | 5,941 | 5,986 | 6,034 | 6,084 | 6,137 | 6,193 | 6,252 | 6,313 | 6,379 | 6,447 | 6,515 | 6,587 | 6,663 | 6,742 | 6,825 | 6,912 | 7,004 | 7,100 | 7,202 |
| 12.0% | 6,238 | 6,286 | 6,336 | 6,389 | 6,445 | 6,504 | 6,566 | 6,631 | 6,699 | 6,771 | 6,843 | 6,919 | 6,998 | 7,082 | 7,169 | 7,261 | 7,358 | 7,459 | 7,566 |
| **12.6%** | 6,552 | 6,602 | 6,655 | 6,711 | 6,769 | 6,831 | 6,896 | 6,965 | 7,037 | **7,112** | 7,188 | 7,268 | 7,351 | 7,439 | 7,531 | 7,628 | 7,730 | 7,837 | 7,949 |
| 13.2% | 6,865 | 6,918 | 6,973 | 7,032 | 7,093 | 7,158 | 7,227 | 7,298 | 7,374 | 7,454 | 7,533 | 7,617 | 7,705 | 7,797 | 7,894 | 7,995 | 8,102 | 8,214 | 8,332 |
| 13.9% | 7,194 | 7,249 | 7,308 | 7,369 | 7,434 | 7,502 | 7,573 | 7,649 | 7,728 | 7,812 | 7,896 | 7,983 | 8,076 | 8,172 | 8,274 | 8,381 | 8,493 | 8,610 | 8,734 |
| 14.6% | 7,539 | 7,597 | 7,659 | 7,723 | 7,791 | 7,862 | 7,938 | 8,017 | 8,100 | 8,188 | 8,276 | 8,368 | 8,465 | 8,567 | 8,673 | 8,785 | 8,903 | 9,026 | 9,156 |
| 15.3% | 7,902 | 7,963 | 8,027 | 8,095 | 8,166 | 8,241 | 8,320 | 8,403 | 8,491 | 8,583 | 8,675 | 8,772 | 8,874 | 8,981 | 9,093 | 9,210 | 9,334 | 9,463 | 9,600 |
| 16.1% | 8,282 | 8,346 | 8,414 | 8,485 | 8,560 | 8,639 | 8,722 | 8,809 | 8,901 | 8,998 | 9,095 | 9,196 | 9,303 | 9,415 | 9,533 | 9,656 | 9,786 | 9,922 | 10,065 |
| 16.9% | 8,682 | 8,749 | 8,820 | 8,895 | 8,974 | 9,057 | 9,144 | 9,235 | 9,332 | 9,434 | 9,535 | 9,642 | 9,754 | 9,872 | 9,995 | 10,125 | 10,261 | 10,404 | 10,554 |
| 17.7% | 9,102 | 9,173 | 9,247 | 9,326 | 9,408 | 9,495 | 9,586 | 9,683 | 9,784 | 9,891 | 9,998 | 10,110 | 10,227 | 10,351 | 10,480 | 10,617 | 10,760 | 10,910 | 11,067 |
| 18.6% | 9,542 | 9,617 | 9,695 | 9,777 | 9,864 | 9,955 | 10,051 | 10,153 | 10,259 | 10,371 | 10,483 | 10,601 | 10,724 | 10,854 | 10,990 | 11,133 | 11,283 | 11,441 | 11,606 |
| 19.5% | 10,005 | 10,083 | 10,165 | 10,252 | 10,343 | 10,439 | 10,540 | 10,646 | 10,758 | 10,875 | 10,993 | 11,116 | 11,246 | 11,382 | 11,525 | 11,675 | 11,833 | 11,999 | 12,172 |

Source: Team Consensus

# Volatility Observations

**This is not a low beta stock.**
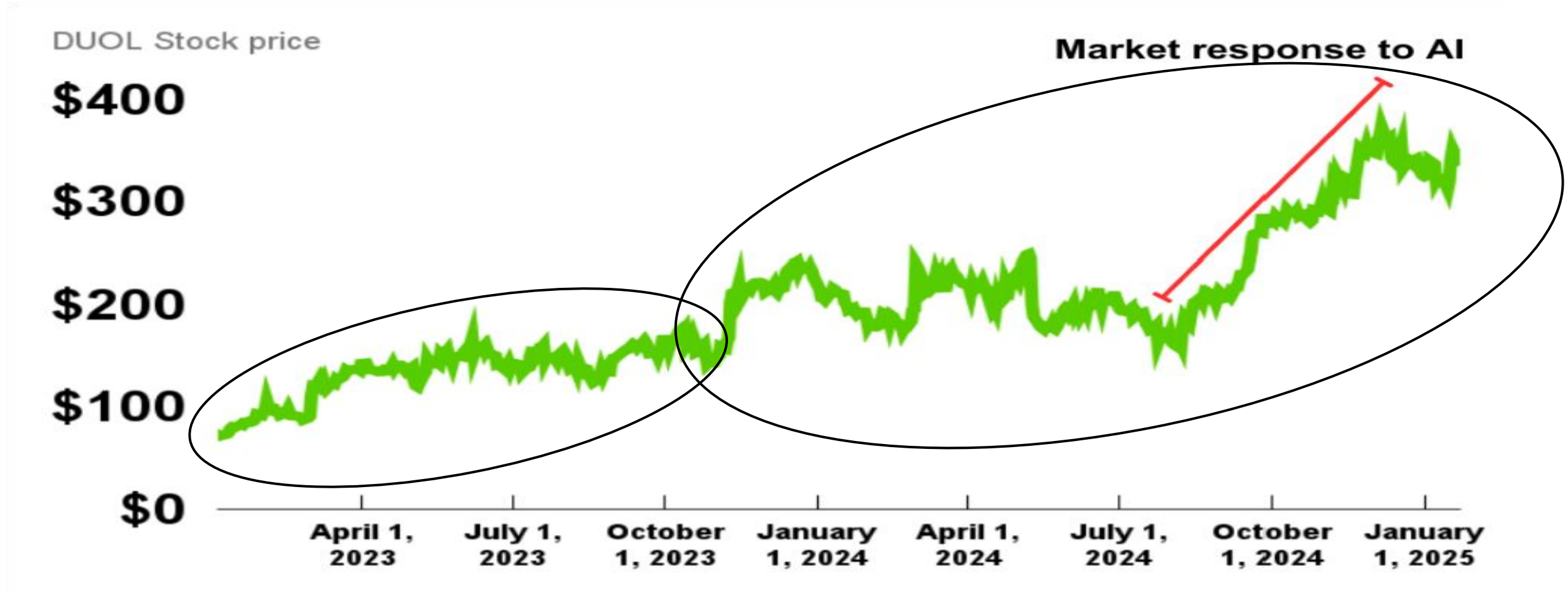


*The price movements of this stock are completely different following announcements regarding AI*

Sources: FactSet, Yahoo Finance, Team Consensus

# Beta Calculation

## DUOL's 1yr beta illustrates how volatile the stock has become.

Increased Volatility, Increased Expected Return

| | 5yr | 3yr | 1yr |
|---|---|---|---|

**Beta**

**SUMMARY OUTPUT**

| Regression Statistics | |
|---|---|
| Multiple R | 0.4 |
| R Square | 0.2 |
| Adjusted R Square | 0.2 |
| Standard Error | 0.0 |
| Observations | 252.0 |

**ANOVA**

| | df | SS | MS | F | Significance F |
|---|---|---|---|---|---|
| Regression | 1.0 | 0.1 | 0.1 | 60.0 | 0.0 |
| Residual | 250.0 | 0.2 | 0.0 | | |
| Total | 251.0 | 0.3 | | | |

| | Coefficients | Standard Error | t Stat | P-value | Lower 95% | Upper 95% | Lower 95.0% | Upper 95.0% |
|---|---|---|---|---|---|---|---|---|
| Intercept | 0.0 | 0.0 | -0.2 | 0.8 | 0.0 | 0.0 | 0.0 | 0.0 |
| X Variable 1 | 1.9 | 0.2 | 7.7 | 0.0 | 1.4 | 2.4 | 1.4 | 2.4 |
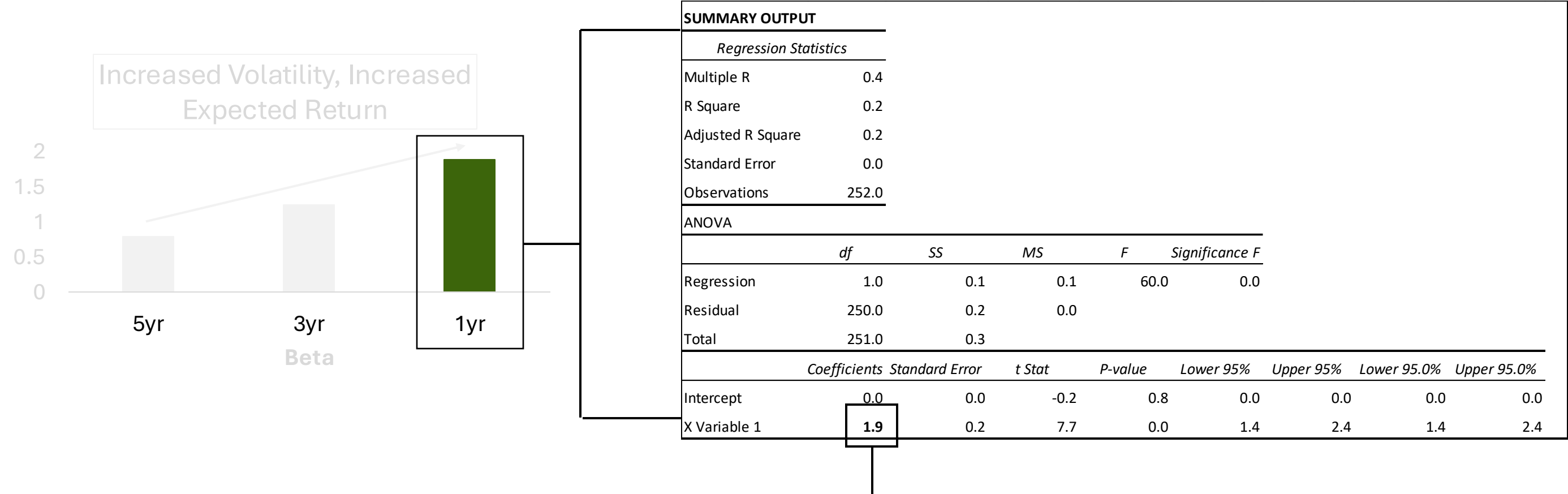
**The 1 yr beta indicated by the linear regression analysis we conducted is over 2x higher than the 5yr beta. Therefore, we have determined that using that much lower beta would mislead investors about the realistic cost of capital for their business.**

Sources: FactSet, Yahoo Finance, Team Consensus

# Beta Calculation

**We take an average of the 1yr, 3yr, and 5yr beta to highlight this shift in volatility.**

**Increased Volatility, Increased Expected Return**



Beta

## Average: **1.3**

| SUMMARY OUTPUT | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| *Regression Statistics* | | | | | | | | |
| Multiple R | 0.4 | | | | | | | |
| R Square | 0.2 | | | | | | | |
| Adjusted R Square | 0.2 | | | | | | | |
| Standard Error | 0.0 | | | | | | | |
| Observations | 252.0 | | | | | | | |
| ANOVA | | | | | | | | |
| | *df* | *SS* | *MS* | *F* | *Significance F* | | | |
| Regression | 1.0 | 0.1 | 0.1 | 60.0 | 0.0 | | | |
| Residual | 250.0 | 0.2 | 0.0 | | | | | |
| Total | 251.0 | 0.3 | | | | | | |
| | *Coefficients* | *Standard Error* | *t Stat* | *P-value* | *Lower 95%* | *Upper 95%* | *Lower 95.0%* | *Upper 95.0%* |
| Intercept | 0.0 | 0.0 | -0.2 | 0.8 | 0.0 | 0.0 | 0.0 | 0.0 |
| X Variable 1 | 1.9 | 0.2 | 7.7 | 0.0 | 1.4 | 2.4 | 1.4 | 2.4 |

The 1 yr beta indicated by the linear regression analysis we conducted is 2x higher then the 5yr beta. Therefore, we have determined that using that much lower beta would mislead investors about the realistic cost of capital for their business.

Sources: FactSet, Yahoo Finance, Team Consensus

# WACC Calculation

## 11 Year Forecasted Period

**Assumptions:**
- Duolingo will not engage in any M&A activity
- Duolingo will not take on debt
- Duolingo's capital structure will remain the same
- The risk free rate will remain at current levels
- Beta will remain closer to 1yr levels

| WACC Calculation | |
|---|---|
| Cost of Debt | N/A |
| Cost of Equity | 10.6% |
| % Debt | N/A |
| % Equity | 50.0% |
| **WACC** | **10.6%** |

## Terminal Value

**Assumptions:**
- Duolingo will take on debt
- Duolingo's capital structure will remain the same
- The risk free rate will remain at current levels
- Beta will remain closer to 1yr levels

| WACC Calculation | |
|---|---|
| Cost of Debt | 6.0% |
| Cost of Equity | 10.3% |
| % Debt | 50.0% |
| % Equity | 50.0% |
| **WACC** | **7.5%** |

Sources: Team Consensus

# Constant Growth Rate

**45% of Duolingo's revenue comes from the United States, and 72% revenue comes from developed nations.**
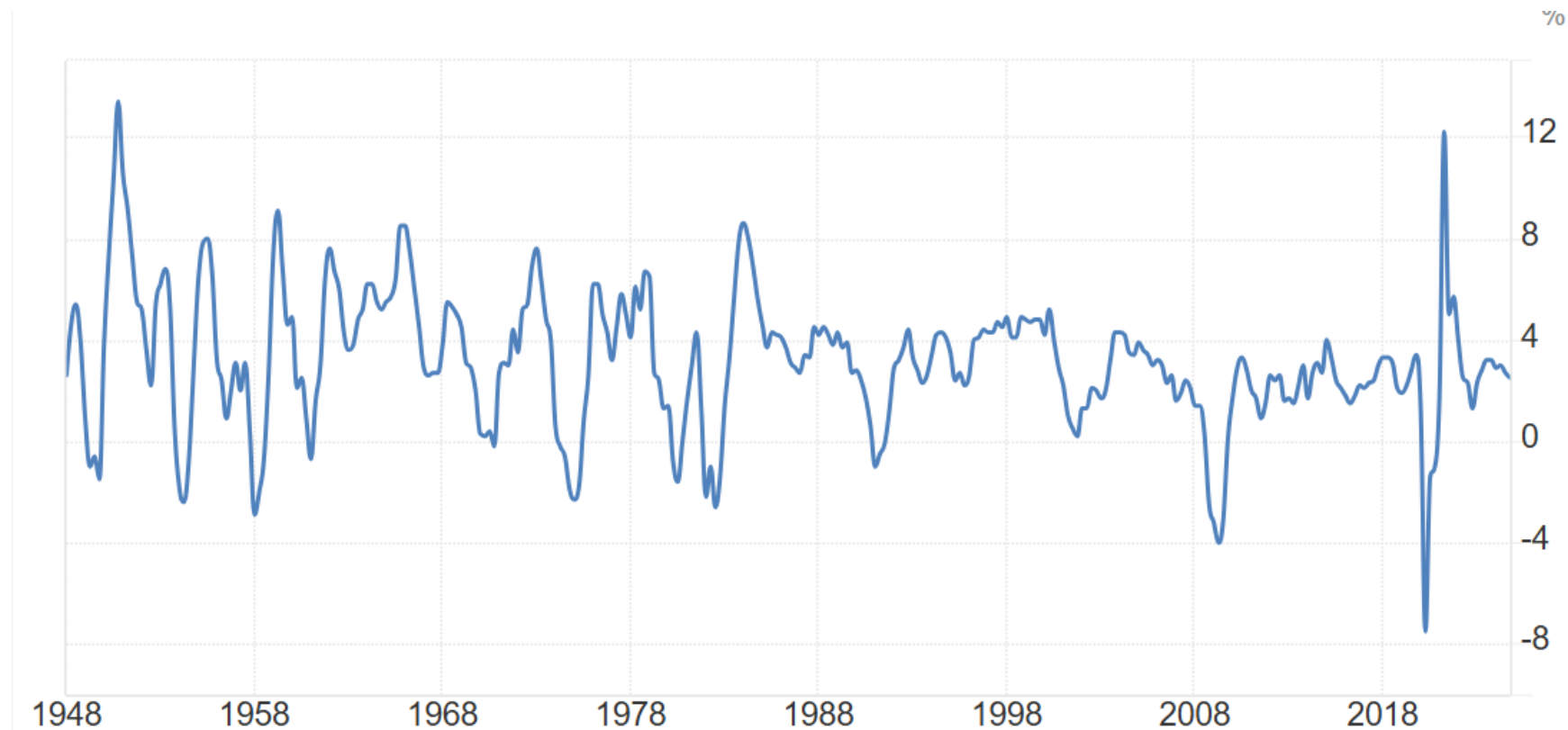


# 2-4%

Constant growth rate range based on average US GDP Growth of 3%

Sources: Trading Economics, Team Consensus

# DCF: Base Case Scenario

## Base Case Scenario DCF Recommendation: Sell

### Discounted Cash Flow Analysis

*All values are in thousands*

| | 2023A | 2024A | 2025E | 2026E | 2027E | 2028E | 2029E | 2030E | 2031E | 2032E | 2033E | 2034E |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Revenues** | **531,109** | **748,024** | **1,083,493** | **1,467,200** | **1,046,957** | **1,464,664** | **1,999,533** | **2,671,729** | **3,500,815** | **4,506,301** | **5,705,442** | **7,112,169** |
| Cost of Goods Sold | (142,105) | (203,645) | (313,394) | (422,966) | (304,793) | (432,362) | (598,021) | (808,940) | (1,072,301) | (1,395,401) | (1,784,969) | (2,246,772) |
| **Gross Profit** | **389,004** | **544,379** | **770,099** | **1,044,234** | **742,165** | **1,032,302** | **1,401,512** | **1,862,790** | **2,428,514** | **3,110,900** | **3,920,473** | **4,865,396** |
| **Operating Expenses:** | | | | | | | | | | | | |
| Research and Development | (194,352) | (235,298) | (335,405) | (446,850) | (313,626) | (431,431) | (578,984) | (760,266) | (978,686) | (1,237,247) | (1,537,956) | (1,881,591) |
| Sales and Marketing | (75,788) | (90,494) | (131,078) | (177,498) | (126,658) | (177,191) | (241,898) | (323,219) | (423,519) | (545,161) | (690,230) | (860,412) |
| General and Administrative | (132,123) | (155,992) | (223,241) | (298,632) | (210,479) | (290,793) | (391,986) | (517,083) | (668,791) | (849,612) | (1,061,433) | (1,305,359) |
| Total Operating Expenses | (402,263) | (481,784) | (689,725) | (922,980) | (650,763) | (899,414) | (1,212,868) | (1,600,568) | (2,070,997) | (2,632,020) | (3,289,619) | (4,047,361) |
| **Earnings Before Interest and Taxes** | **(13,259)** | **62,595** | **80,374** | **121,254** | **91,402** | **132,888** | **188,644** | **262,222** | **357,517** | **478,879** | **630,854** | **818,035** |
| Other Income | 590 | 1,267 | 929 | 929 | 929 | 929 | 929 | 929 | 929 | 929 | 929 | 929 |
| Other Expense | (645) | (4,253) | (2,449) | (2,449) | (2,449) | (2,449) | (2,449) | (2,449) | (2,449) | (2,449) | (2,449) | (2,449) |
| Other (Expense) Income, Net | (55) | (2,986) | (1,521) | (1,521) | (1,521) | (1,521) | (1,521) | (1,521) | (1,521) | (1,521) | (1,521) | (1,521) |
| **Earnings Before Interest and Taxes** | **(13,314)** | **59,609** | **77,333** | **118,213** | **88,361** | **129,847** | **185,603** | **259,181** | **354,476** | **475,838** | **627,813** | **814,994** |
| Interest Income | 31,091 | 42,697 | 61,845 | - | - | - | - | - | - | - | - | - |
| **Earnings Before Taxes** | **17,777** | **102,306** | **139,178** | **118,213** | **88,361** | **129,847** | **185,603** | **259,181** | **354,476** | **475,838** | **627,813** | **814,994** |
| Provision for Income Taxes | (1,710) | (13,732) | (20,877) | (17,732) | (13,254) | (19,477) | (27,840) | (38,877) | (53,171) | (71,376) | (94,172) | (122,249) |
| **Net Income** | **16,067** | **88,574** | **118,302** | **100,481** | **75,106** | **110,370** | **157,762** | **220,304** | **301,305** | **404,463** | **533,641** | **692,745** |
| (+) Depreciation and Amortization | 7,095 | 10,854 | 15,098 | 20,445 | 14,589 | 20,409 | 27,863 | 37,229 | 48,782 | 62,793 | 79,503 | 99,105 |
| (+) Maturity of Investments | - | 3,705 | 193,300 | - | - | - | - | - | - | - | - | - |
| (-) Capital Expenditures | (13,684) | (21,140) | (29,268) | (39,634) | (28,281) | (39,565) | (54,013) | (72,172) | (94,568) | (121,729) | (154,121) | (192,121) |
| (-) Change in Networking Capital | | (20,740) | 158,251 | 89,932 | (102,778) | 98,169 | 124,793 | 155,761 | 190,854 | 230,014 | 272,665 | 318,007 |
| **Unlevered FCF** | **$9,478** | **61,253** | **$455,683** | **$171,225** | **($41,365)** | **$189,383** | **$256,404** | **$341,122** | **$446,374** | **$575,541** | **$731,688** | **$917,735** |

### Terminal Value Calc

| | |
|---|---|
| **Final FCF** | 917,735 |
| **Terminal Value** | 15,482,230 |
| **WACC** | 11% |
| **Constant Growth Rate** | 3% |

### Equity Value Calc

| | |
|---|---|
| **Enterprise Value (V0)** | 7,775,100 |
| **(+) Cash** | 785,791 |
| **(-) Debt** | - |
| **Equity Value** | 8,560,891 |
| **Shares Outstanding** | 39,000 |

### Recomendation

| | |
|---|---|
| **Current Stock Price** | 293 |
| **Price Target** | 220 |
| **Downside** | -25% |
| **Recomendation** | Sell |

Source: Team Consensus

# DCF: Upside Scenario

## Upside Scenario DCF Recommendation: Buy

| Discounted Cash Flow Analysis | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| All values are in thousands | 2023A | 2024A | 2025E | 2026E | 2027E | 2028E | 2029E | 2030E | 2031E | 2032E | 2033E | 2034E |
| Revenues | 531,109 | 748,024 | 1,197,706 | 1,749,935 | 1,242,497 | 1,915,318 | 2,803,709 | 3,948,807 | 5,392,999 | 7,178,060 | 9,342,856 | 11,920,667 |
| Cost of Goods Sold | (142,105) | (203,645) | (346,429) | (507,140) | (364,461) | (570,994) | (848,343) | (1,211,310) | (1,675,477) | (2,256,597) | (2,969,802) | (3,828,655) |
| Gross Profit | 389,004 | 544,379 | 851,277 | 1,242,794 | 878,036 | 1,344,325 | 1,955,366 | 2,737,497 | 3,717,521 | 4,921,462 | 6,373,055 | 8,092,012 |
| | | | | | | | | | | | | |
| Operating Expenses: | | | | | | | | | | | | |
| Research and Development | (194,352) | (235,298) | (370,761) | (532,959) | (372,202) | (564,175) | (811,840) | (1,123,670) | (1,507,664) | (1,970,804) | (2,518,455) | (3,153,725) |
| Sales and Marketing | (75,788) | (90,494) | (144,895) | (211,703) | (150,314) | (231,710) | (339,185) | (477,716) | (652,431) | (868,383) | (1,130,274) | (1,442,131) |
| General and Administrative | (132,123) | (155,992) | (246,774) | (356,180) | (249,790) | (380,265) | (549,636) | (764,247) | (1,030,272) | (1,353,342) | (1,738,133) | (2,187,904) |
| Total Operating Expenses | (402,263) | (481,784) | (762,430) | (1,100,841) | (772,306) | (1,176,150) | (1,700,661) | (2,365,634) | (3,190,366) | (4,192,529) | (5,386,863) | (6,783,760) |
| Earnings Before Interest and Taxes | (13,259) | 62,595 | 88,846 | 141,953 | 105,731 | 168,175 | 254,704 | 371,863 | 527,155 | 728,933 | 986,192 | 1,308,251 |
| | | | | | | | | | | | | |
| Other Income | 590 | 1,267 | 929 | 929 | 929 | 929 | 929 | 929 | 929 | 929 | 929 | 929 |
| Other Expense | (645) | (4,253) | (2,449) | (2,449) | (2,449) | (2,449) | (2,449) | (2,449) | (2,449) | (2,449) | (2,449) | (2,449) |
| Other (Expense) Income, Net | (55) | (2,986) | (1,521) | (1,521) | (1,521) | (1,521) | (1,521) | (1,521) | (1,521) | (1,521) | (1,521) | (1,521) |
| Earnings Before Interest and Taxes | (13,314) | 59,609 | 85,805 | 138,912 | 102,690 | 165,134 | 251,663 | 368,822 | 524,114 | 725,892 | 983,151 | 1,305,210 |
| | | | | | | | | | | | | |
| Interest Income | 31,091 | 42,697 | 68,365 | - | - | - | - | - | - | - | - | - |
| Earnings Before Taxes | 17,777 | 102,306 | 154,170 | 138,912 | 102,690 | 165,134 | 251,663 | 368,822 | 524,114 | 725,892 | 983,151 | 1,305,210 |
| | | | | | | | | | | | | |
| Provision for Income Taxes | (1,710) | (13,732) | (23,126) | (20,837) | (15,403) | (24,770) | (37,750) | (55,323) | (78,617) | (108,884) | (147,473) | (195,782) |
| Net Income | 16,067 | 88,574 | 131,045 | 118,075 | 87,286 | 140,364 | 213,914 | 313,499 | 445,497 | 617,008 | 835,678 | 1,109,429 |
| | | | | | | | | | | | | |
| (+) Depreciation and Amortization | 7,095 | 10,854 | 16,689 | 24,385 | 17,314 | 26,689 | 39,068 | 55,025 | 75,149 | 100,023 | 130,188 | 166,109 |
| (+) Maturity of Investments | - | 3,705 | 193,300 | - | - | - | - | - | - | - | - | - |
| (-) Capital Expenditures | (13,684) | (21,140) | (32,354) | (47,271) | (33,564) | (51,739) | (75,737) | (106,669) | (145,681) | (193,901) | (252,379) | (322,013) |
| (-) Change in Networking Capital | | (20,740) | 186,170 | 129,270 | (124,111) | 157,654 | 206,319 | 263,768 | 330,139 | 405,155 | 488,031 | 577,406 |
| Unlevered FCF | $9,478 | 61,253 | $494,850 | $224,459 | ($53,075) | $272,968 | $383,564 | $525,622 | $705,104 | $928,284 | $1,201,518 | $1,530,930 |

### Terminal Value Calc

| | |
|---|---|
| Final FCF | 1,530,930 |
| Terminal Value | 28,267,111 |
| WACC | 11% |
| Constant Growth Rate | 4% |

### Equity Value Calc

| | |
|---|---|
| Enterprise Value (V0) | 13,465,297 |
| (+) Cash | 785,791 |
| (-) Debt | - |
| Equity Value | 14,251,088 |
| Shares Outstanding | 39,000 |

### Recomendation

| | |
|---|---|
| Current Stock Price | 293 |
| Price Target | 365 |
| Upside | 25% |
| Recomendation | Buy |

Source: Team Consensus

# DCF: Downside Scenario

## Downside Scenario DCF Recommendation: Sell

| Discounted Cash Flow Analysis | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| All values are in thousands | 2023A | 2024A | 2025E | 2026E | 2027E | 2028E | 2029E | 2030E | 2031E | 2032E | 2033E | 2034E |
| Revenues | 531,109 | 748,024 | 973,695 | 1,191,896 | 856,628 | 1,225,633 | 1,700,683 | 2,299,897 | 2,707,605 | 3,160,626 | 3,657,590 | 4,195,509 |
| Cost of Goods Sold | (142,105) | (203,645) | (281,635) | (341,658) | (247,378) | (358,370) | (503,135) | (687,967) | (817,684) | (963,213) | (1,124,382) | (1,300,481) |
| Gross Profit | 389,004 | 544,379 | 692,059 | 850,238 | 609,249 | 867,262 | 1,197,549 | 1,611,930 | 1,889,921 | 2,197,413 | 2,533,208 | 2,895,029 |
| | | | | | | | | | | | | |
| Operating Expenses: | | | | | | | | | | | | |
| Research and Development | (194,352) | (235,298) | (301,416) | (363,003) | (256,611) | (361,022) | (492,449) | (654,457) | (756,937) | (867,780) | (985,938) | (1,109,962) |
| Sales and Marketing | (75,788) | (90,494) | (117,795) | (144,193) | (103,633) | (148,274) | (205,744) | (278,236) | (327,559) | (382,364) | (442,486) | (507,562) |
| General and Administrative | (132,123) | (155,992) | (200,619) | (242,597) | (172,215) | (243,336) | (333,400) | (445,119) | (517,258) | (595,901) | (680,453) | (770,039) |
| Total Operating Expenses | (402,263) | (481,784) | (619,830) | (749,793) | (532,459) | (752,631) | (1,031,593) | (1,377,812) | (1,601,753) | (1,846,045) | (2,108,877) | (2,387,562) |
| Earnings Before Interest and Taxes | (13,259) | 62,595 | 72,229 | 100,445 | 76,790 | 114,631 | 165,956 | 234,117 | 288,168 | 351,368 | 424,331 | 507,467 |
| | | | | | | | | | | | | |
| Other Income | 590 | 1,267 | 929 | 929 | 929 | 929 | 929 | 929 | 929 | 929 | 929 | 929 |
| Other Expense | (645) | (4,253) | (2,449) | (2,449) | (2,449) | (2,449) | (2,449) | (2,449) | (2,449) | (2,449) | (2,449) | (2,449) |
| Other (Expense) Income, Net | (55) | (2,986) | (1,521) | (1,521) | (1,521) | (1,521) | (1,521) | (1,521) | (1,521) | (1,521) | (1,521) | (1,521) |
| Earnings Before Interest and Taxes | (13,314) | 59,609 | 69,188 | 97,404 | 73,749 | 111,590 | 162,915 | 231,076 | 285,127 | 348,327 | 421,290 | 504,426 |
| | | | | | | | | | | | | |
| Interest Income | 31,091 | 42,697 | 61,845 | - | - | - | - | - | - | - | - | - |
| Earnings Before Taxes | 17,777 | 102,306 | 131,034 | 97,404 | 73,749 | 111,590 | 162,915 | 231,076 | 285,127 | 348,327 | 421,290 | 504,426 |
| | | | | | | | | | | | | |
| Provision for Income Taxes | (1,710) | (13,732) | (18,715) | (14,611) | (11,062) | (16,739) | (24,437) | (34,661) | (42,769) | (52,249) | (63,194) | (75,664) |
| Net Income | 16,067 | 88,574 | 112,319 | 82,794 | 62,687 | 94,852 | 138,477 | 196,415 | 242,358 | 296,078 | 358,097 | 428,762 |
| | | | | | | | | | | | | |
| (+) Depreciation and Amortization | 7,095 | 10,854 | 13,568 | 16,609 | 11,937 | 17,079 | 23,698 | 32,048 | 37,729 | 44,042 | 50,967 | 58,462 |
| (+) Maturity of Investments | - | 3,705 | 193,300 | - | - | - | - | - | - | - | - | - |
| (-) Capital Expenditures | (13,684) | (21,140) | (26,302) | (32,197) | (23,140) | (33,108) | (45,941) | (62,127) | (73,141) | (85,378) | (98,803) | (113,333) |
| (-) Change in Networking Capital | | (20,740) | 131,412 | 51,010 | (81,994) | 87,428 | 111,817 | 140,171 | 93,843 | 103,737 | 113,218 | 121,921 |
| Unlevered FCF | $9,478 | 61,253 | $424,296 | $118,215 | ($30,510) | $166,250 | $228,052 | $306,506 | $300,790 | $358,479 | $423,479 | $495,811 |

| Terminal Value Calc | |
|---|---|
| Final FCF | 495,811 |
| Terminal Value | 7,693,688 |
| WACC | 11% |
| Constant Growth Rate | 3% |

| Equity Value Calc | |
|---|---|
| Enterprise Value (V0) | 4,357,016 |
| (+) Cash | 785,791 |
| (-) Debt | - |
| Equity Value | 5,142,807 |
| Shares Outstanding | 39,000 |

| Recomendation | |
|---|---|
| Current Stock Price | 293 |
| Price Target | 132 |
| Downside | -55% |
| Recomendation | Sell |

Source: Team Consensus

# DCF: Base Case Sensitivity

**Constant Growth Rate and WACC**

**Constant Growth Rate**

| Share Price 220 | 2% | 2% | 2% | 2% | 2% | 2% | 3% | 3% | 3% | 3% | 3% | 3% | 3% | 3% | 4% | 4% | 4% | 4% | 4% | 5% |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 7% | 262 | 265 | 267 | 271 | 274 | 278 | 282 | 286 | 291 | 296 | 302 | 308 | 315 | 322 | 331 | 340 | 351 | 364 | 378 |
| 7% | 255 | 258 | 260 | 263 | 266 | 270 | 274 | 278 | 283 | 288 | 293 | 299 | 306 | 313 | 321 | 331 | 341 | 353 | 367 |
| 7% | 248 | 250 | 253 | 256 | 259 | 262 | 266 | 270 | 275 | 280 | 285 | 291 | 297 | 304 | 312 | 321 | 331 | 343 | 356 |
| 8% | 241 | 243 | 246 | 248 | 251 | 255 | 258 | 262 | 267 | 271 | 276 | 282 | 288 | 295 | 303 | 311 | 321 | 332 | 345 |
| 8% | 233 | 236 | 238 | 241 | 244 | 247 | 250 | 254 | 258 | 263 | 268 | 273 | 279 | 286 | 293 | 301 | 311 | 322 | 334 |
| 9% | 226 | 228 | 230 | 233 | 236 | 239 | 242 | 246 | 250 | 254 | 259 | 264 | 270 | 276 | 283 | 291 | 300 | 311 | 323 |
| 9% | 218 | 221 | 223 | 225 | 228 | 231 | 234 | 238 | 241 | 246 | 250 | 255 | 261 | 267 | 273 | 281 | 290 | 300 | 311 |
| 10% | 211 | 213 | 215 | 218 | 220 | 223 | 226 | 229 | 233 | 237 | 241 | 246 | 251 | 257 | 264 | 271 | 279 | 289 | 300 |
| 10% | 203 | 205 | 207 | 210 | 212 | 215 | 218 | 221 | 224 | 228 | 232 | 237 | 242 | 247 | 254 | 261 | 269 | 278 | 288 |
| 11% | 196 | 198 | 200 | 202 | 204 | 207 | 209 | 213 | 216 | **220** | 223 | 228 | 233 | 238 | 244 | 251 | 258 | 267 | 277 |
| 11% | 189 | 190 | 192 | 194 | 197 | 199 | 202 | 205 | 208 | 211 | 215 | 219 | 224 | 229 | 234 | 241 | 248 | 256 | 266 |
| 12% | 182 | 183 | 185 | 187 | 189 | 191 | 194 | 197 | 200 | 203 | 207 | 210 | 215 | 220 | 225 | 231 | 238 | 246 | 255 |
| 12% | 174 | 176 | 178 | 180 | 182 | 184 | 186 | 189 | 192 | 195 | 198 | 202 | 206 | 211 | 216 | 221 | 228 | 236 | 244 |
| 13% | 167 | 169 | 170 | 172 | 174 | 176 | 178 | 181 | 184 | 187 | 190 | 193 | 197 | 202 | 206 | 212 | 218 | 225 | 233 |
| 13% | 160 | 162 | 163 | 165 | 167 | 169 | 171 | 173 | 176 | 179 | 182 | 185 | 189 | 193 | 197 | 202 | 208 | 215 | 223 |
| 14% | 153 | 155 | 156 | 158 | 159 | 161 | 163 | 165 | 168 | 171 | 173 | 177 | 180 | 184 | 188 | 193 | 199 | 205 | 212 |
| 15% | 147 | 148 | 149 | 151 | 152 | 154 | 156 | 158 | 160 | 163 | 165 | 168 | 172 | 175 | 179 | 184 | 189 | 195 | 202 |
| 16% | 140 | 141 | 142 | 144 | 145 | 147 | 149 | 150 | 153 | 155 | 157 | 160 | 163 | 167 | 171 | 175 | 180 | 185 | 192 |
| 16% | 133 | 134 | 136 | 137 | 138 | 140 | 141 | 143 | 145 | 147 | 150 | 152 | 155 | 158 | 162 | 166 | 171 | 176 | 182 |

(WACC on left axis)

**Capital Expenditures and NWC**

**Capital Expenditures**

| Share Price 220 | (121,084) | (127,457) | (134,165) | (141,227) | (148,660) | (156,484) | (164,720) | (173,389) | (182,515) | (192,121) | (201,727) | (211,814) | (222,404) | (233,525) | (245,201) | (257,461) | (270,334) | (283,851) | (298,043) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 200,424 | 212 | 211 | 209 | 208 | 207 | 206 | 204 | 203 | 201 | 200 | 198 | 196 | 196 | 193 | 191 | 189 | 187 | 184 | 182 |
| 210,972 | 213 | 212 | 211 | 210 | 209 | 208 | 206 | 205 | 203 | 202 | 200 | 198 | 196 | 195 | 193 | 191 | 188 | 186 | 184 |
| 222,076 | 215 | 214 | 213 | 212 | 211 | 209 | 208 | 207 | 205 | 203 | 202 | 200 | 198 | 196 | 194 | 192 | 190 | 188 | 186 |
| 233,764 | 217 | 216 | 215 | 214 | 213 | 211 | 210 | 209 | 207 | 205 | 204 | 202 | 200 | 198 | 196 | 194 | 192 | 190 | 188 |
| 246,068 | 219 | 218 | 217 | 216 | 215 | 213 | 212 | 211 | 209 | 207 | 206 | 204 | 202 | 200 | 199 | 196 | 194 | 192 | 190 |
| 259,019 | 222 | 220 | 219 | 218 | 217 | 216 | 214 | 213 | 211 | 210 | 208 | 206 | 205 | 203 | 201 | 199 | 196 | 194 | 192 |
| 272,651 | 224 | 223 | 222 | 220 | 219 | 218 | 216 | 215 | 214 | 212 | 210 | 209 | 207 | 205 | 203 | 201 | 199 | 196 | 194 |
| 287,001 | 226 | 225 | 224 | 223 | 222 | 220 | 219 | 217 | 216 | 214 | 213 | 211 | 209 | 207 | 205 | 203 | 201 | 199 | 197 |
| 302,107 | 229 | 228 | 227 | 225 | 224 | 223 | 221 | 220 | 218 | 217 | 215 | 214 | 212 | 210 | 208 | 206 | 204 | 201 | 199 |
| 318,007 | 231 | 230 | 229 | 228 | 227 | 225 | 224 | 223 | 221 | **220** | 218 | 216 | 214 | 213 | 211 | 209 | 206 | 204 | 202 |
| 333,907 | 234 | 233 | 232 | 231 | 229 | 228 | 227 | 225 | 224 | 222 | 221 | 219 | 217 | 215 | 213 | 211 | 209 | 207 | 204 |
| 350,603 | 237 | 236 | 235 | 234 | 232 | 231 | 230 | 228 | 227 | 225 | 223 | 222 | 220 | 218 | 216 | 214 | 212 | 210 | 207 |
| 368,133 | 240 | 239 | 238 | 236 | 235 | 234 | 233 | 231 | 230 | 228 | 226 | 225 | 223 | 221 | 219 | 217 | 215 | 213 | 210 |
| 386,539 | 243 | 242 | 241 | 240 | 238 | 237 | 236 | 234 | 233 | 231 | 229 | 228 | 226 | 224 | 222 | 220 | 218 | 216 | 213 |
| 405,866 | 246 | 245 | 244 | 243 | 242 | 240 | 239 | 237 | 236 | 234 | 233 | 231 | 229 | 227 | 225 | 223 | 221 | 219 | 216 |
| 426,160 | 250 | 249 | 247 | 246 | 245 | 244 | 242 | 241 | 239 | 238 | 236 | 234 | 233 | 231 | 229 | 227 | 225 | 222 | 220 |
| 447,468 | 253 | 252 | 251 | 250 | 249 | 247 | 246 | 244 | 243 | 241 | 240 | 238 | 236 | 234 | 232 | 230 | 228 | 226 | 223 |
| 469,841 | 257 | 256 | 255 | 254 | 252 | 251 | 250 | 248 | 247 | 245 | 243 | 242 | 240 | 238 | 236 | 234 | 232 | 230 | 227 |
| 493,333 | 261 | 260 | 259 | 257 | 256 | 255 | 254 | 252 | 251 | 249 | 247 | 246 | 244 | 242 | 240 | 238 | 236 | 234 | 231 |

(NWC on left axis)

Source: Team Consensus

# DCF: Upside Sensitivity

**Constant Growth Rate and WACC**

| Share Price 365 | Constant Growth Rate | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| WACC | 2% | 2% | 2% | 3% | 3% | 3% | 3% | 3% | 3% | **4%** | 4% | 4% | 4% | 4% | 4% | 5% | 5% | 5% | 5% |
| 7% | 427 | 432 | 438 | 445 | 452 | 460 | 469 | 479 | 490 | 502 | 515 | 529 | 546 | 564 | 585 | 610 | 638 | 672 | 712 |
| 7% | 414 | 420 | 426 | 432 | 439 | 447 | 456 | 465 | 476 | 487 | 500 | 514 | 530 | 548 | 568 | 592 | 620 | 652 | 691 |
| 7% | 402 | 407 | 413 | 419 | 426 | 434 | 442 | 451 | 461 | 473 | 485 | 498 | 513 | 531 | 551 | 574 | 600 | 632 | 669 |
| 8% | 390 | 395 | 400 | 406 | 413 | 420 | 428 | 437 | 447 | 458 | 469 | 482 | 497 | 514 | 533 | 555 | 581 | 611 | 648 |
| 8% | 377 | 382 | 387 | 393 | 399 | 406 | 414 | 423 | 432 | 443 | 454 | 466 | 481 | 497 | 515 | 536 | 561 | 590 | 625 |
| 9% | 364 | 369 | 374 | 380 | 386 | 393 | 400 | 408 | 417 | 427 | 438 | 450 | 464 | 479 | 497 | 518 | 541 | 569 | 603 |
| 9% | 352 | 356 | 361 | 366 | 372 | 379 | 386 | 393 | 402 | 412 | 422 | 434 | 447 | 462 | 479 | 498 | 521 | 548 | 580 |
| 10% | 339 | 343 | 348 | 353 | 358 | 365 | 371 | 379 | 387 | 396 | 406 | 417 | 430 | 444 | 461 | 479 | 501 | 527 | 558 |
| 10% | 326 | 330 | 334 | 339 | 345 | 350 | 357 | 364 | 372 | 381 | 390 | 401 | 413 | 427 | 442 | 460 | 481 | 506 | 535 |
| **11%** | 313 | 317 | 321 | 326 | 331 | 336 | 343 | 349 | 357 | **365** | 374 | 385 | 396 | 409 | 424 | 441 | 461 | 484 | 512 |
| 11% | 301 | 304 | 308 | 313 | 318 | 323 | 329 | 335 | 343 | 351 | 359 | 369 | 380 | 392 | 406 | 423 | 442 | 464 | 491 |
| 12% | 288 | 292 | 296 | 300 | 304 | 310 | 315 | 321 | 328 | 336 | 344 | 353 | 364 | 375 | 389 | 404 | 422 | 444 | 469 |
| 12% | 276 | 279 | 283 | 287 | 291 | 296 | 302 | 307 | 314 | 321 | 329 | 338 | 348 | 359 | 372 | 386 | 403 | 424 | 448 |
| 13% | 264 | 267 | 271 | 274 | 278 | 283 | 288 | 294 | 300 | 307 | 314 | 322 | 332 | 342 | 354 | 368 | 385 | 404 | 427 |
| 13% | 252 | 255 | 258 | 262 | 266 | 270 | 275 | 280 | 286 | 292 | 299 | 307 | 316 | 326 | 337 | 351 | 366 | 384 | 406 |
| 14% | 240 | 243 | 246 | 249 | 253 | 257 | 262 | 267 | 272 | 278 | 285 | 292 | 300 | 310 | 321 | 333 | 347 | 365 | 385 |
| 15% | 228 | 231 | 234 | 237 | 241 | 244 | 249 | 253 | 258 | 264 | 270 | 277 | 285 | 294 | 304 | 316 | 329 | 345 | 365 |
| 16% | 217 | 219 | 222 | 225 | 228 | 232 | 236 | 240 | 245 | 250 | 256 | 263 | 270 | 278 | 288 | 299 | 312 | 327 | 345 |
| 16% | 206 | 208 | 210 | 213 | 216 | 220 | 223 | 227 | 232 | 237 | 242 | 248 | 255 | 263 | 272 | 282 | 294 | 308 | 325 |

**Capital Expenditures and NWC**

| Share Price 365 | Capital Expenditures | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| NWC | (202,949) | (213,630) | (224,874) | (236,709) | (249,168) | (262,282) | (276,086) | (290,617) | (305,912) | **(322,013)** | (338,114) | (355,019) | (372,770) | (391,409) | (410,979) | (431,528) | (453,105) | (475,760) | (499,548) |
| 363,910 | 348 | 346 | 344 | 342 | 340 | 337 | 335 | 332 | 329 | 326 | 323 | 320 | 317 | 314 | 310 | 306 | 302 | 298 | 294 |
| 383,063 | 352 | 350 | 348 | 345 | 343 | 341 | 338 | 336 | 333 | 330 | 327 | 324 | 321 | 317 | 314 | 310 | 306 | 302 | 297 |
| 403,224 | 355 | 353 | 351 | 349 | 347 | 344 | 342 | 339 | 337 | 334 | 331 | 328 | 324 | 321 | 317 | 314 | 310 | 305 | 301 |
| 424,446 | 359 | 357 | 355 | 353 | 351 | 348 | 346 | 343 | 340 | 337 | 334 | 331 | 328 | 325 | 321 | 317 | 313 | 309 | 305 |
| 446,786 | 363 | 361 | 359 | 357 | 355 | 352 | 350 | 347 | 344 | 342 | 339 | 335 | 332 | 329 | 325 | 321 | 318 | 313 | 309 |
| 470,301 | 368 | 366 | 364 | 361 | 359 | 357 | 354 | 352 | 349 | 346 | 343 | 340 | 337 | 333 | 330 | 326 | 322 | 318 | 313 |
| 495,053 | 372 | 370 | 368 | 366 | 364 | 361 | 359 | 356 | 353 | 350 | 347 | 344 | 341 | 338 | 334 | 330 | 326 | 322 | 318 |
| 521,109 | 377 | 375 | 373 | 371 | 368 | 366 | 364 | 361 | 358 | 355 | 352 | 349 | 346 | 342 | 339 | 335 | 331 | 327 | 323 |
| 548,536 | 382 | 380 | 378 | 376 | 373 | 371 | 369 | 366 | 363 | 360 | 357 | 354 | 351 | 347 | 344 | 340 | 336 | 332 | 328 |
| 577,406 | 387 | 385 | 383 | 381 | 379 | 376 | 374 | 371 | 368 | **365** | 362 | 359 | 356 | 353 | 349 | 345 | 341 | 337 | 333 |
| 606,276 | 392 | 391 | 388 | 386 | 384 | 382 | 379 | 376 | 374 | 371 | 368 | 365 | 361 | 358 | 354 | 351 | 347 | 343 | 338 |
| 636,590 | 398 | 396 | 394 | 392 | 390 | 387 | 385 | 382 | 379 | 376 | 373 | 370 | 367 | 364 | 360 | 356 | 352 | 348 | 344 |
| 668,420 | 404 | 402 | 400 | 398 | 395 | 393 | 390 | 388 | 385 | 382 | 379 | 376 | 373 | 369 | 366 | 362 | 358 | 354 | 350 |
| 701,841 | 410 | 408 | 406 | 404 | 401 | 399 | 397 | 394 | 391 | 388 | 385 | 382 | 379 | 375 | 372 | 368 | 364 | 360 | 356 |
| 736,933 | 416 | 414 | 412 | 410 | 408 | 406 | 403 | 400 | 398 | 395 | 392 | 389 | 385 | 382 | 378 | 375 | 371 | 366 | 362 |
| 773,779 | 423 | 421 | 419 | 417 | 415 | 412 | 410 | 407 | 404 | 401 | 398 | 395 | 392 | 389 | 385 | 381 | 377 | 373 | 369 |
| 812,468 | 430 | 428 | 426 | 424 | 422 | 419 | 417 | 414 | 411 | 408 | 405 | 402 | 399 | 396 | 392 | 388 | 384 | 380 | 376 |
| 853,092 | 438 | 436 | 434 | 431 | 429 | 427 | 424 | 422 | 419 | 416 | 413 | 410 | 407 | 403 | 400 | 396 | 392 | 388 | 383 |
| 895,746 | 445 | 443 | 441 | 439 | 437 | 435 | 432 | 429 | 427 | 424 | 421 | 418 | 414 | 411 | 407 | 404 | 400 | 396 | 391 |

Source: Team Consensus

# DCF: Downside Sensitivity

| 132 | Constant Growth Rate | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 2% | 2% | 2% | 2% | 2% | 2% | 2% | 2% | 2% | **3%** | 3% | 3% | 3% | 3% | 3% | 3% | 3% | 4% | 4% | 4% |
| 7% | 158 | 160 | 161 | 162 | 163 | 165 | 166 | 168 | 170 | 172 | 174 | 176 | 179 | 182 | 185 | 188 | 192 | 196 | 201 |
| 7% | 155 | 156 | 157 | 158 | 159 | 161 | 162 | 164 | 166 | 168 | 170 | 172 | 175 | 177 | 180 | 184 | 187 | 191 | 196 |
| 7% | 151 | 152 | 153 | 154 | 155 | 157 | 158 | 160 | 162 | 163 | 165 | 168 | 170 | 173 | 176 | 179 | 182 | 186 | 191 |
| 8% | 147 | 148 | 149 | 150 | 151 | 153 | 154 | 156 | 157 | 159 | 161 | 163 | 165 | 168 | 171 | 174 | 177 | 181 | 185 |
| 8% | 143 | 144 | 145 | 146 | 147 | 148 | 150 | 151 | 153 | 155 | 157 | 159 | 161 | 163 | 166 | 169 | 172 | 176 | 180 |
| 9% | 139 | 140 | 141 | 142 | 143 | 144 | 145 | 147 | 148 | 150 | 152 | 154 | 156 | 158 | 161 | 164 | 167 | 170 | 174 |
| 9% | 135 | 136 | 137 | 138 | 139 | 140 | 141 | 143 | 144 | 146 | 147 | 149 | 151 | 154 | 156 | 159 | 162 | 165 | 169 |
| 10% | 131 | 132 | 132 | 133 | 134 | 136 | 137 | 138 | 140 | 141 | 143 | 145 | 146 | 149 | 151 | 154 | 157 | 160 | 163 |
| 10% | 127 | 127 | 128 | 129 | 130 | 131 | 132 | 134 | 135 | 137 | 138 | 140 | 142 | 144 | 146 | 148 | 151 | 154 | 158 |
| **11%** | 122 | 123 | 124 | 125 | 126 | 127 | 128 | 129 | 131 | **132** | 133 | 135 | 137 | 139 | 141 | 143 | 146 | 149 | 152 |
| 11% | 119 | 119 | 120 | 121 | 122 | 123 | 124 | 125 | 126 | 128 | 129 | 131 | 132 | 134 | 136 | 138 | 141 | 144 | 147 |
| 12% | 115 | 115 | 116 | 117 | 118 | 119 | 120 | 121 | 122 | 123 | 125 | 126 | 128 | 129 | 131 | 134 | 136 | 139 | 142 |
| 12% | 111 | 111 | 112 | 113 | 114 | 115 | 115 | 117 | 118 | 119 | 120 | 122 | 123 | 125 | 127 | 129 | 131 | 134 | 136 |
| 13% | 107 | 107 | 108 | 109 | 110 | 110 | 111 | 112 | 113 | 115 | 116 | 117 | 119 | 120 | 122 | 124 | 126 | 128 | 131 |
| 13% | 103 | 104 | 104 | 105 | 106 | 106 | 107 | 108 | 109 | 110 | 111 | 113 | 114 | 116 | 117 | 119 | 121 | 123 | 126 |
| 14% | 99 | 100 | 100 | 101 | 102 | 102 | 103 | 104 | 105 | 106 | 107 | 108 | 110 | 111 | 113 | 114 | 116 | 118 | 121 |
| 15% | 95 | 96 | 97 | 97 | 98 | 98 | 99 | 100 | 101 | 102 | 103 | 104 | 105 | 107 | 108 | 110 | 111 | 114 | 116 |
| 16% | 92 | 92 | 93 | 93 | 94 | 95 | 95 | 96 | 97 | 98 | 99 | 100 | 101 | 102 | 104 | 105 | 107 | 109 | 111 |
| 16% | 88 | 89 | 89 | 90 | 90 | 91 | 91 | 92 | 93 | 94 | 95 | 96 | 97 | 98 | 99 | 101 | 102 | 104 | 106 |

The leftmost column is labeled **WACC**.

**Constant Growth Rate and WACC**

| 132 | Capital Expenditures | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | (71,428) | (75,187) | (79,145) | (83,310) | (87,695) | (92,310) | (97,169) | (102,283) | (107,666) | **(113,333)** | (119,000) | (124,950) | (131,197) | (137,757) | (144,645) | (151,877) | (159,471) | (167,444) | (175,817) |
| 76,841 | 131 | 131 | 130 | 130 | 129 | 128 | 127 | 127 | 126 | 125 | 124 | 123 | 122 | 121 | 120 | 119 | 118 | 116 | 115 |
| 80,885 | 132 | 131 | 131 | 130 | 129 | 129 | 128 | 127 | 126 | 125 | 125 | 124 | 123 | 122 | 121 | 120 | 118 | 117 | 116 |
| 85,142 | 133 | 132 | 131 | 131 | 130 | 129 | 129 | 128 | 127 | 126 | 125 | 124 | 123 | 122 | 121 | 120 | 119 | 118 | 116 |
| 89,623 | 133 | 133 | 132 | 132 | 131 | 130 | 129 | 129 | 128 | 127 | 126 | 125 | 124 | 123 | 122 | 121 | 120 | 118 | 117 |
| 94,340 | 134 | 134 | 133 | 132 | 132 | 131 | 130 | 129 | 128 | 128 | 127 | 126 | 125 | 124 | 123 | 122 | 120 | 119 | 118 |
| 99,305 | 135 | 134 | 134 | 133 | 132 | 132 | 131 | 130 | 129 | 128 | 127 | 127 | 126 | 125 | 123 | 122 | 121 | 120 | 119 |
| 104,532 | 136 | 135 | 134 | 134 | 133 | 132 | 132 | 131 | 130 | 129 | 128 | 127 | 126 | 125 | 124 | 123 | 122 | 121 | 119 |
| 110,034 | 137 | 136 | 135 | 135 | 134 | 133 | 133 | 132 | 131 | 130 | 129 | 128 | 127 | 126 | 125 | 124 | 123 | 122 | 120 |
| 115,825 | 137 | 137 | 136 | 136 | 135 | 134 | 133 | 133 | 132 | 131 | 130 | 129 | 128 | 127 | 126 | 125 | 124 | 123 | 121 |
| **121,921** | 138 | 138 | 137 | 137 | 136 | 135 | 134 | 134 | 133 | **132** | 131 | 130 | 129 | 128 | 127 | 126 | 125 | 123 | 122 |
| 128,017 | 139 | 139 | 138 | 137 | 137 | 136 | 135 | 135 | 134 | 133 | 132 | 131 | 130 | 129 | 128 | 127 | 126 | 124 | 123 |
| 134,418 | 140 | 140 | 139 | 138 | 138 | 137 | 136 | 136 | 135 | 134 | 133 | 132 | 131 | 130 | 129 | 128 | 127 | 125 | 124 |
| 141,139 | 141 | 141 | 140 | 140 | 139 | 138 | 137 | 137 | 136 | 135 | 134 | 133 | 132 | 131 | 130 | 129 | 128 | 126 | 125 |
| 148,196 | 142 | 142 | 141 | 141 | 140 | 139 | 138 | 138 | 137 | 136 | 135 | 134 | 133 | 132 | 131 | 130 | 129 | 128 | 126 |
| 155,606 | 144 | 143 | 142 | 142 | 141 | 140 | 140 | 139 | 138 | 137 | 136 | 135 | 134 | 133 | 132 | 131 | 130 | 129 | 127 |
| 163,386 | 145 | 144 | 144 | 143 | 142 | 142 | 141 | 140 | 139 | 138 | 137 | 136 | 136 | 135 | 133 | 132 | 131 | 130 | 129 |
| 171,555 | 146 | 145 | 145 | 144 | 144 | 143 | 142 | 141 | 140 | 140 | 139 | 138 | 137 | 136 | 135 | 134 | 132 | 131 | 130 |
| 180,133 | 147 | 147 | 146 | 146 | 145 | 144 | 143 | 143 | 142 | 141 | 140 | 139 | 138 | 137 | 136 | 135 | 134 | 133 | 131 |
| 189,139 | 149 | 148 | 148 | 147 | 146 | 146 | 145 | 144 | 143 | 142 | 141 | 140 | 140 | 139 | 137 | 136 | 135 | 134 | 133 |

The leftmost column is labeled **NWC**.

**Capital Expenditures and NWC**

Source: Team Consensus

# Reverse DCF

## To justify the stock price, Duolingo's revenue would have to grow CAGR of 35.8% for 11 years.

### Unlevered Free Cash Flow (mm)

| Fiscal Year | 2021A | 2022A | 2023A | 2024E | 2025E | 2026E | 2027E | 2028E | 2029E | 2030E | 2031E | 2032E | 2033E | 2034E |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Revenue** | 250.8 | 369.5 | 531.1 | 694.4 | 908.0 | 1187.2 | 1552.2 | 2029.5 | 2653.6 | 3469.6 | 4536.5 | 5931.4 | 7755.3 | 10140.1 |
| *% growth* | | 47.3% | 43.7% | 30.8% | 30.8% | 30.8% | 30.8% | 30.8% | 30.8% | 30.8% | 30.8% | 30.8% | 30.8% | 30.8% |
| COGS | 67.2 | 98.6 | 140.1 | 179.7 | 230.4 | 295.3 | 378.4 | 484.6 | 620.3 | 793.7 | 1015.1 | 1297.6 | 1657.8 | 2116.8 |
| *COGS % growth* | | 26.7% | 26.4% | 25.9% | 25.4% | 24.9% | 24.4% | 23.9% | 23.4% | 22.9% | 22.4% | 21.9% | 21.4% | 20.9% |
| **Gross Profit** | 183.6 | 270.9 | 391.0 | 514.7 | 677.6 | 891.8 | 1173.8 | 1544.9 | 2033.3 | 2675.9 | 3521.4 | 4633.9 | 6097.6 | 8023.3 |
| *% growth* | | 47.6% | 44.3% | 31.6% | 31.6% | 31.6% | 31.6% | 31.6% | 31.6% | 31.6% | 31.6% | 31.6% | 31.6% | 31.6% |
| Selling, General, and Administrative Expenses | 237.0 | 330.6 | 396.9 | 447.8 | 576.4 | 741.8 | 954.4 | 1227.5 | 1578.5 | 2029.1 | 2607.7 | 3350.3 | 4303.0 | 5524.7 |
| *SG&A % of revenue* | 94.5% | 89.5% | 74.7% | 64.5% | 63.5% | 62.5% | 61.5% | 60.5% | 59.5% | 58.5% | 57.5% | 56.5% | 55.5% | 54.5% |
| Total Operating Expenses | 237.0 | 330.6 | 396.9 | 447.8 | 576.4 | 741.8 | 954.4 | 1227.5 | 1578.5 | 2029.1 | 2607.7 | 3350.3 | 4303.0 | 5524.7 |
| **EBITDA** | -53.4 | -59.7 | -5.8 | 66.9 | 101.1 | 150.1 | 219.5 | 317.4 | 454.8 | 646.7 | 913.6 | 1283.6 | 1794.6 | 2498.5 |
| *Operating Margins* | | -16% | -1% | 10% | 11% | 13% | 14% | 16% | 17% | 19% | 20% | 22% | 23% | 25% |
| Depreciation and Amortization | 2.7 | 4.9 | 7.1 | 0.7 | 1.0 | 1.5 | 2.2 | 3.2 | 4.5 | 6.5 | 9.1 | 12.8 | 17.9 | 25.0 |
| *% of EBITDA* | | | | 1.0% | 1.0% | 1.0% | 1.0% | 1.0% | 1.0% | 1.0% | 1.0% | 1.0% | 1.0% | 1.0% |
| **Operating Profit (EBIT)** | -56.1 | -64.6 | -12.9 | 66.3 | 100.1 | 148.6 | 217.3 | 314.2 | 450.3 | 640.3 | 904.5 | 1270.7 | 1776.6 | 2473.5 |
| *% growth* | | 15.1% | -80.0% | 612.9% | 51.1% | 48.4% | 46.3% | 44.6% | 43.3% | 42.2% | 41.3% | 40.5% | 39.8% | 39.2% |
| Operating Taxes | 0.2 | 0.9 | 1.7 | 9.9 | 15.0 | 22.3 | 32.6 | 47.1 | 67.5 | 96.0 | 135.7 | 190.6 | 266.5 | 371.0 |
| **NOPAT (Net Operating Profit After Taxes)** | -56.3 | -65.5 | -14.6 | 56.3 | 85.1 | 126.3 | 184.7 | 267.1 | 382.7 | 544.2 | 768.8 | 1080.1 | 1510.1 | 2102.5 |
| *% growth* | | 16.4% | -77.7% | 485.0% | 51.1% | 48.4% | 46.3% | 44.6% | 43.3% | 42.2% | 41.3% | 40.5% | 39.8% | 39.2% |
| (+) Depreciation and Amortization | 2.7 | 4.9 | 7.1 | 0.7 | 1.0 | 1.5 | 2.2 | 3.2 | 4.5 | 6.5 | 9.1 | 12.8 | 17.9 | 25.0 |
| *Depreciation Growth Rate* | | | | 14.1% | 12.4% | 11.0% | 9.9% | 9.0% | 8.3% | 7.6% | 7.1% | 6.6% | 10.0% | 10.0% |
| (-) Capital Expenditures | -6.2 | -10.1 | -13.7 | 13.9 | 19.4 | 27.0 | 37.6 | 52.4 | 73.0 | 101.7 | 141.7 | 197.3 | 274.8 | 382.7 |
| *% growth* | | 63.1% | 35.2% | 201.8% | 39.3% | 39.3% | 39.3% | 39.3% | 39.3% | 39.3% | 39.3% | 39.3% | 39.3% | 39.3% |
| (-) Change in NWC | 25.8 | 34.5 | 34.9 | 36.9 | 39.0 | 41.2 | 43.6 | 46.0 | 48.7 | 51.4 | 54.4 | 57.5 | 60.8 | 64.2 |
| **Unlevered Free Cash Flow** | -73.1 | -85.0 | -28.8 | 6.2 | 27.7 | 59.5 | 105.7 | 171.8 | 265.6 | 397.5 | 581.9 | 838.2 | 1192.5 | 1680.5 |
| | | | | 121.5% | 348.7% | 114.7% | 77.5% | 62.6% | 54.6% | 49.7% | 46.4% | 44.0% | 42.3% | 40.9% |

Source: Team Consensus

# AI Cost Assumptions

**We assume around 2000 tokens are used per interaction.**

## Assumptions

| | |
|---|---:|
| # of Interactions Per Call | **7** |
| Chat GPT 4.0 Cost Per 1 million Prompt (Input) Tokens | **$2.5** |
| Chat GPT 4.0 Cost Per 1 Million Tokens Completion (Output) Tokens | **$10.0** |
| Session Prompt Token Requirements (Input) Per Interaction | **1,000.0** |
| Session Completion Token Requirements (Output) Per Interaction | **1,000.0** |
| Chat GPT 4 Cost Per 1000 Prompt Tokens | **$0.003** |
| Chat GPT 4 Cost Per 1000 Completion Tokens | **$0.010** |
| Number of Sessions Engaged in Per Week | **3** |
| Annual AI Cost Per Max User | **$12.3** |

Source: Team Consensus

# AI Cost Projections

## The higher AI costs flow directly into COGS.

| Base Case AI Costs | 2025E | 2026E | 2027E | 2028E | 2029E | 2030E | 2031E | 2032E | 2033E | 2034E |
|---|---|---|---|---|---|---|---|---|---|---|
| Max Userbase | 1,039 | 1,915 | 1,609 | 2,736 | 4,368 | 6,640 | 9,705 | 13,723 | 18,860 | 25,277 |
| Additional AI Costs Allocated to COGS | 12,769 | 23,530 | 19,765 | 33,616 | 53,661 | 81,578 | 119,225 | 168,588 | 231,697 | 310,527 |
| **Gross Margins Post AI Cost Adjustment** | **71.1%** | **71.2%** | **70.9%** | **70.5%** | **70.1%** | **69.7%** | **69.4%** | **69.0%** | **68.7%** | **68.4%** |

| Upside AI Costs | 2025E | 2026E | 2027E | 2028E | 2029E | 2030E | 2031E | 2032E | 2033E | 2034E |
|---|---|---|---|---|---|---|---|---|---|---|
| Max Userbase | 1,225 | 2,502 | 2,133 | 4,034 | 6,923 | 11,092 | 16,871 | 24,617 | 34,698 | 47,483 |
| Additional AI Costs Allocated to COGS | 15,051 | 30,731 | 26,198 | 49,560 | 85,050 | 136,271 | 207,266 | 302,414 | 426,266 | 583,326 |

| Downside AI Costs | 2025E | 2026E | 2027E | 2028E | 2029E | 2030E | 2031E | 2032E | 2033E | 2034E |
|---|---|---|---|---|---|---|---|---|---|---|
| Max Userbase | 868 | 1,398 | 1,153 | 2,011 | 3,267 | 5,033 | 6,557 | 8,364 | 10,470 | 12,884 |
| Additional AI Costs Allocated to COGS | 10,661 | 17,172 | 14,167 | 24,699 | 40,134 | 61,834 | 80,555 | 102,752 | 128,625 | 158,279 |

Source: Team Consensus

# API Token Cost Sensitivity

**We factor these higher AI costs into our DCF, which pushes down the price target.**

| 2034E AI Costs | **310,527** | **Cost of Completion Tokens** | | | | |
|---|---|---|---|---|---|---|
| | | 0.0090 | 0.0095 | **0.0100** | 0.0105 | 0.0110 |
| **Cost of Prompt Tokens** | 0.0023 | 280,251 | 293,362 | 307,163 | 320,965 | 335,456 |
| | 0.0024 | 281,890 | 295,001 | 308,802 | 322,604 | 337,095 |
| | **0.0025** | 283,615 | 296,726 | 310,527 | 324,329 | 338,820 |
| | 0.0026 | 285,340 | 298,451 | 312,253 | 326,054 | 340,545 |
| | 0.0028 | 287,152 | 300,263 | 314,064 | 327,865 | 342,357 |

**\*API token costs increase, COGS increases\***

Sources: Team Consensus

# More Consumer Debt

**Debt has become a higher percentage of income, illustrating the weakening position of the consumer.**



Household Debt Service Payments as a Percent of Disposable Personal Income

Source: Board of Governors of the Federal Reserve System (US) via FRED®
Shaded areas indicate U.S. recessions.

fred.stlouisfed.org
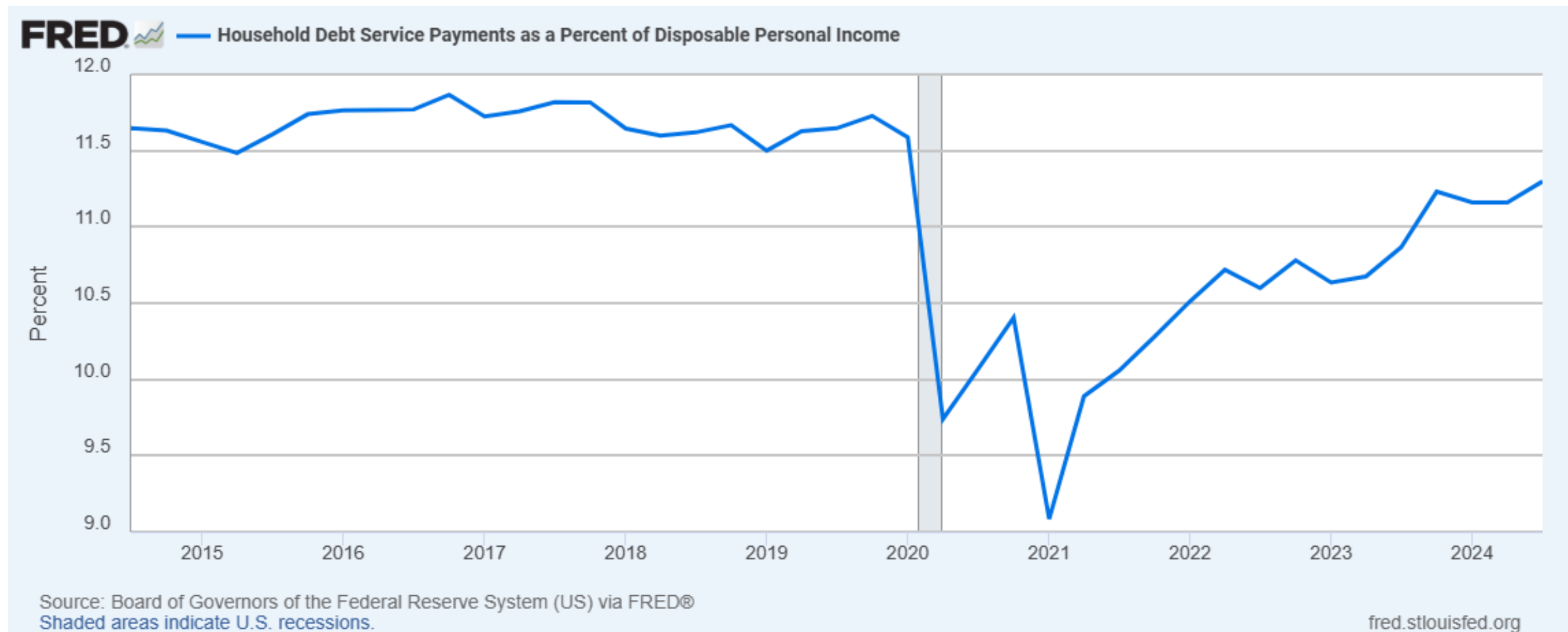
Sources: FRED | St. Louis Fed, Team Consensus

# Savings Rate Decline

**Savings rates remain lower post COVID-19, with unsustainable consumer spending levels.**
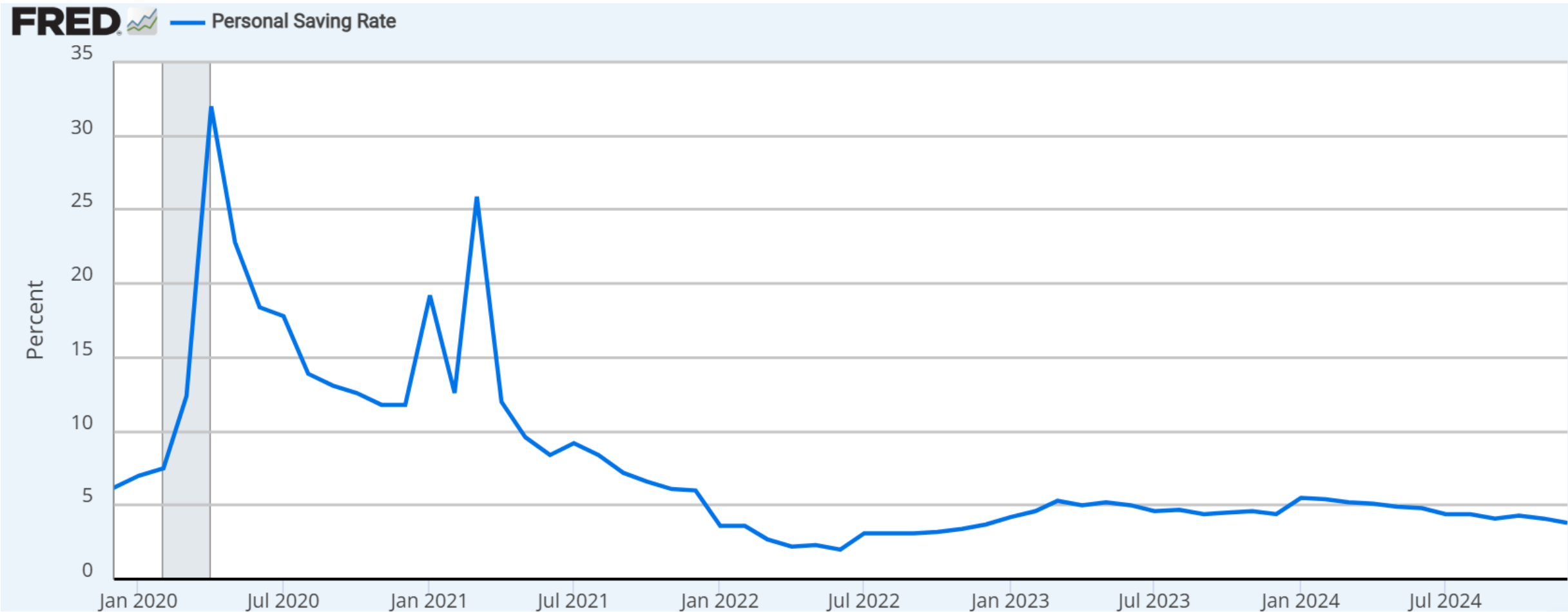


Sources: FRED | St. Louis Fed, Team Consensus

# Sticky Inflation

**Inflation is still above the Federal Reserve's 2% goal, reducing purchasing power of the average consumer.**



US CPI Data

Fed's 2% Goal
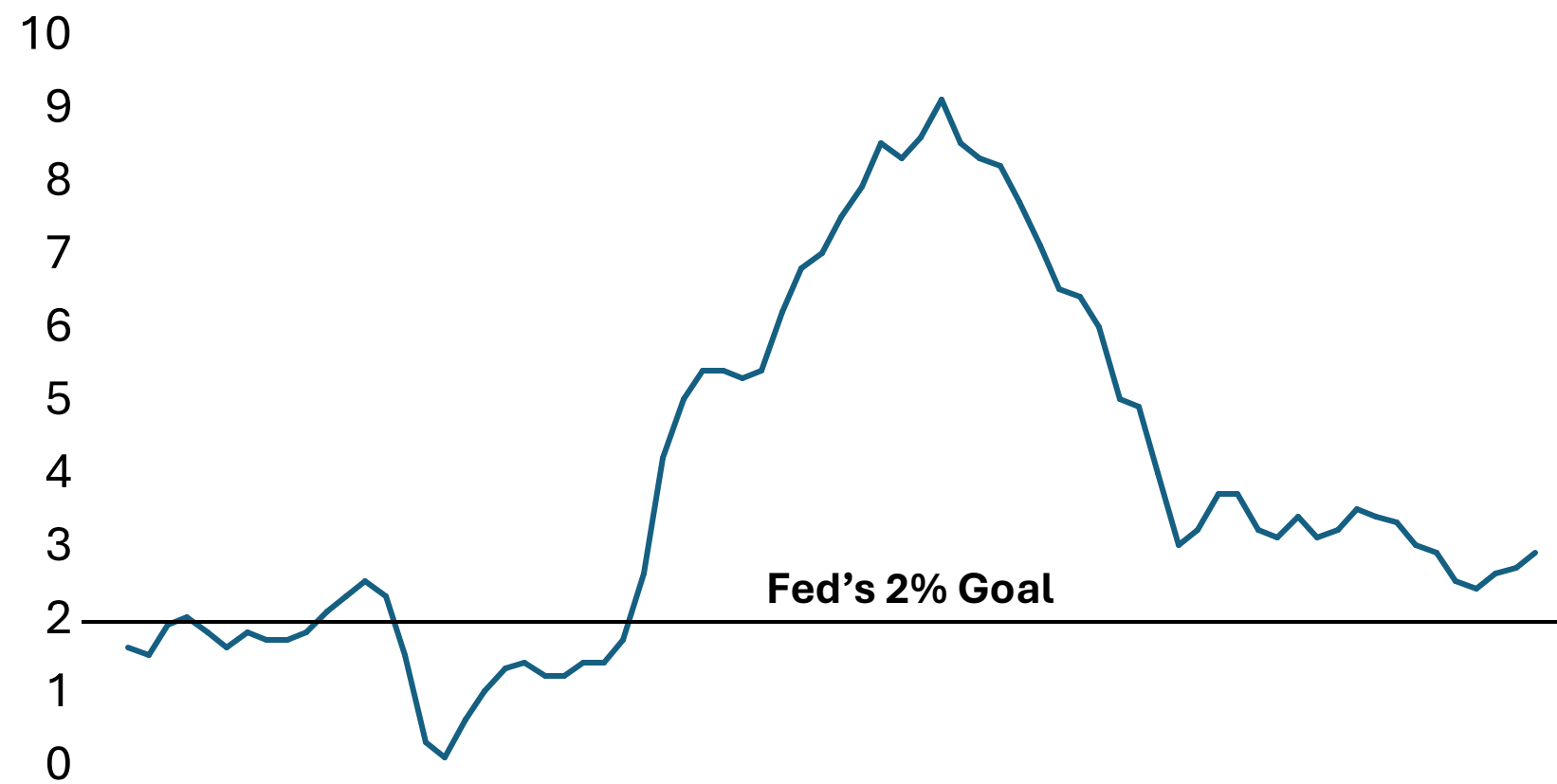
Sources: Bureau of Labor Statistics, Team Consensus

# Sticky Inflation

**Tariffs pose additional risks to the consumer (inherently inflationary).**

## Tariffs Imposed by Trump



| All Imports | Canada & Mexico | China |
| :---: | :---: | :---: |
| 10% | 25% | 54% |
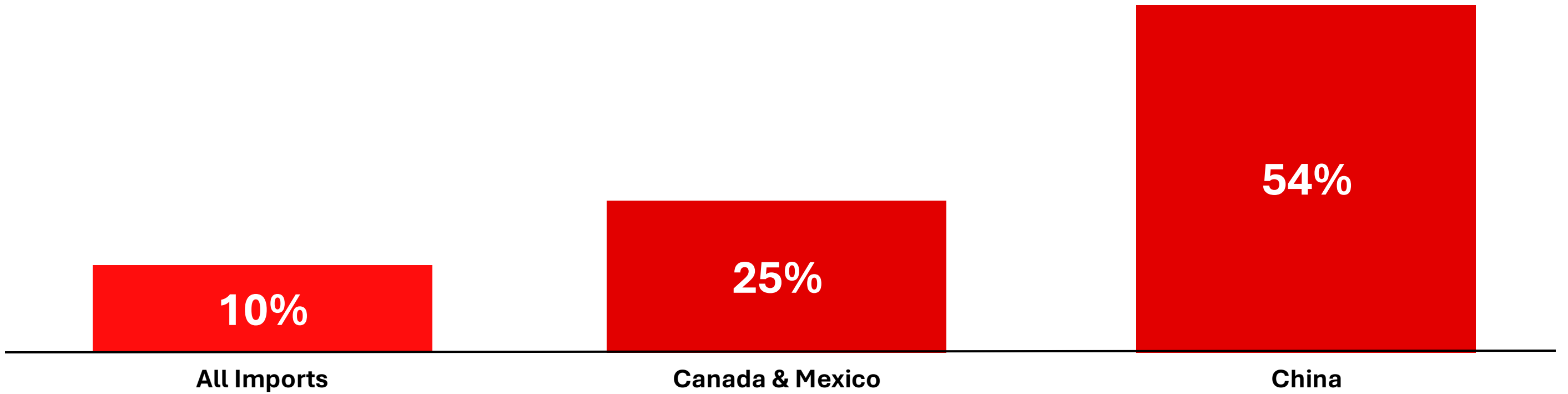
Sources: Bureau of Labor Statistics, Team Consensus

# Financial Pressure is Real

**There has been a meaningful shift in consumer sentiment.**

**Election Results – indication that economy was one of the most important factors that voters cared about.**

**"No Buy 2025" – a trend that involves cutting out all unnecessary expenditures.**

**This won't lead to a complete pullback in subscriptions for Duolingo this year, but eventually the team believes there will be a recession.**

Sources: Wall Street Journal, Team Consensus

# 2024 Subscription Industry Trends

**People have a lot of subscriptions, and they are cancelling those subscriptions if the price isn't right.**

## Early Signs of No Buy 2025

50% of consumers canceled at least one subscription service in the first 6 months of 2024, with over 30% of them canceling their subscriptions due to rising prices.

⬇

61% of those consumers were 18-44-year-olds, while 55% were those earning under $25,000.

⬇

Price remains the most important factor leading to subscriptions: the ability to save money was 1.6 times more important to consumers than other factors.

⬇

For SaaS companies specifically, 36% of consumers cancelled their subscriptions because they "could do without it."

⬇

Consumers already with 8 subscriptions on average can access high quality learning without needing to pay over 100 dollars a year for one of their premium services.

Sources: Whop.com, Team Consensus

# Projected Paying Userbase Decline

**Historical recession impacts on tech companies inform our projections.**

## EBITDA Decline in Recessions

■ Information Technology    ■ Telecommunication Services

| 1973-75 | 1980-82 | 1990 | 2001 |

-13%    -6%    -11%    -57%    -35%    -8%    -99%    -45%

# -34%

_____

Average EBITDA Decline

**In our hypothetical recession year, we reduce the paying user base by 34%, not revenue itself, leading to a revenue decline less severe then -34%.**
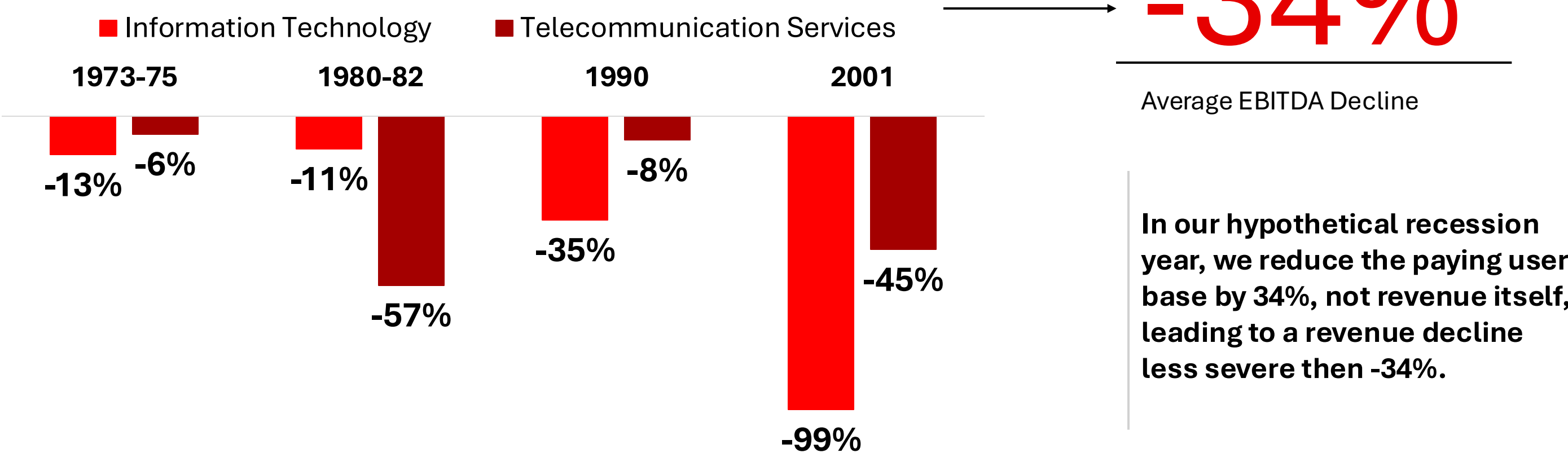
Sources: McKinsey, Team Consensus

# ESG



**Selling Practices & Product Labeling**
6.5%

**Management of the Legal & Regulatory Environment**
9.7%

**Employee Health & Safety**
12.9%

**Employee Engagement, Diversity & Inclusion**
22.6%

**Data Security**
25.8%

**Customer Privacy**
22.6%
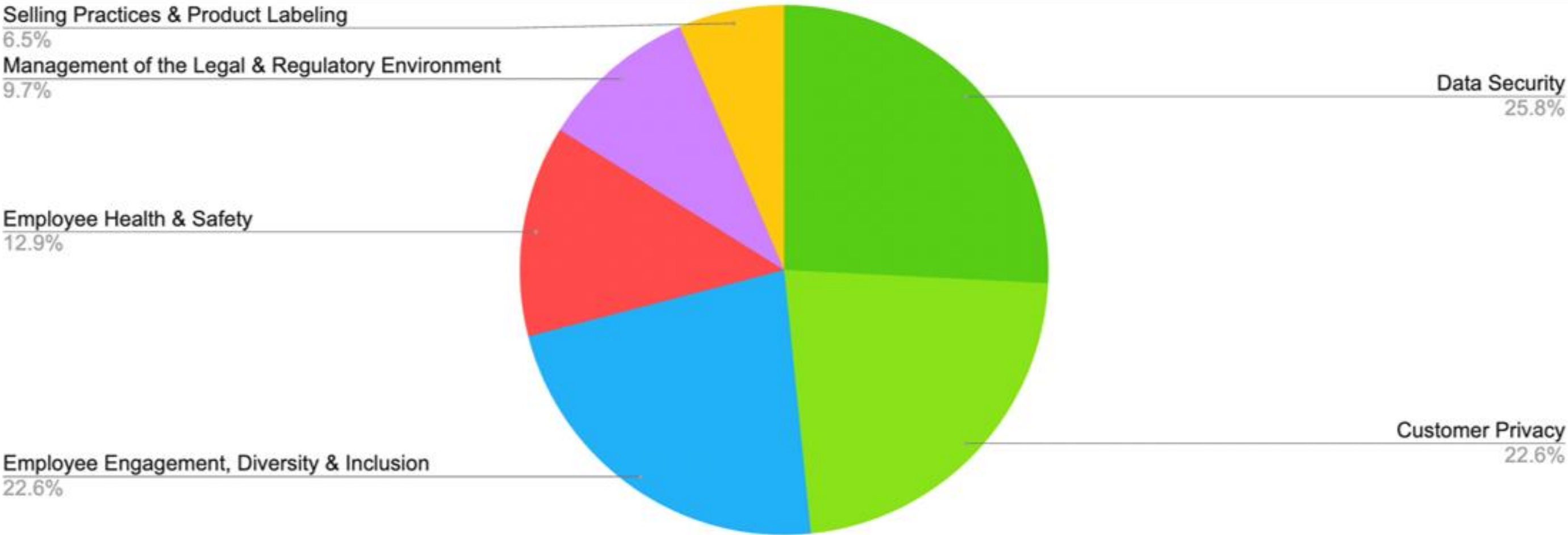
Source: Sustainalytics

# Porter's 5 Forces
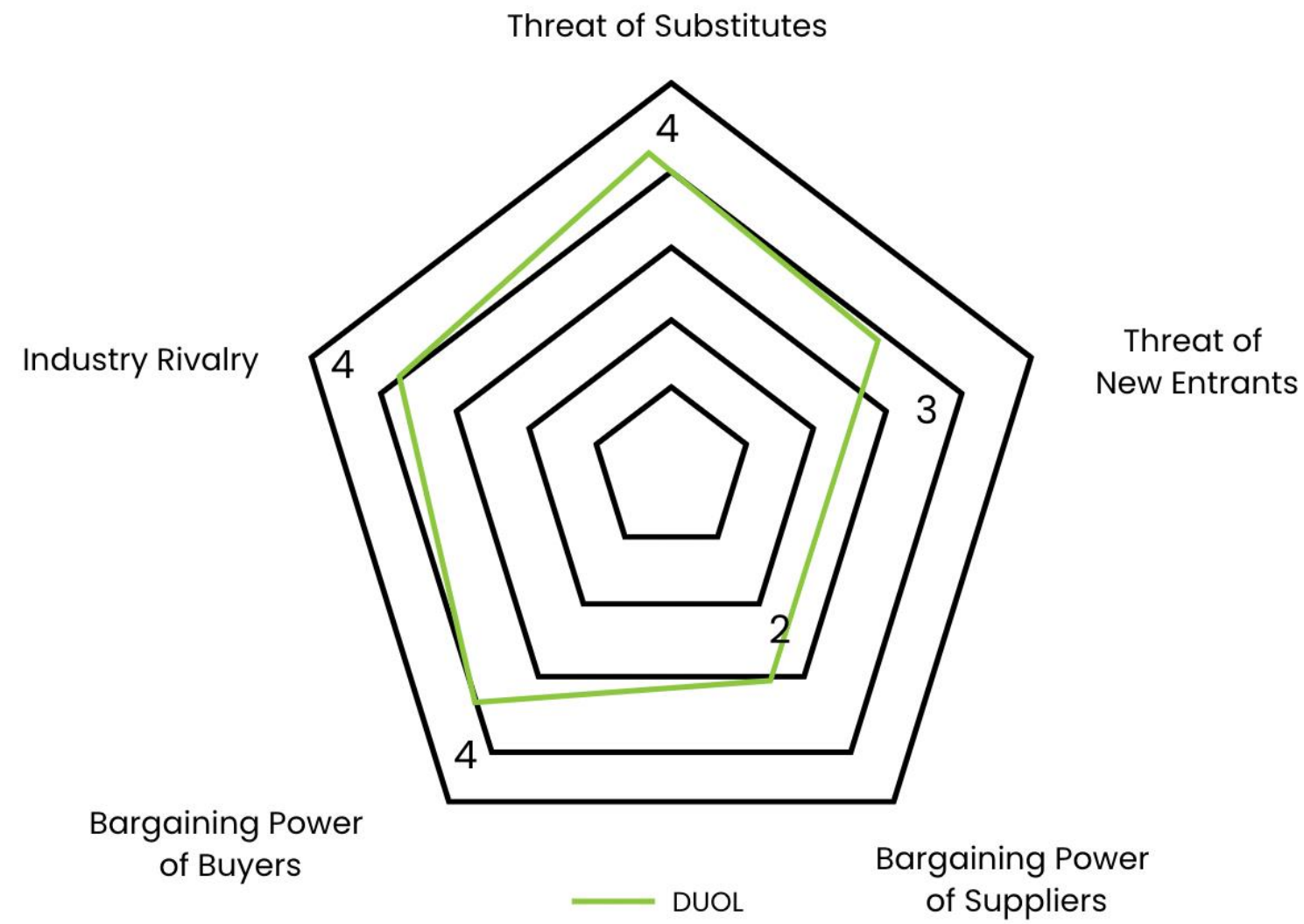


Score from 1-5, with 5 representing the biggest threat, and
1 being the lowest threat

Source: FactSet, MorningStar

# SWOT

| Strenghts | Weaknesses | Opportunities | Threats |
|---|---|---|---|
| • Gamified approach<br>• Freemium model<br>  ○ 92% of Duolingo users are on the free plan<br>• Strong brand & global user base<br>  ○ 500M registered users, 37 million monthly active users<br>• Social media presence driving engagement<br>  ○ Across platforms like Instagram and Facebook, Duolingo sees average engagements of 330K per post<br>• Expansive product offering<br>  ○ Duolingo for Schools, Duolingo English Test, Math & Music | • High dependency on converting free users to paid subscribers<br>  ○ only 8% of MAUs pay for Duolingo<br>• Reliance on AI investment<br>  ○ CapEx growth (39% CAGR) for AI-driven products like DuolingoMax may limit profitability and free cash flow, reducing long-term stock value<br>• Profitability Challenges in Emerging Markets<br>  ○ Emerging markets with lower disposable income (e.g., India, Brazil) could slow paid subscription growth, limiting Duolingo's ability to generate premium revenue | • Monetizing Duolingo for Schools<br>  ○ Duolingo for Schools, a free service, has growth potential by introducing premium features for educators creating a new revenue stream<br>• In-App Purchases for Personalized Learning Tools<br>  ○ Introducing more in-app purchases, such as customizable lesson plans, language books, or specialized vocabulary packs could increase ARPU | • Market Saturation<br>  ○ Increasing competition from free alternatives, YouTube, ChatGPT<br>• Immigration Policy Changes<br>  ○ Tighter U.S. immigration policies may reduce international students, impacting Duolingo's English Test revenue,<br>• Economic Downturn<br>  ○ Inflation and higher interest rates may slow paid subscriptions and increase churn in price-sensitive regions<br>• Regulatory Risks<br>  ○ Data privacy (e.g., GDPR) regulations increase compliance costs and expose Duolingo to risks of data theft and replication |

Source: DUOL 10K

# Upside Risk 1

**Higher than expected paying user conversion rates.**

**Opportunity for Growth**
- If Duolingo enhances its subscription offerings beyond analyst expectations, it could significantly improve the user experience
- A better experience may lead to higher conversion rates on a broader scale

**Word-of-Mouth & Cost Efficiency**
- Increased conversions, coupled with strong word-of-mouth marketing, could lead to lower customer acquisition costs (CAC)

**Impact on Valuation**
- A larger paying user base would bring Duolingo's metrics closer to competitors
- This could justify its current premium valuation in the market

| | **Paying Userbase Percentage** | | | | |
|---|---|---|---|---|---|
| **766.6** | 5.1% | 6.4% | **8.0%** | 9.6% | 11.5% |
| 14.8% | 531.4 | 637.8 | 770.7 | 903.7 | 1063.3 |
| 18.6% | 529.5 | 635.9 | 768.9 | 901.8 | 1061.4 |
| **23.2%** | 527.2 | 633.6 | **766.6** | 899.5 | 1059.1 |
| 27.8% | 524.9 | 631.3 | 764.3 | 897.2 | 1056.8 |
| 33.4% | 522.1 | 628.5 | 761.5 | 894.4 | 1054.0 |

Churn Rate

# Upside Risk 2

**A cost-effective, open-source model like DeepSeek could lead to lower costs/economies of scale.**

## Key Advantages

- Open-source nature makes it cost-effective compared to proprietary models

- Potential for wider adoption due to lower operational costs

### Mitigating Factors

- Data privacy concerns, especially regarding user information security

- China-related risks, including regulatory scrutiny and geopolitical considerations

**Token prices of leading AI models (US$ per million)**
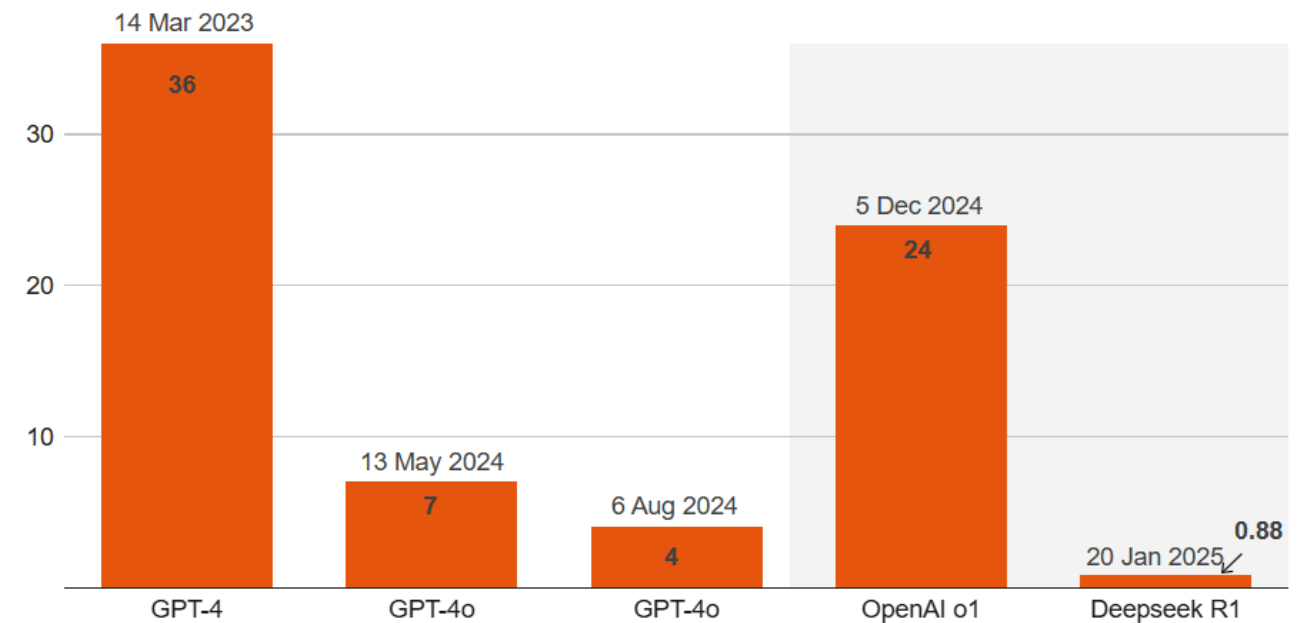


Note: Assuming 4:1 input:output ratio
Source: Deeplearning.ai, OpenAI, DeepSeek

Source: Team Consensus

# Upside Risk 3

**Broader equity market rally and strong earnings leading to multiple expansion.**

### Market Dynamics and Valuation Impact

- Broad equity market rallies can sometimes outweigh short-term and long-term unsystematic risks

- A sustained rally could drive multiple expansion, influencing valuations regardless of company-specific risks

### Potential Catalysts for a Market Rally

- Upcoming economic data releases over the next few months

- Policy shifts, such as changes in tariff policies

- If inflation declines and the labor market remains stable, it could lead to further rate cuts, supporting equity valuations

**Increased Volatility, Increased Expected Return**

Average: **1.3**

Source: Team Consensus
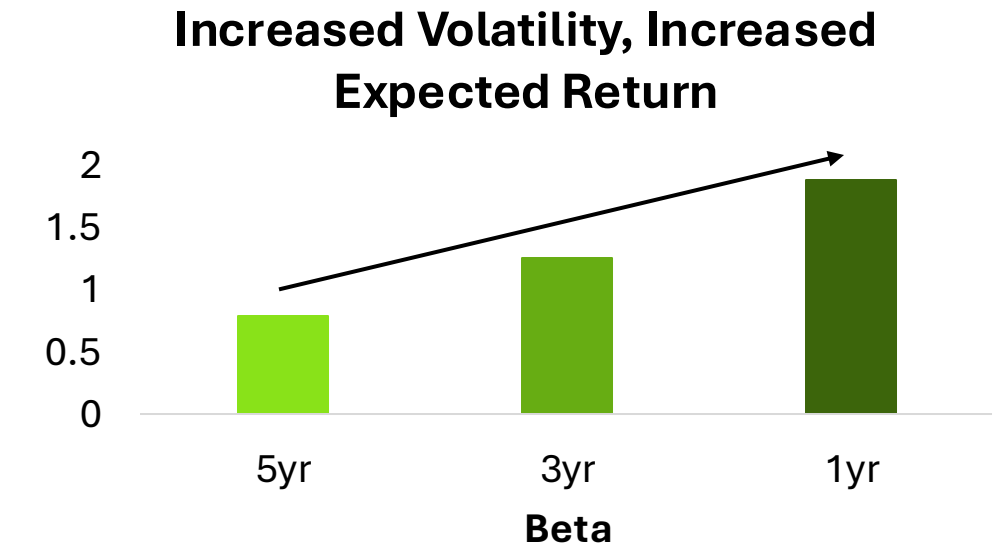
# Upside Risk 4

**An accretive strategic M&A deal could provide Duolingo with synergies.**

### Expansion Potential

- Mergers and acquisitions could drive growth and scalability

- Potential to expand into new markets or enhance existing offerings

### Consideration of Past Acquisitions

- Previous acquisitions have been supplier-side focused, limiting direct revenue impact

- Future M&A strategy would need to target user growth or product expansion for greater value creation

**Duolingo Doubles Down on Design and Animation With Acquisition of Hobbes**

Source: Team Consensus

# Upside Risk 5

**Better than expected performance of Duolingo Max.**

**Potential Impact on Valuation**
- If **Duolingo Max** performs as analysts expect, it could pose a **material risk** to our valuation thesis.

**Investment in Improvement**
- Duolingo is investing **significantly** in enhancing Max.
- If the **quality improves beyond expectations**, it could drive **higher adoption and revenue growth**

**Valuation Justification**
- Stronger performance of Duolingo Max could lead to **higher-than-expected revenue**, helping to **justify the current valuation**

Source: Team Consensus

# Upside Risk 6

**Lower than expected churn rate leading to more stable revenue.**

**Potential Impact on Revenue**

- Our customer life cycle calculations are speculative and could be higher than expected if certain factors are underestimated

- A lower churn rate would result in a larger user base and higher revenue, which could weaken our argument from a relative valuation standpoint

**Possible Drivers of Lower Churn**

- Growing interest in learning multiple languages

- Increased time required to achieve language proficiency

- Underestimation of how much time users spend learning

Source: Team Consensus

# Psychology of the Consumer

**Gamification can have positive and negative effects on users.**

**Positive Psychology:**

- **Progress & Rewards:** Skill trees, badges, points, and levels create a sense of achievement and motivation

- **Instant Feedback:** Reinforces learning and keeps users engaged

**Negative Psychology:**

- **Streaks:** Pressure to maintain daily engagement, exploiting the sunk-cost fallacy

- **Scarcity:** Techniques like Streak Freeze induce anxiety and force spending

- **Emotional Manipulation:** Phrases like "Last chance!" evoke urgency and guilt to drive behavior

Source: YouTube

# Reviews of DET Versus Other Tests

| Aspect | Duolingo English Test (DET) | TOEFL | IELTS |
|---|---|---|---|
| **Recognition** | **Limited recognition, fewer schools** | Widely accepted (esp. US) | Accepted globally (UK, Canada) |
| **Test Format** | **Only online** | Computer/paper-based | Computer/paper/online formats |
| Duration | 55 mins (adaptive + video) | 3.5 hours | 3 hours |
| Speaking Test | Recorded video response | Computer-based | Live interaction with examiner |
| **Test Frequency** | **Less frequent (only online)** | Weekly | Weekly |
| Results | 48 hours | 10 days | 5-7 days |
| **Migration Acceptance** | **Not accepted for migration** | Accepted for migration globally | Accepted for migration globally |
| Cost | USD $49 | USD $180 - $325 | USD $215 - $310 |

Source: IDP IELTS

# Max Inaccessibility

**Not everyone can physically access Duolingo Max yet.**

## By Q3 2024

**Max Accessibility for DAUs**

■ Can Access Max   ■ Cannot Access Max

50%
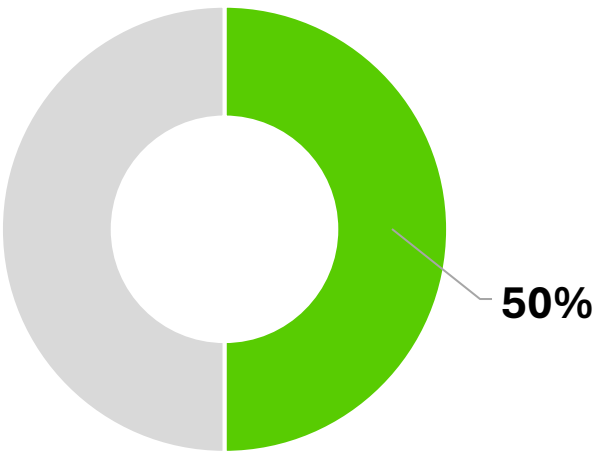
**+10000 bps**

## By Q4 EOY

**Max Accessibility for DAUs**

■ Can Access Max   ■ Cannot Access Max

60%
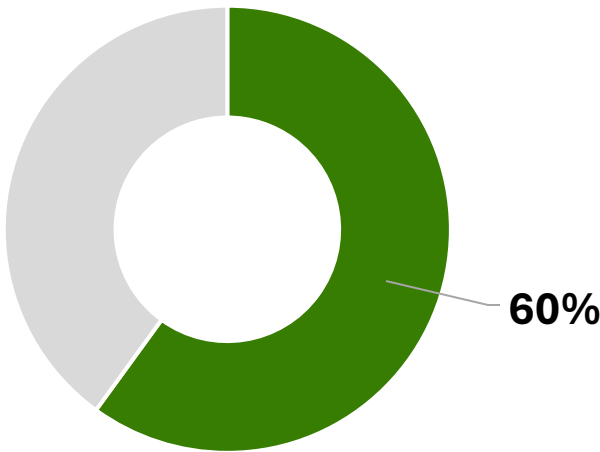
"Max is now available to roughly half of our DAU, and we expect this will increase by about 10 points or so as we scale it to more users, primarily on Android, by the end of the year."
**– Q3 2024 Earnings Call Transcript**

Source: 2023 Earnings Call Transcript

# Compensation Comparison

| | Name | Position | Tenure (yrs) | Year Joined | Education | Pay |
|---|---|---|---|---|---|---|
| | Luis von Ahn | Co-founder/CEO | 14 | 2011 | Mathematics (BS) PhD CS | $750k |
| | Severin Hacker | Co-founder/CTO | 14 | 2011 | CS (BSc) PhD CS | $460k |
| | Robert Meese | Chief Business Officer | 8 | 2017 | Economics, CS (BS) Business MBA | $480k |
| | Molly Lindsay | Chief People Officer | 7 | 2018 | Chinese Language (IUP) Business MBA | - |
| | Matthew Skaruppa | Chief Financial Officer | 5 | 2020 | Chemical Engineering Business MBA | $650k |
| | Natalie Glance | Chief Engineering Officer | 10 | 2015 | Physics (BA) Physics (PhD) | $650k |
| | Stephen Chen | General Counsel | 5 | 2020 | History (BA) Law (JD) | $490k |
| | Manu Orssaud | Chief Marketing Officer | 5 | 2020 | Multimedia (BA) | - |
| | Ryan Sims | Chief Design Officer | 6 | 2019 | - | - |

**Executive management earns 12-13x the average employee**

Source: DUOL Annual Report, Yahoo Finance

# Magnificent 7 Capital Expenditures

**Capital expenditure growth for Duolingo is not unrealistic.**

Capital spending, quarterly
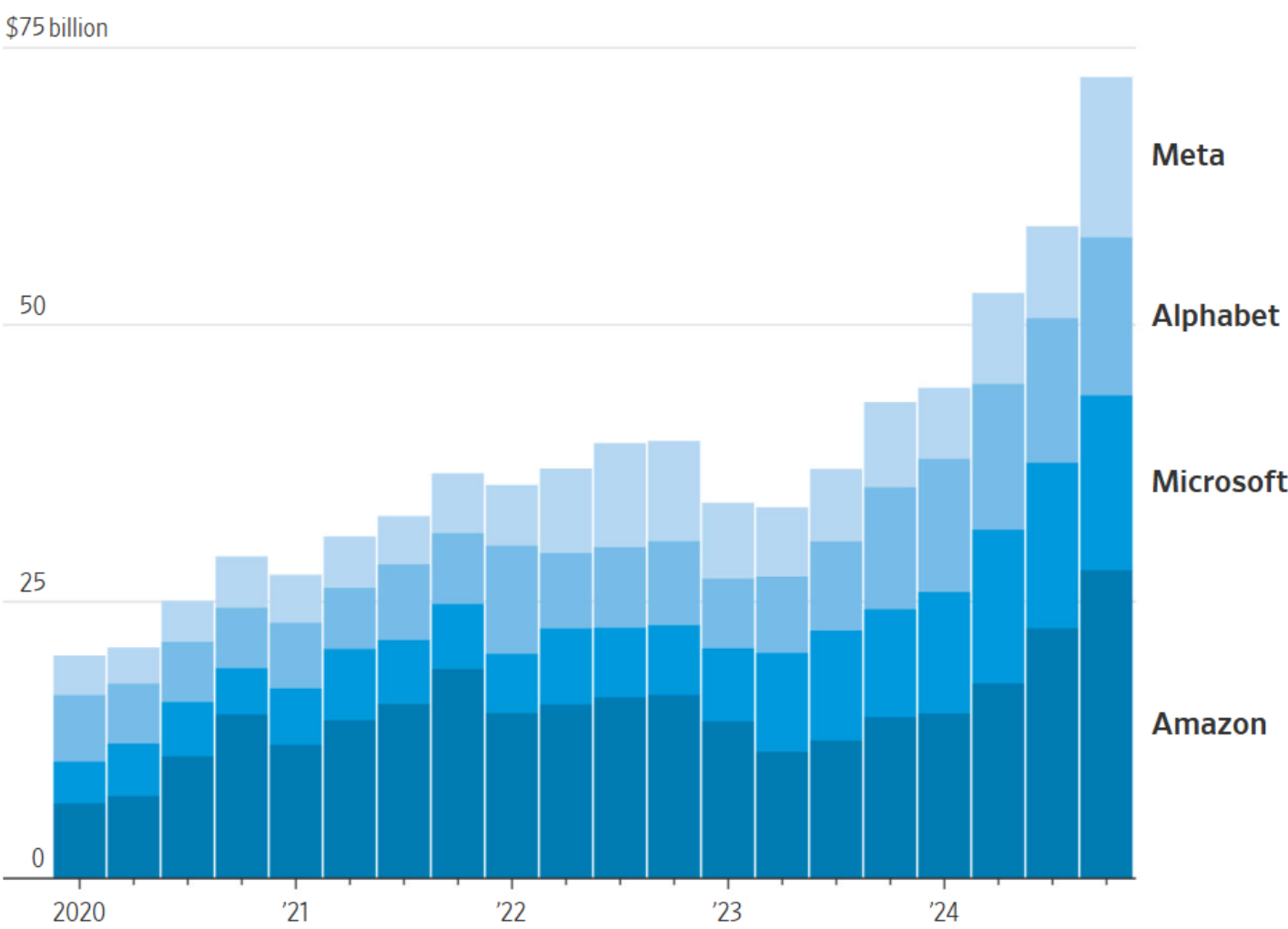


## FY 2025 CapEx Projections

1. Google: **$75.0B**

2. Microsoft: **$80.0B**

3. Meta: **$60.0B**

Sources: Wall Street Journal, Team Consensus

# Operating Expense Breakdown

**R&D has made the largest contribution to OpEx growth.**



**R&D as % of Total OpEx**



Legend:
- **Research And Development**
- **Sales and Marketing**
- **General and Administrative**
- **Total Operating Expenses**
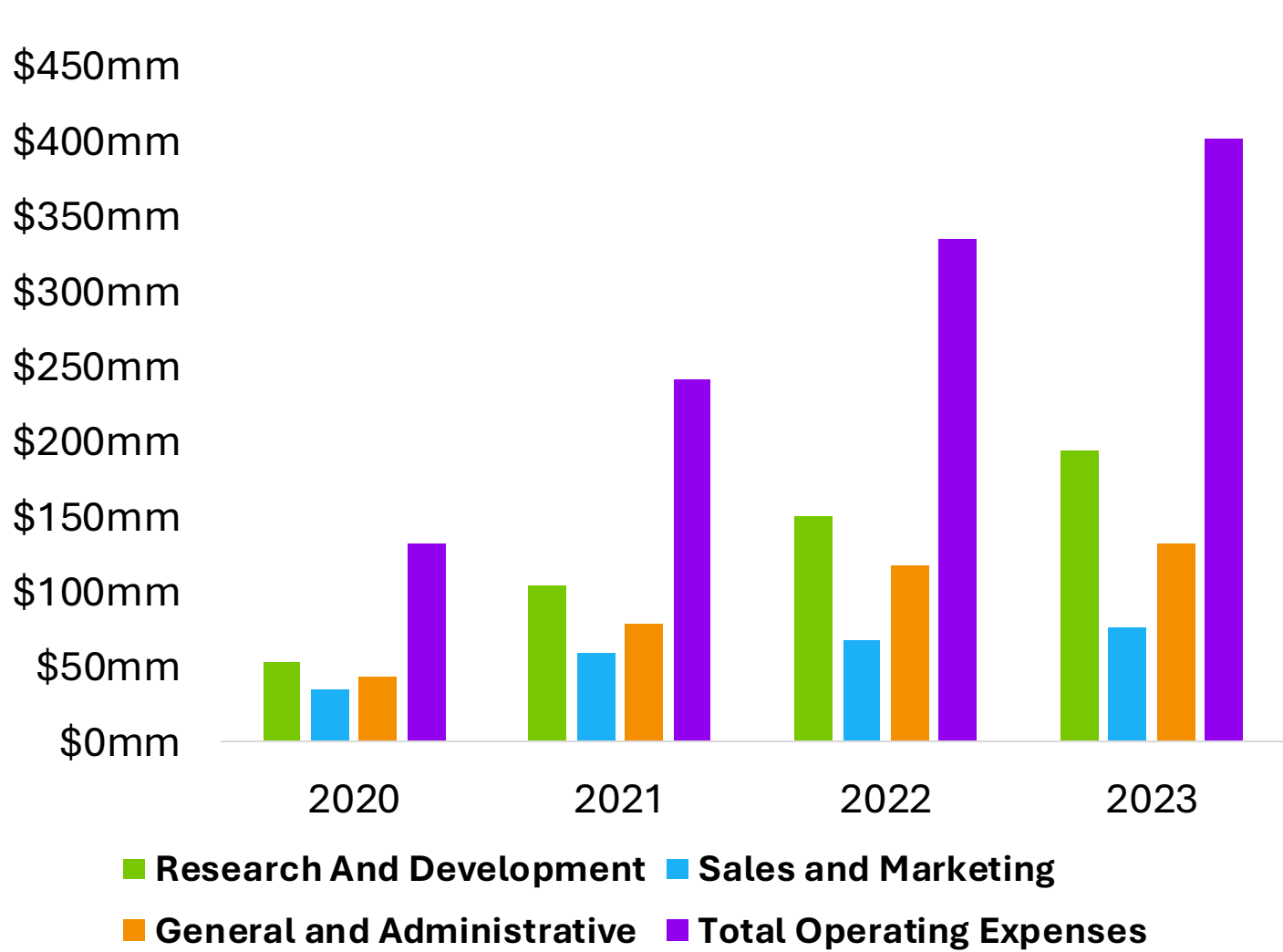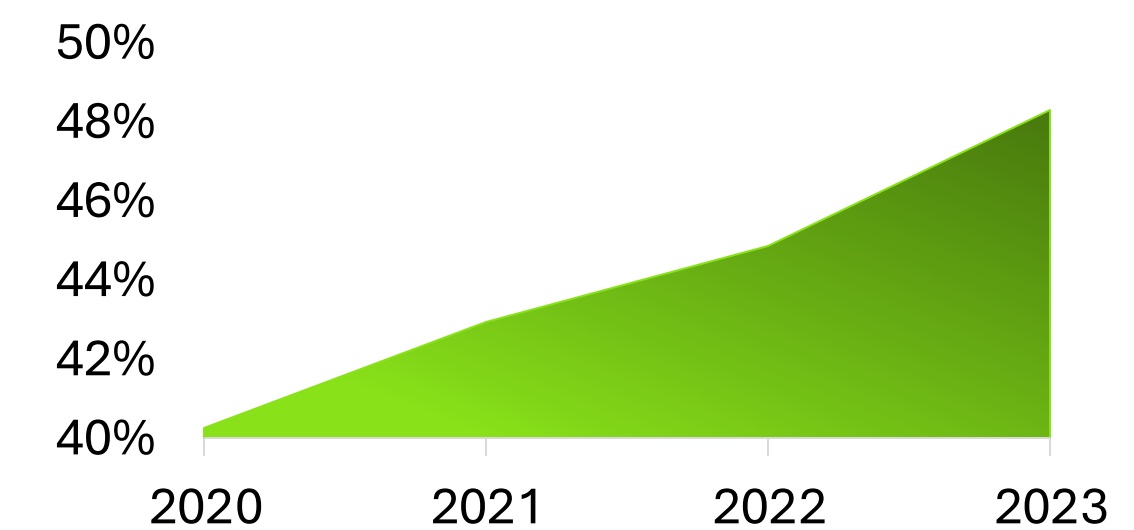
Duolingo is not a capital-intensive business. **Talent is the primary cost** for them.

# MAU/R&D Relationship

**As Duolingo's looks to convert more MAUs to Max users, R&D will increase.**

## MAU and R&D Linear Relationship

■ **Research And Development**    ■ **MAU Base**



- $53mm (2020)
- $104mm / 42mm (2021)
- $150mm / 61mm (2022)
- $194mm / 88mm (2023)
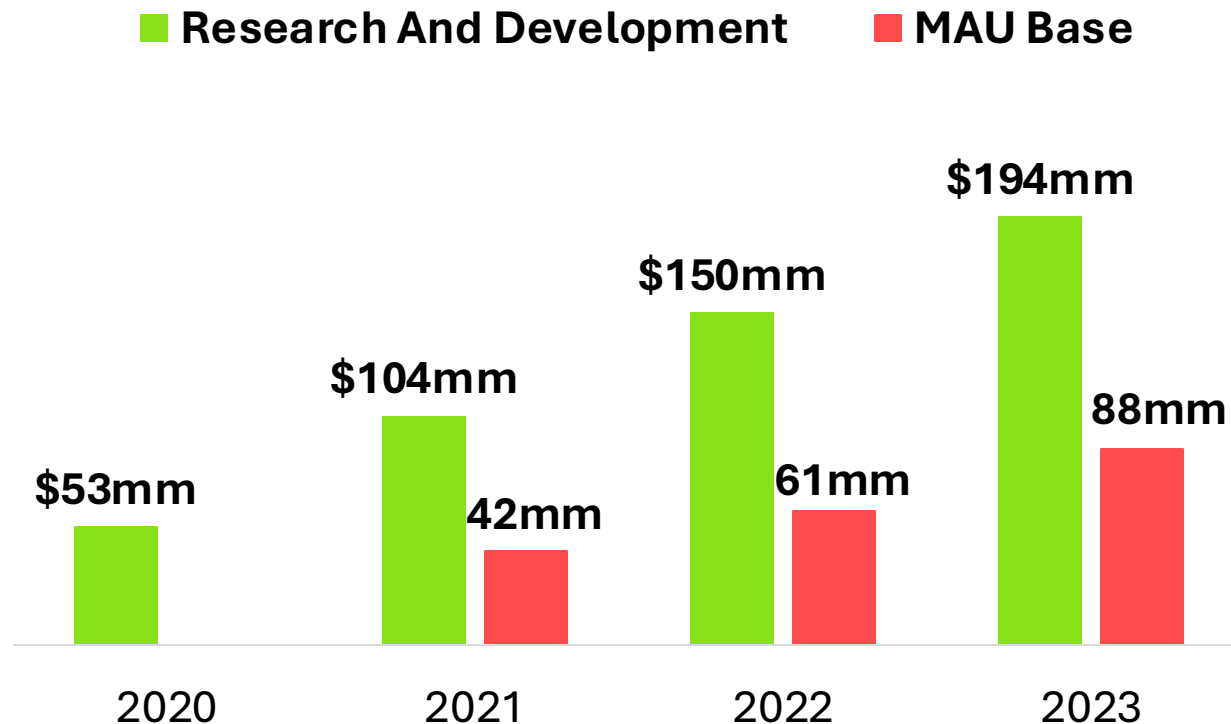
## What R&D for Max represents:

1. Compensation for personnel:
   a) Engineering
   b) Product Design
   c) Testing
2. A/B testing to improve quality of Max
3. Depreciation of PP&E

Sources: Company Filings, FactSet, Team Consensus

# Historical CapEx Spending

**To improve the quality of Duolingo Max, CapEx spending will increase.**

## Capital Expenditures
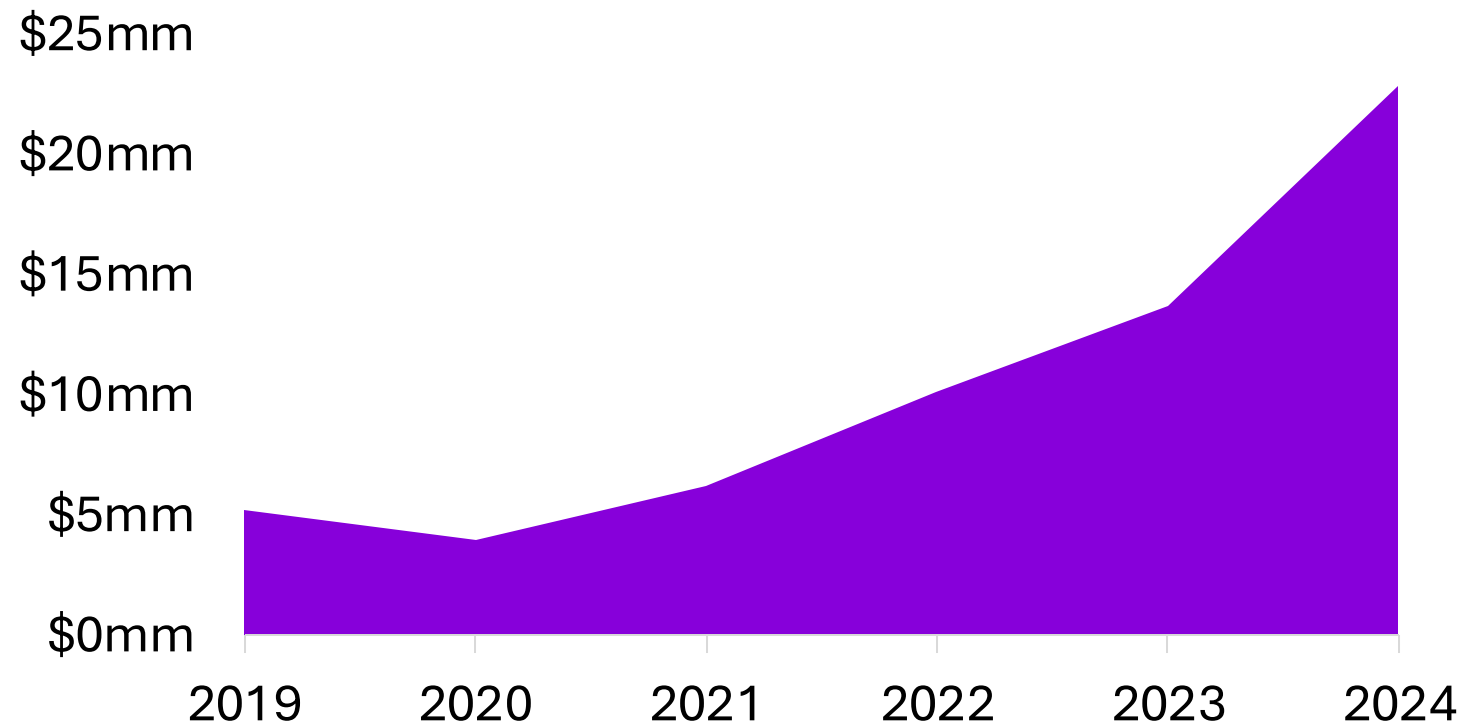


### What CapEx for Max represents:

1. **Office Equipment** (servers, computers)
2. **Capitalization of Software Development**
   a) Tech Infrastructure
      - Cloud computing and storage costs
      - LLM Training
   b) Software
      - Lily Dialogue
      - Voice and Speech Recognition

Sources: Company Filings, FactSet, Team Consensus

# Positive Cash Flow Movements

**Working capital is decreasing, despite receivables increasing and payables decreasing.**

## DSO/DPO Movement

58 days · 67 days · 69 days · 77 days

24 days · 26 days · 16 days · 4 days

2020    2021    2022    2023

— Days of Sales Outstanding    — Days of Payables Outstanding

## CA vs. CL

| | 2020 | 2021 | 2022 | 2023 |
|---|---|---|---|---|
| Total Current Assets - Cash | 38 | 65 | 89 | 150 |
| Total Current Liabilities | **31** | **65** | **116** | **177** |
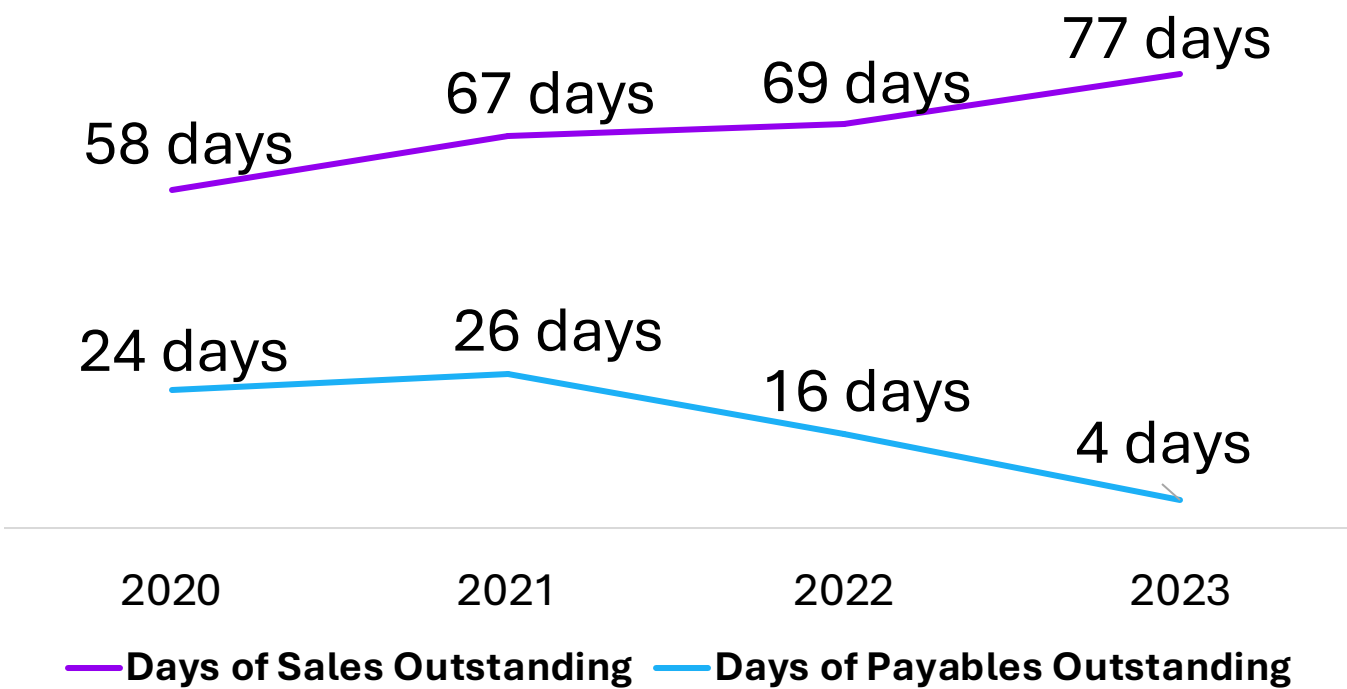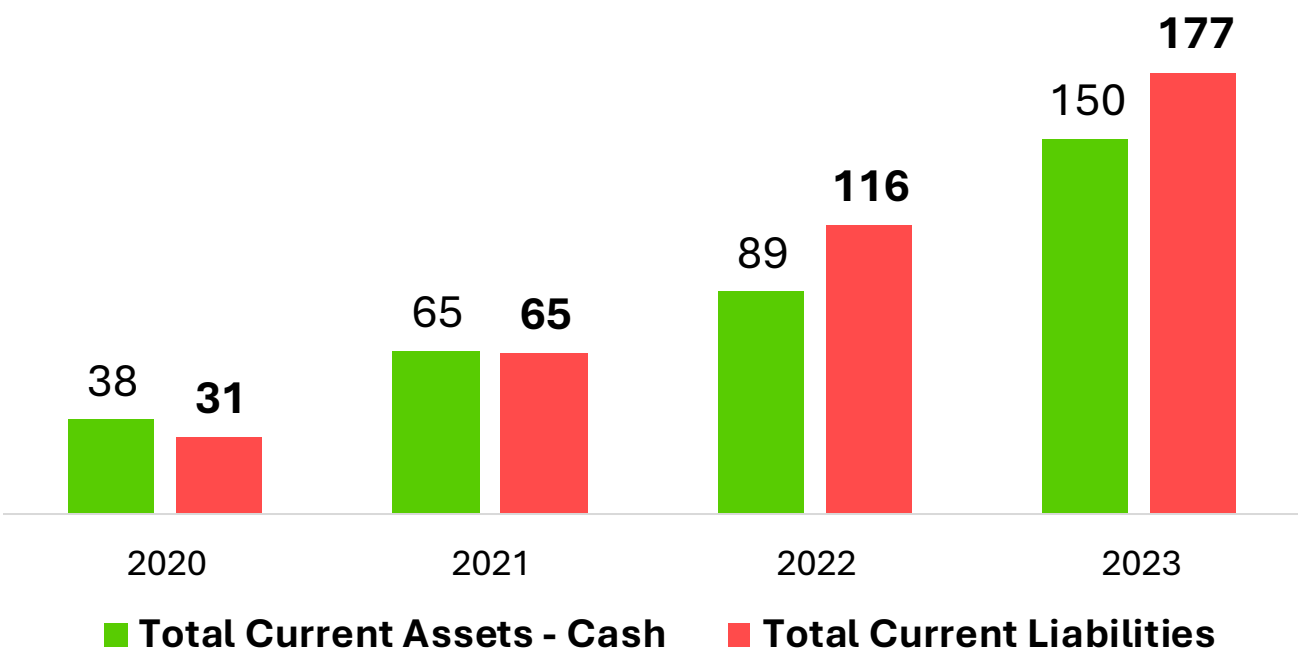
**Current liabilities have grown faster due to deferred revenue growth (current liability) outpacing current asset growth.**

Sources: Company Filings, FactSet, Team Consensus

# Promising Trends

**Duolingo's trend upward illustrates that they are on the right track as a company.**

## Margins Are Turning Positive

■ Operating Margin  ■ Net Margin

- 2019: -18% / -19%
- 2020: -10% / -10%
- 2021: -22% / -24%
- 2022: -17% / -16%
- 2023: -2% / 3%
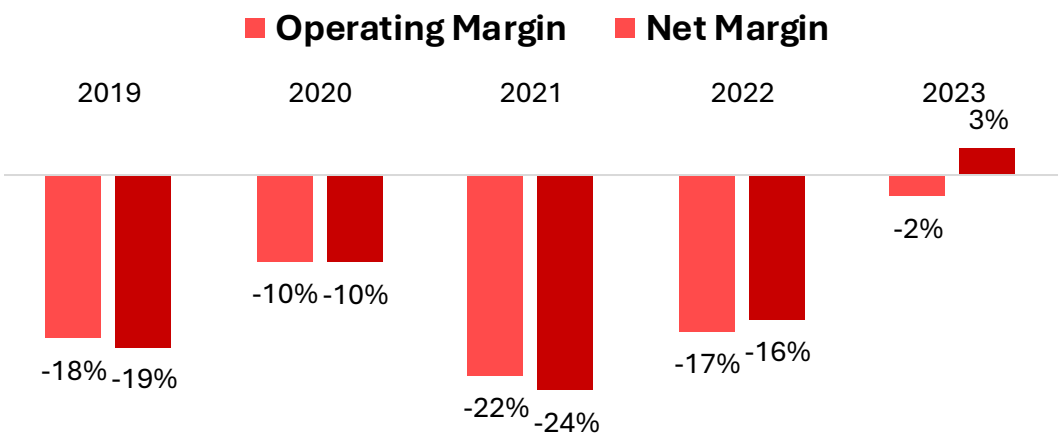
## ROE/ROA Upwards Trend



— ROA  — ROE
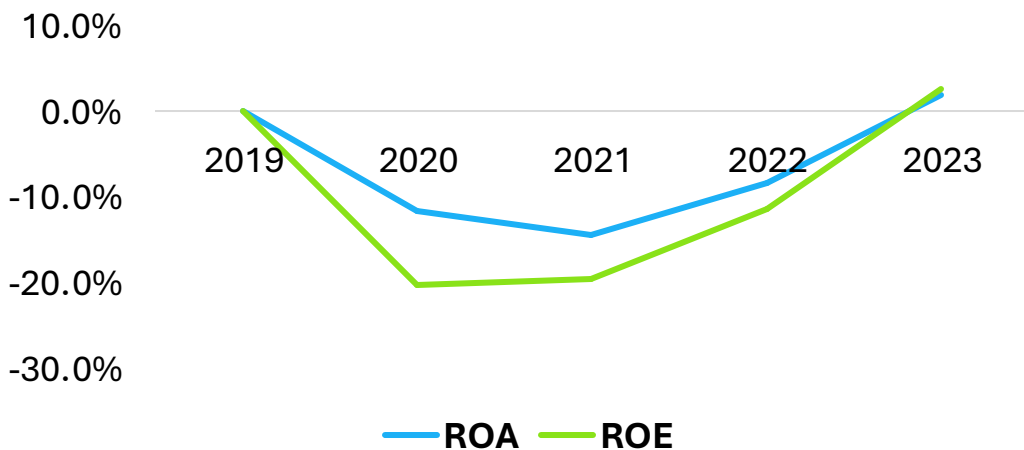
## High Cash Ratio
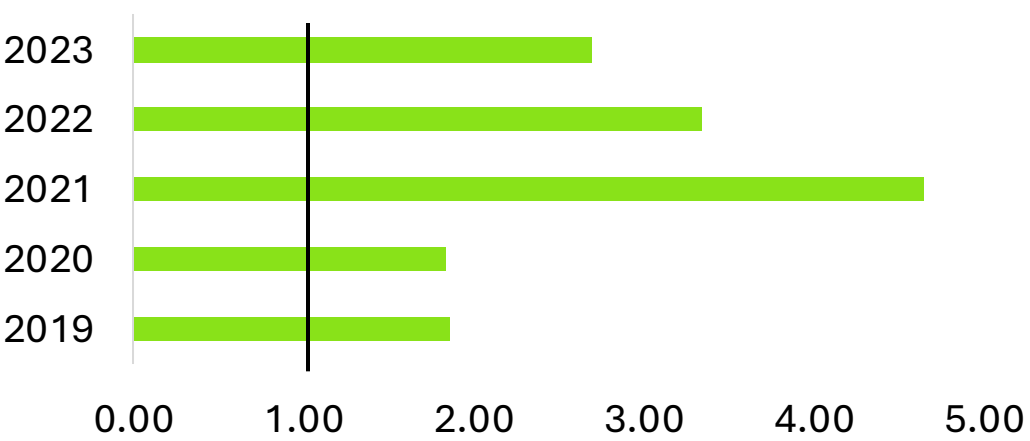


## Increasing Sales Per Share
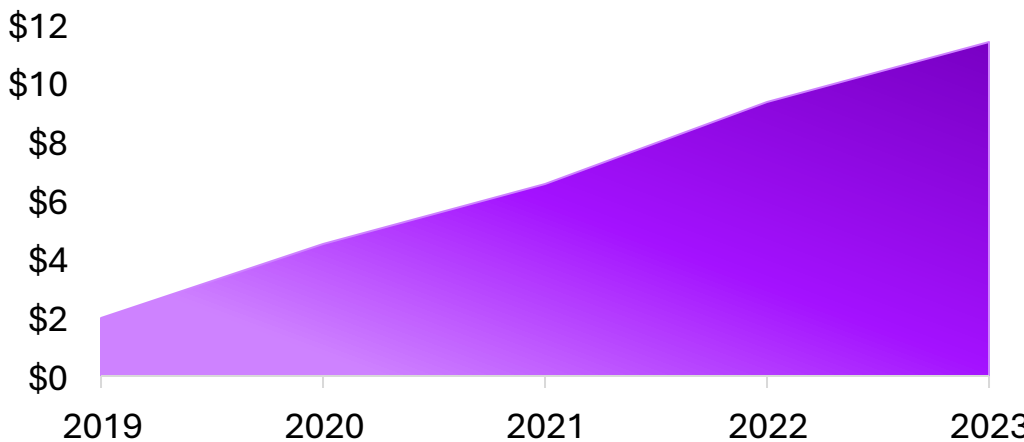


Sources: FactSet, Duolingo Q3 2024 Earnings Call Transcript, Team Consensus

# Acquisition Target

**Duolingo could potentially be an acquisition target.**

**EBITDA Margin Expansion**

**COGS Outlook**

**Corporate Debt Investments**
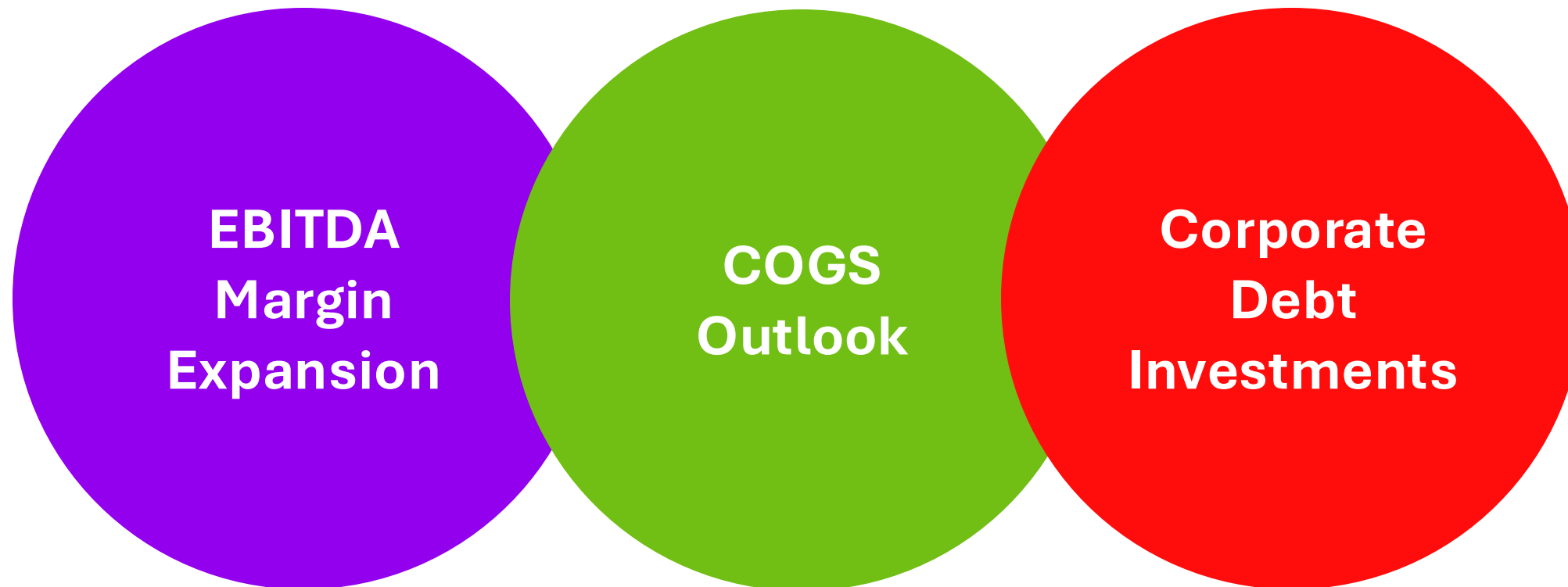
Sources: FactSet, Duolingo Q3 2024 Earnings Call Transcript, Team Consensus

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