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EVALUATING STOCK SELECTION IN THE SAAS INDUSTRY: THE EFFECTIVENESS OF THE RULE OF 40

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Abstract

The Rule of 40 is a popular financial guideline used by software-as-a-service (SaaS) industry participants to assess the operational health of the companies. This paper investigates the effectiveness of the Rule of 40 as a stock selection criterion. Our study analyses a sample of 1771 SaaS companies worldwide spanning the period 2003-2022. The findings demonstrate that the Rule of 40 adds value and delivers a moderately high Sharpe ratio as a stock selection tool. A modified rule, the SaaS Investing Rule of 65, is proposed and found to outperform the Rule of 40 in identifying relative winners and losers within the SaaS space. The effectiveness of the rules raises practical implications for investors and analysts. Additionally, we explore the effectiveness of alternative versions of the Rule of 40 using different measures of profitability, as well investigate whether the returns are driven by traditional style factors.

Keywords: Rule of 40, SaaS, software-as-a-service, stock selection, SaaS Investing Rule of 65

1. Introduction

The software-as-a-service (SaaS) industry is characterised by rapid innovation, intense competition, and evolving business models. Because the industry is predominantly governed by the network effect, where each new customer increases the value of the product for all existing for future customers, young SaaS companies frequently prioritise growth over short-term profitability to expand their market share. However, as these businesses approach the top of their initial S-curves, revenue growth slows, and profitability becomes a greater focus. Due to the lag between bookings and revenues, companies facing upfront costs for customer acquisition and R&D must make strategic decisions on how to balance growth and profitability, and this is where the Rule of 40 comes in.

The Rule of 40 was introduced by Brad Feld (2015). It is essentially a financial guideline that provides a holistic framework for evaluating SaaS companies and it states that for a healthy SaaS company, the sum of its revenue growth rate and profitability margin should be higher than 40%. By taking into account these two key factors, the rule provides a comfortable trade-off between growth and profitability. A combined value of 40% or higher therefore indicates that a company is striking a healthy balance between the two, while a value below 40% suggests potential issues in either area.

Despite its simplicity, beating the Rule of 40 appears to be a lot more challenging. Roche and Tandon (2021) examined more than 200 software companies of various firm sizes between 2011 and 2020 and found that only one-third of them were able to achieve the Rule of 40, with even fewer able to sustain it. Similarly, Depeyrot and Heap (2018) researched the performances of 124 publicly traded

software companies to identify those that outperformed the Rule of 40 over three and five years. They found that only 40% of them were able to exceed the rule in the single year of 2017, and only 25% and 16% were able to outperform the rule for three or more years and for all five years respectively, adjusted for mergers and acquisitions.

As expected, the rule has become a favourite rule of thumb for venture capitalists and SaaS industry watchers, including boards and management teams, to assess their company's operating performance. For investors and analysts seeking attractive investment opportunities within the dynamic SaaS sector, the rule may also help identify promising companies. However, despite its potential as a useful stock selection tool, little research has been conducted on its efficacy as one.

This paper seeks to study the effectiveness of the Rule of 40 as a stock selection criterion in the SaaS industry. The study examines 1771 SaaS firms across the world between 2003 and 2022, categorising them into long or short portfolios based on their ability to satisfy the Rule of 40. The study finds that the median SaaS company, whether it satisfies the Rule of 40 or not, generally delivers negative returns over the sample time period. However, the median stock within the long portfolio significantly outperforms the median stock in the short portfolio over time, leading to fairly consistent outperformance of a long-minus-short strategy within the SaaS stock universe. These findings remain even when country effects are taken into consideration. The study also finds that EBITDA margin is the most effective measure of firm profitability compared to EBIT margin and net margin. The study further proposes a modified SaaS Investing Rule of 65 that combines the Rule of 40 with valuation consideration. The proposed rule outperforms the Rule of 40 in identifying relative winners and losers. An analysis of the macroeconomic sensitivities of both the rules evinced that the Rule of 40 exhibited a superior performance in contracting growth and subdued inflation environments relative to its performance in expanding growth and escalating inflation environments. Conversely, the SaaS Investing Rule of 65 demonstrated a more favourable outcome in expanding growth and escalating inflation periods compared to its performance in contracting growth and subdued inflation periods. Furthermore, stress testing conducted across major market crises indicated that both investment rules generally yielded positive returns, with the SaaS Investing Rule of 65 outperforming the Rule of 40, except during the Taper Tantrum and the Covid-19 pandemic episodes.

By investigating the Rule of 40, the study contributes to the existing literature on financial metrics for stock selection and provides insights into its usefulness for investors and analysts. The study aims to enhance understanding the Rule of 40 and its implications for decision-making in the software and technology industry. Additionally, the study proposes a modified rule for investing in SaaS stocks that takes into account both the Rule of 40 and stock valuations, which may be useful to practitioners seeking to identify attractive investment opportunities in the SaaS industry. Overall, the study provides valuable insights into the effectiveness of the Rule of 40 as a stock selection criterion in the SaaS industry and highlights the importance of considering both growth and profitability when evaluating SaaS companies.

This paper is structured as follows: Section 2 provides a brief literature review and the economic rationales underpinning the Rule of 40. Section 3 gives an overview of the data used in the study and the methodology employed. Section 4 reports our empirical findings and Section 5 concludes the paper.

2. Literature Review

2.1 Background

The software industry has undergone a substantial transformation in recent years, marked by a pronounced shift towards the SaaS model. This development, influenced by the widespread adoption of cloud computing and the allure of flexible, scalable software solutions, has led to an increasing demand for effective valuation methodologies that accurately reflect the economic realities of SaaS companies. Although SaaS represents a segment within the broader software industry, it exhibits unique characteristics that challenge the application of valuation methods conventionally used for traditional software companies.

In particular, SaaS businesses face substantial challenges in achieving profitability during their start-up and early growth phases, compared to traditional software businesses. These challenges primarily stem from three fundamental differences between SaaS and traditional software business models.

The first distinguishing factor between traditional software and SaaS companies is the timing of revenue and cost recognition. Both types of companies incur immediate product development costs and customer acquisition costs (CAC) to generate sales. However, the timing of revenue recognition varies significantly between the two. Traditional software firms, such as Oracle and SAP, typically generate revenue through the one-off sale and delivery of perpetual licenses and subsequent upgrades (Osterwalder & Pigneur, 2010), recognising these revenues upfront. This aligns the timing of revenue and expenses, enabling these firms to achieve profitability early in their lifecycle. In contrast, SaaS firms operate on a subscription-based model, with customers subscribing to the software for a period of time, typically monthly or annually (Dempsey & Kelliher, 2017). Accounting rules dictate that these revenues are recognised over the time that the service is delivered (Guo & Ma, 2018), resulting in a delay in revenue recognition compared to traditional software firms. This leads to a misalignment between revenue and expenses. Consequently, SaaS businesses often experience initial losses, as a single subscription fee does not cover the associated customer acquisition cost. As SaaS firms acquire more customers, they incur additional costs, while the return on investment is only realised over the subscription period (Gardner, 2015). These losses can intensify with increased customer acquisition. Furthermore, the timing of cash flow is also misaligned, as customers typically pay for the service periodically, while the company must cover its expenses immediately. This results in a scenario where growth initially exacerbates cash flow, as the faster a SaaS company grows, the more upfront sales expense it incurs without the corresponding incoming cash from customer subscriptions.

The second distinction between Software as a Service (SaaS) enterprises and traditional software firms is manifested in their respective expense trajectories. Two crucial factors to examine in this context are the cost of service delivery and the financial implications of customer churn. In the realm of traditional software companies, upon purchase, the customer effectively takes over ownership of the software and manages it using their own IT infrastructure. This arrangement encompasses assuming the responsibilities for installation, updates, licensing, maintenance, and other ancillary costs associated with the software's operation. Consequently, traditional software companies experience minimal financial impact from customers ceasing to use their software, as the initial purchase typically suffices to recoup the customer acquisition costs (CAC) (Bandulet, 2017).

In contrast, SaaS models centralise the software and hardware within the vendor's infrastructure, assigning the onus of maintenance, updates, and upgrades predominantly to the vendor. This structural difference renders SaaS businesses particularly vulnerable to the effects of churn (York, 2012). The financial ramifications of churn are especially acute if a subscription is terminated before the CAC has been fully recuperated (Bandulet, 2017). As a result, SaaS entities must prioritise not only the attraction of new customers but also the retention of existing ones to optimise the lifetime value

derived from each customer relationship. This dual focus on acquisition and retention engenders a steeper expense curve for SaaS companies in comparison to their traditional software counterparts.

The third distinction between SaaS businesses and traditional software companies is manifested in the predictability and profitability of their long-term revenue streams. SaaS models, predicated on subscription-based revenue, offer a more stable financial outlook once a robust subscriber base has been established. This stability stems from the inherent "stickiness" of SaaS offerings, whereby customers, having outsourced their software management to a third-party vendor, are more likely to maintain their subscription over an extended period. This enduring customer relationship is further reinforced by the challenges associated with switching SaaS providers. The deeply integrated nature of SaaS solutions within business processes, coupled with the complexities of budget decentralisation and department-specific utilisation, significantly heightens the barriers to switching providers, thereby fostering a predictable and continuous revenue flow for the SaaS provider.

Contrastingly, traditional software models, which predominantly rely on single-purchase transactions, do not facilitate the establishment of long-term customer relationships to the same extent, nor do they benefit from recurrent revenue streams. Moreover, SaaS enterprises exhibit enhanced profitability. SaaS platforms are engineered for seamless scalability in response to the evolving requirements of customers. Leveraging cloud-based infrastructure, SaaS vendors can adeptly accommodate surges in demand without necessitating substantial investments in infrastructure. This scalability not only enables SaaS companies to cater to an expanding clientele with minimal additional costs but also amplifies profitability.

The scalability characteristic is further propelled by the pronounced network effects inherent in SaaS business models, which, as Shim and Lee (2012) elucidate, augment the product's value and contribute to the exponential valuation growth of companies like Zoom with each new active user. Additionally, SaaS providers can capitalise on economies of scale by servicing multiple clients on a communal infrastructure, thereby distributing the costs associated with development, maintenance, and support over a broader customer base. This distribution mechanism effectively reduces per-unit costs and, as the customer base burgeons, significantly elevates profit margins.

Given these unique characteristics, SaaS entities often adopt aggressive sales and marketing strategies during periods of heightened adoption to capitalise on early growth opportunities. This approach is deemed essential within the highly competitive, winner-take-all markets characteristic of the SaaS industry (Bandulet, 2017). The establishment of a robust subscription base subsequently facilitates the transition to more predictable and profitable revenue streams for SaaS companies.

The distinct operational and financial dynamics of SaaS companies have prompted a scholarly consensus advocating for differentiated management and valuation practices for these entities in contrast to traditional software firms (Li et al., 2017; Cadambi & Easwaran, 2016; Li et al., 2017; Skok, 2017). A salient challenge identified in this discourse pertains to the strategic dilemma SaaS managers face in balancing the prioritisation of short-term growth against the pursuit of long-term profitability. This conundrum is exacerbated by the temporal disparities in revenue and expense recognition, as well as the strategic imperative to build an economic moat upon achieving critical mass. Despite the apparent dichotomy between growth and profitability in the nascent stages of a SaaS company's development, Dolgaia and Sorokina (2020) find that most industry experts agree that they remain the most important metrics to focus on for SaaS companies.

Recent scholarly investigations have similarly underscored the pivotal roles of growth and profitability in the valuation of Software as a Service (SaaS) firms. Research conducted by Gardner (2016) and Kellogg (2013) elucidates that SaaS entities demonstrating superior revenue growth rates relative to their similarly-sized counterparts command higher market valuations. This assertion is further corroborated by Newton and Schlecht (2016), who, upon analysing 63 publicly listed SaaS corporations over the 44 quarters since 2005, identified a positive correlation between both revenue growth and EBITDA margin with corporate valuations. Notably, during the examined period, revenue

growth was ascertained to be of twofold importance compared to EBITDA margin, although the significance attributed to profitability has experienced an uptick between 2014 and 2015. This trend towards an increased valuation of profitability was affirmed by Heimann and Rathi (2017), who observed a market inclination towards rewarding profitable SaaS companies.

2.2 Theoretical Framework

The 'Rule of 40' has emerged as a critical evaluative framework within the technology sector and venture capital milieu for appraising the balance between growth and profitability of SaaS firms. Popularised by Techstars' Brad Feld (2015) on his popular blog Feld Thoughts, this heuristic posits that the aggregate of a software company's revenue growth rate and profitability margin should surpass 40% to denote a healthy operational state (Feld, 2015). The utility of the 'Rule of 40' is twofold: it furnishes investors with a comprehensive metric to assess the health of a company (Depeyrot & Heap, 2018; Kellogg, 2013; Kellogg, 2023; Cummings, 2015; Strazzulla, 2016), and it incentivises SaaS providers to concurrently prioritise profitability and growth, thereby aiding in the establishment of strategic objectives (Depeyrot & Heap, 2018).

Eriksen (2022) posits that the 'Rule of 40' constitutes the paramount Key Performance Indicator (KPI) for maximising a SaaS company's valuation. This assertion is supported by Löfgren and Petterson (2021), who, in their study on performance measures and quality criteria for SaaS B2B companies, found that two out of seven companies identified the 'Rule of 40' as among the top five of their most important measurements. Latka (2022) further suggests that this rule can serve as a guideline for companies, particularly those achieving $1 million in recurring revenues, to balance their capacity for investment without compromising earnings. Complementing this, Depeyrot and Heap (2018) observed that companies surpassing the 40% threshold typically enjoy valuations twice as large as those failing to meet this criterion. Collectively, these studies highlight the 'Rule of 40' as an indispensable benchmark for SaaS companies, guiding them towards a balanced pursuit of growth and profitability to maximise their market valuation.

3. Data and Methodology

The methodology employed in this study aims to evaluate the effectiveness of the Rule of 40 as a stock selection criterion in the SaaS industry. The following sections outline the data collection process, sample selection, and calculation of the Rule of 40. All calculations within the study are executed using the R software.

3.1 Data

All the data for this study were downloaded from FactSet. Key financial indicators including revenue growth rate, profit margin, and stock returns were collected monthly over the twenty-year period of January 2003 to December 2022. Detailed explanations of the variables and their respective Factset mnemonics are provided in Table 1. In our analysis, we include only those firm-year datapoints that have the necessary data for calculating the Rule of 40 and the corresponding price returns.

Table 1: Definitions of variables

Variable	Factset mnemonic	Definition
Monthly stock returns	P_PRICE_RETURNS	Monthly total returns of the security in USD.
Monthly country-neutral stock returns	MSCI_TOTAL_RET_IDX	Monthly total returns of the security in USD minus Monthly total returns of the MSCI country index in USD.
One-year sales growth	FF_SALES_GR	Calculated as the year-over-year percent change in Net Sales or Revenue (FF_SALES).
EBITDA margin	FF_EBITDA_OPER_MGN	Calculated as EBITDA (Operating Income Plus Depreciation & Amortization) (FF_EBITDA_OPER) divided by Net Sales (FF_SALES).
EBIT margin	FF_EBIT_OPER_MGN	Calculated as EBIT - Operating Income (WSF_EBIT_OPER) divided by Net Sales (WSF_SALES).
Net margin	FF_NET_MGN	Calculated as Net Income (FF_NET_INC) divided by Net Sales or Revenue (FF_SALES), multiplied by 100
Price to sales	FF_PSALES	Calculated as Price - Close (FF_PRICE_CLOSE_FP) divided by Sales Per Share (FF_SALES_PS).

3.2 Sample Selection

We identify software-as-a-service companies globally using Revere Business Industry Classification System (RBICS), a comprehensive, bottom-up structured taxonomy that classifies companies according to the products and services they provide. Companies with RBICS that correspond to "software" are screened, which yields us the final sample which comprises a diverse set of 1771 SaaS companies operating a range of software, including Retail Industry Software, Mobile Platform Applications Software and Compliance ERP Software, within various economic sectors such as Finance, Technology and Industrials. Due to occurrences of delisting and bankruptcies among certain SaaS companies within the sample period, as well as some companies being listed midway through the period, the resultant sample is characterised by an unbalanced panel structure.

Figures 1 and 2 show the breakdown of our sample set by country and sector respectively over time. We can see that while there were only about 300 SaaS companies in 2023, that number steadily increased by almost six-fold over the next two decades, with US, Japan and China accounting for approximately two-fifths of them. In terms of economic sectors, Technology is expectedly where most of the SaaS companies are found, followed by Finance.

Figure 1: Breakdown of global SaaS universe by country

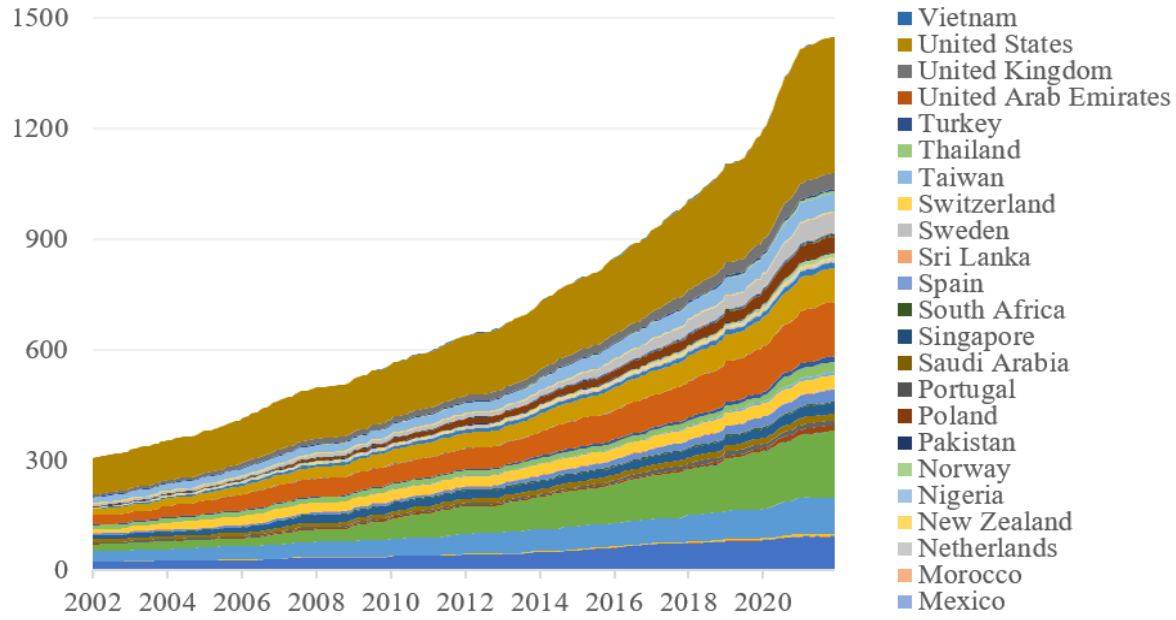
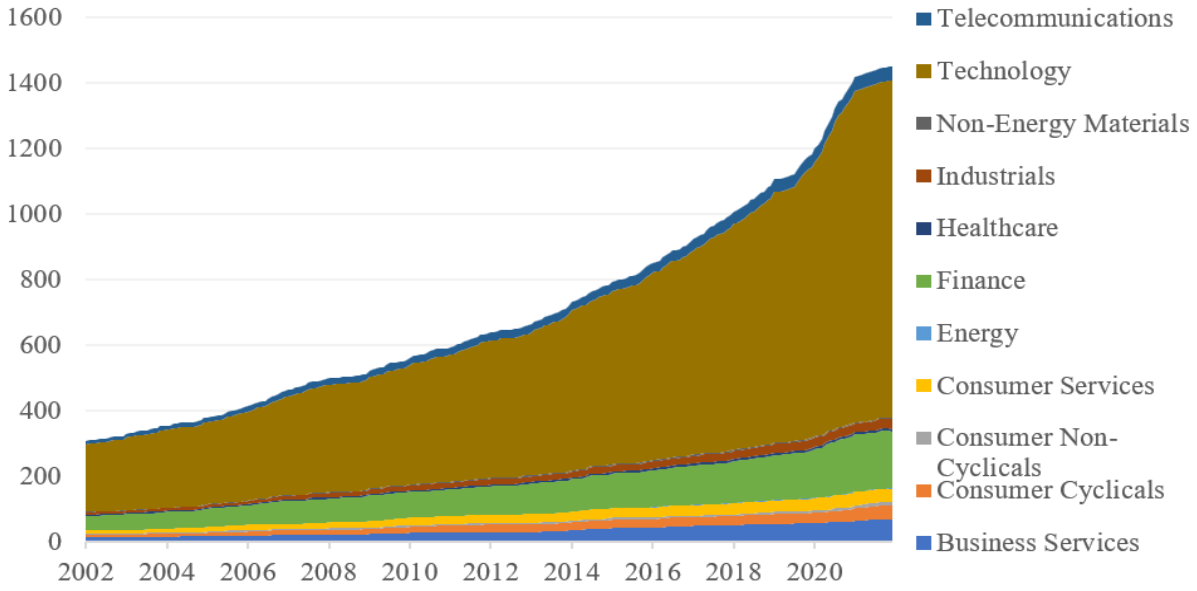


Figure 2: Breakdown of SaaS universe by industry sector



3.3 Calculation of the Rule of 40 and Portfolio Formation

The Rule of 40 (R40) is calculated by summing the company's revenue growth rate and profit margin. We represent revenue growth rate as the percentage change in sales over the last year. For the definition of profitability, there is no generally agreed upon measure. The margins of Unlevered Free Cash Flow, Operating Income, and Earnings Before Interest, Tax, Depreciation and Amortisation

(EBITDA) are all different measures of profitability that Feld (2015) consider to be legitimate candidates for use in the Rule of 40 calculation. Following Feld (2015) and common practice, we use EBITDA margin, defined as EBITDA divided by sales, as our measure of profitability.

The formula for calculating the Rule of 40 is therefore as follows:

$$\text{Rule of 40} = \text{Sales growth over last year} + \text{EBITDA margin} \quad (1)$$

The combined value is then compared to the threshold of 40% to determine whether the company meets the Rule of 40 criteria. The companies that met or exceeded the Rule of 40 threshold are categorised into the long portfolio while the ones that fail the rule are put into the short portfolio, with the stocks in the respective portfolios being equally weighted, The monthly median returns of the portfolios are then calculated. Due to the existence of extreme outliers in the returns of our sample set, we use median, as opposed to mean, to represent the average returns of the portfolios. We also calculate the returns of a long-minus-short portfolio to capture the excess returns generated when using the Rule of 40 as a stock selection criteria.

4. Empirical findings

4.1 Descriptive statistics

Table 2 provides the descriptive statistics of the variables utilised in this study, including monthly stock returns, monthly country-neutral stock returns, one-year sales growth, EBITDA margin, EBIT margin, net margin, and the Rule of 40. The monthly returns and sales growth variables exhibit positive skewness to the right, while the margin variables are all negatively skewed to the left. The sample universe displays high kurtosis across all variables, indicating that the data is skewed to the right and heavily tailed with outliers. The positive mean return of the average SaaS firm and the negative median return suggests that the data is significantly impacted by extreme outliers, supporting the use of the median to represent the average returns of the formed portfolios. The mean of the Rule of 40 variable indicates that, on average over time, only 30% of companies satisfy the Rule of 40, consistent with the findings of Roche and Tandon (2021) and Depeyrot and Heap (2018).

Table 2: Descriptive statistics

	Monthly stock returns	Monthly country-neutral stock returns	One-year sales growth	EBITDA margin	EBIT margin	Net margin	Rule of 40
Mean	38.405	37.895	416.477	-5913.99	-6011.84	-7824.89	0.301
Median	-0.513	-1.602	9.878	8.368	3.379	2.379	0.000
Standard deviation	9721.13	9735.117	19740.09	440841.5	448082	637481.3	0.459
Skewness	389.801	389.241	105.239	-125.125	-125.535	-127.451	0.87
Kurtosis	160875.618	160413.775	12244.035	15955.11	16052.23	16418.73	1.756

4.2 Rule of 40

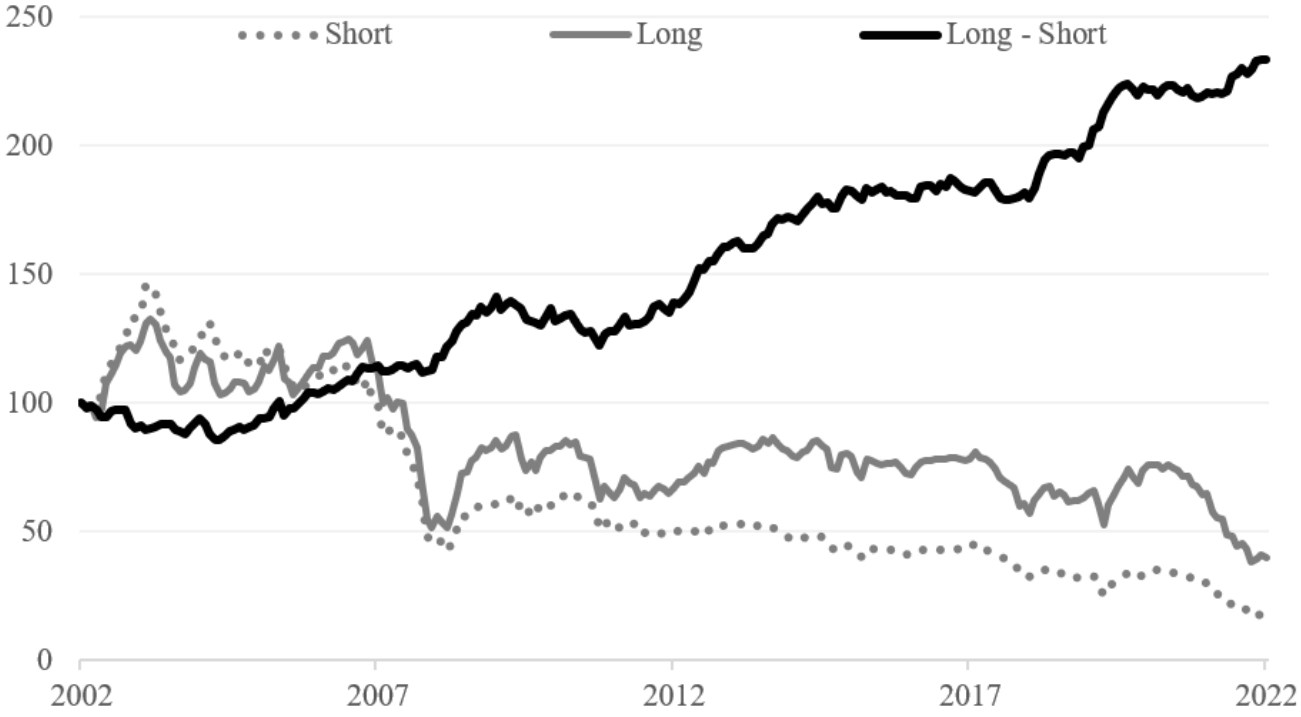
The findings of the backtesting analysis are presented in Panel A of Table 3. Despite the commonly held belief that the SaaS industry is a high-growth and high-return sector, the median stock return of SaaS companies, regardless of their adherence to the Rule of 40 criteria, is predominantly negative. The median stock in the long portfolio generated positive monthly returns only 50% of the time, while the median stock in the short portfolio achieved the same around 40% of the time. Nonetheless, as a stock selection criterion to differentiate the winners from the losers within the SaaS industry, the Rule of 40 has proven to be effective, delivering positive annualised returns, a moderately high Sharpe ratio,

and a high win ratio (defined as the proportion of positive-returns months). The efficacy of the Rule of 40 has remained consistent over time, with the cumulative returns of the long-minus-short portfolio increasing over time, as illustrated in Figure 3.

Table 3: Portfolio tests (January 2003 - December 2022)

		Rule of 40	
		Pass	Fail
	Long - Short	Long	Short
Panel A: Absolute returns			
Return (ann)	4.403	-3.120	-7.523
Risk (ann)	5.510	16.860	15.114
Sharpe ratio	0.799	-0.185	-0.498
Win ratio	61.3%	50.0%	42.9%
Panel B: Country-neutral returns			
Return (ann)	4.435	-11.911	-16.346
Risk (ann)	5.832	7.681	6.642
Sharpe ratio	0.760	-1.551	-2.461
Win ratio	60.4%	30.0%	15.4%
Panel C: Using EBIT margin			
Return (ann)	1.611	-5.096	-6.707
Risk (ann)	6.195	17.249	15.094
Sharpe ratio	0.260	-0.295	-0.444
Win ratio	51.7%	48.3%	44.6%
Panel D: Using Net margin			
Return (ann)	0.592	-5.827	-6.419
Risk (ann)	6.814	17.755	15.034
Sharpe ratio	0.087	-0.328	-0.427
Win ratio	52.9%	47.9%	46.3%
Panel E: SaaS Investing Rule of 65			
Return (ann)	10.562	-1.947	-12.509
Risk (ann)	5.749	15.312	16.112
Sharpe ratio	1.837	-0.127	-0.776
Win ratio	74.6%	50.0%	39.2%

Figure 3: Time series plots of the cumulative returns of long, short and long-minus-short portfolios formed on the Rule of 40 (January 2003 – December 2022)



Note: This chart shows the cumulative monthly returns of the long, short and long-minus-short portfolios formed on the Rule of 40 (Rule of 40). The long portfolio consists of companies which satisfy the rule while the short portfolio consists of companies that fail the rule. Monthly median returns from January 2003 to December 2022 are used for the calculations.

4.3 Country-neutral returns

In order to eliminate the influence of country-specific factors, we also assess the country-neutral returns of the three portfolios by computing the returns of the stocks relative to their respective MSCI country indices. Panel B of Table 2 presents the country-neutral returns of both the long and short portfolios, which are even more disappointing than the earlier results, with both portfolios delivering double-digit negative relative returns. However, the results of the long-minus-short portfolio remain relatively unchanged, which confirms the effectiveness of the Rule of 40 as a stock selection criterion within the SaaS industry.

4.4 Alternative measures of profitability

While EBITDA margin is the preferred profitability metric in the calculation of the Rule of 40, alternative measures such as EBIT margin and net income margin can also be used. In Panels C and D of Table 2, we evaluate the performance of the long-minus-short portfolios using these alternative metrics. Both alternative measures exhibit poor performance compared to EBITDA margin, delivering low positive annualised median returns and negligible Sharpe ratios over the sample period.

4.5 Fama-French factors

To investigate whether the efficacy of the Rule of 40 is simply a result of style factors within the market, we perform a regression analysis of the relationship between the monthly excess returns of the long-minus-short portfolio formed on the Rule of 40 and several factors, including the market premium (Mkt-RF) and the Fama-French equity anomaly factors of size (SMB), value (HML), profitability (RMW), and

investment (CMA). The monthly returns of these factors are obtained from the website of Kenneth French[1].

Table 4 provides the results of the analysis. The intercept of the regression is 0.373, which represents the expected excess returns of the long-minus-short portfolio when all of the independent variables are equal to zero. The intercept is statistically significant at the 1% level, indicating that the long-minus-short portfolio generates positive excess returns that are not explained by the market premium or the Fama-French factors. The regression coefficient for Mkt-RF is 0.069, which is also statistically significant at the 1% level. This suggests that the excess returns of the long-minus-short portfolio are positively related to the market premium.

Table 4: Long-minus-short portfolio alpha and beta with respect to market and Fama-French factors (January 2003 - December 2022)

	Intercept	Mkt-RF	SMB	HML	RMW	CMA
Regression coefficient	0.373**	0.069**	-0.126	-0.020	-0.092	-0.160
	(3.494)	(2.705)	(-1.832)	(-0.301)	(-0.984)	(-1.686)
Adjusted R-squared:	0.074			No of observations:		240

Note: This table reports the regression results of the monthly excess returns of the long-minus-short portfolio formed on the Rule of 40 versus the market premium and the Fama-French equity anomaly factors SMB, HML, RMW and CMA. t-statistics are shown in the parentheses. Significance levels: ** = 1%, * = 5%.

However, the regression coefficients for SMB, HML, RMW, and CMA are all not statistically significant at the 5% level, which indicates that the returns from the Rule of 40 are not significantly impacted by the Fama-French factors. In fact, the low adjusted R-squared of the regression of 0.074 suggests that other factors besides the market premium and Fama-French factors may be driving the excess returns of the long-minus-short portfolio.

Overall, the regression analysis indicates that the efficacy of the Rule of 40 is not simply a result of style factors within the market, as the excess returns of the long-minus-short portfolio are not significantly impacted by the Fama-French factors. However, the low adjusted R-squared suggests that there may be other factors driving the excess returns of the portfolio.

4.6 A modified rule: SaaS Investing Rule of 65

Despite the effectiveness of the Rule of 40 as a stock selection criterion, some value-oriented practitioners may criticise the rule for its lack of consideration for the valuation of stocks. In particular, the identification of the value premium within stock returns was already exposed by Fama and French in their seminal 1992 study. They observed that, throughout the period extending from 1963 to 1990, stocks within the United States exhibiting elevated book equity to market value ratios yielded higher average returns compared to those with diminished book-to-market ratios. This foundational observation concerning book-to-market ratios received further empirical support from the research conducted by Davis et al. (2000), which encompassed a comprehensive analysis over a nearly seven-decade span (1929-1997). Subsequent scholarly endeavours (Penman et al., 2005; Leibowitz, 2002; Nissim & Penman, 1999) have consistently demonstrated that investment strategies predicated on selecting stocks with lower valuation ratios are associated with the realisation of above-average returns on stock portfolios.

[1] https://mba.tuck.dartmouth.edu/pages/faculty/ken.french/data_library.html

While the majority of these investigations have predominantly employed price-to-earnings (P/E) or price-to-book (P/B) ratios as preferred metrics for valuation, Fisher (1984) introduced an alternative financial ratio, namely the market price-to-sales (P/S) ratio. This ratio, which quantifies the amount an investor is prepared to expend for each dollar of sales, has gained increasing prominence among investors for the purpose of stock selection in recent years. Fisher posited that the inherent stability of a company's sales relative to its earnings or book values renders the P/S ratio a more efficacious measure for assessing the robustness of the underlying business. He further contended that the P/S ratio serves as an adept indicator of a stock's market popularity.

According to Fisher (1984), stocks associated with companies that command high P/S ratios enjoy widespread popularity among investors; however, they are less likely to generate long-term, above-average returns due to their elevated stock prices in relation to sales. In contrast, stocks characterised by low P/S ratios are posited to have a higher likelihood of yielding long-term, above-average returns, especially in instances where there is an improvement in the company's performance, such as unforeseen increases in earnings or sales, which would significantly elevate the stock's attractiveness to investors. Moreover, an emphasis on sales enables investors to uncover investment opportunities among companies that, despite operating at a loss (thereby lacking P/E ratios due to negative earnings), exhibit low P/S ratios and hold promising growth prospects. This point is particularly pertinent to young SaaS companies.

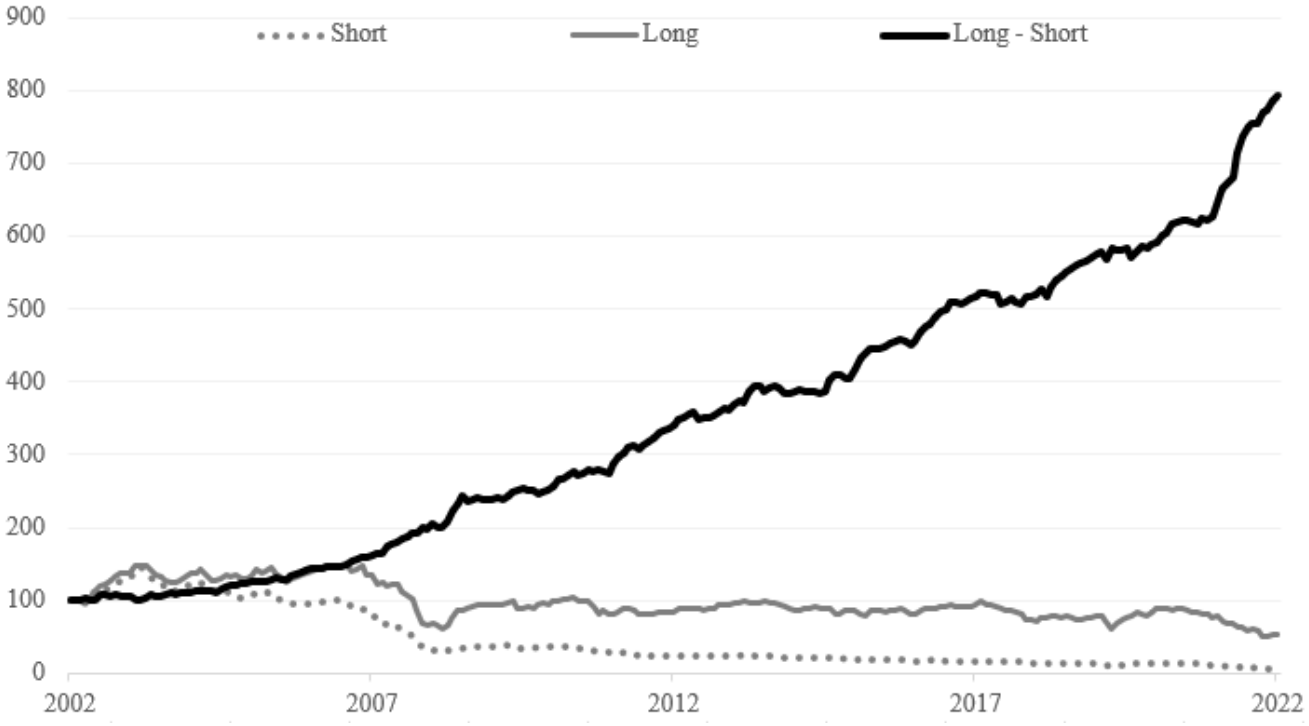
To incorporate the consideration of valuation in the rule, we propose a SaaS Investing Rule of 65 (SIR65), which is defined as follows:

$$\text{SaaS Investing Rule of 65} = \text{Sales growth over last year} + \text{EBITDA margin} + \text{Sales yield} \quad (2)$$

where Sales yield is defined as the inverted Price-to-Sales ratio.

The results of this proposed rule are presented in Panel E of Table 2. Compared to the Rule of 40, stocks that exceed our proposed rule deliver better returns at similar win rates, while stocks that fail the modified rule perform significantly worse with lower win ratios. The long-short portfolio also delivers significantly higher returns and win ratio when using the SIR65 as a stock selection criterion versus the Rule of 40. The cumulative returns of the long-minus-short portfolio that are shown in Figure 4 shows the more consistent positive return generation of the modified rule.

Figure 4: Time series plots of the cumulative returns of long, short and long-minus-short portfolios formed on the SaaS Investing Rule of 65 (January 2003 – December 2022)



Note: This chart shows the cumulative monthly returns of the long, short and long-minus-short portfolios formed on the SaaS Investing Rule of 65 (SIR65). The long portfolio consists of companies which satisfy the rule while the short portfolio consists of companies that fail the rule. Monthly median returns from January 2003 to December 2022 are used for the calculations.

4.7 Macroeconomic sensitivities

In order to gain a deeper comprehension of the macroeconomic sensitivities of the Rule of 40 and the SaaS Investing Rule of 65, we conduct two statistical analyses. First, we examine the long-short performance of these rules under varying macroeconomic conditions. Second, we perform stress testing to assess the robustness of these rules under extreme market scenarios.

4.7.1 Growth and inflation environments

Though there may be differing viewpoints on which macroeconomic dimensions are most crucial to examine, it is commonly accepted that economic growth and inflation exert the most significant influence on investment returns. Concurring with this widely held belief, our analysis focuses on these two fundamental macroeconomic factors.

In this study, we utilise the Citi Surprise Indices as measures of economic growth and inflation. These indices, developed by Citigroup, are objective and quantitative gauges designed to monitor the degree to which economic data releases diverge from market expectations. They offer a weighted historical mean of data surprises (actual releases versus Bloomberg survey median) for a range of key macroeconomic indicators. Specifically, we employ the Citi Economic Surprise Index and the Citi Inflation Surprise Index for both Developed and Emerging markets. Following the methodology of Ilmanen et al. (2014), we categorise these indices into binary "up" and "down" states by comparing the monthly value with the historical median, ensuring an equal distribution of observations across both states.

Our findings, as presented in Panel A of Table 5, evinced that the Rule of 40 typically exhibited a superior performance in "down" environments characterised by contracting growth or subdued inflation, achieving Sharpe ratios exceeding 1.0. This performance was notably superior to that observed in "up" environments, where the Sharpe ratios were generally less than half of those attained during "down" periods. Conversely, the SaaS Investing Rule of 65 demonstrated an improved performance in "up" environments marked by expanding growth and escalating inflation compared to its performance in "down" environments. However, it is noteworthy that the differences in the Sharpe ratios across both states were relatively narrow for this rule. Across all states of both macroeconomic factors examined, the SaaS Investing Rule of 65 consistently delivered higher Sharpe ratios in comparison to the Rule of 40.

Table 5: Macroeconomic sensitivities (January 2003 - December 2022)

Panel A: Hypothetical Sharpe ratios in growth and inflation environments

Environment	State	Rule of 40	SaaS Investing Rule of 65
Growth (Developed markets)	Up	0.451	2.003
	Down	1.174	1.703
Inflation (Developed markets)	Up	0.567	2.078
	Down	1.016	1.592
Growth (Emerging markets)	Up	0.430	2.118
	Down	1.186	1.562
Inflation (Emerging markets)	Up	0.388	2.148
	Down	1.140	1.555

Panel B: Stress testing using historical scenarios

Event	Start date	End date	Number of months	Rule of 40	SaaS Investing Rule of 65
Global financial crisis	30-Apr-08	28-Feb-09	10	6.268	13.690
Euro debt crisis	31-Mar-11	30-Nov-11	8	-4.812	2.776
Taper tantrum	30-Apr-13	31-Aug-13	4	5.804	3.765
Oil price decline	30-Jun-14	31-Dec-14	6	4.026	4.991
EM slowdown	31-May-15	30-Sep-15	4	-2.514	-1.039
Brexit referendum	31-May-16	30-Jun-16	1	0.360	0.499
Volatility spike	31-Aug-18	31-Dec-18	4	0.208	1.650
Covid pandemic	31-Jan-20	31-Mar-20	2	3.317	0.290
DM rate hike	31-Dec-21	30-Sep-22	9	3.981	5.673

4.7.2 Stress testing

We next conduct historical stress tests to quantify potential losses during periods of historical stress and to assess the resilience of the investment rules. This is accomplished by examining the influence of these historical events on the performance of the Rule of 40 and the SaaS Investing Rule of 65, thereby providing a robust evaluation of these strategies' capacity to withstand adverse market conditions.

In line with the approach adopted by Norges Bank Investment Management (2022), we select nine stress periods within our sample timeframe, including the Global Financial Crisis, which persisted for ten months until February 2009. As evidenced in Panel B of Table 5, during the majority of these episodes, both the Rule of 40 and the SaaS Investing Rule of 65 yielded positive returns. The Rule of 40 recorded negative returns in only two of these periods, while the SaaS Investing Rule of 65 experienced negative returns in just one. Notably, both rules manifested negative returns during the Emerging Markets (EM) slowdown from May to September 2015. While this could imply that the effectiveness of these rules is contingent on economic growth in emerging markets, our earlier analysis does not support this assertion. Across all these stress periods, the SaaS Investing Rule of 65 generally outperformed the Rule of 40, with the exceptions being the Taper Tantrum and the Covid pandemic.

4.8 Complementing the Rule of 40/65 with qualitative analysis

While the Rule of 40 and the suggested Rule of 65 have demonstrated efficacy in the selection of stocks within the SaaS sector, the inherently dynamic nature of the SaaS marketplace underscores the significance of qualitative factors in shaping the relevance and effectiveness of these benchmarks. A nuanced integration of such qualitative dimensions with these financial metrics can furnish a more holistic perspective on the operational and strategic health of SaaS enterprises. In their extensive examinations of the scholarly corpus, Floerecke and Lehner (2022) and Walther et al. (2012) identify several critical qualitative elements that merit consideration.

Paramount amongst these qualitative factors is management quality, with the expertise, vision, and execution prowess of the leadership team being pivotal to SaaS firm success. Possessing a profound comprehension of the SaaS model, competitive dynamics, customer needs, and technological trends is imperative for astute strategic decision-making and deftly steering the company through challenges while seizing opportunities.

Continuous product innovation is another critical factor, necessitating substantial investment in R&D, vigilant monitoring of customer needs and market shifts, and consistent updates to maintain a competitive edge over stagnant offerings. Market position constitutes a key advantage, with an established brand, sizeable share and deep competitive intelligence enabling robust market defence, share gains, stronger pricing power, and incisive competitive strategies.

Effective customer acquisition and retention strategies, including judicious marketing, tailored sales approaches, attractive pricing, and exceptional customer experience, are paramount for cost-effective customer management and sustained growth. Concurrently, scalability through secure, adaptable infrastructure is crucial for seamlessly handling demand fluctuations and capitalising on growth. Robust interoperability, leveraging standard protocols and architectures, fosters seamless integration with customers' IT ecosystems, driving adoption.

A culture promoting innovation, agility, collaboration, and employee engagement is valuable for attracting top talent and nurturing an environment conducive to developing market-leading solutions. Moreover, harnessing data analytics can yield valuable insights for enhancing offerings, experiences, pricing strategies, and informed decision-making. Ensuring regulatory compliance, data privacy, and robust cybersecurity is imperative for building customer trust and avoiding penalties.

Ultimately, he capacity to adapt products, processes, and business models to the rapidly changing SaaS landscape is indispensable for sustained competitiveness and seizing market opportunities. By incorporating an analysis of these qualitative factors alongside the quantitative benchmarks of 40/65,

investors can enhance their ability to distinguish between potentially successful and unsuccessful SaaS enterprises.

5. Conclusion

The Rule of 40 has emerged as a valuable financial guideline for stock selection in the software and technology industry. By considering the balance between revenue growth rate and profit margin, the Rule of 40 offers a comprehensive assessment of a company's financial health and growth potential. This paper explores the effectiveness of the Rule of 40 as a stock selection criterion, providing insights into its application and implications for investors and analysts.

The analysis and findings of this study demonstrate that the Rule of 40 adds value and delivers a moderately high Sharpe ratio as a stock selection tool within the SaaS universe. We also propose a modified rule, which we term the SaaS Investing Rule of 65, that encompasses valuation considerations. Our findings suggest that our modified rule outperforms well in identifying relative winners and losers within the SaaS space and achieves high Sharpe ratios.

The effectiveness of the Rule of 40 and our proposed SaaS Investing Rule of 65 as stock selection criteria in the SaaS industry raises practical implications for investors and analysts. We identify four uses for the rules. Firstly, they can serve as initial screening tools for identifying SaaS companies with a balanced financial profile. By applying the rules, investors can filter out companies that may have potential issues with either growth or profitability and narrow down the investment universe to companies that exhibit strong growth prospects combined with healthy profit margins. Secondly, the rules, being quantitative assessments of companies' attractiveness as investment opportunities, can also be complemented with qualitative analyses. Factors such as competitive positioning, product differentiation, management team, and market dynamics should be considered to gain a comprehensive understanding of a company's long-term prospects. Combining the rules with qualitative analysis can enhance the investment decision-making process. Thirdly, the rules are particularly suited for investors with a long-term investment horizon. SaaS companies often prioritise growth and may temporarily prioritise market share over immediate profitability. Investors with a long-term perspective can therefore leverage the rules to align their investment strategies with the growth potential of the SaaS industry.

Further research and exploration are warranted to investigate the usefulness of these rules in other sectors that are also dominated by network effects, such as the ecommerce and internet industries.

In conclusion, the Rule of 40 and SaaS Investing Rule of 65 serve as valuable additions to the toolkit of investors and analysts seeking to identify relative SaaS stock winners and losers. By incorporating the rules into investment strategies, stakeholders can enhance their decision-making processes and align their portfolios with the dynamic landscape of the software and technology industry.

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