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Analysis of Earnings Quality and Enterprise Valuation of Microsoft by Earnings Quality and Residual Income Model

Ruitao Jiang

Department of Accountancy, University of Illinois Urbana-Champaign, Champaign, United States

ruitaoj2@illinois.edu

Abstract. Artificial intelligence has had a remarkable influence in recent years and has developed many revolutionary solutions in many industries. OpenAI's ChatGPT is one of the most popular products in this trend. As the largest stockholder of OpenAI, Microsoft has committed itself to integrating artificial intelligence into its primary products, like Microsoft Office and Azure. Although Microsoft experienced a continuous slump in stock in 2022, Microsoft's current stock price has broken through $400 per share. This paper aims to conduct a financial analysis and forecast Microsoft's future growth to figure out Microsoft's intrinsic value. This article uses earnings quality analysis and residual income model to evaluate Microsoft's financial performance and conduct valuation. Microsoft's Cash Conversion Cycle has become negative since 2021, so Microsoft can reinvest the cash it receives from sales before using it to pay suppliers. The present value of the continuing value in the Residual Income Model indicates that Microsoft is undervalued compared to the current stock price. Economic conditions and the global supply chain will also influence investors' expectations, except for quantitative factors. Therefore, Microsoft's stock price fluctuates and does not exceed the forecasted price. This article offers some insights on Microsoft and relevant industry valuation analysis.

Keywords: Microsoft; Earnings quality; Intrinsic value; Residual income model.

1. Introduction

Since its inception in developing software for personal computers (PC), Microsoft has already become one of the world's largest technology companies. Microsoft has profound development in operating systems, software, hardware, web services, and generative artificial intelligence (AI). As AI development matured recently, Microsoft invested in and partnered with OpenAI. After collaborating with OpenAI, Microsoft published its generative AI Copilot powered by OpenAI's ChatGPT and began launching it into Microsoft Office 365. Although Copilot can solve programming problems, the provided codes have errors that novice programmers cannot solve [1]. According to Microsoft 2023 FORM 10-K, compared to the fiscal year 2022, cloud services and other revenue increased by 17%, while product revenue decreased by 11% [2]. This revenue structure indicates that Microsoft is already mainly focusing on providing cloud services like Azure and is gradually moving its concentration away from selling products like Surface and Xbox. In Microsoft 2023 Q4 Earnings Call, Satya Nadella, CEO of Microsoft, stated that Microsoft aims to maximize customer value from its cloud services, lead in AI integration across the technology stack, and enhance operating efficiency [3]. Besides, Satya Nadella said many customers have begun to move their workload to Azure, and Meta and OpenAI provide support on Azure and Windows [3]. Nadella's words indicate Microsoft's confidence and clear business layout on AI.

According to Rajesh Kumar, Microsoft's key growth strategies include reinventing productivity and business processes, building intelligent cloud platforms, and creating a personal computing experience [4]. Microsoft heavily invests in cloud computing and already become one of the largest providers of cloud services. Microsoft's analytics solutions and big data technologies also help its customers make business decisions [4]. Besides, Microsoft's financial and operational risk management and crisis management plan help Microsoft identify, respond to, and review risks [5].

Microsoft's commitment to sustainability is not just a side note, but a key pillar of its business strategy. Wehmeyer's analysis highlights this, pointing out that Microsoft's sustainability strategy is focused on quality education, decent work and economic growth, climate action, and justice institutions, all of which are addressed through various programs and partnerships [6]. Microsoft's corporate social responsibility is also centered around sustainability, particularly addressing racial injustice, investing in digital skills, and making special efforts toward responsible sourcing [6]. This emphasis on sustainability and social responsibility underscores Microsoft's commitment to making a positive impact beyond its core business operations.

Microsoft currently has transparent and sustainable business strategies, so it is essential to analyze Microsoft's earnings quality and intrinsic value to discover potential opportunities and risks. According to Yu, Microsoft's stock is worth short-term investment; however, Microsoft's ability to deliver investment returns is weak [7]. Besides, Yi's analysis reveals that Microsoft's stock is stable, and some investment portfolios will include Microsoft for safety reasons [8]. This research paper aims to analyze Microsoft's earnings quality and predict the enterprise value Residual Income Model (RIM) by using Microsoft's recent five-year financial statements. Earnings quality refers to the trustworthiness of a company's earnings when evaluating its present and future performance. According to Pietro and Alfred, a high earnings quality can improve capital market efficiency and indicates a stable earnings generation process [9]. Calculating the Cash Conversion Cycle (CCC) is an excellent way to measure earnings quality. CCC is a working capital metric that measures how many days a company will take to convert cash into inventory and sell inventory back into cash [10]. The prerequisite to estimating intrinsic value by RIM is calculating the cost of equity by using the Capital Asset Pricing Model (CAPM). Mona stated that the CAPM illustrates the correlation between the inherent risks of investing, also known as systematic risk, and the anticipated return on investments, especially in stocks [11]. When calculating CAPM, the formula needs the current risk-free rate, the volatility of the firm's stock relative to others (beta), and the market risk premium [11]. When applying RIM, the key calculation is to get an equity charge by using the required rate of return, which can be estimated by the CAPM [12]. The intrinsic value can then be calculated with the company's book value and the present value of future residual incomes using the RIM formula [12]. The final value of RIM is the forecasted stock price, and the stock price can be compared with the current stock price to determine whether the value of the companies is undervalued, overvalued, or correctly priced.

2. Methodology

2.1. Data Source

The financial data and key information for this analysis were collected from Microsoft SEC Filings and Yahoo Finance. The financial data mainly includes Microsoft's income statements, balance sheet, cash flows, Microsoft's monthly adjusted close price for the last ten years, and NASDAQ monthly adjusted close price for the last ten years. Other key information includes Microsoft's earnings call transcript.

2.2. Method Introduction

There are many ways to evaluate a firm's earning quality, and the article will analyze Microsoft's income statement and CCC to measure Microsoft's earning quality. The income statement includes many indicators that relate to companies' earnings quality and accounting choices. Vertical income statement analysis is expressed as a percentage of revenue, which shows the percentage of specific costs on sales. Vertical analysis also allows comparisons over time while controlling firm size. Horizontal income statement analysis is expressed as a percentage change compared to last year, which is the growth rate for each item. CCC measures how long a company takes to collect accounts receivable, sell its inventory, and pay the accounts payable. The CCC is one of several quantitative metrics used to assess the efficiency of a company's operations and management. A decreasing or

stable CCC over multiple periods indicates good performance of a company's ability to convert cash [8].

To evaluate a company's intrinsic value, RIM uses residual value created when earnings exceed the required rate of return to determine the market value of equity [14]. RIM's first advantage is that it uses the available data from the firm's financial statements, which are easily retrievable. Secondly, RIM ensures a more accurate measurement of a firm's ability to generate value above the investor's required rate of return by explicitly considering the cost of equity. Thirdly, RIM is suitable for evaluating long-term performance and is well-suited to Microsoft's history of sustained value creation through innovation and market leadership.

2.3. Valuation Equations

The earnings quality includes an analysis of the income statement and CCC. For income statements, vertical and horizontal analyses are suitable measures because these two analyses show the rate of change of each account and provide rates for the forecast. When a company has a lower CCC, its ability to convert cash is more effective. CCC includes three components, which are Days Sales Outstanding (DSO), Days in Inventory (DII), and Days Payable Outstanding (DPO), and the calculation formulas are as follows:

$$CCC = DSO + DII - DPO \tag{1}$$

$$DSO = \frac{Average\ Account\ Reveivable * 365\ days}{Sales} \tag{2}$$

$$DII = \frac{Average\ Inventory * 365\ days}{Cost\ of\ Goods\ Sold} \tag{3}$$

$$DPO = \frac{Average\ Account\ Payable * 365\ days}{Cost\ of\ Goods\ Sold} \tag{4}$$

In the RIM, the first thing that needs to be calculated is the cost of equity as the rate of return, which the CAPM usually calculates. The CAPM formula is as follows:

$$r_e = r_f + \beta(r_m - r_f) \tag{5}$$

$$\beta = \frac{COVARIANCE(RiRm)}{\sigma^2(Rm)} \tag{6}$$

The components of CAPM are required return (re), risk-free rate (rf), beta of investment (β), and return of the market (rm). Then, the required return is used to calculate the market value of equity in the RIM:

$$MVE_0 = BVE_0 + \frac{RI_1}{(1+r)^n} + \frac{RI_2}{(1+r)^{n+1}} + \cdots \tag{7}$$

The components of RIM are the market value of equity (MVE0), the book value of equity (BVE0), residual income (RI), the cost of equity (r), and the n start from 1 to the end of the forecasted period. For most valuation models, the most common forecast period is five years. A longer forecast period does not mean better because a longer period consists of more uncertainty. The residual income is calculated from BVE's previous year:

$$RI_n = Earnings - r * BVE_{n-1} \tag{8}$$

Then, the intrinsic value of the company is the present value (PV) of the continuing value (CV):

$$CV = \frac{RI_{n+1}*(1+g)}{(1+r)-(1+g)} \tag{9}$$

$$PV = \frac{CV}{(1+r)^{n+1}} \tag{10}$$

The PV of the CV is the estimated intrinsic value of the firm. The growth rate (g) is the U.S. annual GDP growth rate in 2023 to calculate CV.

3. Results and Discussion

3.1. Earnings Quality Analysis

For the past five years, Microsoft's revenue has experienced a significant increase from 2019 to 2022 and slowed down in 2023. According to Microsoft's horizontal income statement analysis, the growth rate of product revenue decreased each year and became negative in 2023. However, the revenue growth rate from service increased furiously in 2021 and 2022. From the vertical income statement analysis, the percentages of revenue from products were decreasing, and the percentages of revenue from services were increasing. Therefore, the switch of Microsoft's primary sources of revenue reflects Microsoft's main focused on providing cloud services like Azure and LinkedIn. Although Microsoft's research and development (R&D) expense increased each year, the percentage of the revenue decreased slightly since 2021. Since OpenAI shared ChatGPT with Microsoft, the R&D expenses might not need to increase proportionately with the revenue. Besides, the decline in product sales may also cause Microsoft to reduce its R&D expenses to maintain profit.

Microsoft has a strong cash flow, and its CCC in table 1 has stayed negative since 2021. A negative CCC means Microsoft can invest the cash it receives from product sales before using it to pay suppliers. Although Microsoft's DSO and DII have increased since 2020, its DPO has increased and mitigated the effects of increasing CCC. The increase in DPO might be a combination of multiple effects. First, Microsoft has strong relationships with its suppliers, so Microsoft has more flexibility in payment terms. Second, since the world economic conditions contain more uncertainties like wars and trade blockades, Microsoft may be less willing to pay cash, which leads to longer payment cycles. Third, Microsoft continuously increased the purchasing volume, which might result in longer payment terms.

Table 1. The Cash Conversion Cycle of Microsoft

	2023	2022	2021	2020
DSO	80.05	75.76	76.06	78.52
DII	17.30	18.58	15.83	15.68
DPO	102.79	99.52	96.76	86.79
CCC	-5.44	-5.18	-4.87	7.41

3.2. Residual Income Model Valuation

Table 2 exhibits Microsoft forecasted income statement. The RIM calculation needs forecasted earnings per share (EPS) in the income statement and dividend per share. The product sales experienced an 11% decrease in 2023; however, the reason might be the temporary fall in the demand for Xbox and Surface. Since Microsoft published the Microsoft Game Pass (XGP) in 2017, Xbox has become inconsequential for some players. XGP subscribers can play games the service provides on PC or Xbox. If individuals can play the same games on their computers, many would not consider Xbox. However, the sudden decrease in 2023 was more than in previous years and had no prelude. Therefore, the expected growth rate for the next five years is the average growth rate from 2019 to

2023, which was -0.32%. The expected growth rate for revenue from services and others is in 2023. The growth rates for service were exaggerated since 2019 and fell to a regular rate in 2023, which was 17.27%. Therefore, the growth rate in 2023 will be reasonable for forecasting when the market becomes calm for AI and cloud services. For expected gross margin, R&D, sales and marketing, general and administrative, other income, and provision for income taxes, the forecasted values are the average of the percentage of revenue from past five years because vertical analysis shows percentages of each dollar sale on specific costs related to operating items. This article estimates the weighted average shares outstanding to be the same as 2023's record because the plan for issuing shares is hard to predict. Finally, the earnings per share (EPS) equals net income divided by the weighted average shares outstanding.

Table 2. Forecasted Income Statement of Microsoft

income statement ($ in millions)	2028	2027	2026	2025	2024
Revenue:					
Product	63,679	63,882	64,085	64,289	64,494
Service and other	326,478	278,403	237,408	202,449	172,637
Total revenue	390,157	342,285	301,492	266,738	237,131
Cost of revenue:					
Product	41,635	36,526	32,173	28,464	25,305
Service and other	83,270	73,052	64,346	56,929	50,610
Total cost of revenue	124,904	109,579	96,519	85,393	75,915
Gross margin	265,252	232,706	204,973	181,344	161,216
Research and development	50,255	44,089	38,835	34,358	30,544
Sales and marketing	48,295	42,369	37,320	33,018	29,353
General and administrative	13,300	11,668	10,277	9,093	8,083
Total operating expenses	111,850	98,126	86,432	76,468	67,981
Operating income	153,402	134,580	118,541	104,876	93,235
Other income, net	1,466	1,286	1,133	1,002	891
Income before income taxes	154,868	135,866	119,674	105,878	94,126
Provision for income taxes	22,661	19,880	17,511	15,492	13,773
Net income	132,207	115,986	102,163	90,386	80,354
Earnings per share:					
Basic	17.76	15.58	13.72	12.14	10.79
Diluted	17.69	15.52	13.67	12.10	10.75
Weighted average shares outstanding:					
Basic	7,446	7,446	7,446	7,446	7,446
Diluted	7,472	7,472	7,472	7,472	7,472

Then, the weighted average shares outstanding is also used to calculate the forecasted dividend per share in table 3. This article uses the average annual growth rate for the past four years for the expected common dividends. The dividend per share equals the common dividends divided by the basic shares outstanding.

Table 3. Forecasted Dividend of Microsoft

$ in millions	2028	2027	2026	2025	2024
Common dividends	31,798	29,055	26,548	24,258	22,165
Basic shares outstanding	7,446	7,446	7,446	7,446	7,446
Dividend per share	4.27	3.90	3.57	3.26	2.98

When computing CAPM, this article uses the U.S. 10-year Treasury bond rate at Microsoft's fiscal year-end, which is 3.82%. Beta is determined by dividing the covariance of Microsoft stock's return and the index's return by the variance of the index's return over a period [7]. Since the risk-free rate

is ten years, this article also uses monthly historical data over ten years to calculate the beta, which is 0.87. Besides, the market risk premium is the average of ten years in the U.S., which is 5.5%. As a result, the required rate of return is 8.61%.

The calculation of the continuing value (CV) of Microsoft is a key step in this analysis. It begins with the computation of the end book value of equity (BVE) for forecasted years in table 4. The ending BVE is the sum of the beginning BVE, EPS, and minus dividend per share. The residual income is then determined by subtracting the required return from EPS, which is the previous year's ending BVE times the discount rate. The discount rate is calculated as one plus the required rate of return, multiplied by itself for the number of years in the period. For example, the discount rate in 2025 is the square of one plus 0.0861. The present value (PV) of residual income is the residual income divided by the discount rate. This analysis sets the growth rate used to calculate CV as the U.S. GPD growth rate in 2023, at 6.3%. Therefore, the CV is 556.04, and the PV of the CV is 368.01. Finally, the intrinsic value of Microsoft is 434.68, which is the sum of 2023 ending BVE, total PV of residual income, and PV of CV. Currently, this intrinsic value indicates that Microsoft is undervalued.

Table 4. Residual Income Model and intrinsic value of Microsoft

	2023	2024	2025	2026	2027	2028
Beg BVE		27.70	35.51	44.39	54.55	66.22
EPS		10.79	12.14	13.72	15.58	17.76
Dividend/share		-2.98	-3.26	-3.57	-3.90	-4.27
Ending BVE	27.70	35.51	44.39	54.55	66.22	79.71
EPS		10.79	12.14	13.72	15.58	17.76
Required return		-2.38	-3.06	-3.82	-4.69	-5.70
Residual income		8.41	9.08	9.90	10.88	12.06
Discount rate		1.09	1.18	1.28	1.39	1.51
PV of Residual income		7.74	7.70	7.73	7.82	7.98
Total PV of Residual income	38.97					
Continuing Value	556.04					
PV of continuing value	368.01					
Equity value per share	434.68					

3.3. Limitations and Prospects

The vertical and horizontal forecast models used in this article are simple and might not reflect Microsoft's actual growth. Since RIM uses data from financial statements, any false historical presentation or occasional events like the pandemic will make forecasts unreliable. Secondly, the RIM heavily relies on the cost of equity, and different methods of calculating or selecting risk rates will result in huge differences in forecasted intrinsic values. Thirdly, RIM ignores cash flow and focuses on accounting profits, which might not accurately reflect a company's financial health and ability to generate cash.

4. Conclusion

In general, this article shows that Microsoft's intrinsic value is higher than its current stock price, and this difference shows the cooling-off period for investors' expectations of artificial intelligence. However, Microsoft's consistent growth in revenue from service and expense in R&D indicates that Microsoft still has the potential to invest and develop more in the artificial intelligence industry. Although Microsoft's stock price never reached the forecasted price, the outstanding cash conversion cycle, steady increase in revenue from service, and fixed R&D expense as a percentage of revenue indicates that Microsoft has the potential to grow. Investors are more cautious about topics related to virtual products because of the failure of the metaverse, so the fever of AI does not grow drastically. The AI industry is still thriving after the stable iteration of ChatGPT and the release of new

challengers in the market. As one of the most solid propellants, Microsoft will be the first beneficiary of the AI industry's success and still worth further investment.

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