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Successfully Scaling Digital Technology Ventures: An Empirical Study of the Strategic Choices that Maximize Firm Value

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Abstract

Our study aims to understand the choices managers working for subscription-based digital ventures must make at arguably the most critical juncture of their firm's lifecycle. With few slack resources to repair mistakes, managers at these scaling firms must make decisions that are larger in scope and scale than in the start-up phase. Tradeoffs are often required as decision-makers face choices such as investing more resources in sales and marketing to drive growth or in product development to improve quality and add new products or features. In many instances, the question is whether to forego some growth opportunities to maximize profitability or pursue growth even if the result is profit losses. Prioritization must be given to a few limited resources while consciously allowing others to remain underfunded. Further complicating matters, these initial investments are often inefficient. For example, a new sales team does not instantly create value. Managers making poor choices with minimal financial slack heighten a scaling firm's risk of setback or failure. Using resource orchestration as the theoretical framework, we conduct a panel analysis over a six-year period and discuss the empirical implications of the resource configuration strategies managers can implement to positively impact the firm valuation of scaling digital ventures. We find that managers who navigate the tradeoff between value creation and value capture in a way that meets the rule of 40, while also delivering future growth that includes a mix of foreign sales with a business-to-business revenue models will significantly impact firm value.

Keywords: Digital Ventures, Scaling, Resource Orchestration, Valuation, Econometrics

Table of Contents

List of Equations, Figures, and Tables:

Acknowledgments

Completion of a DBA is the culmination of a goal I have had for over a decade. Since reading ***Halftime*** by Bob Buford, it has been my intent to start a second career in which I move 'success to significance.' I admittedly love work and have been blessed with an extremely diverse career spanning numerous industries, countries, and cultures. Career choices were almost always made on the basis of which direct supervisor would be the best mentor and which opportunity offered the most stimulating challenge.

An official retirement from 30 years of corporate life is giving way to a pivot into a second career in academia. I hope to pay homage to the many wonderful and talented people that taught and mentored me in my career by passing along their lessons. I further hope to honor the faculty at UMSL who poured into me during my wonderful DBA experience by teaching the next generation with rigor and relevance.

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I am looking forward to my second career! Thanks to all.

Chapter 1: Introduction

Digital Technology Ventures

Digital technology is a broad category. Our research focuses on software providers. Software ventures typically generate revenue through sales of perpetual licenses or subscription-based licenses. Subscription software may include Software as a Service (SaaS) or non-SaaS products. We believe that some of our findings and implications are valid and extensible to both SaaS and non-SaaS providers. The number of SaaS firms has been exploding in recent years, and we intend for this research to provide managers at these providers with useful data that may inform decisions on resource orchestration strategies that will maximize firm value.

The estimated 15,000 worldwide SaaS providers in 2020 doubled to almost 30,000 in 2023 (Ariella, 2023; Cardconnect, 2020). However, less than 100 SaaS providers trade publicly on a United States (U.S.) stock exchange. In fact, most of these businesses generate less than $3 million in revenue and are not profitable (TSR, 2017). The risk of failure is high for any new venture, let alone those that are subscale and not profitable. Successfully scaling a business is as important to its employees and investors as to local economies that count on these businesses for job creation and tax revenue. The implications in our study are timely and provide managers with insights as to which resource orchestration strategies positively impact the firm valuation of scaling SaaS providers. Our findings show that managers who navigate the tradeoff between value creation and value capture in a way that meets the rule of 40, while also delivering future growth that includes a mix of foreign sales and a business-to-business revenue models will significantly impact firm value.

A defining characteristic of SaaS products is that they are subscription-based software provided to customers via the internet (Lycko et al., 2021; Piaskowska et al., 2021; Valilshery, 2023; Van Der Kooij & Pizarro, 2018). SaaS products differ from other subscription software in that they are non-custom network software that reside on a remote server owned or leased by the provider. A SaaS product is accessed via a customers' employees' individual computers through an internet connection and paid for on a subscription basis (Campbell-Kelly, 2009; Valilshery, 2023). Many digital ventures offer some non-SaaS products which require small, regular payments from customers. These products in fact are closer to a perpetual licensed product than what we are defining as SaaS. A non-SaaS subscription product likely requires a regular payment, but access to new or upgraded features may be an additional cost or higher subscription level. For example, Microsoft appears on some lists of SaaS companies, but non-SaaS products generate most of its revenue. For our research, we classify SaaS providers as those meeting the above criteria and generating most of their revenue from subscription-based payments (Sonders, 2023).

Many businesses prefer to purchase SaaS products rather than perpetual license alternatives, which include enterprise resource planning (ERP) and business management system (BMS) solutions (Hai & Sakoda, 2009; Johansson & Ruivo, 2013). ERP and BMS providers require customers to provide and maintain their servers. ERP and BMS solutions, therefore, require significantly higher up-front perpetual license costs and expenses along with lengthier implementation and training processes (Johansson & Ruivo, 2013; Seethamraju, 2015). Reduced implementation times and up-front costs are two benefits of SaaS products. SaaS providers own and maintain the servers for their customers and

provide regular product updates and improvements (Lycko et al., 2021; Valilshery, 2023; Van Der Kooij & Pizarro, 2018). As in leasing, the pay-as-you-go, subscription-based nature of SaaS products helps customers preserve capital availability and debt capacity, leaving financial resources which can be otherwise deployed to accelerate growth or make investments devoted to operational efficiency (Caskey & Ozel, 2019; Cosh et al., 2009; Lipe, 2001; Zhang, 2018). As a result, SaaS adoption is growing rapidly, with industry followers estimating that anywhere between 80 - 99% of companies use at least one SaaS product today, and adoption rates are still climbing in virtually any industry (Ariella, 2023; Cardconnect, 2020; Rimol, 2021, 2022; Saltan & Smolander, 2021).

Despite the impressive adoption rates and compelling value propositions, most SaaS providers are small firms. In 2020, CardConnect cited data from Crunchbase that estimated over 15,000 SaaS providers worldwide. Ariella (2023) now notes an estimate approaching 30,000 SaaS providers in 2023, which we confirmed via a Crunchbase Pro subscription. It is further estimated that the vast majority of these 30,000 SaaS providers are generating less than $3 million in revenue, with many not profitable (Ariella, 2023; Cardconnect, 2020; Newton & Schlecht, 2016b; Rimol, 2021; TSR, 2017). To meet our definition of a SaaS provider, a firm must bear the upfront costs, including product development and customer acquisition, and ongoing expenses, such as customer support, maintenance, and new feature development. Whereas BMS and ERP providers recoup these high costs with large up-front billings to customers, SaaS providers recover these costs incrementally and over time through smaller, regular (often monthly) customer subscription fees. These high up-front costs with small, recurring subscription revenues make many SaaS providers marginally or not profitable (Newton & Schlecht, 2016b; TSR,

2017). Lack of profitability results in few slack financial resources as these SaaS providers attempt to scale successfully.

SaaS products generated an estimated $167 billion (U.S. dollars) in global revenue in 2022 (Valilshery, 2023). Firms that successfully scale often deliver high growth rates creating shareholder wealth and employment growth beneficial to local economies (Coviello, 2019; Gimmon & Levie, 2021; Piaskowska et al., 2021; Sullivan, 2016; Tippmann et al., 2022). Studies in the UK and Canada indicate that while high-growth businesses only make up 1% of the universe of firms, they account for more than 60% of new job creation (Coviello, 2019; Octopus, 2019).

A study that assists managers working for SaaS providers in navigating various scaling challenges while increasing firm value is timely.

Importance of Scale-Ups

Though growth is essential to scaling, we do not wish to confuse these two separate and distinct concepts. Whereas growth is a measurement most often associated with revenue or the number of employees, scaling is a particular stage within the lifecycle of any firm of any age that includes but is not limited to growth (Coviello, 2019).

The scaling stage is perhaps the most difficult to navigate and the highest point of risk within a business's lifecycle (DeSantola & Gulati, 2017; Gimmon & Levie, 2021; Ranft & O'Neill, 2001; Tippmann et al., 2022). Gimmon and Levie (2021) find that though the failure rate among new technology ventures is high, entrepreneurs who identify key indicators for long-term success can learn to “fail fast” when these indicators are unfavorable. Recognizing key indicators early is essential, but other studies also show that

firms that mismanage the orchestration of resources during the scale-up stage often fail (Gilbert et al., 2006; Sirmon et al., 2011).

High failure rates are not surprising given the unique and often paradoxical challenges during scale-up. Ill-prepared founders and entrepreneurs often deal with choices such as faster versus better or formal versus flexible as the scope and scale of activities rapidly increase during scale-up (Amit & Zott, 2001; DeSantola & Gulati, 2017; Sutton et al., 2016). Yet, despite these challenges, start-ups must scale as a failure to grow often leads to the inability to survive (Sirmon et al., 2011). Studies have shown that many new ventures die within their first five (5) years (DeSantola & Gulati, 2017; Gimmon & Levie, 2021). The survival rate of any start-up is low (Delmar et al., 2013; DeSantola & Gulati, 2017; Gimmon & Levie, 2021). As evidenced by the estimated doubling of SaaS providers from 2020 to 2023, some of these companies are start-ups (Cardconnect, 2020; Valilshery, 2023). Other unique challenges facing SaaS providers are that they are often small and unprofitable for extended periods, thus increasing the importance of managers making the most of the resources they do possess (Carnes et al., 2017; Gilbert et al., 2006; Wales et al., 2013).

One common difficulty most start-ups must navigate is moving from an idiosyncratic organizational structure to a larger organization with more defined and specialized roles that require substantial investment (DeSantola & Gulati, 2017; Gulati & Desantola, 2016; Sirmon et al., 2011; Sutton et al., 2016). By allowing job flexibility, these idiosyncratic organizational structures can avoid costs by reducing headcount requirements and the need for specialists. Flexible teams can improvise as unforeseen opportunities or challenges arise (Gulati & Desantola, 2016; Sullivan, 2016). Unfortunately, these same

improvisational and adaptable structures, integral during start-up, create inefficiencies as businesses scale. The lack of governance, expertise from specialists, and formal organizational structure can increase complexity as the organization fails to benefit from procedures to deal with repeat issues, wasting time in trial-and-error cycles or perpetual one-off solutions, and disagreements over decision-making rights (Gulati & Desantola, 2016).

Risks during scale-up may also include the need for significant investments before a product's legitimacy is established. Though the start-up stage may present unique challenges, less money is invested, meaning there is less to lose, and mistakes are often easier to fix (Isenberg & Lawton, 2014; Sirmon et al., 2011). The stakes are more significant as firms scale. During scale-up, inefficient investments are common as firms deal with rapid growth and the corresponding complexity. A simple example is that adding any new employee is inefficient until that employee develops enough firm-specific knowledge to become effective (Lycko et al., 2021). Firms in scale-up mode may discuss adding entire departments or multiple new employees, thus magnifying these inefficiencies.

Having product legitimacy is undoubtedly beneficial. However, product legitimacy may create or attract competition which managers at scaling firms may be unprepared to handle (DeSantola & Gulati, 2017). Therefore, time is of the essence for firms that wish to gain a significant first-mover advantage by leveraging resources to drive brand awareness and increase switching costs (Amit & Zott, 2001). Other benefits of effectively coordinating resources to take market share rapidly include the potential for improved efficiencies. The greater volume that comes with a significant market share may drive

economies of scale as replicable processes are developed, and marginal costs to serve new customers decline (Piaskowska et al., 2021; Sullivan, 2016; Tippmann et al., 2022).

Scaling SaaS Providers

This paper refers to firms that build and sell SaaS products as SaaS providers. The businesses that use these SaaS products are SaaS customers or simply customers. Products or services the SaaS provider sells to another company are considered to employ a business-to-business (B2B) sales model. If a SaaS provider sells their product to individuals rather than businesses, we will refer to these users as consumers. SaaS providers selling to consumers conduct business-to-consumer (B2C) transactions.

SaaS providers are plentiful and operate in myriad industries. Each industry has unique environmental conditions, but adoption rates are rising rapidly in almost all industries (Cardconnect, 2020; Valilshery, 2023). Like leasing, SaaS products allow customers to forego upfront investments and long implementation periods while avoiding IT staffing and repair and maintenance costs incurred for owned software (Campbell-Kelly, 2009; Lee et al., 2013; Wu et al., 2011).

Business (i.e., B2B) customers often consider cash flow when comparing a BMS or ERP system to a SaaS option. BMS products require a firm to spend significant, up-front cash or leverage external financing to purchase these systems (Zhang et al., 2020). On the other hand, the subscription nature of these SaaS products offers similar benefits to capital leases. As in leasing, routine and small expenses associated with a SaaS subscription increase capital availability and debt capacity (Caskey & Ozel, 2019; Cosh et al., 2009; Lipe, 2001; Zhang, 2018). Rather than investing capital in BMS or ERP software, customers can invest in resources that can facilitate growth or drive operational efficiency.

In addition, SaaS products, like leases, potentially reduce tax liabilities (Benlian et al., 2009; Campbell-Kelly, 2009; Gavazza, 2011; Seethamraju, 2015; Wang et al., 2019). Subscriptions create low, regular payments, treated as operating expenses rather than depreciable capital investments. These operating expenses reduce a SaaS customer's taxable net income (Caskey & Ozel, 2019; Cosh et al., 2009; Gavazza, 2011; Lipe, 2001; Seethamraju, 2015; Wang et al., 2019; Zhang, 2018).

As popularity and acceptance grow, SaaS providers may generate significant shareholder value (Hottenhuis, 2020; Newton & Schlecht, 2016b). In 2020, the average value of the top 50 largest publicly traded SaaS providers increased by 162% (Sonders, 2023). In a short time, the industry has become very large, with collective industry revenue estimated to be well above $100 billion and growing (Ismail, 2020; Rimol, 2021, 2022; Statista, 2022). Estimates now suggest that over 80% and perhaps as many as 99% of all businesses use at least one SaaS product (Rimol, 2021, 2022; Saltan & Smolander, 2021; Valilshery, 2023). However, the great majority of SaaS providers are very small. Estimates indicate the 2020 figure of 15,000 SaaS providers worldwide may have almost doubled to almost 30,000 in 2023 (Cardconnect, 2020; Rimol, 2021, 2022; Valilshery, 2023). Sources also estimate that most SaaS providers generate less than $3 million in annual revenue (TSR, 2017). As these small providers begin to scale, decisions regarding which resources to invest in will have a long-lasting impact on their business model.

SaaS Business Models

SaaS providers choose all types of business models. Business models are a complex set of resources, capabilities, and activities that comingle and interact to enable a firm to create and capture value (Foss & Saebi, 2017; Lycko et al., 2021). Executives seek to build

interdependent activities using the resources and capabilities of the firm to seize opportunities (Ott & Eisenhardt, 2020; Ott et al., 2017). New providers in nascent markets often require flexibility to deal with developing market structures, yet-to-be-defined product definitions, ambiguous demand, and a high rate of change (Ott & Eisenhardt, 2020). However, as these markets mature and become more defined, more rigorous processes and procedures require a reallocation or even entirely different resources, often requiring more defined organizational structures (Kirtley & O'Mahony, 2020; Ott & Eisenhardt, 2020).

The SaaS providers are highly scalable as these firms have minimal variable costs, which appear on financial statements as costs of goods sold (COGS), resulting in generally high gross margins (Lycko et al., 2021). Once a SaaS product is developed, the marginal cost of adding new customers is relatively low (Sullivan, 2016). However, the pay-as-you-go subscription process required for revenue generation means that SaaS providers must accumulate and retain many customers to create meaningful revenue (Lycko et al., 2021). SaaS providers incur high up-front costs to develop products and acquire customers (Campbell-Kelly, 2009; Roche & Tandon, 2021). SaaS providers attempt to rapidly grow revenue rapidly to mitigate the risk of long payback periods (Sullivan, 2016). Generally speaking, firms that move fast incur more significant risks as the pace of decision-making does not allow long or deep analysis (Sullivan, 2016). The speed required to capture market share and the diligence and processes needed to build quality products and retain customers create conflicting priorities. Establishing a first-mover advantage and accumulating market share is crucial on the one hand (Sullivan, 2016; Tippmann et al., 2022). On the other hand,

an emphasis on product quality and new feature development is often required to ensure customer retention (Campbell-Kelly, 2009; Choudhary, 2007; Cohen & Neubert, 2019b).

Speed is often a necessity, however, as barriers to entry are relatively low for SaaS providers (Campbell-Kelly, 2009; Sullivan, 2016; Tippmann et al., 2022). Once a product establishes legitimacy, the likelihood of new entrants increases (Sullivan, 2016). Although the low barrier to entry may create disadvantages, such as increased competition, it may also create opportunities. For example, economies of scope, as in entry into foreign markets with marginal incremental costs, may be available for some products (Stallkamp et al., 2022; Tippmann et al., 2022). Moreover, a firm's ability to expand to international markets validates its product's legitimacy while opening new expansionary value-creation opportunities (Ireland et al., 2001; Stallkamp et al., 2022). Additional expansion opportunities exist if products built for B2B transactions can extend offerings into the consumer realm and generate B2C transactions.

Value Creation

Digitization enables new resource configuration opportunities that significantly impact how SaaS providers create value (Amit & Han, 2017; Amit & Zott, 2001). For example, the subscription nature of SaaS products means that value can be provided to customers over a long period. The quality and usefulness of a SaaS product drive the usage intensity and, ultimately, the value a customer receives (Lycko et al., 2021). As SaaS providers develop knowledge of customer usage and feature adoption, new functions can be added, creating upsell or revenue expansion opportunities (Lycko et al., 2021; Van Der Kooij & Pizarro, 2018). Prior work suggests revenue growth is critical to small and scaling

firms' success and survival (Ireland et al., 2001; Lycko et al., 2021; Van Der Kooij & Pizarro, 2018; Zott et al., 2011).

Another source of value creation for SaaS providers is retaining current customers. SaaS providers bear the upfront expenses of product development and customer acquisition with the ongoing expenses of customer support, maintenance, and new feature development. These expenses are recovered incrementally over long periods via smaller monthly subscription fees. A customer who churns prematurely does not allow the provider to cover the up-front investment, let alone generate profit from the relationship. Customer acquisition costs include sales and marketing, installation, and training costs. These customer acquisition costs are often higher than the costs to retain a customer (Roche & Tandon, 2021; Van Der Kooij & Pizarro, 2018). Therefore, the customer net retention rate is another critical metric as revenue from net new customers is additive to revenue versus an offset to lost revenue from customers who have churned (Roche & Tandon, 2021). Retained customers are also an opportunity for expansion and upsell revenue as new features, new products, and product improvements are introduced.

Value Capture

Value capture is the portion of a firm's revenue retained as profit (Zott et al., 2011). As noted above, SaaS providers have few direct costs and generally very high gross margins. Therefore, operating expenses are the most significnat difference between revenue and value capture. SaaS providers leverage operating expenses for customer acquisition, innovation, and back-office staff, including customer support. These operating expenses are disaggregated on financial statements as sales and marketing, research and development, and general and administrative costs (Van Der Kooij & Pizarro, 2018).

Customer acquisition costs are sales, marketing, and advertising expenses, whereas customer retention costs reflect expenses associated with ensuring high product quality and customer support requirements (Van Der Kooij & Pizarro, 2018). Research and development expenses include the costs associated with the technology team and any expenses related to a product or feature development and improvements in product quality. Other costs include general and administrative expenses, which capture costs associated with the executive team, customer support, human resources, finance, legal, etc. (DeSantola & Gulati, 2017; Gulati & Desantola, 2016; Lycko et al., 2021; Van Der Kooij & Pizarro, 2018).

Observation of the components of operating expenses can provide insight into what resource orchestration strategies management uses at a given time. We hope to provide evidence of how these investments impact value creation and capture. We also intend to provide insight into which resource orchestration strategies managers use to manage the tradeoff between value creation and capture to maximize firm value.

Value Creation and Value Capture Trade-off

Industry participants and observers use various SaaS-specific metrics to evaluate the value creation and value capture tradeoff (Van Der Kooij & Pizarro, 2018). One of the more prevalent metrics unique to SaaS is the Rule of 40 (Algkvist Nordfors & Hansson, 2023; Feld, 2015; Hottenhuis, 2020; Roche & Tandon, 2021; Shaw, 2018). The calculation is simply growth rate plus profit margin. For example, if a firm's profit margin is -20%, the firm must generate 60% growth to meet the Rule of 40 (i.e., -20% + 60% = 40%). Many within the SaaS community believe that profit and growth are, to some extent, mutually exclusive, and meeting the Rule of 40 requires a provider to constantly rebalance the profit

and growth mix (Algkvist Nordfors & Hansson, 2023; Feld, 2015; Hottenhuis, 2020; Newton & Schlecht, 2016b; Shaw, 2018).

Prior research indicates that investors place a premium on growth over profit among publicly listed digital technology ventures, meaning SaaS providers should maximize growth as long as the firm can continue to meet the rule of 40 (Algkvist Nordfors & Hansson, 2023; Cohen & Neubert, 2019a, 2019b; Hottenhuis, 2020; Newton & Schlecht, 2016b; Shaw, 2018). When revenue growth no longer allows the firm to meet the rule of 40, managers must change resource orchestration strategies (Hottenhuis, 2020; Roche & Tandon, 2021; Shaw, 2018). Expenses are the typical levers to control both growth rate and profit—spend more to grow more and stop spending when growth slows to drive profit margin (Algkvist Nordfors & Hansson, 2023; Boudet et al., 2023; Lycko et al., 2021; Newton & Schlecht, 2016b; Van Der Kooij & Pizarro, 2018). According to the rule of 40, it does not matter if the firm loses money so long as the 'rule' is met. As growth slows, sales and marketing, product development, or other growth-related expenses can be reduced, thereby increasing profit to the point where the rule of 40 is again met.

Using resource orchestration as the theoretical framework, we empirically study the question of what resource configuration strategies managers can implement to positively impact the firm valuation of scaling digital ventures. Using panel analysis, we study 65 'pure-play' SaaS firms over the six calendar years 2017 to 2022. We define 'pure play' as generating at least 51% of revenue from sales of SaaS products. From our 65 firms, we have 391 lines of publicly available, third-party data and consider various dependent and independent variables. Our findings are robust and support six of our ten hypotheses.

This study seeks to help SaaS providers understand what resource configurations are most likely to create the greatest firm value. There is limited prior research on both scale-ups as well as SaaS firms. Most of the research that is available on either topic is not empirical. Our findings provide practical implications for managers who must navigate the tradeoff between value creation and value capture. Decisions that allow cause the business to meet the rule of 40, while also delivering future growth that includes a mix of foreign sales and a business-to-business revenue model will significantly impact firm value.

We offer theoretical contributions by studying changes in resource orchestration strategies, whereby we identify patterns that positively influence firm valuation during the scaling stage of SaaS firms. Our study will contribute to the business model, scaling digital technology ventures, and resource orchestration literature.

Table 1: Empirical studies on scaling SaaS firms

Authors	Study	Data and Methods	Variables
Roche and Tandon (2021)	Investors reward rule of 40 SaaS companies with higher EV:Revenue multiples (top quartile companies have multiples 3x greater), so what do these top-performing SaaS companies do differently?	Separate firms into quartiles based on rule of 40 performance, then look for factors that correlate to rule of 40 for each quartile using proprietary data and publicly available data for 100 firms.	ARR growth LTM Payback NRR LTM FCF% Opex / Employee DV: Rule of 40 Revenue growth EBITDA Margin Profitability during market stress Gross Margin Scale (Market Cap) Revenue Growth:EV Multiple NTM Revenue Growth DV: TEV to Revenue multiple
Newton and Schlecht (2016)	SaaS companies have recurring revenue which makes forecasting more predictable but low or negative cash flow, so what has driven valuations in the SaaS sector?	5 factor panel regression using 44 quarters of data for 63 publicly traded SaaS companies which were segregated into three categories: Market Darlings, Prove-Its, and Underperformers.	Financing: value of capital raised, number of rounds, and time between rounds Innovation: patents Digitization: digital users and human resource measures Acquisitions: acquisitions including scale, geography, and scope B2B v. B2C Degree of digitization Pre-IPO acquisitions Controls: - Firm size - Age at IPO - Net Income year prior to IPO - Industry
Piaskowska et al. (2021)	Are there distinct scale-up modes which firms with digital business models choose when scaling and if so what are they?	Cluster analysis of 184 unicorns that are less than 10 years old, have completed at least an A-round of financing from a private equity or venture capital firm, at a $500 million or greater valuation.	
Stallkamp et al. (2022)	What is the empirical evidence behind why some digital firms find it easier to achieve international scale than others?	Tobit model of 169 digital US firms that completed an IPO between 2010 – 2019.	
Lycko et al. (2021)	What are the mechanisms that affect value creation and value capture while explaining SaaS ventures' dynamic and diverse performance development?	Systems dynamic model derived from a case study of two companies using annual reports as data sources.	Revenue growth Number of customers Gross margin % Operating expense Employee count Net profit margin ROA

Chapter 2: Literature Review and Theoretical Framework

Literature Review

Our study aims to understand the scaling of digital technology ventures and the choices that decision makers, often with few slack financial resources, must make at arguably the most critical juncture of their firm's lifecycle. Specifically, we consider SaaS providers due to their abundance and the fact so few have successfully scaled.

We use Resource Orchestration Theory as the theoretical framework to answer the question of which configuration of resources drives the greatest firm valuation among scaling digital ventures – specifically, SaaS providers. Though research on SaaS providers is limited, most of the closest topically related studies published to date are qualitative and do not consider firm valuation (Achtenhagen et al., 2017; Amit & Han, 2017; Nason & Wiklund, 2018; Piaskowska et al., 2021; Tippmann et al., 2022). A recent study by Tippmann et al. (2022) looks at eight SaaS providers and considers their global scaling strategies. The second study by Piaskowska et al. (2021) identifies four distinct scale-up modes for 184 digital technology ventures (their sample includes some SaaS providers) classified as unicorns or emerging unicorns.

Several studies have taken an empirical approach to understanding whether the rule of 40 predicts firm valuation among SaaS providers, mechanisms for value capture or creation, or international scaling strategies, but none of these studies considered management resource orchestration strategies or scaling (Algkvist Nordfors & Hansson, 2023; Hottenhuis, 2020; Lycko et al., 2021; Newton & Schlecht, 2016b; Shaw, 2018; Stallkamp et al., 2022). Hottenhuis (2020) analyzes the 50 largest publicly traded SaaS providers and studies the various approaches to calculate the rule of 40 to determine which method correlates most strongly with the SaaS provider's enterprise value to revenue

multiple. Shaw (2018) studied 73 publicly traded SaaS companies and found that the Rule of 40 did not predict shareholder returns. Algkvist Nordfors and Hansson (2023) and Newton and Schlecht (2016b) consider firm valuation and the tradeoff between value creation versus value capture and the rule of 40. Still, neither use the lens of scaling phase or resource orchestration strategies. Finally, Lycko et al. (2021) present a case study using systems dynamic modeling to analyze two firms and determine the mechanisms affecting value creation and capture.

While all are fascinating studies, our empirical approach to analyzing how management's resource orchestration strategies impact firm value as a SaaS provider scales is novel.

Theoretical Framework

We use resource orchestration as the theoretical framework to answer the question of which resource orchestration strategies positively influence the firm valuation of scaling digital technology ventures. Considering how these SaaS providers reached scale, we want to understand which resources received the most significant investment and did these strategies positively impacted firm value. For example, did the managers choose to invest in more sales and marketing resources to drive growth, or did they invest in research and development resources to create a steady stream of new products? How did these choices affect firm value?

Resource orchestration theory provides a suitable framework for assessing resource management and asset orchestration decisions. Deciding which resources to invest in at the right time is critical to the success of digital technology ventures as they scale (Gilbert et al., 2006; Sirmon et al., 2011). These decisions may differ between creating a sustainable

competitive advantage and giving competitors that opportunity. Operating expense investments are usually antecedent to the revenue, economies of scale, and efficiencies expected to deliver. For example, the Penrose effect speaks to the inefficiency of expenses associated with managing the growth process (Penrose & Penrose, 2009; Piaskowska et al., 2021). There is a time lag, whether hiring new people or creating new products or processes, between the expense itself and the time it takes to recoup and create economies of scale (Penrose & Penrose, 2009; Piaskowska et al., 2021). The research question of this study is not, however, whether investments are initially inefficient but rather which specific resource orchestration strategies can be empirically shown to affect firm value.

A firm's resources, including assets, capabilities, organizational processes, attributes, information, and knowledge, enable the implementation of strategies that improve efficiency and effectiveness (Barney, 1991). The Resource-based View (RBV) suggests that a first mover or sustainable advantage that is difficult for competitors to imitate can be created if the firm's resources are valuable, rare, inimitable, and non-substitutable (Barney, 1991, 2001). However, the RBV primarily considers what resources a firm has and not how those resources are leveraged by managers (Amit & Han, 2017; Sirmon et al., 2011). Specifically, the RBV does not explain why highly scalable technology companies may show different growth patterns or how resources interact with one another or evolve into configurations that match the competitive environment (Clarysse et al., 2011).

Dynamic capabilities extend the RBV by considering how providers create, extend, or modify their resource base (Helfat et al., 2009; Teece et al., 1997). The process begins with establishing a strategic objective, including leveraging the firm's network of co-

specialized or complimentary assets to achieve that objective (Helfat et al., 2009; Teece et al., 1997). The theory is that providers must constantly reconfigure resources and capabilities to address ever-changing external market environments (Teece et al., 1997). SaaS providers with strong dynamic capabilities are often highly entrepreneurial, *sensing* market opportunities and *seizing* upon them by utilizing all available resources (Helfat et al., 2009; Teece et al., 1997).

Knowledge of external market conditions is critical. Schilke et al. (2018) tell us that firms practicing dynamic capabilities without considering the external market environment may do more harm than good to value creation. However, it is argued that dynamic capabilities are most relevant to providers in often poorly developed markets with high technological change where multiple inventions must be combined to address customer needs (Teece et al., 1997). In other words, dynamic capabilities may only be required in highly dynamic environments (Fainshmidt et al., 2019).

Indeed, some digital technology ventures may operate in dynamic environments, but SaaS providers often merely bring a digital offering to an existing market (Amit & Zott, 2001). Amit and Zott (2001) give the example of Priceline.com (Priceline). The ability to book airline travel already existed. Priceline just created an opportunity for consumers to do this digitally and directly without the assistance of a travel agent or the airline.

Barriers to entry for knowledge-based SaaS products are low (Amit & Zott, 2001; Campbell-Kelly, 2009; Tippmann et al., 2022). For digital ventures, the goal is often to configure resources to grow revenue and scale quickly (Gimmon & Levie, 2021; Hitt et al., 2011; Sirmon et al., 2011; Wales et al., 2013). Unfortunately, SaaS providers commonly possess few slack resources during scale-up and often experience high failure

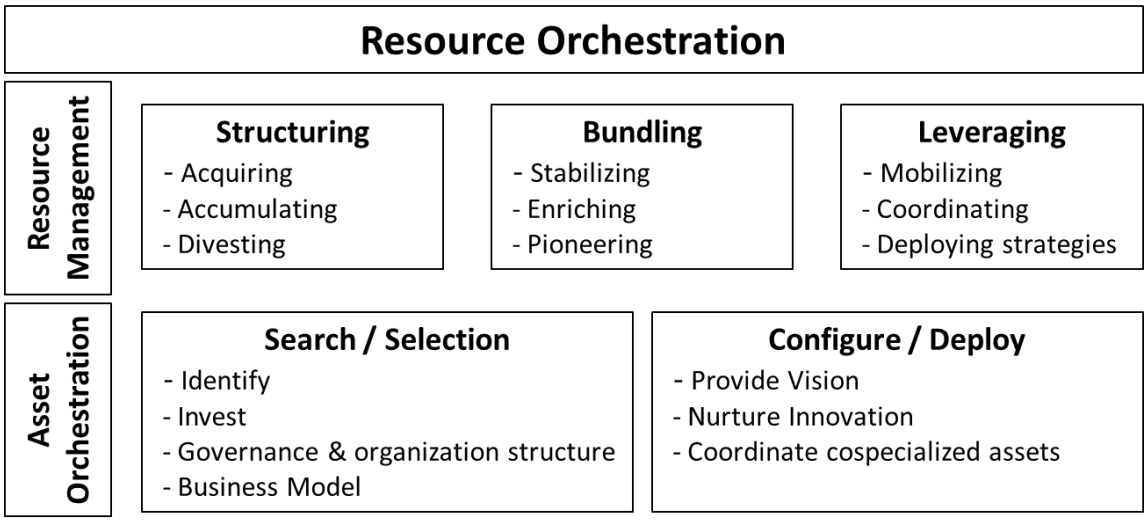
rates if they do not correctly configure their limited resources (Carnes et al., 2017; Wales et al., 2013). Next, we consider resource orchestration theory.

Resource Orchestration Theory

Emphasizing the importance of managers, resource orchestration suggests that success depends on how well leaders fit the level and type of resources in the presence of ever-changing environments (Sirmon et al., 2011). Like dynamic capabilities, resource orchestration theory builds on the Resource-based View (Sirmon et al., 2007; Sirmon et al., 2011). However, resource orchestration theory states that merely having the resources does not create a competitive advantage; what managers do with those resources when faced with specific opportunities or challenges is what matters (Amit & Han, 2017; Sirmon et al., 2011). Resource orchestration is essentially the synthesis of resource management and asset orchestration.

Figure 1 below is adapted from Sirmon et al. (2011) and depicts the relationship between resource orchestration, resource management, and asset orchestration.

Figure 1: Resource Orchestration Diagram



Resource Management

Resource management is one component of resource orchestration. Resource management considers how managers of SaaS providers structure, bundle, and leverage resources to create value (Sirmon et al., 2007). Structuring includes how SaaS providers acquire, accumulate, and divest resources (Sirmon et al., 2007; Sirmon et al., 2011). Bundling resources considers how SaaS providers stabilize (incremental improvements to existing capabilities), enrich (extend existing capabilities), or pioneer (develop new capabilities altogether) capabilities (Sirmon et al., 2007; Sirmon et al., 2011). Finally, leveraging resources includes mobilizing (planning the required resource configuration), coordinating (effectively executing the required configurations), and deploying (exploiting market opportunities via the coordination of resources).

Asset Orchestration

Asset orchestration is the second component of resource orchestration. Asset orchestration builds on dynamic capabilities by considering how SaaS providers search, select, configure, and deploy available assets (Helfat et al., 2009; Sirmon et al., 2011). Sirmon and Hitt (2009) point out asset orchestration is vital for superior firm performance. Assets must be viewed and deployed as a complementary system to maximize firm value (Helfat et al., 2009; Teece et al., 1997). Attempting to optimize the performance of a single asset without considering the entire network of assets may sub-optimize firm results (Sirmon & Hitt, 2009).

Research Question and Gaps

Prior digital technology venture research frequently looks at the tradeoff between value creation and capture and the various methods of calculating the Rule of 40 and its

predictive power on firm valuation (Algkvist Nordfors & Hansson, 2023; Hottenhuis, 2020; Lycko et al., 2021; Shaw, 2018). Other qualitative digital technology venture studies address scale-up modes and global scaling strategies (Piaskowska et al., 2021; Tippmann et al., 2022). Practitioner studies have also examined key metrics that lead to firm value for digital technology ventures (Newton & Schlecht, 2016b; Roche & Tandon, 2021). The studies mentioned above are helpful for investors and digital venture executives. In addition, many of these studies discuss the critical metrics that digital technology venture executives should focus on to produce the best investor results.

This study seeks to help SaaS providers understand what resource configurations are most likely required to generate the metrics and outcomes discussed in prior studies. For example, previous studies show the importance of achieving economies of scale to drive value capture. Piaskowska et al. (2021) discuss the importance of increased productivity or mergers and acquisitions in creating these efficiencies. Stallkamp et al. (2022) note that most of the costs are incurred as a digital product is developed, so the marginal costs of selling that product in a new country may be relatively low. With few slack financial resources, which activities should a manager focus on to improve value capture? Or, if a manager wishes to spend more on sales and marketing, when might they expect to see results from that spending? Would more customers be retained by spending money to add resources to a customer success organization? Should the SaaS provider invest resources in product development, adding features that assist customer retention? To answer these questions, we look at the underlying components of the calculation or the rule of 40 to determine what resource orchestration positively impacts firm value.

Specifically, we examine factors managers can control or influence, driving value creation and capture, and how these impact firm value.

Using resource orchestration as the theoretical framework, we seek to answer the question of which resource orchestration strategies positively influence the firm valuation of scaling digital ventures.

Hypotheses

Creating wealth is the primary financial goal of any firm (Ireland et al., 2001). Therefore, we seek to understand what drives wealth among our sample SaaS firms. In this study, we will specifically look at firm valuations. Newton and Schlecht (2016) find that investors often place premium valuations on high-growth SaaS providers with negative earnings. However, as growth for digital ventures slows, economies of scale to drive value capture and improve profitability become significantly more critical (Delmar et al., 2013; Piaskowska et al., 2021; Roche & Tandon, 2021). Theoretically speaking, as firms mature or even move into decline, exploitation and conservation (i.e., economies of scale) must be the mandate for executives (Hitt et al., 2011; Sirmon et al., 2011). Sirmon et al. (2011) and Lycko et al. (2021) go so far as to note that increasing margins may indicate slowing growth. Managers create economies of scale when they decide how a firm chooses to leverage, configure and deploy resources (Hitt et al., 2011; Lycko et al., 2021; Sirmon et al., 2011).

The rule of 40 is the firm's growth rate (value creation) plus the profit margin (value capture) and therefore acts as a continuous metric of the tradeoff between the two (Feld, 2015). Researchers have wondered if the rule of 40 is a predictor of firm value as it measures how well management navigates this tradeoff (Algkvist Nordfors & Hansson,

2023; Hottenhuis, 2020; Newton & Schlecht, 2016b; Priem et al., 2013; Roche & Tandon, 2021; Shaw, 2018). We will test value creation and capture individually and then collectively in the rule of 40 metric to see how or whether they ultimately affect firm values.

Value Creation

The rapid growth that digital technology ventures often experience can accelerate resource constraints (Carnes et al., 2017; Piaskowska et al., 2021; Wales et al., 2013). Resolving resource constraints in a high-growth environment may increase difficulty in developing economies of scale, but if unresolved, it could also limit growth (Lycko et al., 2021). SaaS providers may need to choose one path to grow revenue as they try to scale. Different paths require different resource orchestration strategies. One firm may pursue growth through innovation, structuring, bundling, and configuring resources on research and development to develop and launch new products or features. Another firm may choose to grow by expanding its customer base. This path will necessitate a firm to deploy resources to the sales and marketing organization while structuring governance policies to focus on acquiring and accumulating customers (Sullivan, 2016).

Customer Satisfaction and Retention

First, we consider whether certain resource constraints may limit or impede growth regardless of whether an innovation-centric or customer acquisition-centric path is taken. Some studies suggest slow growers underinvest in customer support and other professional services, leading to poor customer retention (Roche & Tandon, 2021). Customer acquisition expenses become sunk costs, but the SaaS provider loses the opportunity to recoup these costs and capture value if the acquired customer is lost or ‘churns’ per industry

parlance. Customer retention preserves the SaaS provider's revenue base meaning new customers are additive to revenue instead of replacements for lost revenue. Further, these retained customers provide the opportunity to develop new products or features that can be sold to existing customers. Upsell or expansion revenue occurs when existing customers purchase new features or upgrade to more expensive ones. Upsell and expansion revenue has little to no customer acquisition costs associated with it since the existing customers are already familiar with the SaaS provider and its products.

Retaining the customer is often the role of the customer support organization (Van Der Kooij & Pizarro, 2018). Failure to invest in the proper organization structure, staffing levels, and governance may constrain value creation levels (Ireland et al., 2001; Lycko et al., 2021). Costs associated with the customer support organization are reported within general and administrative expenses.

The departments reported within general and administrative expenses are often referred to as back-office functions and include customer support, legal, human resources, finance, and information technology. Costs associated with the executive team are also captured in general and administrative expenses. If back-office staffing levels do not keep up with company growth and customer satisfaction is impacted, the result will be customer churn. Therefore, these back-office functions may constrain growth (Lycko et al., 2021). Our data sources do not explicitly contain spending levels or employee counts for specific departments, such as customer support. However, Yahoo! Finance Plus allows us to disaggregate operating expenses into sales and marketing, research and development, and general and administrative expenses. By observing general and administrative spending

trends, we can assess management decisions and how they structure and leverage these back-office resources as revenue grows. Therefore,

> **Hypothesis 1a:** General and administrative spending will positively impact revenue growth for scaling SaaS firms.

Customer Acquisition

When market opportunities exist, and firms possess resource advantages, savvy managers leverage sales and marketing resources to drive revenue growth (Boudet et al., 2023; Ireland et al., 2001; Wales et al., 2013). SaaS provider sales teams directly interface with customers and promote the firm's products, whereas marketing resources are deployed to build brand awareness and drive customer interest in the firm's products (Van Der Kooij & Pizarro, 2018). Roche and Tandon (2021) find that high-growth SaaS firms may require 50% of revenue or higher sales and marketing spending. Customer acquisition costs are sales and marketing expenses associated with generating leads and converting them into customers (Van Der Kooij & Pizarro, 2018).

Depending on the market and the sophistication level of the customers, SaaS executives may choose a high-touch or low-touch sales process (Van Der Kooij & Pizarro, 2018). In a high-touch environment, managers mobilize resources such that there is a relatively heavy interaction between prospective customers and the sales team. There may be a team of sales people who make continuous calls to lists of prospective customers to have the prospects sit through product demonstrations or convince a prospective customer to buy the SaaS provider's products (Van Der Kooij & Pizarro, 2018). Managers who coordinate resources and deploy assets in a low-touch environment may not even have a sales team. Instead, they may rely on advertising and promotions created by a marketing

team that drives a prospective customer to a website where they can download the firm's products and begin using them (Amit & Han, 2017; Amit & Zott, 2001; Van Der Kooij & Pizarro, 2018). Readers may be able to relate to the experience of using Turbo Tax or signing up for Adobe, for instance. In low-touch SaaS transactions, a human being rarely prompts or assists the consumer.

Investment in sales and marketing is required to create revenue growth whether managers orchestrate resources in a high-touch or low-touch manner. Thus,

> **Hypothesis 1b:** Sales and marketing spending will positively impact revenue growth for scaling SaaS firms.

Innovation

We have discussed the importance of product quality. Quality improvements are often the domain of the research and development team. However, managers may also configure and deploy resources or assets in a way that nurtures innovation. Innovation, whether this is the development of new features or new products, is a source of revenue growth (Delmar et al., 2013; Hitt et al., 2011; Ireland et al., 2001; Piaskowska et al., 2021; Roche & Tandon, 2021). Due to the low barriers to entry, successful SaaS firms must quickly offer product extensions and improved functionality of existing products (Campbell-Kelly, 2009; Hitt et al., 2011; Ireland et al., 2001; Tippmann et al., 2022). Continuous innovation is one potential path to scaling and will be reflected in research and development spending.

Patents are another potential indication of product innovation (Hitt et al., 2011; Piaskowska et al., 2021). However, we must acknowledge that many software firms choose

not to patent products due to the required public disclosure. A firm may be highly innovative but decide not to patent products, instead protecting them as trade secrets.

Hypothesis 1c: Research and development spending will positively impact revenue growth for scaling SaaS firms.

Value Capture

Not all studies agree on whether profit rates drive firm value (Algkvist Nordfors & Hansson, 2023; Coad, 2007; Newton & Schlecht, 2016b; Roche & Tandon, 2021). Most literature agrees that as digital ventures mature and as growth slows, a firm will emphasize economies of scale and focus more on value capture (Feld, 2015; Hottenhuis, 2020; Lycko et al., 2021; Piaskowska et al., 2021; Shaw, 2018; Sirmon et al., 2011). The importance of executives capable of changing resource orchestration strategies increases as markets reach maturity or competitors reach parity and revenue growth rates begin to slow (Hitt et al., 2011).

Once growth slows, firms focus on economies of scale to increase value capture (Lycko et al., 2021; Piaskowska et al., 2021). Our sources offer limited financial data indicating how managers orchestrate resources to pursue economies of scale. We can observe changes in profit margin over time and compare these to growth rates to observe whether tradeoffs appear to be occurring. However, we must also identify independent variables that would indicate conscious management decisions reflecting a change in resource orchestration strategy.

The rule of 40 literature states that firms will reorient mobilization and deployment strategies and perhaps even revise organization structures and governance to gain spending

leverage (Algkvist Nordfors & Hansson, 2023; Bandulet, 2023; Hottenhuis, 2020; Lycko et al., 2021; Newton & Schlecht, 2016b; Roche & Tandon, 2021; Shaw, 2018).

Potential evidence that management focuses on economies of scale includes increased employee productivity, mergers and acquisitions, and foreign sales.

Productivity

Our data sources offer total employee counts, but we cannot specifically see headcount by department. If sales and marketing personnel were declining over time, but customer support personnel were not, we could discern that the SaaS provider is shifting from customer acquisition to customer retention strategies, for example. With the data we have, we can calculate how revenue per employee changes over time by dividing total revenue by total employees.

Revenue per employee is one way to observe whether productivity increases or decreases. If a consistent trend is observed over time, we assume managers have intentionally changed how they structure and deploy resources and assets to improve productivity. Improved training for existing or new employees to increase productivity or shorten the Penrose effect could be conscious management decisions. Using the data available, we will argue that productivity, as measured by revenue per employee, is one metric that demonstrates economies of scale. So we submit,

> **Hypothesis 2a:** Revenue per employee will positively impact value capture for scaling SaaS firms.

Mergers and Acquisitions

Mergers and acquisitions indicate that leaders intentionally acquire, accumulate, bundle, and leverage resources and assets (Sirmon et al., 2011). The

motivation to acquire other businesses may be driven by the desire to unlock potential economies of scale or gain access to novel technologies (Ireland et al., 2001; Piaskowska et al., 2021; Sirmon et al., 2011). Novel technologies create bundling opportunities without incremental costs. For example, the acquired company may have already developed a novel product. The acquirer's sales team can promote the acquired company's products to existing customers or vice versa to create upsell and revenue expansion opportunities without having to re-incur research and development costs (Carnes et al., 2017; Delmar et al., 2013; Ireland et al., 2001; Tippmann et al., 2022).

Acquisitions may also create economies of scale by realizing cost synergies (Hitt et al., 2009). Synergies include cost savings opportunities generated by reducing duplicative functions such as human resources or something as mundane as a single cyber security insurance policy rather than one for each of the acquired and acquiring firms (Healy et al., 1992; Hitt et al., 2009; Makri et al., 2010). Acquiring firms may take a 'best-of-the-best' approach whereby best practices from either the acquiring or the acquired company inform the governance of the newly combined entity (Christensen et al., 2011). This same logic can be extended to personnel decisions. The new entity would not require two CEOs or two CFOs, so only the best personnel for each position would be retained, thus eliminating the expense associated with the other person.

Mergers and acquisitions may also generate economies of scope, allowing the acquiring firm to rapidly internationalize (Ireland et al., 2001; Lycko et al., 2021; Piaskowska et al., 2021). Managers may select an attractive international market and search for a desirable acquisition target through which to mobilize and deploy their resources and

assets. In addition to opening new geographies, the bundling, structuring, and deployment opportunities described above remain available.

Mergers and acquisitions offer myriad structuring and bundling opportunities which can be sources of value capture, and so,

Hypothesis 2b: Mergers and acquisitions will positively impact value capture for scaling SaaS firms.

Foreign Sales

Geographic diversification may be necessary to ensure continued growth as firms mature (Carnes et al., 2017). Such expansion may also be highly efficient, thereby benefiting value capture. The lack of tangible assets required to build a knowledge-based SaaS product means that a product must only be developed once. Selling an existing product means only customer acquisition costs remain. Therefore, foreign sales may not only be continued revenue growth opportunities but may also be highly profitable if the firm can generate synergies by leveraging existing resources (Carnes et al., 2017; Piaskowska et al., 2021; Tippmann et al., 2022).

Adding potential customers through international expansion helps recover these development costs faster than mobilizing resources in a domestic market alone (Carnes et al., 2017; Stallkamp et al., 2022; Tippmann et al., 2022). Foreign expansion may be cheaper and faster for SaaS providers than other types of businesses as knowledge-based software products do not have manufacturing assets and supply chain investments to consider (Amit & Zott, 2001; Campbell-Kelly, 2009; Tippmann et al., 2022). Established firms can use international expansion to build cost advantages versus rivals by leveraging these economies of scale (Tippmann et al., 2022). The most significant barrier to entry into

foreign markets for a SaaS provider may be the local market fit of the product or service (Gimmon & Levie, 2021).

Successful strategies to participate in multiple markets (home and abroad) require some level of sophistication in resource orchestration and are considered a critical domain for value creation (Ireland et al., 2001; Sirmon et al., 2011; Stallkamp et al., 2022; Tippmann et al., 2022). A successful foreign expansion strategy requires managers to practice search, selection, bundling, leveraging, and deployment strategies (Carnes et al., 2017; Ireland et al., 2001; Sirmon et al., 2011; Tippmann et al., 2022). Accordingly,

Hypothesis 2c: Foreign sales will positively impact value capture for scaling SaaS firms.

Firm Value

Value Creation and Revenue Growth

Studies find that revenue growth significantly impacts firm value among SaaS providers (Algkvist Nordfors & Hansson, 2023; Cohen & Neubert, 2019b; Newton & Schlecht, 2016a, 2016b; Roche & Tandon, 2021). Newton and Schlecht (2016) and Algkvist Nordfors and Hansson (2023) find that SaaS providers with negative earnings often have high valuations. They find revenue growth is significantly more impactful than profitability among their sample firms. First-mover advantages and market share capture are therefore crucial and encourage managers to prioritize growth until it slows and only then pursue economies of scale (Amit & Zott, 2001; Coad, 2007; Feld, 2015; Gimmon & Levie, 2021; Lycko et al., 2021; Piaskowska et al., 2021). Revenue growth for scaling firms is the best and sometimes only means to create financial slack (Carnes et al., 2017; Delmar et al., 2013; Wales et al., 2013).

While investors place some value on firms with a track record of revenue growth, even greater value is placed on future growth (Algkvist Nordfors & Hansson, 2023; Newton & Schlecht, 2016b). Future growth is significant in firm valuation for SaaS providers that realize profit losses.

Hypothesis 3a: Future revenue growth will positively impact firm value for scaling SaaS firms.

Value Creation and Value Capture Trade-off

Resource orchestration strategies change as SaaS providers move from an emphasis on value creation to maximization of value capture. Navigating this tradeoff in a manner that increases firm value tests the capabilities of managers and is a precarious stage within a firm's lifecycle (Delmar et al., 2013; Piaskowska et al., 2021; Roche & Tandon, 2021). Sirmon et al. (2011) and Lycko et al. (2021) go so far as to note that increasing profit margins may be leading indicators of slowing growth. At this tradeoff stage where revenue growth slows, economies of scale and efficiencies become the focus (Lycko et al., 2021; Piaskowska et al., 2021). Once resources have been orchestrated to generate high-profit margins, managers may pass on lower profit revenue growth opportunities from less demanding firms (Coad, 2007).

How well a management team manages this critical tradeoff phase can be monitored by observing the rule of 40 (Feld, 2015; Priem et al., 2013). The two components of the rule of 40 are (1) total revenue growth and (2) profit margin (Feld, 2015). Meeting the rule of 40 over time requires constant changes in resource orchestration strategies (Carnes et al., 2017; Clarysse et al., 2011; Coad, 2007; Hitt et al., 2011; Sirmon et al., 2007; Sirmon et al., 2011; Wales et al., 2013). Prior studies seek to answer the question of

whether meeting the rule of 40 impacts firm valuation (Algkvist Nordfors & Hansson, 2023; Hottenhuis, 2020; Newton & Schlecht, 2016b; Roche & Tandon, 2021; Shaw, 2018). We seek to confirm prior findings while quantifying the importance of meeting the rule of 40 in our sample. We submit,

Hypothesis 3b: Meeting the rule of 40 will positively impact firm value for scaling SaaS firms.

Signs of Firm Maturity

Ireland et al. (2001) tell us that internationalization is a crucial domain of wealth creation, and a firm must possess a certain maturity to create the networks that are key to successful internationalization. Furthermore, internationalization is made easier if mature governance practices and organizational structures exist such that managers need only replicate and leverage these to expand to foreign markets (Stallkamp et al., 2022; Teece, 2014; Tippmann et al., 2022).

Foreign sales may create leveraging opportunities that drive value capture discussed in Hypothesis 2c. These same factors are essential for firm valuation and signal to investors the legitimacy and maturity of the firm. We believe that,

Hypothesis 3c: Foreign sales will positively impact firm value for scaling SaaS firms.

Go-to-Market Strategy

We have incorporated a dummy variable into our data to test for other potential contributors to firm value. The variable is whether a firm sells to consumers or businesses. All firms in our data set sell their products to other businesses, known as business-to-business (B2B) sales. A few of these firms also sell products to consumers, known as

business-to-consumer sales (B2C). B2B models often require different product offerings and levels of product sophistication and almost certainly have other sales channels to reach end customers (Dotzel & Shankar, 2019; Lee et al., 2002). Due to the increased complexity required to satisfy the needs of a business versus the comparatively more uncomplicated needs of an individual consumer, a SaaS provider will incur more significant up-front expenses associated with product development. Generally, B2B sales require a longer sales cycle than B2C sales (Dotzel & Shankar, 2019; Van Der Kooij & Pizarro, 2018). SaaS providers targeting B2B customers may incur more significant profit losses for extended periods than those selling B2C.

B2B customers will generally produce more average revenue per user due to the higher prices associated with B2B SaaS products, and it may be easier for SaaS providers to identify the appropriate target customers for their products (Dotzel & Shankar, 2019). Therefore, mobilizing and deploying sales and marketing resources is often more efficient in a B2B environment versus a B2C approach. Previous studies have shown that firms achieve superior valuation without incurring more significant risk by focusing on B2B sales (Dotzel & Shankar, 2019).

We consider the impact these differences have on firm valuation and believe go-to-market strategy is an essential factor to consider concerning firm value such that,

> **Hypothesis 3d:** Firms that sell business-to-business rather than business-to-consumer will positively impact firm value for scaling SaaS firms.

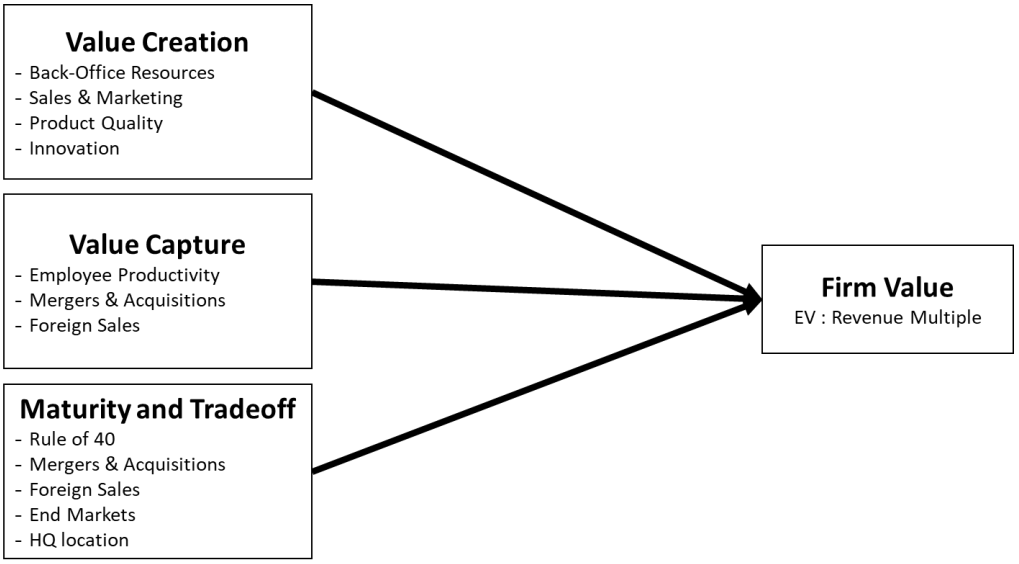
Expected Contributions

This study adds to the literature on resource orchestration, business models, digital ventures, and scaling. It also guides the thousands of managers employed by SaaS

providers as they consider which resources to invest in during the critical scaling phase of the firm lifecycle. In doing so, we consider tradeoff factors between value creation and value capture and the resulting impact on firm value. For example, initial investments in resources such as a new sales team, new marketing strategy, or new product development are an antecedent to the corresponding revenue generation expected and necessary to recoup the investment cost (Coad, 2007; Delmar et al., 2013; Kor & Mahoney, 2000; Penrose & Penrose, 2009; Piaskowska et al., 2021). As the Penrose effect explains, investments in new resources are not immediately efficient, and it takes time to understand whether the investment choices are correct. Therefore, we consider providers' tradeoffs between value creation and value capture resources to study which configurations drive the greatest firm value.

In addition to corroborating the difficulties and risks associated with scaling, this study intends to contribute critical findings to the limited academic publications on scale-ups (Clarysse et al., 2011; DeSantola & Gulati, 2017; Gulati & Desantola, 2016; Isenberg & Lawton, 2014; Piaskowska et al., 2021; Tippmann et al., 2022). Our study will contribute to business model literature by reviewing SaaS providers' strategic choices regarding which resources to invest in over others and how to configure these resources to maximize firm value.

Figure 2: Hypothetical Research Model



Chapter 3: Methodology and Data Collection

Research Design

This study employs empirical analysis to generate quantitative data showing which resource orchestration strategies seem to contribute to the highest firm value. We can collect multiple heterogenous independent variables from 65 SaaS firms (see list of firms in Appendix Figure 1) in a longitudinal fashion in regular intervals from 2017 – 2022. Given our numerous factors, time series, and reasonably large sample size, a panel regression is ideal for observing these dynamic, heterogenous factors over time and between firms (Cameron & Trivedi, 2010; Wooldridge, 2010). The panel regression considers the relationships between various independent and dependent variables of value creation, value capture resources, and firm valuation.

We specifically look at publicly available data from these digital SaaS ventures that predominantly rely on subscription-based software to generate revenue. We use annual longitudinal data from the SaaS providers' public filings and other publicly available sources. Free sites include www.sec.gov and individual firms' websites. We also use data from low-cost paid subscriptions to sites such as Crunchbase, SeekingAlpha, and Yahoo! Finance Plus. Other cost-prohibitive sites that were considered include FactSet and Pitchbook.

The study's empirical nature means we must select data to inform us about the resources SaaS providers are emphasizing and receiving investment. Resource orchestration, we believe, can be observed by utilizing an empirical analysis of our independent variables over the six years 2017 - 2022. These observations will provide insight into how providers' decisions regarding resource orchestration affect a SaaS provider's valuation. Using Stata Statistics and Data Science 17.0 MP-Parallel Edition, we

conduct numerous multi-factor, panel regressions to find the level of contribution each independent variable has to certain dependent variables, including firm value.

Sample Selection and Data Collection

To conduct the analysis, we first must construct a sample set consisting of a list of SaaS providers to analyze. Since data from private companies is difficult to access and may not contain a consistent list of the indirect variables we wish to study, we turn to publicly available data providers where we can reliably find these variables. Our sample providers must generate most of their revenue from recurring subscription payments associated with remotely hosted SaaS products. We use only publicly available financial data from firms traded on a US stock exchange to ensure that the data are consistently measured and reliable. To have data in 2017, a firm must have had an initial public offering (IPO) not later than 2019. Since the U.S. Securities and Exchange Commission (SEC) requires two years of financial statements to be publicly disclosed to IPO, a firm that IPOs in 2019 will have to make financial data available back to 2017.

Non-financial data, such as the number of employees or patents, are gathered from sites requiring low-cost subscriptions, including Seeking Alpha Premium, Crunchbase Pro, and Crunchbase Data Boost. These sites provide data over most of the period for most of the firms, but occasionally, other sources, such as www.uspto.gov/patents, were required. Although firms that had an IPO before 2019 had to file financial data dating back to 2017, we sometimes found it difficult to gather pre-IPO headcount information, resulting in some employee-related metrics being unbalanced.

Various lists of SaaS firms are on the internet. Firms on these lists may include pure-play SaaS firms. Often the lists also include software and other firms that generate

some, but far from all, of their revenue from actual SaaS products. The researcher's former colleagues from JP Morgan graciously provided a list of "pure play" publicly traded SaaS providers. This list compares those supplied by former colleagues or obtained from third-party websites, including Mike Sonders, Madison Park Group, and Software Equity Group (MPG, 2023; SEG, 2022; Sonders, 2023). Some of the firms appearing in these lists do not generate most of their sales per our inclusion criteria. They have been acquired, did not IPO in or before 2019, or were traded on an international rather than a U.S. stock exchange and have been eliminated from consideration. Ultimately, our sample includes 65 firms that meet all our inclusion criteria.

Our study will look at resource orchestration strategies over time, thus requiring longitudinal data to be collected at regular intervals. Few publicly traded SaaS providers meet our inclusion criteria, and even fewer have been publicly traded for an extended period. To ensure a large enough sample size and at least a minimal amount of historical data, we selected the six (6) year period from January 1, 2017, through December 31, 2022.

With a sample of 65 firms, we began collecting data from various sources, including paid subscription access to Yahoo! Finance Plus Essential, Crunchbase Pro, and Seeking Alpha Premium.

Controls

Firms Publicly Listed on a U.S. Stock Exchange

One control factor we discussed is that the providers must be listed on a U.S. stock exchange with publicly available financial data from 2017 through 2022. The sample size was the key factor in choosing the period. Both Amit and Zott (2001) and Stallkamp et al. (2022) similarly chose only publicly traded firms listed on U.S. stock exchanges for their

sample due to government-mandated disclosure requirements in the IPO process while also ensuring complete and comparable data amongst firms which independent third-party accounting firms annually audit.

Longitudinal Data

We gather data for the years 2017 through 2022. Although these data are publicly available, this does not mean all are post-IPO. Before IPO, firms must file at least two years of historical financial data with the SEC. These pre-IPO data are also part of the public record and available from SeekingAlpha, Yahoo! Finance Plus, www.sec.gov, and under investor relations on a firm's website. Consideration was given to using only data from firms that had completed an IPO in 2017 or prior but restricted our sample size to an undesirable level.

Dependent Variables

Growth Rate

Among digital technology ventures, early sales success confirms a firm's operational capabilities and the legitimacy of product-market fit (Gimmon & Levie, 2021). Ongoing revenue growth is a common goal for all providers, regardless of lifecycle stage, market position, or industry, as increased revenue creates financial slack, thereby improving survival rates (Carnes et al., 2017; Ireland et al., 2001; Sirmon et al., 2011; Wales et al., 2013). Continuous revenue growth is one of the key indicators of sustainability survival (Gimmon & Levie, 2021; Ireland et al., 2001). The literature shows that investors reward firms that orchestrate resources to emphasize revenue growth (Coad, 2007; Newton & Schlecht, 2016b; Sullivan, 2016).

Newton and Schlecht (2016b) conclude that investors focus on revenue growth rates and are willing to overlook SaaS providers' negative earnings (i.e., EBITDA) to the point that SaaS provider growth is more than twice as valuable as profits in their model. Prior research indicates that many scale-up attempts are not successful; however, firms that take a market-leading position and increase their chances of long-term survival (Amit & Zott, 2001; DeSantola & Gulati, 2017; Gimmon & Levie, 2021; Sullivan, 2016; Tippmann et al., 2022). Based on the logic above, we choose our dependent variable for value creation as annual revenue growth.

The Penrose effect explains that not all investments are immediately efficient (Penrose & Penrose, 2009). For example, sales and marketing or research and development spending may have a lag factor where spending in the first year will affect future growth, not the current year. Therefore, for each of the independent variables discussed in this value creation section, we look to see how independent variables impact revenue growth in each of the in-year or last 12 months (LTM), the next 12 months ($Growth_{(t-1)}$), and the next 24 months ($Growth_{(t-2)}$) periods.

To be more precise, if we invested in sales and marketing resources in 2017, how did these investments impact each of the 2017 revenue growth (LTM), 2018 revenue growth ($Growth_{(t-1)}$), or 2019 revenue growth ($Growth_{(t-2)}$)? In our example above, the LTM growth rate is determined by taking the 2017 total revenue divided by the 2016 total revenue and subtracting one. The result is our 2017 growth rate which we refer to as the in-year or LTM growth rate. The growth rate for the NTM period is the same calculation substituting 2018 total revenue and then dividing by 2017 total revenue.

Our dependent variables for value creation are the LTM growth rate, $Growth_{(t-1)}$, and $Growth_{(t-2)}$.

Profitability

Financial statements contain several line items which might be considered to express a firm's profit margin. These profit margins can rise or fall for any number of reasons. Price discounts may be necessary to gain share, and revenue growth may require hiring new employees who, as the Penrose effect suggests, may need time to be efficient and productive in their tasks (Penrose & Penrose, 2009; Piaskowska et al., 2021). Christensen and Overdorf (2000) point out that margins may fall as companies expand offerings, add new features and functions, and enter new markets. There are spectacular examples of situations where new, lower-price products enter a market, forcing existing players to decide whether to cut prices and reduce margins to maintain market share (Christensen, 2013; Christensen & Overdorf, 2000; Tripsas & Gavetti, 2000). We are interested in finding the best measure of profitability, reflecting the resource orchestration strategies managers may employ to maximize value capture.

Several direct variables were considered for the value capture portion of the analysis. The first variable we consider is gross margin. Gross margin is total revenue minus the cost of goods sold (COGS). COGS includes those direct costs associated with making the products that generate revenue. GAAP (Generally Accepted Accounting Principles) consists of the following within COGS: raw materials, freight, returns, sales discounts, labor, and factory overhead. As sales volume increases or decreases, direct costs are variable, meaning they rise or fall in accordance with the production volume (Anderson et al., 2003).

Since SaaS products are knowledge-intensive and asset-light, direct expenses are low and highly efficient. These low variable costs also make the SaaS business model highly scalable since the marginal cost of adding a new customer is also extremely low (Amit & Zott, 2001; Lycko et al., 2021; Sullivan, 2016; Tippmann et al., 2022). Gross margin is an important indicator of health as it proves a firm can generate rents greater than its direct costs (Cohen & Neubert, 2019b; Newton & Schlecht, 2016b). However, because SaaS providers generally report high gross margins without much variation, we conclude that gross margin is not the ideal variable for value capture.

Despite strong gross margins, we read that many SaaS providers are marginally or not at all profitable. This lack of profitability is due to the substantial upfront, indirect expenses to develop products and acquire customers. Long payback periods follow as SaaS providers recover these costs in small amounts of regular payments throughout a subscription term (Campbell-Kelly, 2009; Lycko et al., 2021; Roche & Tandon, 2021). These up-front investments with slow revenue recovery make many SaaS providers unprofitable. Recovery and eventual control of these indirect costs determine a SaaS provider's profitability. While gross margin considers only direct costs, EBITDA (Earnings Before Interest Taxes, Depreciation, and Amortization) and free cash flow take these indirect costs into account. Both metrics are acceptable and commonly found in the literature.

Indirect costs are expressed in financial statements as operating expenses. Operating expenses are the sum of general and administrative, sales and marketing, and research and development expenses. As revenue growth declines, managers of SaaS firms can leverage existing resources to reduce operating expenses and see a corresponding rise

in profitability. Free cash flow is considered a potential measure for value capture. However, free cash flow considers working capital and capital expenditures, whereas EBITDA does not. When comparing multiple firms, there may be less EBITDA variability due to accounting practices, working capital management, or capital expenses. We further find that EBITDA is the most frequently used metric in prior SaaS provider research. Therefore, we choose EBITDA (EBITDA as a percentage of total revenue) as our dependent variable for value capture.

Firm Valuation

Newton and Schlecht (2016b) and Roche and Tandon (2021) find that many SaaS providers have high revenue growth, weak balance sheets, and negative EBITDA for long periods. Therefore, investors in digital ventures often focus on revenue multiples when valuing these businesses. Thus, the enterprise value to revenue ratio is deemed the most appropriate metric for our dependent variable.

We gather enterprise value data from Yahoo! Finance Plus. Enterprise value is the total company value as measured by the sum of the market value of common equity, debt, and preferred equity minus the value of cash and short-term investments. A simple formula for enterprise value is market capitalization plus outstanding debt minus available cash. So, to obtain the enterprise value to revenue multiple, we divide a firm's current year's enterprise value by the current year's revenue. The result will be the enterprise value to revenue multiple.

Other valuation metrics were considered, including cumulative shareholder return, total market capitalization (Market Cap), earnings per share (EPS), and enterprise value to EBITDA ratios. Market Cap is the price of a stock multiplied by the number of outstanding

shares. EPS can be calculated by subtracting preferred dividends from a firm's net income and dividing that by the number of outstanding shares.

Fortunately, Yahoo! Finance Plus gives us these data without having to do the calculations for each provider in our sample. Each potential variable has drawbacks. Although our paid website sources can collect pre-IPO data from sources such as public filings, not all the providers in our sample have been publicly traded for the full five (5) years. Therefore, enterprise value, stock prices to calculate cumulative shareholder return, Market Cap, and EPS may not be available for our time period. Finally, many providers in our sample are losing money and report negative EBITDA figures annually. A metric such as an enterprise value to EBITDA would produce an extensive range of outcomes as we compare highly profitable and non-profitable within the sample.

Independent Variables

There is considerable variation in scale among the providers in our sample. Therefore, we avoid looking at metrics that include aggregate dollars in our attributes. Instead, we seek details related to resource orchestration that can be measured in rates of change, ratios, or proportions. We take log scale figures when we must use aggregate statistics.

Revenue Growth Rate

We discuss the various revenue growth metrics in the preceding discussion on dependent variables. We will also consider these factors as independent variables in some models over the same periods: LTM, $Growth_{(t-1)}$, and $Growth_{(t-2)}$.

Customer Satisfaction and Retention

Operating expenses (OPEX) are considered indirect expenses or overhead and include general and administrative expenses, sales and marketing expenses, and research and development expenses. According to www.investopedia.com, these indirect costs are not directly tied to producing a firm's goods or services. We can obtain each of these from Yahoo! Finance Plus. We look at the log-transformed version of the applicable figure in the models considering these expense categories. We also consider the relative expense category (e.g., general and administrative) divided by total revenue for that year to calculate the category spending as a percentage of revenue.

Our value creation model considers general and administrative expenses based on the hypothesis that a lack of back-office support can artificially constrain revenue (Lycko et al., 2021). According to GAAP, general and administrative expenses include indirect costs such as rent, utilities, insurance, and functions such as executives, finance, legal, information technology, customer support, and human resources (www.investoedia.com). A lack of staffing, for example, in finance, may prevent timely customer billing or increase billing errors, which could dampen growth efforts. In the case of delayed billing, a firm may face cash flow issues. In the case of billing errors, customers may get frustrated, and salespeople may waste time smoothing over mistakes and rebuilding trust rather than selling to new customers. Resource orchestration strategies that do not appropriately invest in the back-office support organization structure may negatively impact revenue growth.

Conversely, resource orchestration strategies that focus on customer satisfaction should be observable by monitoring general and administrative spending changes.

Managers intent on stabilizing or enriching customer retention and improving customer satisfaction must spend more on the general and administrative accounts.

Additionally, we have discussed the Penrose effect, whereby it may take time for new employees or new departments to learn company culture and practices to the extent that they become productive. We submit that this delayed effectiveness may apply to expenses seen in the general and administrative categories and therefore consider lag factors between the expense recognition and change in revenue growth.

Customer Acquisition

According to GAAP (www.investoedia.com), sales and marketing expenses include salaries and other costs related to distributing and generating product demand. These expenses may include sales and marketing staff salaries, promotional literature, trade shows, advertisements, websites, or other forms of marketing. These expenses are intended to build brand awareness and acquire revenue-generating customers. Digital venture literature tells us that firms will seek to grow rapidly even if the costs of realizing growth result in profit losses (Newton & Schlecht, 2016b; Roche & Tandon, 2021). As growth slows, we are told that these firms enter a new lifecycle phase focusing on economies of scale to improve profitability (Lycko et al., 2021; Piaskowska et al., 2021). Changes in sales and marketing expenses may therefore be a leading indicator of an upcoming new stage in the lifecycle of these digital ventures. Managers should shift resources away from customer acquisition if sales and marketing expenses are not generating the previous growth levels (Boudet et al., 2023; Lu & Beamish, 2004).

A marketing campaign may take time to generate purchase intent and customer acquisitions, so we consider lag factors in revenue generation associated with leveraging

these resources. Perhaps customers have a testing protocol, pre-existing contract timing considerations, or budgetary constraints that delay any revenue impact.

Innovation

Research and development spending indicates that managers are stabilizing, enriching, or pioneering product innovations. The regular, if not frequent, release of new products and features is vital for the revenue growth of digital ventures. Existing products can be enriched with new features or greater functionality. These product extensions create add-on revenue opportunities and may lead to better retention of current customers. New product introductions may also give a firm access to new markets, customers, or geographies. In addition to the revenue opportunity that comes with innovation, firms may be better able to fend off attacks from rivals with a steady stream of product development. Research and development spending and patents are potential signs of healthy innovation.

We must consider a possible lag effect regarding research and development expenses. A firm may launch a new product but not see significant revenue for some time as it builds customer awareness and generates demand.

Research and development spending is obtained from Yahoo! Finance Plus. As with gross margin, we are interested in the amount of research and development spending as a percentage of total revenue to understand the relative importance of research and development compared to other departments. However, firms with low revenue can spend relatively few dollars on research and development and still have a high spending level as a percentage of sales. Therefore, we must also consider the actual spending (log) on research and development.

Patents may be another indication of innovation. However, many SaaS providers and other digital ventures choose not to patent products. The patent process requires detailed descriptions of the item being patented. Since software is knowledge-based, documentation may allow competitors to copy the product more easily. Using a Crunchbase Pro subscription and adding the Data Boost Package gives us access to patent filings and patents granted by year for the firms in our sample. When patent data is unavailable on Crunchbase, we turn to www.globaldata.com and www.uspto.gov/patents to search for filings and granted patents.

Productivity Measures and Other Signs of Maturity

Literature tells us that another indicator of the lifecycle stage is whether a firm focuses on economies of scale. Firms in high growth mode will pursue revenue growth and market share capture regardless of the impact on profit. Firms with slowing growth will focus on economies of scale to realize improved profits.

Our first independent variable is the most literal productivity metric. We calculate revenue per employee (log) by dividing total revenue by total employees. We expect firms focused on growth to have a lower revenue per employee than firms focused on economies of scale. The revenue growth rate may indicate the lifecycle phase and determine when managers should attempt a tradeoff between value creation and value capture. We, therefore, use revenue per employee instead of operating expenses per employee.

The following two variables require more explanation of how they may relate to productivity and firm maturity. The first is mergers and acquisitions. Using Crunchbase Pro, we see the number of acquisitions a firm makes each year. Acquisitions in and of themselves are not an indicator of productivity. Acquisitions may also create bundling

opportunities whereby both the acquiring and the acquired firm may use existing resources to sell the other's products to existing customers.

Another motivating factor for acquisition is the realization of cost synergies to accelerate economies of scale (Hitt et al., 2009). The concept is that the combinative process of bringing two firms together would allow for the elimination of duplicative functions and the associated expenses. For example, an acquiring firm does not require two chief executive officers, so savings may be available by eliminating the acquired firm's CEO. Hence, mergers and acquisitions may signal that managers seek bundling and leveraging opportunities. A question is whether forecasted synergies can be realized immediately or whether there may be a 12-month or 24-month lag for these economies of scale to appear.

Similarly, foreign sales may be a resource-leveraging opportunity. We obtain foreign sales data from Seeking Alpha Premium, and when unavailable, we turn to an individual firm's SEC Form 10-K filings. Once a digital venture has developed its software, certain indirect expenses, such as research and development, are sunk. A firm can therefore sell its products anywhere while incurring only direct costs and the limited portion of indirect costs required to acquire customers. Configuring assets or managing resources to leverage existing products and proven customer acquisition strategies can drive value capture and increase firm value. Foreign sales as a percentage of total revenue indicate management's decision to orchestrate resources to boost internationalization.

The Tradeoff Between Value Creation and Value Capture

Continuously orchestrating resources to respond to the changing market environments to create firm value takes thoughtful planning, time, and sophisticated

managers (Amit & Han, 2017; Clarysse et al., 2011; Sirmon et al., 2011). Successfully orchestrating resources to create value is particularly important for scaling firms with few slack resources (Hitt et al., 2011; Wales et al., 2013). Rapid value creation requires extensive planning to identify and invest in the appropriate assets or resources while creating the proper governance and organization structure to succeed (Clarysse et al., 2011; Ireland et al., 2001; Sullivan, 2016). While the environment allows, we cite research indicating revenue growth impacts firm value more significantly than profitability. Thus, managers should be encouraged to leverage, configure and deploy resources to pursue growth when possible. We seek to confirm this is true for our data set and understand the relative impact of either metric on firm value.

Managers may be required to decide whether to pursue strategies focusing on value creation or capture, but scaling firms, in particular, may be unable to focus on both simultaneously. Managers prioritize value capture when environmental conditions change. The rule of 40 allows us to monitor how well managers shift resource orchestration strategies as market environments change and whether these strategies impact firm value.

The rule of 40 is calculated by adding the year-over-year revenue growth rate to the EBITDA. We obtain revenue and EBITDA figures from Yahoo! Finance Plus and then make the rule of 40 and growth rate calculations in Microsoft Excel. Promulgators of the rule of 40 within the SaaS community state that profit and growth are, to some extent, mutually exclusive, and meeting the rule of 40 requires a provider to constantly redeploy and reconfigure resources and assets to control the profit and growth mix (Feld, 2015; Hottenhuis, 2020; Newton & Schlecht, 2016b; Shaw, 2018).

Therefore, the rule of 40 is a critical, independent variable that informs us how well managers use resource management and asset orchestration to balance the trade-off between profitability and sales growth and how this impacts firm value.

Go-To-Market Transaction Type

All the providers in our sample conduct B2B transactions. A few also conduct B2C in addition to B2B transactions. We want to understand whether adding B2C efforts may benefit or complicate providers, so we have coded B2B only providers as one (1) and providers with B2B and B2C sales models as zero (0).

Terms and Definitions

The terms and definitions that are used for our dependent and independent variables can be seen in table 2 below.

Table 2: Terms and Definitions

Term	Definition
Acquisitions	Number of acquisitions in the then current year
B2B	Business to business sales model only (no B2C sales)
EBITDA	EBITDA as a percentage of total revenue
EV : Revenue	Enterprise value to revenue multiple
Foreign Sales	Foreign sales as a percentage of total revenue
G&A	General and Administrative expense as a percentage of total revenue
GM	Gross margin as a percentage of total revenue
R&D	Research and Development expense as a percentage of total revenue
Growth	Revenue growth in the then current 12 month period
$Growth_{(t-1)}$	Revenue growth 1 year lag or next 12 month period (NTM)
$Growth_{(t-2)}$	Revenue growth 2 year lag or next 24 month period (N24)
Rev per EE	Revenue per employee (Log)
Rule of 40	Revenue growth percentage plus EBITDA percentage
S&M	Sales and Marketing expense as a percentage of total revenue

Data Processing and Analysis

Data were collected and entered into a Microsoft Excel (Excel) workbook. Data were entered by the firm by year. Calculations in Excel were required for specific ratios and certain metrics that required the combination of certain data (e.g., year-over-year

growth, the rule of 40, revenue per employee, etc.). Some independent variables were selected a priori, whereas others were emergent as the analysis evolved and meaningful relationships became identifiable. Some of the categories required author discretion and subjective decision-making. For example, deciding whether a firm generates most of its revenue from SaaS product sales and is included in the sample needed some discretion—other decisions regarding whether a firm was in a vertical or horizontal market required judgment.

It is also noteworthy that not all our independent variables are captured for every firm throughout the entire period of our study. Missing data are noted in the number of observations we can generate for each analysis. We also note that, on occasion, a primary data source may be missing information that was later obtained from a secondary data source. For example, Seeking Alpha was our primary data source for foreign sales, but occasionally we may have to refer to that firm's annual form 10-K to find the data.

Panel Analysis

With multi-factor, time-series data from which we seek to make repeated measurements, we choose to conduct panel regression analysis. Panel data analysis is ideal for observing dynamic heterogeneity in variables among many providers over time (Cameron & Trivedi, 2010; Frees, 2004; Wooldridge, 2010). This methodology will assist in estimating the marginal effects that can inform causal hypotheses, or in other words, inform us of each variable's relative impact compared to other independent variables and each dependent variable (Cameron & Trivedi, 2010; Wooldridge, 2010). We conduct Hausman tests in each model to determine whether a fixed or random effects panel analysis is most appropriate (Cameron & Trivedi, 2010).

Assumptions & Limitations

Our study attempts to determine how digital ventures successfully scale using Resource Orchestration as our theoretical framework. We focus on firms primarily relying on SaaS business practices and products to generate revenue. Though there is an abundance of these firms, very few have scaled, and even fewer have publicly available data. We are, therefore, limited to a sample of 65 firms. It could be argued that a firm capable of issuing an initial public offering has already scaled. However, we believe that the combination of employee and revenue growth and the wide range of rule of 40 results indicate continued scaling.

Summary

Discussion of the data collection, research design, and empirical methods used to answer our research question are described in chapter three (3). In chapter four (4), we will review the research results, followed by a discussion in chapter five (5). Chapter five (5) will also include limitations, theoretical implications, contributions, and potential considerations for future studies.

Chapter 4: Results

This study will determine the resource orchestration strategies used by digital ventures that maximize firm value while successfully scaling. Specifically, our interest is digital ventures whose primary revenue source is subscription-based SaaS products. Although there are estimated to be as many as 30,000 SaaS firms globally, very few trade publicly. Data from private firms are difficult to obtain, may not contain consistent line items of data to support each of our independent variables, and may not be consistently reported since private firms do not have annual audit requirements and may not report financials according to GAAP.

Publicly traded firms, one could argue, have already reached scale. While this may be true in some industries, many SaaS providers exhibit scaling characteristics post-IPO as adoption rates are still climbing. A longitudinal view of the data demonstrates that the firms in our sample are still scaling as we observe combinations of employee, revenue, spending, and profit growth rates. Thus, we can observe how management teams balance the tradeoffs between value creation and value capture over time and how these decisions ultimately affect firm value.

Prior studies attempt to prove that scaling SaaS firms should focus on revenue growth to establish first-mover advantages and market share capture while the markets are growing or developing. As growth opportunities subside, managers should focus on economies of scale to increase value capture. Managers who successfully maximize value creation and execute the tradeoff to maximize value capture should see these results as superior firm valuations. Our analysis will show the resource orchestration strategies that drive value creation and capture, then how these patterns impact firm valuation.

Table 3: Descriptive Statistics & Correlations

Value Creation Descriptive Statistics & Correlations

Variable	Obs	Mean	SD	VIF	1	2	3	4
Growth $_{(t-2)}$	260	0.27	0.27		1.00			
G&A	390	0.18	0.18	1.44	0.06	1.00		
R&D	390	0.21	0.21	1.57	0.15	0.14	1.00	
S&M	390	0.37	0.37	1.31	0.24	0.18	0.47	1.00

Value Capture Descriptive Statistics & Correlations

Variable	Obs	Mean	SD	VIF	1	2	3	4
EBITDA	390	-0.15	0.24		1.00			
Acquisitions	390	0.99	1.37	1.02	0.22	1.00		
Foreign Sales	390	0.26	0.18	1.02	-0.06	0.13	1.00	
Rev per EE	387	5.40	0.21	1.00	0.22	0.01	0.03	1.00

Firm Value Descriptive Statistics & Correlations

Variable	Obs	Mean	SD	VIF	1	2	3	4	5
EV : Revenue	390	10.79	10.85		1.00				
B2B	390	0.91	0.29	1.01	0.11	1.00			
Foreign Sales	390	0.26	0.19	1.00	0.20	-0.03	1.00		
Growth $_{(t-1)}$	325	0.28	0.27	1.08	0.31	-0.02	0.02	1.00	
Rule of 40	390	0.27	0.34	1.08	0.27	-0.15	-0.01	0.26	1.00

Value Creation Model

Our dependent variable for the value creation model is revenue growth. Digital venture literature indicates various potential resource orchestration strategies may be deployed to maximize value creation. The independent variables are general and administrative, sales and marketing, and research and development spending and will indicate resource orchestration strategies of customer satisfaction/retention, customer acquisition, and innovation, respectively.

Equation 1: Value Creation

$$\boldsymbol{Revenue\ Growth_{(t-2)\ i,t}} = \boldsymbol{\beta_0 + \beta_1 GA_{i,t} + \beta_2 SM_{i,t} + \beta_3 RD_{i,t} + \epsilon_{i,t}} \ \textbf{(1)}$$

For example, managers focusing on customer acquisition can be identified by their higher spending levels on sales and marketing. Managers in high-growth SaaS businesses may invest as much as 50% of revenue in sales and marketing to increase brand awareness and acquire customers (Roche & Tandon, 2021).

Innovation-led strategies featuring new products and features and improved product quality may be identifiable by increased spending on research and development. Managers focused on customer satisfaction and retention may demonstrate this with higher spending levels in general and administrative accounts. Lycko et al. (2021) and Roche and Tandon (2021) find that slower-growing firms underinvest in these back-office resources and constrain their value creation levels. Further, suppose a firm does not create an organizational structure that coordinates and deploys a strong customer support organization. In that case, customer retention may suffer, and revenue growth will be offset by lost revenue from customer churn.

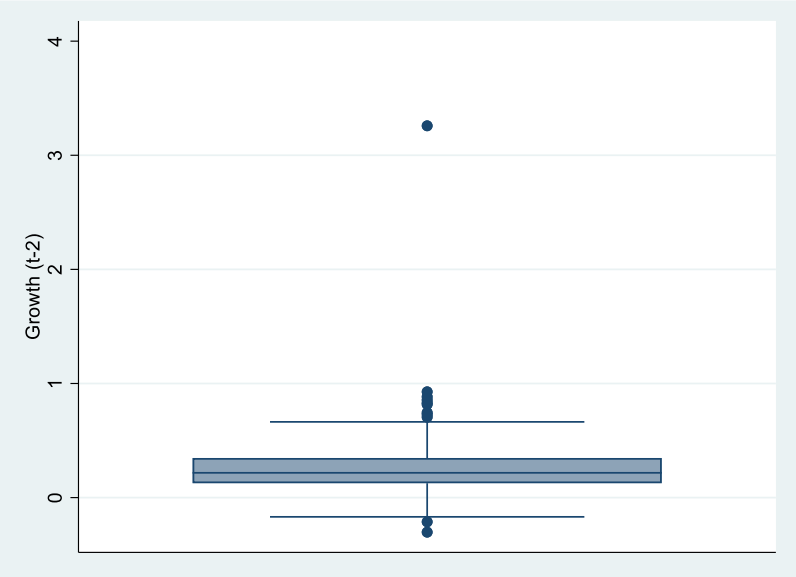
Finally, managers may configure and deploy resources to innovate by creating new products and features to drive revenue growth (Carnes et al., 2017; Hitt et al., 2011; Piaskowska et al., 2021). We look at research and development expenses and patents indicators of an innovation-led revenue growth strategy.

Considering the Penrose effect, we consider lag factors between the period the expenses occur and the resulting impact on revenue growth for each independent variable. A larger sales team may ultimately acquire more customers, but training the sales personnel to conduct customer outreach, demonstrate products, and close sales may take time. Once trained, it may take more time for new sales staff to accumulate enough customers to generate meaningful subscription revenue. Our models consider whether resource

orchestration changes generate increased revenue growth within the current year, after a 12-month lag (Growth $_{(t-1)}$), and after a 24-month lag (Growth$_{(t-2)}$).

The Growth$_{(t-2)}$ results produce valid and significant findings, so the data we review will be from this model. Results from the current year and Growth$_{(t-1)}$ models can be found in Appendix Figure 2.

Figure 3: Value Creation Outliers



A review of scatter plots and the box plot shown in Figure 3 above indicate that our data contain one extreme outlier. The outlier is Zoom Video Communications, Inc. (Zoom), which experienced year-over-year revenue growth of 326% in 2020 due to the COVID-19 pandemic shelter-in-place restrictions. These restrictions, including work-from-home mandates, increased the need for Zoom's video conferencing SaaS products. As we proceed with the analysis, we eliminate the outlier.

We first note the number of observations for this analysis. Since we use a 24-month lag for this analysis, our observations are limited to 259.

Our dependent variable for this model is the two-year lag of revenue growth ($Growth_{(t-2)}$). In this case, we look to see if spending classified as general and administrative (G&A), sales and marketing (S&M), or research and development (R&D) positively impacts revenue growth 24 months later. For example, these could be 2017 expenses, but with the 24-month lag, we consider whether they impact 2019 revenue growth. Our mean revenue growth is 25.4%, but the standard deviation is very high at 19.47%, and we have a wide range between our minimum and maximum values.

G&A is the general and administrative expenses as a percentage of total revenue. In this case, our mean is 17.78% with a comparatively tighter standard deviation of 6.83% but a large range of minimum to maximum values.

S&M is the sales and marketing expenditures expressed as a percentage of total revenue. The mean is 37.3%, with a very large output range and a standard deviation of 20%. Of note is that the firm at the high end of the spectrum is spending 121% of its revenue on sales and marketing. Per earlier discussion in this study, the assumption is that this spending level is to maximize market share and perhaps capture first-mover advantages.

Finally, we observe research and development spending. This metric is the current year's actual research and development dollars spent as a percentage of total revenue. The mean value of 21.0% has a smaller variability and tighter range than the metrics other than G&A this analysis. A standard deviation of 10.8%, however, is still considered wide.

Before proceeding, we test for multicollinearity by looking at the correlation between variables and each variable's variance inflation factor (vif). Although well below the 0.7 threshold, we note the moderately high correlation between S&M (sales and marketing as a percentage of total revenue) and R&D (research and development as a

percentage of total revenue) at 0.4706, but do not consider this problematic. We do not find any concerns with our VIF on any of the variables.

To properly evaluate our model, we must consider whether a fixed or random effects model is most appropriate (Cameron & Trivedi, 2010). We run a panel regression for the model using fixed and random effects followed by a Hausman test to determine the most valid method. According to the results below in Table 4, we will use fixed effects after noting the chi^2 value is less than 0.1.

Table 4: Value Creation Hausman Test

	Coefficients			
	(b) fe	(B) re	(b-B) Difference	Sqrt(diag(V_b-V_B)) Std. err.
General & Administrative	0.6836	0.4084	0.2753	0.2049
Sales & Marketing	0.5582	0.2788	0.2794	0.1454
Research & Development	-0.1905	0.1992	-0.3896	0.2316

b = Consistent under H0 and Ha; obtained from xtreg.
B = Inconsistent under Ha, efficient under H0; obtained from xtreg.

Test of H0: Difference in coefficients not systematic

chi2(3) = (b-B)'[(V_b-V_B)^(-1)](b-B)
= 5.98
Prob > chi2 = 0.1125

The independent variables significantly impact revenue growth, with a two-year lag in Table 5 below. The LTM ('in-year') and Growth$_{(t-1)}$ lag results are in Appendix Table 1.

Table 5: Value Creation Model

Growth $_{(t-2)}$	**Coeff.**	**Std. Err.**	**P > T**
G&A	0.6283	0.2888	0.031
R&D	0.2525	0.1833	0.170
S&M	0.2525	0.1833	0.170
Year	Yes		
Model Statistics:			
R^2	0.03		
F (3,191)	23.06		
N	259		
VIF	1.21		

We conduct a panel regression to examine the relationship between the three independent variables and revenue growth with a two-year lag ($Growth_{(t-2)}$) for the 65 firms in our sample. The analysis included 259 observations. By implanting the two-year lag, we had to eliminate the first two years of the period (i.e., 2017 and 2018). The predictors explained only a very small portion of revenue growth 24 months in the future ($F(6,188) = 7.90$, $p < 0.0000$; $R^2 = 0.1136$). Only general and administrative spending as a percentage of revenue (G&A) is valid ($p < 0.031$). G&A positively relates to the $Growth_{(t-2)}$ and has a significant impact ($\beta = 0.628$). Neither Sales and Marketing (S&M) nor research and development spending (R&D) are valid.

Data for the other periods including the consideration of number of patents as an independent variable can be seen in Appendix Table 2.

Our model confirms the Penrose effect whereby managers must allow time for resources invested in sales and marketing or general and administrative activities to impact value creation. In our model, configuration, and deployment of these resources to impact revenue growth may take up to 24 months to generate the desired results. Possible reasons research and development and sales and marketing spending do not impact revenue growth may include the fact that it takes time both to develop new features and products and build brand equity. Spending on innovation in particular may begin in one year but take months or years to complete and launch.

Value Capture Model

As SaaS providers mature, managers are expected to shift resource orchestration strategies from one that maximizes revenue growth to one that pursues economies of scale

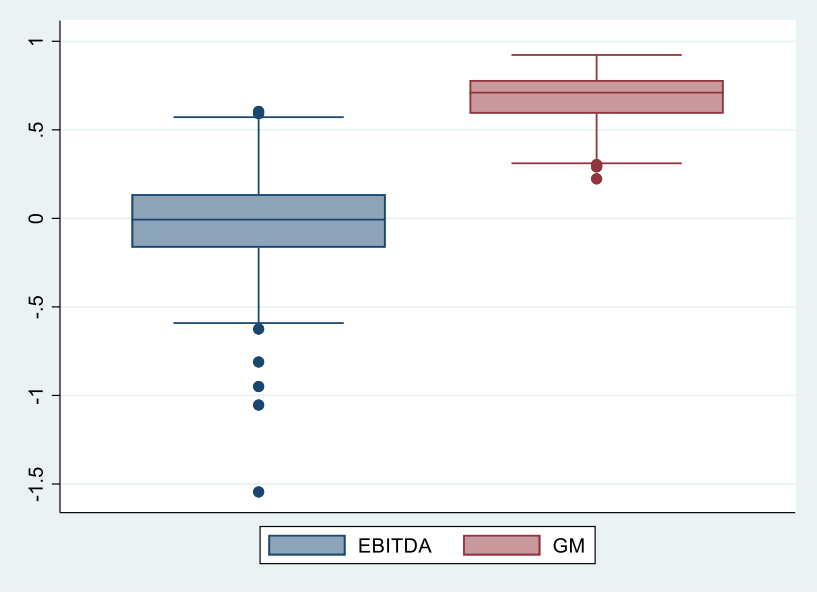
(Lycko et al., 2021; Piaskowska et al., 2021). Thus, we seek an appropriate value capture metric and the independent variables that would indicate resource orchestration strategies consistent with the pursuit of economies of scale.

Equation 2: Value Capture

$$\boldsymbol{EBITDA\ Margin_{i,t} = \beta_0 + \beta_1 Revenue\ Per\ Employee_{i,t} + \beta_2 Acquisitions_{i,t} + \beta_3 Foreign\ Sales_{i,t}}$$

For this model, we select EBITDA as a percentage of revenue (EBITDA_P) as our dependent variable. EBITDA is a firm's measure of earnings before interest depreciation, interest, tax, depreciation, and amortization. We rule out gross margin as a percentage of revenue (GM) since SaaS providers have very few direct costs. Thus, we observe very high and tightly clustered gross margin data. These data compare to EBITDAs that are right at breakeven but have a much wider range and could more significantly impact firm value.

Figure 4: Value Capture Box Plots



Digital venture literature also tells us that as growth slows and firms mature, resource orchestration strategies change to focus on maximizing value capture (Roche & Tandon, 2021). This increase in value capture is often driven by resource orchestration

strategies that maximize economies of scale (Lycko et al., 2021; Piaskowska et al., 2021). Increased productivity indicates that management may leverage and deploy resources to maximize value capture. Revenue per employee is one metric that may demonstrate increased productivity. This metric will be a lagging indicator, meaning that the output is the result of actions already taken by management, and therefore time lags are not required for this part of the analysis.

Digital venture literature also reveals that foreign sales can generate economies of scale (Stallkamp et al., 2022; Tippmann et al., 2022). A product must only be developed once, and successful customer acquisition strategies can be replicated and leveraged in new geographies. Managers' decisions to pursue these productivity improvements can be identified by observing how foreign sales as a percentage of total revenue increase over time. Foreign sales are also a lagging indicator; therefore, we do not consider time lags.

Finally, we note mergers and acquisitions are a source of potential value capture through the realization of synergies (Christensen et al., 2011; Hitt et al., 2009; Makri et al., 2010). Structuring strategies that include mergers and acquisitions require managers to identify, acquire, invest, and accumulate businesses that provide synergy opportunities and grow value capture. Analyzing a firm's pursuit of acquisitions may indicate management's decision to pursue economies of scale. Orchestrating assets and managing resources as required to realize synergies may take time, so we look at mergers and acquisitions as both a leading and a lagging indicator and review time lag models. The time-lag models did not generate valid results, as seen in Appendix Table 3.

Our descriptive statistics show a wide range of EBITDAs amongst the sample, with the mean being almost breakeven, albeit a negative number at -1.47%.

Revenue per employee (log) has a relatively tight range between 4.272 and 5.908, with a mean of 5.4 and a standard deviation of 0.214.

The annual mergers and acquisitions figure counts the number of acquisitions completed. The mean is just under one (1) acquisition per year, and the most acquisitive firm completes nine (9) acquisitions in a single year during the six years.

Foreign sales as a percentage of total revenue has a wide range of firms with no foreign sales to firms with as much as 85% of total revenue coming from foreign sales. The mean is 26.36%, with a standard deviation of 18.78%.

We do not suspect collinearity in our model, as indicated by our results shown in Table 3.

To properly evaluate our model, we must consider whether a fixed or random effects model is most appropriate. We run a panel regression for the model using fixed and random effects followed by a Hausman test to determine the most valid method. According to the results below in Table 6, we will use fixed effects after noting the chi^2 value is less than 0.1.

Table 6: Value Capture Hausman Test

	Coefficients			
	(b) fe	**(B) re**	**(b-B) Difference**	**Sqrt(diag(V_b-V_B)) Std. err.**
Revenue per Employee	0.5699	0.4779	0.0920	0.0413
Acquisitions	0.0109	0.0127	-0.0018	0.0007
Foreign Sales	0.0148	-0.0311	0.0459	0.1006

b = Consistent under H0 and Ha; obtained from xtreg.
B = Inconsistent under Ha, efficient under H0; obtained from xtreg.

Test of H0: Difference in coefficients not systematic

chi2(3) = (b-B)'[(V_b-V_B)^(-1)](b-B)
= 30.87
Prob > chi2 = 0.0000

A panel regression examines the relationship between the three independent variables and the EBITDA for the 65 firms in our sample. The analysis included 387 observations.

Table 8: Value Capture Model

EBITDA	Coeff.	Std. Err.	P > T
Revenue per EE	0.6371	0.0927	0.000
Acquisitions	0.0090	0.0055	0.101
Foreign Sales	0.0113	0.1487	0.939
Year	Yes		
Model Statistics:			
R^2	0.06		
F (8,314)	8.07		
N	387		
VIF	1.05		

The predictors explained a moderate proportion of the EBITDA ($F(8,314) = 8.07$, $p < 0.0000$; $R^2 = 0.0594$). Revenue per employee was valid ($p < 0.05$) and positively related to EBITDA, with a significant impact ($\beta = 0.6371$).

Neither foreign sales nor annual mergers and acquisitions were valid ($p > 0.05$).

Time lags were considered for mergers and acquisitions as well as foreign sales. The results were not valid ($p > 0.05$). Figures can be seen in Appendix Table 3.

Firm Value Model

Firm value is measured by the enterprise value to revenue multiple (EV : Revenue). We have considered the individual components of value creation and capture and their underlying predictors. For this portion of our study, we look at the independent variables that may indicate resources managers can orchestrate to generate firm value as their firm scales.

Equation 3: Firm Value

$$\boldsymbol{EV: Revenue_{i,t} = \beta_0 + \beta_1 Next\ year\ revenue\ growth_{i,t} + \beta_2 Rule\ of\ 4_{i,t} + \beta_3 Foreign\ sales_{i,t} + \beta_4 B2B_{i,t}}$$

Prior studies have found successful scaling involves a tradeoff between value creation and capture. The rule of 40 is a continuous variable that indicates how well managers navigate the tradeoff. We look to verify whether successful management of this tradeoff drives firm value.

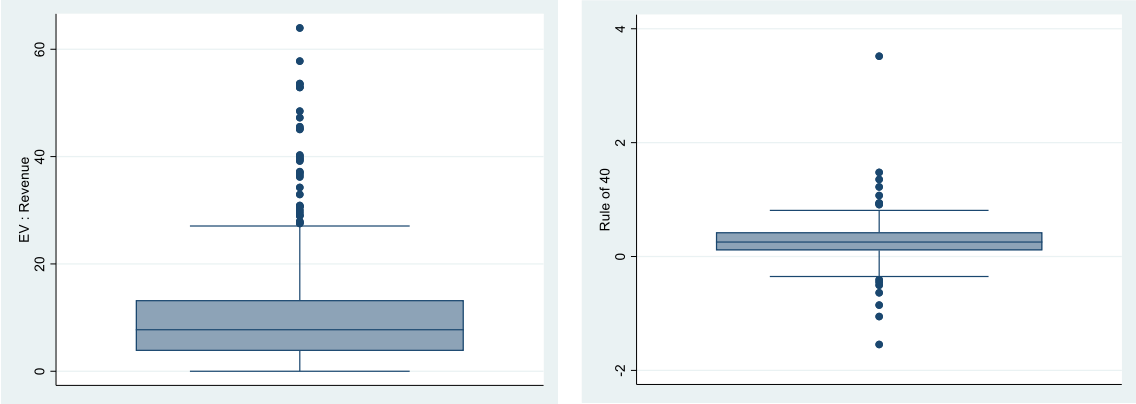
The tradeoff is typically only contemplated as revenue growth opportunities begin to fade. Various studies speak to growth as, in some cases, twice as important as profit for SaaS providers. We, therefore, need to consider revenue growth in our model. LTM (in-year or last twelve months) growth is contemplated within our rule of 40 calculation, so we look at $Growth_{(t-1)}$. While the market may not know exactly what a provider's $Growth_{(t-1)}$ growth rate will be, variables such as momentum, trends, and management forecasts are available, so we assume that investors have some indication of what forward growth may look like.

Proof of product acceptance in new geographic territories may give investors confidence that growth rates can be sustained or reinvigorated with international expansion. Therefore, we consider foreign sales a percentage of total revenue (Foreign Sales) in our model.

Finally, we introduce a dummy variable: B2B go-to-market strategy. Literature suggests a B2B approach is more efficient than B2C models since a single business may be easier to reach and provide more substantial revenue than a single consumer.

In looking for outliers, we note a wide range of enterprise value to revenue multiples. Still, nothing so extreme as considering an outlier, and all firm multiples are greater than zero. We observe Zoom 2020 results as an outlier when evaluating our independent variable 'rule of 40' and we will exclude this figure in our analyses.

Figure 5: Firm Value Box Plots



Our sample includes all 65 firms with 389 observations. Table 9 shows a wide range enterprise to revenue multiples with a mean value of 10.71, but a substantial variance is evidenced by a standard deviation approximately equal to the mean at 10.76.

The next twelve months' revenue growth ($Growth_{(t-1)}$) would be the actual revenue growth 12 months after the other variables. To avoid doubt, if we consider Enterprise value to revenue multiples (EV : Revenue) for the year 2017, our $Growth_{(t-1)}$ figure would be a provider's revenue growth from January 1, 2018, through January 31, 2018. That is, 2018 year-end revenue divided by 2017 year-end revenue minus one (1).

Firms that meet the rule of 40 would be represented with a result of 0.40 or 40.0%. The rule of 40 results also has a broad range with a mean of 26.44% and a standard deviation of 29.68%.

Foreign sales as a percentage of total revenue (Foreign Sales) has a wide range of results, with some SaaS providers having no foreign sales to others having as much as 85.3% of total revenue coming from foreign sales. The mean is 26.35%, with a standard deviation of 18.8%.

B2B is a dummy variable. A B2B score of one (1) indicates the firm is only focused on B2B sales versus a zero (0) which indicates the firm has both B2B and B2C sales.

We do not suspect collinearity in our model, as indicated by our results shown in Table 3.

Whereas with other models, we prefer fixed effects panel regression, in this case, we prefer a random effects model because of our categorical B2B variable. In a fixed effects model, the categorical variables are omitted due to collinearity (see Appendix Table 4).

A panel regression was conducted to examine the relationship of the five independent variables to the enterprise value to revenue multiple.

Table 8: Firm Value Model

EV : Revenue	**Coeff.**	**Std. Err.**	**P > T**
B2B	5.98	2.45	0.015
Foreign Sales	8.06	3.68	0.028
Growth $_{(t-1)}$	11.66	2.07	0.000
Rule of 40	6.99	1.82	0.000
Year	Yes		
Model Statistics:			
R^2	0.38		
Chi^2	183.03		
N	324		
VIF	1.05		

The predictors explained a significant proportion of the dependent variable (chi^2 = 183.03, $p < 0.0000$; $R^2 = 0.3804$). All factors are valid ($p < 0.05$). Each of these predictors was positively related to the enterprise value to revenue multiple. Revenue growth in the subsequent 12-month period ($Growth_{(t-1)}$) significantly impacts firm value ($\beta = 11.655$). The other factors of foreign sales, meeting the rule of 40 (R40_Act), and using a business-to-business (B2B) approach to market also have a positive and significant impact ($\beta = 8.055$, $\beta = 6.994$, and $\beta = 5.981$, respectively).

We conclude that growth in the subsequent or next 12-month period and generating revenue from international expansion are essential to firm valuation. Managers able to execute the tradeoff between value creation and value capture in a way that meets the rule of 40 will also significantly impact firm value. Deploying resources in B2B go-to-market approach is crucial to enterprise value and revenue multiples.

Summary

To assess which scaling strategies SaaS providers use to maximize firm value, we consider how firms orchestrate resources to improve enterprise value to revenue multiples. A combination of prior studies provides insight into which independent variables may impact firm value. Digital venture literature and SaaS studies cite an industry-specific metric called the rule of 40. The rule of 40 is a critical metric in assessing how well managers handle the tradeoff between a focus on value creation and value capture as firms grow and scale. Therefore, we conduct similar analyses to determine which factors positively impact value creation and capture.

We limit our sample to 65 publicly traded firms primarily relying on subscription-based SaaS products to generate revenue. Collecting publicly available data over the six years 2017 to 2022 allows us to rely on panel regressions as our analysis method. These analyses give insight into resource orchestration strategies SaaS provider managers employ to overcome significant, upfront, indirect expenses to pioneer, configure, and deploy products that are recovered over time via regular, small subscription payments.

Our analyses suggest that there may not be a standard mode of driving value creation. Still, careful structuring, bundling, leveraging, and deploying resources may impact results after a 24-month lag. Specifically, firms that invest the appropriate resources

in sales and marketing and general and administrative functions may see better revenue growth results.

As the literature suggests, we also find that value capture may be driven by mobilizing and deploying resources to focus on economies of scale, as evidenced by greater productivity. Finally, our findings suggest that orchestrating resources to focus on economies of scope, such as generating revenue in new geographies, delivering revenue growth in the subsequent year, and configuring a B2B sales model while coordinating resources to continuously meet the rule of 40, will significantly impact firm value.

Chapter 5: Discussion

In this chapter, we review our hypotheses and discuss the evidence that may reveal resource orchestration strategies the management team at a scaling SaaS firm can deploy to impact firm value positively. Our first analysis examines resource orchestration strategies that may positively impact revenue growth (value creation) and profit (value capture). We then consider whether these value creation and capture findings collectively, as expressed in the rule of 40, impact firm value.

We specifically look at variables that managers can control or influence and which may indicate specific resource orchestration strategies. For example, a manager cannot leverage or deploy assets and resources to change the age or scale of a firm, so we do not consider these variables. Managers can, however, decide whether to acquire and accumulate assets and resources via acquisitions. Pursuing economies of scope by configuring and deploying resources in such a way as to grow foreign sales also requires intentional resource orchestration.

We review digital venture, business scaling, and resource orchestration literature to choose appropriate variables. Prior work is limited, and some of it comes from practitioners. Studies on the rule of 40 exist. Two of these studies focus on the calculation and whether it predicts stock prices. Another deconstructs the rule of 40 into its two (2) factors and then creates a more elaborate five (5) factor model to determine which components influence firm value. These studies did not take scaling or resource orchestration into account. Other studies consider scaling and internationalization strategies but not the impact these have on firm value. Yet other studies consider company culture and organizational structures necessary for scaling digital ventures.

Our findings may offer unique tactics and strategies to orchestrate resources as managers scale a digital venture.

Hypotheses and Evidence

Value Creation

Our first analysis considers resource orchestration strategies managers may use to capture value.

Hypothesis 1a: Higher general and administrative spending will positively impact revenue growth among SaaS firms.

Managers at scaling SaaS providers with limited resources may have to choose between orchestrating resources to maximize either value creation or capture. Still, they may not have the ability to do both simultaneously. The prevailing sentiment within the literature is value creation will be rewarded due to first-mover advantages and rapid market share that generate annuities from accumulating subscription-paying customers. One question in some studies is whether growth can be inadvertently constrained by not investing in the appropriate organizational structure and back-office resources (e.g., customer support, human resources, legal, executives, information technology, etc.).

Structuring and acquiring new resources may require time for these resources to be deployed in a manner that creates value. We, therefore, consider revenue growth rates in the current year, $Growth_{(t-1)}$ and $Growth_{(t-2)}$. Indeed, our findings suggest that higher general and administrative spending may be required to support revenue growth, but these benefits may require 24 months before having a positive impact.

One possible explanation for this is the importance of customer retention for our SaaS providers. When revenue gains are offset by customer churn, value creation

momentum is difficult to generate and sustain. Functional groups such as customer support are directly associated with customer satisfaction and retention. Once a customer is acquired, the sales team passes responsibility for the customer to the customer support department. Customer support's role is to keep the acquired customers satisfied by answering questions and resolving customer issues with the product. Indirectly, human resources and finance functions may be significant for customer retention. Ongoing billing issues may be a source of customer dissatisfaction and, if frequent enough or combined with other issues, could cause a customer to churn. Similarly, value creation may be impacted if the human resources department is not identifying, hiring, training, and retaining personnel appropriate to the firm's purpose and vision.

Other possible explanations exist, but our findings suggest. Hypothesis 1a is supported when considering a two (2) year lag.

Hypothesis 1b: Sales and marketing spending will positively impact revenue growth among SaaS firms.

Sales and marketing expenses include anything typically associated with acquiring customers. These expenses may consist of all compensation for sales and marketing personnel and marketing and advertising campaigns, including trade shows, ads, displays, and other forms of brand or product promotion. It is reasonable to expect that sales and marketing spending will positively impact revenue growth; however, we also wish to consider first the relative weight of this impact and whether there is a timing aspect to mobilizing and deploying these resources for maximum impact.

However, our findings are that hypothesis 1b is not supported. There are many potential explanations, including that brand-building and sales cycles may require more

extensive time. Another, however, concerns the nature of SaaS providers' business model. The subscription nature of SaaS products means SaaS providers generate revenue through small, routine payments rather than all at once. As such, even successful, expensive advertising campaigns or headcount additions will take time to accumulate enough small subscription revenue to impact growth meaningfully.

Our data find Hypothesis 1b is not supported when considering a two (2) year lag.

Hypothesis 1c: Research and development spending will positively impact revenue growth among SaaS firms.

Innovation to create a continuous stream of new features and products is another potential source of revenue growth. Patents could indicate a firm's commitment to an innovation strategy. We found sources that report the number of patents filed and granted each year. However, we find no correlation between patents and revenue growth.

Next, we looked at research and development spending as an indicator of innovation. Research and development expenses include personnel, equipment, testing, or technology associated with pioneering, enriching, and stabilizing existing products or nurturing innovation in developing new products. We expect these new or improved features and products will contribute to revenue growth in successful businesses; however, this is inconsistent with the findings. Research and development spending, whether in the current year or considering $Growth_{(t-1)}$ and $Growth_{(t-2)}$, negatively contributes to revenue growth and value creation.

Our data do not allow us to draw definitive conclusions, but several logical explanations exist for this negative impact. As we mention, many of these scaling SaaS providers have few slack resources. More spending on research and development might

mean less spending on activities that drive value creation, such as sales, marketing, and general and administrative functions. Another potential explanation involves the same logic as described in Hypothesis 1b. Given the low-cost, subscription nature of SaaS product pricing, significant research and development expenses take even longer to accumulate a large customer base to generate revenue growth.

Further, it may take months or years to develop new features and products that can begin the slow accumulative process of meaningful revenue generation. A provider may release some of these products, especially if serving a stabilizing and enriching function, to customers at no additional cost. It is conceivable that some research and development expenses may not generate any revenue.

Hypothesis 1c is not supported, and research and development spending is negatively associated with revenue growth over any in-year, next twelve-month, and next 24-month months.

Value Capture

The second analysis considers how managers may orchestrate resources to drive value capture.

Hypothesis 2a: Revenue per employee will positively impact value capture among SaaS firms.

Digital venture literature describes a shift in resource orchestration required as revenue growth opportunities slow. Managers must successfully navigate a tradeoff from strategies focusing on value creation to those driving economies of scale to maximize value capture. Finding metrics indicative of economies of scale using our data sources is challenging. We can perform a calculation to determine how revenue per employee is

changing. Since we are looking at a time series, we can assume that a pattern of year-over-year improvements may indicate intentional efforts by management to re-orchestrate resources to do more with less to increase productivity.

Productivity may be driven by configuring and deploying resources by lowering costs while serving the same or a growing number of customers. Gains could also result from deploying resources to stabilize or enrich products, resulting in pricing gains without additional costs. In either case, the result is improved productivity, evidenced by higher revenue per employee.

Our model explains a moderate amount of the factors that drive value capture, with revenue per employee being the most critical factor.

Hypothesis 2a is positively supported.

Hypothesis 2b: Mergers and acquisitions will positively impact value capture among SaaS firms.

A scaling digital venture may acquire another business to access new technology, new capabilities, or new markets and customers. An acquisition strategy focusing on targets with some overlap or complementary capabilities has a better chance of improving value capture. Such a strategy may indicate slowing organic growth opportunities; thus, management seeks inorganic growth opportunities. In such cases, acquisitions can be sources of synergies that increase the combined value capture capabilities of the new combined entity.

Our model indicates that acquisitions are not a valid independent variable when considering value capture. We did consider that it may take time for a firm to realize

synergies from an acquisition and thus looked at a one-year and two-year time lag on the impact to value capture. The results were also not valid.

We find that hypothesis 2b is not supported.

Hypothesis 2c: Foreign sales will positively impact value capture among SaaS firms.

Economies of scope, that is, selling an existing product in a new geographic territory, may also indicate an intentional tradeoff to a more conscious value capture phase. Foreign sales may result from a provider's product simply being in demand in a new country or a management team looking for new potential sources of revenue growth.

Whatever the motivation, foreign sales may be sources of economies of scale for digital ventures. Since SaaS products are knowledge-intensive, they only need to be created once, unlike a manufactured product which must be made each time a new order is received. With products already configured, development costs are sunk. Similarly, successful deployment strategies in existing markets may be replicated and extendable into new markets, thus potentially saving time and money. Therefore, international expansion be able to leverage previous products and strategies efficiently.

Our model, however, does not find that foreign sales are a valid factor in driving value capture. Thus, hypothesis 2c is not supported.

Firm Value

The final analysis considers how managers may orchestrate resources to drive firm value.

Hypothesis 3a: Future revenue growth will positively impact firm value among SaaS firms.

Our analysis seems to indicate that growth over the $Growth_{(t-1)}$ period positively impacts enterprise value to revenue multiples. We check growth rates for the in the current year and $Growth_{(t-2)}$ periods and find neither valid relative to enterprise value to revenue multiples. This finding would support the concept that investors value the business on future prospects rather than past performance.

Hypothesis 3a is positively supported by our findings in the subsequent 12-month period.

Hypothesis 3b: Meeting the rule of 40 will positively impact firm value among SaaS firms.

The rule of 40 is the sum of a provider's in-year or last twelve-month revenue growth rate and profit margin. In our case, we use EBITDA as the metric for profit. The rule of 40 is a continuous metric demonstrating how well a manager handles resource orchestration changes that may be required as a firm moves from a high-value creation phase to a leveling out of growth that involves tradeoffs to emphasize value capture. This tradeoff can be a very challenging time for a provider.

Our model suggests that managing the rule of 40 is as important as future revenue growth rates.

Our findings positively support Hypothesis 3b.

Hypothesis 3c: Foreign sales will positively impact firm value among SaaS firms.

As mentioned in Hypothesis 2c, foreign sales were believed to be a potential source of economies of scope and support value capture. Opening new international territories may also create new growth opportunities for firms that can deploy existing products to a new set of customers.

Our model finds that foreign sales as a percentage of total revenue are the most meaningful opportunity a manager can pursue to impact firm value.

Hypothesis 3c is positively supported.

Hypothesis 3d: Firms that sell business-to-business rather than business-to-consumer will positively impact firm value among SaaS firms.

Business-to-business (B2B) sales models are thought to be more efficient than business-to-consumer (B2C) sales models. Businesses are easier to find and target with advertising and marketing campaigns and have more extensive purchasing power than consumers.

Our findings indicate that, indeed, firm value is positively impacted by a B2B sales model. Managers who bundle products and mobilize and deploy their teams in a way that focuses on B2B customers may positively impact enterprise value to revenue multiples. B2C sales models have a negative impact on firm value in our model.

Hypothesis 3d is positively supported.

Table 9: Summary of Findings

Hypothesis		**Result**
1a	Higher G&A spending will positively impact revenue growth	Supported
1b	Higher S&M spending will positively impact revenue growth	Not Supported
1c	Higher R&D spending will positively impact revenue growth	Not Supported
2a	Rev per EE will positively impact value capture	Supported
2b	Acquisitions will positively impact value capture	Not Supported
2c	Foreign Sales will positively impact value capture	Not Supported
3a	Growth $_{(t-1)}$ will positively impact firm value	Supported
3b	Meeting the rule of 40 will positively impact firm value	Supported
3c	Foreign sales will positively impact firm value	Supported
3d	Firms that sell B2B will positively impact firm value	Supported

Gaps and Limitations

SaaS providers are abundant in number and face unique challenges, given the nature of their business model. Most SaaS providers incur significant upfront costs to develop their products and hire teams to promote them and acquire customers. Revenue is generated through small, regular subscription payments. Often, these providers endure long periods of profit losses. With few slack resources, scaling can be a challenge, as evidenced by the fact that we find only 65 providers who generate most of their revenue from a subscription-based SaaS model. Providers in our sample must also be publicly traded on a US stock exchange since this requires financial data to be reported per GAAP and annual audits to be conducted by reputable third-party accounting firms.

While a sample of 65 firms is acceptable, one of our limitations is the number of firms. A larger sample would potentially increase the number of variables we can consider in our models and let us break the sample into smaller groups for deeper analysis. For example, more insightful analysis might be available if we could generate data by quartiles. For example, if we were to group four (4) sets of 16 firms according to their growth rate, we may find that the highest-growth quartile is pursuing unique strategies for value capture. Our sample size prevents us from further sub-dividing the firms and drawing reliable conclusions.

The fact we rely on publicly available also limits the depth of the conclusions we can draw. Understanding customer net retention rates, customer churn, customer acquisition costs, headcounts by department, and other more nuanced and specific data would allow for more robust modeling that may be highly useful for managers. Of course, selecting only publicly traded firms introduces the potential for survivor bias in our

findings. We must also acknowledge that while we believe that the data suggest the providers in our sample are still scaling, the publicly available data on these firms may not include variables from the moment of tradeoff or greatest peril in the firm's history and therefore does not allow us to provide managers with as much guidance as we hope.

Another limitation is that our analysis does not consider environmental factors that may affect any of our dependent variables. Understanding competition and relative munificence or dynamism of the market in which the provider participates may significantly impact our variables and not be representative of managers intentionally orchestrating resources. The COVID pandemic and shutdown occurred in the latter years of our sample. Again, it would be ideal, but our sample size prevents us from separating the data, comparing pre-COVID years to COVID years, and drawing reliable conclusions. Data subsets would be helpful to determine what changes in management resource orchestration strategies occurred and what impact these had.

Finally, we have limited our indirect variables to those we believe can be influenced, if not controlled, by intentional management strategies regarding orchestrating resources. Other variables, such as scale, age, etc., were considered and, in some cases, even seen to have an impact on the direct variable but were ultimately not included as these are beyond management's capabilities to influence per se.

Indeed, other limitations in the study exist, but we believe those enumerated above are the most significant.

Theoretical Contributions

This study adds to the body of knowledge in resource orchestration theory and scaling and digital venture literature. To our knowledge, no prior studies empirically

consider resource orchestration strategies managers can apply to a scaling digital venture, namely SaaS providers. We empirically show the level and degree to which these strategies of structuring, bundling, leveraging, configuring, and deploying resources can impact firm value.

Digital venture literature includes prior studies which consider the optimal methodology for calculating the rule of 40 and whether the rule of 40 is a predictor of stock returns (Hottenhuis, 2020; Lycko et al., 2021; Newton & Schlecht, 2016b; Roche & Tandon, 2021; Shaw, 2018). None of these studies look at the issue within the theoretical context of resource orchestration and empirically how these management decisions tie back to firm valuation. While not explicitly mentioning the rule of 40, some researchers discuss how profits affect firm growth (Coad, 2007; Delmar et al., 2013; Lycko et al., 2021). We leverage their findings and extend the rule of 40 discussions to consider how well managers change resource orchestration strategies to execute the tradeoff between value creation and value capture as a scaling SaaS provider matures and growth slows.

Contributions to the resource orchestration body of knowledge include the study's empirical nature and how managers' resource orchestration strategies affect firm value. The need for a tradeoff between value creation and value capture as scaling occurs is discussed in the literature (Amit & Han, 2017; Carnes et al., 2017; Hitt et al., 2011; Ireland et al., 2001; Sirmon et al., 2011; Wales et al., 2013). We empirically demonstrate the impact on firm value among scaling SaaS providers and which management choices may lead to the best chances of meeting the rule of 40. Our work is novel in considering the unique challenges that face SaaS providers. It is common practice for SaaS providers to bear long-term profit losses. Losses are generated by the costs to develop and launch products,

followed by costs to acquire and retain customers. These expenses are incurred in very early lifecycle stages and are recovered as the firm scales via the small, routine revenue collection practices.

Digital ventures are considered regularly in scaling literature. Sometimes, these works look specifically at SaaS providers (Lycko et al., 2021; Piaskowska et al., 2021). Other scaling studies have specifically focused on the importance of internationalization ((Stallkamp et al., 2022; Tippmann et al., 2022). This study is novel in its empirical view of firm value as SaaS providers scale and how specific decisions managers make, such as whether to internationalize, impact firm value.

Practical Implications

Our work offers more profound insight into the abundance and unique challenges that SaaS providers face. Some of the challenges we discuss are true of any software or knowledge-based product in general. Other challenges are similar to those faced by leasing companies. However, it is the unique combination that makes the SaaS challenges interesting. With an estimated 30,000 SaaS providers worldwide and a number of these generating less than $3 million in revenue and not profitable, the opportunity to guide these managers in structuring, bundling, leveraging, configuring, and deploying resources to drive firm value is appealing.

These findings are intended to offer potential strategies for managers of SaaS providers as they orchestrate resources during scaling. Given the often limited slack resources, maintaining firm value and investor trust during crucial tradeoff decisions may mean the difference between thriving and surviving. We specifically look at resource

orchestration strategies that may impact value creation and capture but offer the rule of 40 to continuously monitor how well managers navigate tradeoff decisions between the two.

Future Studies

Gaining access to data from a sample group of the non-publicly listed 15,000 SaaS providers may significantly enhance these findings. Simply increasing the sample size may give more power to the analyses herein and lead to better conclusions. As proposed in our limitation section, a larger sample size would also allow for subdividing the data.

Qualitative studies to review data unavailable in public filings would be fascinating. The impact of variables such as customer retention rates, headcount by department, and other pieces discussed in the limitation section would allow for a more nuanced understanding of some of the findings in our study.

Finally, qualitative interviews with management to understand environmental and cultural factors that may have influenced specific outcomes would also add to the usefulness of our work. Gaining a better understanding of a firm's market's relative munificence or dynamism will make for rich conclusions.

Conclusions

Our study seeks to provide empirical insight into scaling SaaS providers as to which resource orchestration strategies may impact firm value. The consensus is that scaling SaaS providers should orchestrate resources to maximize revenue growth while it is available. Certain benefits may be conferred upon market leaders and firms that capture first-mover advantages. Therefore, we look at the factors that may impact value creation and capture.

Our findings indicate that factors which impact value creation may be wide and varied. Our model only explains approximately 2.7% of the value creation results.

Evidence suggests that firms must invest in general and administrative as well as sales and marketing resources but may not see a positive impact on revenue growth of these investments for up to 24 months. We propose that underspending in these areas may constrain the ability to capture or support customers and highlight the importance of customer retention so that churn does not offset revenue growth. The lag factor may be driven by the fact that it requires time to build brand and product awareness but may also be because it takes a great deal of customer accumulation for low, routine subscription payments to amount to significant revenue growth. Whatever the reason, managers who emphasize resource deployment in sales and marketing may give themselves the best chance to impact future growth.

The concept of innovation is also considered in each of the models. Many prior studies discuss the importance of a steady stream of new products and features related to the future growth of scaling digital ventures. Our value creation model results suggest that overspending on research and development may have a negative impact on revenue growth. Possible explanations may include that money spent on research and development is money not spent on resources that will more immediately impact revenue growth, such as sales and marketing. New products and features may take time to develop, launch, and accumulate users, or they may provide incremental revenue compared to existing, higher revenue-generated products.

Findings include an analysis of factors that may explain 6.1% of value capture for SaaS providers. Our factors focus on resource orchestration strategies managers may employ to drive economies of scale or scope. Configuring and leveraging resources to drive greater productivity has the most significant impact on value capture. However, the main

objective of our work is to determine the factors that determine firm value as a business scales and must manage the tradeoff between value creation and capture.

To this end, we find a model whose factors explain almost 18% of the enterprise value to revenue multiples representing firm value. Managers who navigate the tradeoff between value creation and value capture in a way that meets the rule of 40, delivering future growth, a mix of foreign sales, and focusing on business-to-business revenue models will significantly impact firm value.

We believe these findings are not only novel but require managers to orchestrate resources in a way that delivers the firm valuation results. We hope these findings will be useful to managers as they sometimes face daunting decisions about deploying limited slack resources during a perilous period of scaling where missteps can mean firm failure.

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Appendix

Appendix Figure 1: List of Saas Provider Firms

1	2U	26	Nutanix	50	Altassian
2	8x8	27	Okta	51	Bandwidth
3	ACI Worldwide	28	Ooma	52	Ceridian
4	Adobe	29	Paycom	53	Cloudflare
5	Alarm.com	30	Paylocity	54	CrowdStrike
6	Alteryx	31	PROS	55	Datadog
7	AppFolio	32	Q2	56	DocuSign
8	Appian	33	Qualys	57	Domo
9	Blackbaud	34	RingCentral	58	Dropbox
10	BlackLine	35	Salesforce	59	Momentive
11	Box	36	ServiceNow	60	PagerDuty
12	Brightcove	37	SPS Commerce	61	Shopify
13	Care Cloud	38	SS&C Tech	62	Smartsheet
14	Coupa	39	Tabla Rasa HC	63	Zoom
15	Ebix	40	The Trade Desk	64	Zscaler
16	Everbridge	41	TrueCar	65	Zuora
17	Five9	42	Twilio		
18	Guidewire	43	Upland Software		
19	Healthstream	44	Varonis		
20	HubSpot	45	Veeva		
21	LivePerson	46	Workday		
22	Model N	47	Workiva		
23	Mongo DB	48	Yext		
24	MSCI	49	ZiffDavis		
25	New Relic				

Appendix Table 1: Value Creation with In-Year and 1-Year Lag Results

Growth $_{(t-2)}$	**Coeff.**	**Std. Err.**	**P > T**
G&A	-0.5149	0.4534	0.258
R&D	0.5060	0.5058	0.318
S&M	1.1889	0.2973	0.000
Year	Yes		
Model Statistics:			
R^2	0.02		
F (6,184)	5.03		
N	255		

Growth $_{(t-1)}$	**Coeff.**	**Std. Err.**	**P > T**
G&A	-0.2175	0.4534	0.258
R&D	0.5628	0.2974	0.000
S&M	0.5628	0.5058	0.318
Year	Yes		
Model Statistics:			
R^2	0.02		
F (6,184)	5.03		
N	255		

Appendix Table 2: Value Creation with Alternate Innovation Variables

Growth	**Coeff.**	**Std. Err.**	**P > T**
G&A	-0.4988	0.4514	0.271
R&D	0.4831	0.5037	0.339
S&M	-1.1495	0.2970	0.000
Patents	0.0013	0.0008	0.102
Year	Yes		
Model Statistics:			
R^2	0.02		
F (7,183)	4.74		
N	255		

Growth $_{(t-1)}$	**Coeff.**	**Std. Err.**	**P > T**
G&A	-0.2134	0.4992	0.258
R&D	0.0598	0.5012	0.000
S&M	0.5692	0.3175	0.318
PATENTS	0.0003	0.0009	0.775
Year	Yes		
Model Statistics:			
R^2	0.02		
F (6,184)	5.03		
N	255		

Growth$_{(t-2)}$	**Coeff.**	**Std. Err.**	**P > T**
G&A	0.6204	0.2889	0.033
R&D	0.1479	0.2900	0.611
S&M	0.2400	0.1838	0.193
Patents	-0.0004	0.0005	0.340
Year	Yes		
Model Statistics:			
R^2	0.09		
F (7,187)	6.90		
N	259		

Appendix Table 3: Value Capture with Time Lags

Growth $_{(t-2)}$	**Coeff.**	**Std. Err.**	**P > T**
Rev / EE	3.7924	0.0885	0.000
Acquisitions	0.0019	0.0051	0.718
Foreign Sales	-0.0189	-0.0189	0.900
Year	Yes		
Model Statistics:			
R^2	0.06		
F (7,250)	3.70		
N	322		

Growth $_{(t-2)}$	**Coeff.**	**Std. Err.**	**P > T**
Rev / EE	0.0284	0.0845	0.737
Acquisitions	-0.0003	0.0050	0.947
Foreign Sales	-0.0049	0.1482	0.974
Year	Yes		
Model Statistics:			
R^2	0.02		
F (6,186)	0.79		
N	257		

Appendix Table 4: Firm Value Fixed Effects Model

EV : Rev		**Coeff.**	**Std. Err.**	**P > T**
Growth$_{(t-1)}$	8.0339	2.4529	0.001	
Rule of 40	7.7460	2.2132	0.001	
Foreign Sales	-33.8714	12.0621	0.005	
B2B	omitted			
Year	Yes			
Model Statistics:				
R^2	0.06			
F (7,252)	22.99			
N	324			