UNIVERSITY OF GOTHENBURG
SCHOOL OF BUSINESS, ECONOMICS AND LAW

Financial Justifications for the Software-as-a-Service Business Model Trend

Based on Financial Differences between Companies in the Software-as-a-Service and Pharmaceutical Industry

Bachelor's thesis

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Johannes Lindvall
Daniel Olsson

Examinator: Marta Gonzalez-Aregall

Abstract

The Software-as-a-Service (SaaS) business model is a new type of business model that has gained great attention from both researchers and practitioners. The rapid growth has resulted in a more and more refined business model and is described as the future of software. Thus, it is not unexpected that the model is frequently used for many start-ups. The business model relies on the so-called SaaS pricing model, i.e. services that are often provided and developed continuously and paid recurrently. This is in contrast to the more traditional industries, such as the pharmaceutical (pharma), who are supplying pharmaceutical drugs used for medication, where many of the large multinational corporations originate from the 19th century. The pharma business model is characterized by its substantial initial project investments, long project and product life cycles with lump-sum payments.

The purpose of this report is to assess the justifications of the SaaS business model trend, by comparing the financial differences between the SaaS and pharma industries. The aim is to identify differences between capital structure, profitability, and cash flow to embrace an understanding of the financial implications of the business models. In order to ease financial decision-making regarding business models, in both academia as well as the business sector.

The methodology was based on a deductive research design, that was executed through an external and objective approach with emphasis on a quantitative collection and analysis of data. The collected data was based on a sample of 20 companies, with 10 in the SaaS industry and 10 in the pharma industry, for the time period 2015-2019. The analysis was conducted through unpaired t-test for the variables capital structure, free cash flow in relation to both revenue and operating, and profitability in the sense of return on assets and profit margin.

The findings indicate that there are weak justifications for the SaaS business model trend from a financial perspective, in terms of capital structure, cash flow and profitability. Thus, if these are of high importance other more traditional business models should be considered. On the other hand, there are other justifications for the SaaS business model trend, as the business model embraces scaling, low initial and marginal costs, recurrent payments, and continuous development during deployment.

Key words: Software-as-a-Service, Pharmaceutical, Financial differences

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1. Introduction

This chapter aims to describe the motives for the report by presenting a background to the topic followed by a problem description, the purpose, research questions, and limitations.

1.1 Background & Problem Description

In this section the background context and the problem description will be presented.

1.1.1 The Software-as-a-Service Business Model Trend

The Software-as-a-Service (SaaS) is a new type of business model that has gained great attention from both researchers and practitioners (Ma, 2007). This is showcased by an annual growth over 20% for the SaaS market, compared to a single-digit growth in the more traditional software market (Lacy, 2006). As a result, the business model is gradually becoming more and more refined, as it is of importance to reduce operation costs of services, whilst maintaining the service efficiency (Liao, et al., 2017). Bill Gates describes the emergence and rise of the SaaS business model as the "next sea-change" for computing (Niccolai, 2005). This indicates a growing trend for the SaaS business model and thus it is not unexpected that the model is frequently used for many start-ups[1].

1.1.2 Contradictions to the Pharmaceutical Business Model

In contradiction to the newly formed sector encircled around the SaaS business models there are far more established industries. One of those is the pharmaceutical (pharma) industry, which relies on discovery, development, production and marketing of pharmaceutical drugs used for medication, as many of the large multinational corporations within the industry have their roots in the 19th century. The pharmaceutical business model differs substantially from the SaaS business model, which relies on services that are often provided continuously and paid recurrently, the so-called Software as a Service pricing model (Hall, 2008). Whereas pharmaceutical business model is characterized by its substantial initial project investments, long project and product life cycles with lump-sum payments (Rehan et al., 2020). Due to the contrasting characteristics of SaaS and Pharma in terms of the nature of the incoming

[1] A company in the first stages of its operations, generally with high cost and limited revenues, focusing on expansion (Grant, 2020).

payments into the company, the cash flow may be considered as more stable and predictable for SaaS companies compared to pharma companies. However, long-term profitability is less certain to anticipate (Hall, 2008; Simanjuntak & Tjandrawinata, 2011).

1.1.3 The Main Objective of Companies

The main objective of a company is to create a maximum sustainable profit for its shareholder and to satisfy the needs of the company's various stakeholders (Fregert & Jonung, 2010). The challenge when striving to achieve this objective of profit-maximizing constitutes one of the essential problems of economics; to fulfill a man's endless needs and desires with limited available resources (Fregert & Jonung, 2010). According to Shil et al. (2019), one aspect of enabling this is to maintain a balanced and functional capital structure in the company, in order to fulfill the financial needs the company requires to successfully operate, compete and grow, whilst generating stakeholder value. However, different companies operating in different industries under different preconditions require a diverse way of financing the business, and thereby a diverse way of maintaining the capital structure.

1.1.4 The Importance of Capital Structure

Capital structure is a term that describes to what degree a firm finances its operations and growth with debt and equity, often depicted to the debt-to-equity (Tuovila, 2020). Depending on the preconditions of the company, e.g. business risk, credit rating, shareholders' confidence in the management, financial strength, and the need for operational investments, the optimal capital structure varies considerably depending on which industry the company operates in. Connected to how the capital structure ratio is determined, is the individual company's choices to finance its conduct of the business, which can be explained with the Pecking Order Hypothesis (POH). The POH describes the preferences of which managers of a company tend to finance available investment opportunities. If feasible, the primary choice according to the hypothesis is so-called internal financing. Using retained earnings, followed by debt issuance and equity financing as a last resort. The preferences are a consequence of minimizing the asymmetrical information dilemma that occurs between the owners and management (Myers, 1984; Myers & Majluf, 1984).

1.1.5 The Importance of Cash Flow

Another central metric in this paper is cash flow, which is the amount of cash in- and outflows generated and transferred through the company. Cash flow is usually divided into three sources; the cash flows from the companies' operations, its investments and its financial conduct, where the first is usually the main origin of inflows and the two latter the outflows. According to Dechow et al. (1998), cash flow is a measure of financial health, liquidity and stability, while indicating how well the cash generated from the company's operations can finance future investments and growth.

1.1.6 The Importance of Profitability

Furthermore, profitability is a central measure of to what degree a business or activity yields a profit relative to e.g. revenues or assets, i.e. to what extent a company performs in terms of using its resources efficiently to create profit (Shil et al., 2019). Shil et al. (2019) further explain that profitability has consequences for the capital structure decision, as it changes the preconditions of financing its operations, whether it will be internal, using retained earnings, or external, using debt or equity. Adequate profitability is a prerequisite for long-term sustainable business performance and ability to finance future endeavors.

1.2 Purpose

The purpose of this report is to shed a light on the financial differences between the companies in the trending SaaS industry compared to the more traditional pharmaceutical industry, to assess the justifications of the SaaS business model trend. Thus, the aim is to identify differences between capital structure, profitability, and cash flow for companies in these industries, to embrace an understanding of the financial implications of the business models. As a result, the findings aim to ease financial decision-making regarding business models, in both academia as well as the business sector.

1.3 Research Questions

In order to fulfill the purpose of the paper, the following questions will be addressed:

1. How is the SaaS business model trend justified compared to the more traditional pharmaceutical business model from a financial perspective?
    1.1. How does the capital structure differ between companies within the SaaS-industry and the pharmaceutical industry?
    1.2. How does the cash flow differ between these?
    1.3. How does the profitability differ between these?

1.4 Limitations

The scope of this report is limited to companies within the aforementioned industries. The scope is further limited to objectively focus on the companies in the two industries in terms of the financial metrics; capital structure, cash flow and profitability. The time frame is also delimited and thus the report is focusing on a sample in the selected industries. Due to this limited selection of companies, the analysis and findings of this report may not reflect the two industries in full. However, the study is not limited to a geographical area but rather to the sample of companies of the two industries mentioned, implying that the report in this regard takes a global perspective. Lastly, the chosen methodology limits the research to solely study the companies from an external and objective perspective, which implies that the identified capital structure, cash flow, and profitability cannot be derived from an internal perspective. This means that the understanding of the studied companies will be limited to some extent, as more subjective factors affecting the three areas will not be identified.

2. Literature review

The following chapter presents the literature review in which the analysis, discussion and conclusion of the thesis is based upon. The chapter is divided into the areas; capital structure, cash flow and profitability, which are described in general terms as well as in terms of the SaaS and pharma industry. The literature review is summarized in Table 1, where each manuscript is presented along with its focus, methodology, context and key contributing findings to this thesis. The purpose of Table 1 is to give the reader an overview of the literature review to enhance an understanding of the theoretical foundation.

Table 1, *Overview of the literature review*. Source: Own elaboration.

Manuscript	Focus	Methodology	Context	Findings
Myers (2001)	Capital Structure	Subject research	General	General about capital structure.
Khan and Ghayas (2020)	Capital Structure	Quantitive research study	General	The capital structure decision and significant factors.
Modigliani and Miller (1958)	Capital Structure	Subject research	General	The M&M Theorem.
Bierman (2003)	Capital Structure	Subject research	General	The capital structure's dependence on environmental settings and made assumptions.
Agarwal (2013)	Capital Structure	Subject research	General	The capital structure's relation to failure and success.
Yiadom et al. (2020)	Capital Structure	Quantitive research study	General	The capital structure has a negative correlation with organizational performance.
Shil et al. (2019)	Capital Structure	Quantitive research study	General	Absence of significant factors determining capital structure.
Hogan and Hutson (2005)	Capital Structure	Quantitive research study	Software Sector	Internal financing is consistent with the POH.
Gill et al. (2009)	Capital Structure	Quantitive research study	Service Industry	Significant factors determining the capital structure for service companies.
Nunes and Serrasqueiro (2007)	Capital Structure	Quantitive research study	Service Industry	The service industry does not use internal & external financing indifferently, supporting POH. Whereas the most profitable companies prefer self-financing.
DiMasi et al. (1991)	Capital Structure	Quantitive research study	Pharmaceutical	Showcases the R&D costs and fundings for NCEs.
Rehan et al. (2020)	Capital Structure	Quantitive research study	Pharmaceutical	The capital structure's relation to profitability.
Mohammadzadeh et al. (2013)	Capital Structure	Quantitive research study	Pharmaceutical	The capital structure's relation to profitability.
Dechow et al. (1998)	Cash Flow	Subject research	General	General about cash flow and its usage to predict future earnings.
Choudhary (2007)	Cash Flow	Subject research	SaaS	The characteristics for the SaaS model and its effects on the company's cash flow.
Hall (2008)	Cash Flow	Quantitive research study	SaaS	The characteristics for the SaaS model and its effects on the company's cash flow.
Simanjuntak & Tjandrawinata (2011)	Cash Flow	Quantitive research study	Pharmaceutical	Cash flow characteristics in pharma and key the importance of R&D investments.
Shil et al. (2019)	Profitability	Quantitive research study	General	Explaining general factors for profitability and its relation to the capital structure.
Hall (2008)	Profitability	Quantitive research study	SaaS	How SaaS creates competitive advantages and enables higher margins for profitability.
Choudhary (2007)	Profitability	Subject research	SaaS	How the characteristics for the SaaS model creates profitability due to operative advantages.
Ma (2007)	Profitability	Quantitive research study	SaaS	Advantages of the SaaS business model and relation to profitability.
Eng Lieh and Jarzabek (2016)	Profitability	Quantitive research study	Service Industry	The low value of tangible assets, implies higher ROA than more capital intensive sectors. The profibiliaty is based on how effectiness of development and service.
Simanjuntak & Tjandrawinata (2011)	Profitability	Quantitive research study	Pharmaceutical	New product development in relation to profitability.
Rehan et al. (2020)	Profitability	Quantitive research study	Pharmaceutical	The capital structure's relation to profitability.

2.1 Capital Structure

The capital structure is according to Myers (2001) defined as an explanation of the mix of securities and financing sources that a company uses to finance their real investments. Khan and Ghayas (2020) elaborate and state that the capital structure has to be decided, in order for a firm to determine if it should utilize its operations or additional funds to finance its new projects. Therefore, the formulation of capital structure is one of the most crucial decisions that the CFO or finance manager of a company must take, as these decisions underlies both the overall cost of capital and the market value of the firm (Khan & Ghayas, 2020).

Most of the literature showcases that the research about capital structure is focused on the debt-equity ratio in percentage, derived from in the right-hand side in the balance sheet (Myers, 2001). The general understanding of capital structure has changed over the years. Before 1958 the research indicated that there was an optimum capital structure. However, this changed when Modigliani and Miller (1958) stated that the firm's value is independent of the capital structure, deriving the well-known M&M theorem. On the other hand, their theorem only applies under perfect capital markets, where there is no corporate taxes, no transactions, nor agency costs, as well as a perfect disclosure of all the available information. Later modifications of the theorem, including corporate tax, suggests that a firm should have as close to 100% debt as possible. Based on this it was concluded that the optimal capital structure lies between 0 and 100% debt, supporting the initial research (Bierman, 2003).

There is however no universal optimal choice of the debt-equity ratio, as there are multiple conditions to take in consideration (Myers, 2001; Bierman, 2003). Agarwal (2013) states that the capital structure and its related decisions are central in a company as it can absorb failure and aid success for a company. Yiadom et al. (2020) exemplifies this in their research study for the Club 100 companies listed on the Ghana Stock Exchange over the period of 2007 to 2016. The authors conclude that the capital structure, in the sense of debt-equity ratio, has a negative correlation with the organizational performance, measured in terms of return of assets, indicating a negative effect of increasing debt (Yiadom et al., 2020). The capital can both fuel or hinder survival and growth. Thus, the capital structure decision is a central force that decides the orientation of decisions that will meet several conflicting goals and priority structures. The capital structure decision is, likewise other decisions, a process of estimating the goals and constraints, in order to evaluate the different alternatives (Agarwal, 2013).

Bierman (2003) further showcases that the capital structure decision is dependent on the environmental settings and made assumptions. Whereas the capital structure decision does differ in nature and is dependent on the tax, i.e. whether it is no taxes, corporate taxes or corporate and investor taxes, the cost of financial distress, and the relation between friendly and unfriendly debt. Where unfriendly debt is defined as debt that cannot or will not be purchased by stockholders, and friendly debt as the opposite (Bierman, 2003).

But there are also company specific factors affecting the capital structure decision. This is showcased in Khan and Ghayas (2020) quantitative research study, based on that data during the period of 2009 to 2018 for 191 Indian companies listed on the National Stock Exchange (NSE 500). The authors showcase that the profitability, size of the company, growth, tangibility, business risk, i.e. probability for financial distress, and liquidity, have a significant on the capital structure, in the sense of total debt (Khan & Ghayas, 2020). However, this is in contrast to the research study by Shil et al. (2019), where they conduct quantitative research for 27 companies across three industries out of 113 companies listed on the Dhaka Stock Exchange. The authors conclude that none of the elven factors; asset tangibility, profitability, growth opportunities, liquidity, firm size, product uniqueness, risk, non-debt tax shields, age of enterprise, dividends and agency cost, have a significant impact on the capital structure (Shil et al., 2019).

2.1.1 Capital Structure for SaaS Companies

Hogan and Hutson (2005) researched the capital structure of 117 Irish companies within the software sector, which the authors refer to as new technology-based firms (NTBFs). Their conclusion proposes that the internal financing of the studied companies is in consistency with the POH, as it dominated funding both in a start-up phase and on a continuing basis. On the other hand, regarding external financing, the study showcases contradictions to the POH, as the companies rather use equity than debt as the primal source of external financing. It is also shown that the average split between external and internal financing for the companies responds to a 50/50 relationship. But, the higher the age of the firm the more reliant on internal financing rather than external (Hogan & Hutson, 2005).

Gill et al. (2009) conducted a study researching the capital structure determinants based on 300 US companies in the service industry. Their study showcases the relationship between collateralized assets, i.e. fixed assets divided by total assets, and leverage, i.e. debt divided by

total assets, is negative. This is, according to the authors, contradictory to theoretical research. But the authors argue for this finding by relating to the fact that the service companies are signified by low levels of assets. Whereas current assets are easier to convert to liquidity than fixed assets. Therefore, the service industry values the current assets greater, in order to increase the liquidity capacity, which is essential to get loans from lending institutions. The study further shows that the profitability has a negative correlation with leverage, i.e. that a higher profitability implies a lower degree of debt. However, effective income tax rate, non-debt tax shield, firm size and growth opportunities yielded a significant impact on the leverage (Gill et al., 2009).

Maçãs Nunes and Serrasqueiro (2007) conducted research on the capital structure determinants. This time, based on the 500 biggest Portuguese companies in the service industry. Their analysis shows that the Portuguese service industry does not use internal, respectively, external financing indifferently, as the financial effect of the company itself, company size, asset structure and profitability are influencing the level of debt. This means that their findings do not conform to the M&M theory. However, the POH is supported, as the relation between profitability and level of debt is negative. Whereas the most profitable companies prefer self-financing. The earnings volatility and growth opportunities are concluded to not be determinants of the capital structure, as these factors show absence of statistical significance (Maçãs Nunes & Serrasqueiro, 2007).

2.1.2 Capital Structure for Pharma Companies

DiMasi et al. (1991) conducted research based on the drug development from a large data set of 12 US firms, during the period 1970-1982. The authors mean that the product innovation in R&D for the pharmaceutical industry is both risky and time demanding and responds to a large proportion of the revenue. For the sample the average development cost was 231 million USD. Whereas on average 114 million USD was financed internally (DiMasi et al., 1991).

Rehan et al. (2020) researched how the capital structure impacts on different profitability metrics in the pharmaceutical industry, based on the Pakistan Equity Market, between 2007-2018 and 84 observations. Their findings showcase that the capital structure does not significantly affect the net profit margin, earnings per share nor return on capital employed.

Whereas these three profitability metrics have a negative relationship with the debt-equity ratio, meaning that these decrease when the percentage debt increases. However, the authors showcase that the debt-equity ratio has a significant effect on the return on equity (ROE), where the relationship again is negative. However, at 5% ROE, the relationship is insignificant and at 10% ROE the negative relationship is described as substantial (Rehan et al., 2020).

Mohammadzadeh et al. (2013) further researched the effect of the capital structure on profitability, for the top 30 Iranian pharmaceutical companies during the period 2001-2010. Their findings showcase that profitability, in the sense of the net margin profit, has a significant negative relationship to the capital structure, defined as the debts to asset ratio. This derived the conclusion that the studied pharmaceutical companies are using the POH, whereas internal financing results in higher profitability (Mohammadzadeh et al., 2013).

2.2 Cash Flow

The cash flow statement is, along with the balance sheet and income statement, one of the three most important sources of information provided by the company to stakeholders. The statement presents all the incoming and outgoing cash flows on a consolidated level and portraits the transactions through the company (Dechow et al., 1998). The cash flows are divided into three main flows; the cash transferred by its operations, its investments and the financing of the company. The result of these constitutes the so-called net cash flow, which implicates how the company's cash level has changed throughout a given period. Thus, the cash flow statement is a measure of the financial health, and how well the cash generated from the company's operations can finance future investments and furthermore defray debt and dividends.

In the literature study there has concluded that there are two ways of determining the performance of the business conduct and how to evaluate future growth potential in the income streams and profits. In addition to eventual financial risks that may affect the company. As explained by Dechow et al. (1998), these two predictive variables are the free cash flow and earnings, of which the first has traditionally been described as being a predictor of the future investing perspective relative to the second, mainly to the reason of accounting being a process looking backward. According to Dechow et al. (1998), accounting measures

the company's performance, through earnings, and is widely used as a key performance indicator for the valuation of investment opportunities. In their research paper, Dechow et al. (1998) compares the predictive nature of earnings and cash flow analysis of the implications and predictions of a sample of 1337 firms over a period over 29 years. They conclude that earnings in fact predict future cash flows better and more accurately than current operating cash flow, meaning that using periodization is a beneficial tool for estimating future profits. The reason behind this can be connected to the equalising effects of the periodization. As the authors explained it, the relation between sales and cash flow is not one-to-one as sales are sometimes made on credit, meaning that they become receivables on the balance sheet instead of incoming payments, implying a discrepancy of what is displayed in the cash flow statement relative to the income statement. For instance, a sale in the on the cash flow statement will typically at first be generating a cash outflow and then a cash inflow, compared to an accounted revenue (Dechow et al., 1998).

2.2.1 Cash flow for SaaS Companies

The SaaS pricing model is based on a subscription payment model which is characterized by the recurring incremental payments with a certain frequency, typically per use or over a time period, e.g. monthly och quarterly (Choudhary, 2007). The author continues to clarify examples of this software licencing model for companies, such as Microsoft, SAP and Adobe. In these cases, customers are paying cumulatively over a period or to the extent of use, rather than purchasing the usage rights in a one-time event. This stands in contrast to the traditional payment method based with a perpetual payment model, meaning that the goods, or in this case software licences are only paid once. This means that the software publisher receives a significant cash inflow early on and the customer, or user, undergoes a single significant cash outflow initially. A clear illustration of this is the early Microsoft Windows operating systems, which in an almost monopolistic way were offered to the market. As a result, this perpetual investment in corporate digital infrastructure meant a sunk cost for the customers when the purchase was completed (Hall, 2008; Choudhary, 2007)

When considering the economical effects on the cash flow as a result of the SaaS pricing model, one must consider comparing it to equivalent firms in the same business sector , in this case the software services industry. Based on his research, Hall (2008) concluded that the SaaS model has a significant effect on the company's financial performance. This includes

cash flow, as well as maintaining a competitive advantage towards its peers in the market using a perpetual cash flow model. Furthermore the SaaS companies tend to have a lower cost of goods sold (COGS) leading to a better operational cash flow. Moreover, the SaaS companies tend to be younger with lower leverage overall, and due to that its repetitive cash flow is less dependent on taking debt as a consequence of the better operational margins on both cash flow and turnover and less expenses and outflows towards interest and mortgages. Hall (2008) however points out that SaaS companies have higher overhead costs in terms of sales, administration and general (SG&A) but on the other hand have better outlooks for a scalable business model. Due to having software as a product, the marginal cost for goods sold are almost negligible, meaning that these SG&A costs per product sold decreases heavily with a growing customer base, which usually is the case in the early phases of the SaaS companies (Hall, 2008). Hence, a better cash flow when the business has grown to a certain size and since the goods/services are consumed concurrently, the cash inflows are more stable compared to when sold once in a perpetual software licence model (Hall, 2008). Interestingly, SaaS does make a footprint according to Hall (2008) in terms of low COGS and equivalent R&D expenses relative to other business sectors.

According to Choudhary (2007), R&D investments are relatively large in SaaS compared to its perpetual peers, leading to better product/software equilibrium quality compared to perpetual licensing because of the more even cash flow which can be developed and released incrementally. The burden of maintaining hardware shifts to the customer from publisher, meaning everything is handled remotely through the internet without the need for the publisher to allocate assets in hardware and thereby enabling increased return on assets. The author continues by stating that the SaaS model creates incentives to make the most current features available in their software solutions, along with more customized solutions such as: product differentiation, modularity and add-ins but maybe most importantly, not holding back new features as in the perpetual model. As a consequence, the better the customer experience may lead to higher willingness to pay (WTP), higher quality due to incremental development as well as fast time-to-market. This creates a competitive advantage as well as a more stable and cumulatively higher cash flow due recurring payments and WTP. (Choudhary, 2007)

2.2.2 Cash flow for Pharma Companies

According to Simanjuntak and Tjandrawinata (2011), the cost of developing a new pharmaceutical product is usually massive and time-consuming before it is ready to be launched to market fully safety tested. The cost of developing a single specific drug may vary widely, but the authors mention an interval up approximately one billion dollar, which certainly augments the importance of keeping the finances under control (Simanjuntak & Tjandrawinata, 2011). In their study, they conclude that research and development (R&D) expenditure has an important role when exploring the prospect of investing in existing or new products. Moreover, investing in R&D is crucial for maintaining market share, keeping entry barriers and competitiveness relative to its peers. As a consequence, the overall investments into R&D have grown significantly in the recent years within the pharma industry (Simanjuntak & Tjandrawinata, 2011).

According to Simanjuntak and Tjandrawinata (2011) the amount invested depends on the financial stability of the company, R&D efforts and innovation activities, that enables opportunities of making a more stable and yielding cash flow, as well as higher profits. If able to perform this, the excessive monetary resources can be reinvested and hence the positive spiral continues. The authors continue to present a study where it is statistically concluded that larger pharmaceutical firms must reach a certain profitability in order to create a sustainable investment strategy in R&D, leading to better firm financial performance, including cash flow, and market competitiveness. Thereby, the authors imply that the cash flow has a significant impact on the level of R&D expenditures made in a company, and thereby also the profitability. There is initially a huge outflow during time of development, and the funding is preferably used with internal resources, such as retained earnings by managers (Simanjuntak & Tjandrawinata, 2011). According to the authors, the consistency of R&D spendings in the pharmaceutical industry is a well known phenomenon and that both domestic and multinational companies' R&D expenditure are significantly positively related to better cash flow performance.

2.3 Profitability

In financial literature, profitability is a variable of determining to what extent a company performs in terms of using its available resources efficiently to create profits for its stakeholders (Shil et al., 2019). Profitability is often measured in regards to how well the company uses its assets to create profits, the so called return on assets (ROA) but could also be measured in relation to what degree the total turnover becomes profit, the so called profit margin (Shil et al., 2019). This chapter focuses mainly on ROA and profit-margin as metrics of analysis.

According to Shil et al. (2019), the profitability has consequences for the capital structure. For instance, a company with higher profitability might have another structure than a low margin business. This, as its operation to a higher degree could be internally financed with retained earnings in contrast to company's reliance on external finance such as debt or equity, given that the cash flow is similar in alignment to the pecking order hypothesis (Shil et al., 2019). Furthermore, the authors explain that there is a positive correlation between profitability and debt which could be derived from the tax shield effects that might affect, in addition to lowered agency costs with free cash flow.

2.3.1 Profitability for SaaS Companies

Previously in chapter 2.2.1, the characteristics of the cash flow for SaaS companies were presented based on the findings of Hall (2008) and Choudhary (2007). Since the aspects of cash flow and profitability are strongly connected in terms of the preconditions, this chapter will revisit these findings in the scope of profitability.

According to Hall (2008), the SaaS model differentiates itself from the traditional software business model since it is characterized by a recurring and subscription contract rather than the perpetual licence. As mentioned, SaaS benefits from a significantly lower COGS than the traditional model, meaning that the gross margin and marginal revenue per product sold are higher in SaaS. However, SaaS has higher costs in terms of the overhead SG&A which burdens the operational margin. SaaS has an advantage in the sense that the marginal cost of distributing is negligible, meaning that scalability is beneficial and is essential for conducting a profitable business and to streamline the profit margins (Hall 2008). According to Choudhary (2007), SaaS has an increased WTP for customers compared to its peers due to a

higher quality equilibrium, creating a competitive advantage that improves profitability. Furthermore, in the SaaS model, the burden of maintaining hardware shifts to the customer meaning that the service is delivered remotely (Choudhary 2007). Ma (2007) implies that the vendor-lock-in power increases in the SaaS model, as it enables the software publisher to extract a greater surplus from existing users compared to the traditional perpetual license. This is due to switching barriers which could entail higher profitability. Due to relatively low book value of tangible assets, the ROA is often high relative to more capital intensive sectors (Eng Lieh & Jarzabek, 2016). Moreover, it is important to point out that SaaS is not applicable for all businesses, neither for all software applications, implying that the advantages are hard to replicate in another context (Eng Lieh & Jarzabek, 2016). Lastly, in line with Choudhary (2007), Eng Lieh and Jarzabek (2016) explains that SaaS profitability is significantly related to the cost of R&D as well as how effectively a software publisher manages to provide adaptability in terms of development, service and time.

2.3.2 Profitability for Pharma Companies

This chapter will revisit the findings of Simanjuntak and Tjandrawinata (2011), but in the scope of profitability rather than cash flow, which were approached in chapter 2.2.2. Since the characteristics of cash flow and profitability are connected and explicitly treated, the content in this chapter will be more to the point.

As explained by Simanjuntak and Tjandrawinata (2011), the development of a new product is usually connected to huge cost and time consumption before it can be launched to market. In their research, the authors further point out that the R&D expenditures are strongly positively linked to profitability, which in the pharmaceutical industry context could mean the creation of new revenue streams in which the cash flow can finance new projects. The funding of projects in pharma is preferably used with internal finances such as retained earnings, in alignment with the POH (Simanjuntak & Tjandrawinata, 2011). The amount invested into new revenue streams depends on the financial stability of the company. Whereas the R&D efforts and innovation activities enable opportunities of creating larger profits, hence increasing profitability. If successfully reinvesting the business surplus, more streams can be created and a spiral of increasing profits may occur (Simanjuntak & Tjandrawinata, 2011). Simanjuntak and Tjandrawinata (2011) explain that larger pharmaceutical companies in order to achieve sustainable profitability must reach a critical profitability to gain the internal fund

necessary to finance the projects that could enable better performance in market competitiveness and profits. Lastly, Rehan et al. (2020) describe that higher leverage in pharmaceutical companies is correlated to profitability in terms of higher profit margins. Furthermore, the authors imply that the pharma companies in their study, have established a POH, meaning that sufficient profitability has led to internal financing which has led to a better profitability.

3. Methodology

This chapter presents the methodology, research strategy, methods for collection and analysis of data, and other courses of action conducted in this research. The decisions taken are presented with support from complementary theory.

3.1. Methodology and Research Strategy

The methodology of a research project can be considered as the base that both strategies and methods are legitimized upon and further be broken down into ontology and epistemology, which are philosophical assumptions that describe how theory and existence are interpreted. This means that the choice of action and results of research is dependent on the authors' different opinions and interpretations, which derive different outcomes of the research (Bryman & Bell, 2011). From an ontological perspective, the perspective of objectivism was taken, which means that the existence of social phenomena is independent of actors (Bryman & Bell, 2011). This perspective was appealing to take in this specific research, as the companies were objectively analyzed as a whole, without taking consideration of the social setting and influence. From an epistemological perspective, positivism was chosen, which means that reality exists objectively and externally, where the appropriate way to gather data is by directly observing or measuring the phenomena (Bryman & Bell, 2011). According to Bryman and Bell (2011), this further means that theory is considered as reliable, as it for instance is derived from obtained data and inductive analyses. This was appropriate to use in this research, as it encircled financial data, strictly controlled by law, indicating an objective and external existence.

The philosophical assumptions were compiled to form the methodology, in this case, to conduct a deductive research strategy. This means that research is developed by using existing theory, in order to develop hypotheses, which confirmations or rejections can be used to revise the theory (Bryman & Bell, 2011). This was in line with the purpose of the paper, as the purpose favored using hypotheses, as confirmations or rejections of the hypotheses can enhance understanding and guide financial decision-making. Whereas the hypothesis could be developed based on existing theories about capital structure, cash flows, and profitability for companies in the SaaS and pharma industries as well as in general terms. In order to confirm or reject the hypothesis, it is according to Bryman and Bell (2011)

favorable to use a research strategy that emphasizes a quantitative collection and analysis of data, which was used in the study. Therefore, the goal was to collect quantitative data, in this case, numeric financial data, e.g. income statements and balance sheets for the global companies in the SaaS and pharma industries. Further, was the research strategy based on statistical analysis, which put emphasis on comparing the companies in the SaaS industry with companies in the pharma industry. Because the research questions of the paper are dependent on addressing financial differences between companies in the two industries, rather between companies within the same industry.

3.1.1 Ethical Aspects of Research

Bryman and Bell (2011) mention four ethical principles to consider when conducting research. Firstly, is whether there is any harm to the participants. In this case, there were no human interactions, which removed the risk of harming individuals. The objective approach in collection and analysis of data further removes the risk of harming the studied companies, e.g. damaging their reputation. Secondly, is whether there is a lack of informed consent. In this case, there is no informed consent, since the studied companies are not aware of their participation in this research. This can be problematic but was mitigated by the objective approach and usage of officially published data. Thirdly, is whatever there is an invasion of privacy. In this research only officially published data was collected, which eliminated possibilities for an invasion of privacy. Lastly, is whether there is deception. The analysis was based on a validated statistical analysis method, which ensures that the data was handled and presented in a fair manner, hence avoiding the deception of data.

3.2 Methods for Collection of Data

The study is limited to a sample of ten publicly listed companies in respective industries. The reason ten companies were chosen was to achieve a sufficient number of data points to calculate the test statistic, as according to Mueller (2020) the behavior of the t-test will be poor if there not is a vast number of observations. The data is based on annual reports within the last five years, due to that many companies, especially in SaaS, are relatively new, but also for using data as relevant and up-to-date. This limitation is thus based on the availability of credible data, in regard to pure SaaS companies. Due to this limited selection of companies, the analysis and findings of this report may not reflect the two industries in full.

Based on the determined methodology and research strategy, a literature review and database extraction were chosen for data collection. The reason a literature review was chosen was due to the sufficiency initial need for information to ensure alignment with the methodology and research strategy, as it was fundamental to create hypotheses, based on the existing theory, in order to respond to the research questions. Furthermore, was a database extraction chosen, where the financial data was extracted from the Yahoo Finance database. This was favorable as this data is published in accordance with laws and further audited by accounting firms, whom of which further ensured credibility. This also ensured applicability and replication in this research, as the Yahoo Finance database provided external and objective data, available to the public.

The sample was based on 20 companies. Whereas ten companies are operating in the SaaS industry and the remaining ten companies are operating in the pharmaceutical industry. To be regarded as a SaaS company in this study, at least 75% of the total turnover must originate from a SaaS revenue stream, as proposed by Hall (2008). To be regarded as a pharma company, a majority of the revenue must come from pharmaceuticals. All companies are publicly listed, due to ensure data availability and transparency. The sample also solely contained multinational corporations with revenues over 1,5 billion USD. Further, the companies are mature as they have been active for more than 10 years, implying a more predictable and stable cash flows and profitability. This limitation in collection of data, was used to avoid discrepancies in e.g. the start-up and growing phases. Data were collected for the period, based on the fiscal years 2015-2019, to mitigate noise factors and fluctuations within the data set. This limitation is therefore based on the availability of credible data. The companies within the sample are presented in Table 2.

Table 2. *The companies within the sample.*

Source: own elaboration based on Yahoo Finance (2020) Database.

Company	Industry	Revenue LCY (2019)	Founded	Employees (Year)
Johnson & Johnson	Pharma	82,059,000,000 USD	1886	132,000 (2019)
Pfizer Inc.	Pharma	51,750,000,000 USD	1849	88,300 (2019)
AstraZeneca plc	Pharma	24,384,000,000 USD	1913*	70,600 (2020)
Novartis International AG	Pharma	48,677,000,000 USD	1996	103,914 (2019)
Roche Holding AG	Pharma	61,466,000,000 CHF	1896	97,735 (2019)
Merck & Co., Inc.	Pharma	46,840,000,000 USD	1891	~71,000 (2020)
Sanofi S.A.	Pharma	37,631,000,000 USD	1973**	100,409 (2019)
AbbVie Inc.	Pharma	33,266,000,000 USD	1888***	~47,000 (2020)
GlaxoSmithKline plc	Pharma	33,754,000,000 USD	2000	99,437 (2019)
Takeda Pharmaceutical Company Limited	Pharma	3,291,188,000,000 JPY	1781	49,578 (2019)
Adobe Inc.	SaaS	11,171,297,000 USD	1982	22,635 (2020)
SAP SE	SaaS	27,553,000,000 EUR	1972	100,330 (2019)
ServiceNow, Inc.	SaaS	3,460,437,000 USD	2003	12,500+ (2020)
Shopify Inc.	SaaS	1,578,173,000 USD	2006	5,000+ (2020)
Dropbox, Inc.	SaaS	1,661,300,000 USD	2007	2,323 (2019)
Cisco Systems, Inc.	SaaS	49,301,000,000 USD	1984	75,900 (2019)
salesforce.com, Inc.	SaaS	17,098,000,000 USD	1999	49,000 (2020)
Workday, Inc.	SaaS	3,627,206,000 USD	2005	12,500 (2020)
Atlassian Corporation Plc	SaaS	1,614,173,000 USD	2002	4,907 (July 2020)
Citrix Systems, Inc.	SaaS	3,010,564,000 USD	1989	8,200 (2018)

* Astra AB was founded in 1913, however AstraZeneca was merged and founded 1999

** Sanofi S.A. was founded in 2004, however Sanofi-Aventis was founded 1973

*** AbbVie Inc. was founded in 2013, but it is a spin-off of Abbott Laboratories founded in 1888

From the Yahoo Finance database, the following data was extracted for every company within the sample for the given period; Total Liabilities, Total Equity, Total Revenue, Net Income, Total Assets, Operating Cash Flow and Free Cash Flow.

3.3 Methods for Analysis of Data

For analysis of data a comparative design was applied, where specified factors, i.e. capital structure, cash flow, and profitability, from each of the studied companies, are imported and further clustered into two groups, based on the SaaS and Pharma industries. Then these groups will be analyzed in a logical comparison between each other, by applying statistical analysis, to evaluate the statistical significance, in order to confirm or reject the hypotheses (Bryaman & Bell, 2011).

More precisely, for the analysis of data econometrics was applied, as an unpaired t-test was used as an analysis strategy. The t-test according to Amemiya (1985) is ideal within econometrics when there is a single constraint, which was the prerequisite for the conducted analysis. The purpose of the unpaired t-test is to analyze differences in means between two independent groups that are assumed to be normally distributed (Cortinhas & Black, 2012). This was aligned with the purpose of this research as the aim is to analyze the differences in mean between the two independent groups of companies within the SaaS industry and companies within the pharmaceutical industry. Thus, this analysis strategy was considered suitable.

Based on the purpose of this research, the collected data was expanded by calculating five additional variables. These variables are presented and defined in Table 3. It is of importance to have relative definitions, in order to conduct the logical comparison and analysis, as the unpaired t-test is conducted based on relative metrics for the two samples. Thus, first of all, the capital structure, which was defined as the proportion of booked debt relative debt plus booked equity. This definition is the most recurrent for defining capital structure in the literature. Secondly, two variables regarding the cash flow were calculated. One variable dividing the free cash flow with the revenue and another variable dividing the free cash flow with operating cash flow, i.e., the amount of cash generated from the normal business operations. The reason two variables were used for the cash flow was to create nuances in the analysis. Lastly, regarding profitability, which is a relative metric, two variables were calculated. The return on assets is the most common in previous literature. This was complemented by calculating the profit margin, yet again to create nuances in the analysis.

Table 3, *underlying variables for analysis.* Source: own elaboration.

Variable	Definition
Capital Structure (CS)	Debt / (Debt + Equity)
Free Cash Flow 1 (FCF1)	Free Cash Flow / Revenue
Free Cash Flow 2 (FCF1)	Free Cash Flow / Operating Cash Flow
Return on Assets (ROA)	Net Income / Total Assets
Profit Margin (PM)	Net Income / Total Revenue

The data was structured in Excel resulting in 1500 data points as a basis for the analysis. The data was then clustered into columns, for both SaaS and Pharma and for each of the five variables. The data was then extracted into JMP Pro 15, where the unpaired t-test was conducted. This meant that five t-tests were conducted independently, based on the five proposed hypotheses, which were the following:

H1: The difference in CS between SaaS and Pharma is 0.

H2: The difference in FCF1 between SaaS and Pharma is 0.

H3: The difference in FCF2 between SaaS and Pharma is 0.

H4: The difference in ROA between SaaS and Pharma is 0.

H5: The difference in PM between SaaS and Pharma is 0.

The determined significance level was set at 0,05, as this is according to Cortinhas and Black (2012) commonly used in research as a reference level to determine statistical significance. This means that if the calculated t-value is outside than the critical t-interval for alpha equals 0,05, the null hypothesis will be rejected and thus the findings will have a 95% confidence level that there is a statistical significance difference between the two industries. If the t-value lays within the t-interval, then the results are inconclusive (Cortinhas & Black, 2012).

3.4 Method Execution

Based on the choices presented in the two the previous paragraphs the collection and analysis of data were executed in the following steps, see figure 1:

1. *Formulated research questions and made limitations for the research.*
   The presented research questions in chapter 1.2, was derived from the introduction, background, and problem discussion as well as the purpose of the report. Further, did the limitations specify the scope of this paper and is presented in chapter 1.3

2. *Collected data from databases and online libraries for the literature review.*
   The data was collected using the databases EBSCO, Google Scholar, Jstor and Scopus, by using combinations of the keywords "Capital Structure", "Cash Flow", "Profitability", "Software as a Service", "SaaS", "Software-as-a-Service", "Pharmaceutical" and "Pharma". But also through internet sources, e.g. Investopedia.

3. *Structured the collected data and developed hypotheses.*
   The data was then structured into three areas; capital structure, cash flow, and profitability. The areas were merged to form the finalized literature review, where hypotheses were developed based on the existing theories about generalized theories, SaaS theories, and Pharma theories, about each of the three areas.

4. *Collected financial data based on database extraction.*
   The financial data for every company within the sample were collected from the Yahoo Finance database.

5. *Structured the collected financial data to create prerequisites for analysis.*
   The financial data for all studied companies was then structured in Excel, to create an overview of the data and develop a basis for the analysis.

6. *Conduct the analysis in accordance with the unpaired t-test.*
   The financial data was then transferred to JMP Pro 15, where the analysis was conducted using the unpaired t-test. Each of the three areas was analyzed independently, to be able to answer the three hypotheses.

7. *Discussed the findings from the analysis to draw conclusions.*
   Findings from the analysis were then discussed in order to pinpoint the more

qualitative implications of the findings. Based on the discussion, conclusions could be drawn to address the research questions, in order to contribute to the theory.

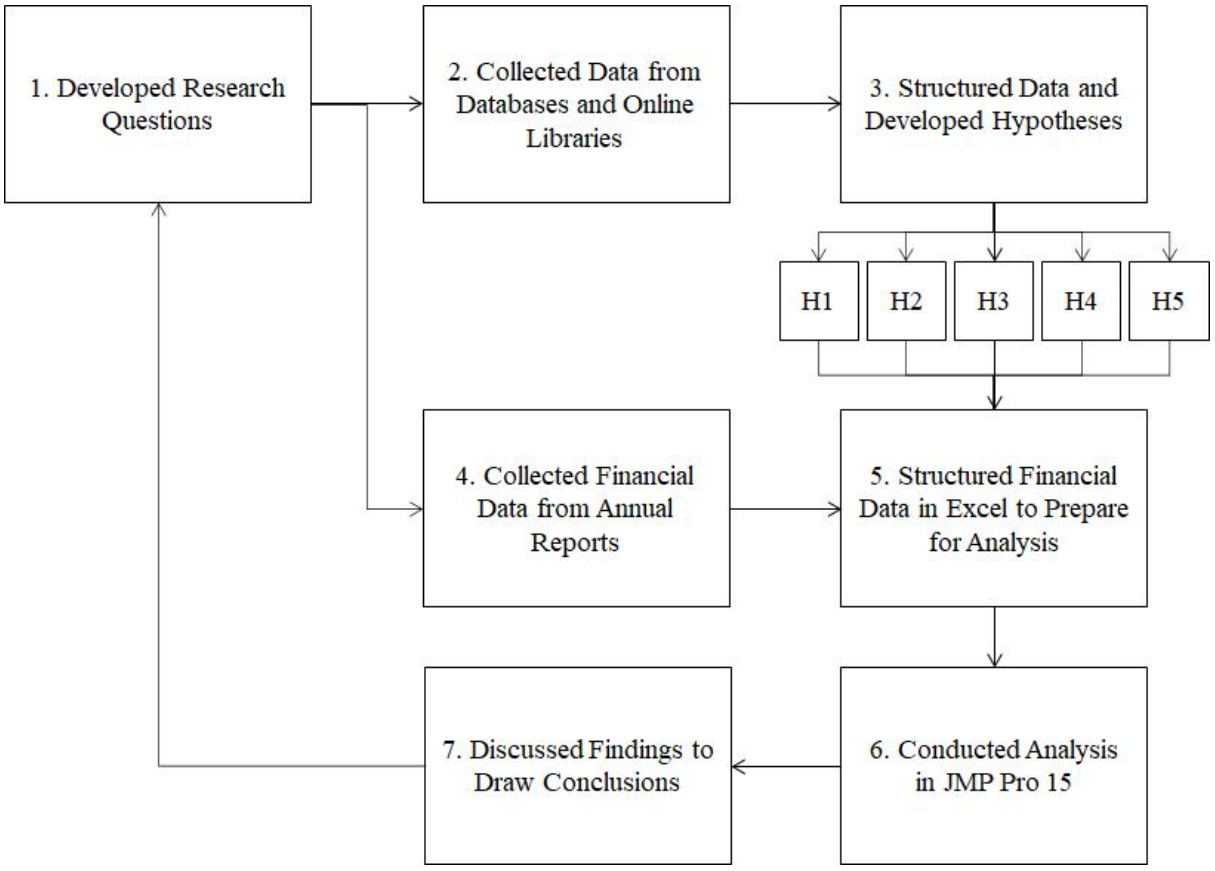

Figure 1. *execution of the collection and analysis of data for the conducted research*. Source: own elaboration.

4. Results

The following chapter presents the results from the data analysis in JMP 15 Pro, described in chapter 3.4. The chapter is divided into the areas of capital structure, cash flow and profitability.

4.1 Capital Structure

The CS between SaaS and pharma showcase a statistical significance, as the t-value exceeds the critical t-value. This means that the hypothesis H1 can be rejected, and thereby is shown that the difference between the industries is not 0. Furthermore, looking at the average ratio of debt, the SaaS companies have 0,5646, compared to the pharma companies, which have 0,6510. This means that pharma companies on average have nine percentage points more debt than SaaS companies. It can also be seen that the variance is greater for the SaaS, even though the variance can be considered low for both industries. The results from the unpaired t-test for CS are presented in table 4.

Table 4, *summarization of the results of the unpaired t-test for CS.*
Source: own elaboration based on JMP 15 Pro.

CS	Mean	Variance	Observations	Pooled Variance	t Critical	t-Stat
SaaS	0,5646	0,0487	50	0,0403	1,6606	2,1508
Pharma	0,6510	0,0319	50			

4.2 Cash Flow

The cash flow was considered by putting the free cash flow into relation to both the revenue and the operating cash flow. In relation to revenue, it can be concluded that low t-value close to 0 indicates that the results are inconclusive, as the hypothesis H2 cannot be rejected nor accepted. However, it can be seen that the differences are minor, as the FCF1 is 0,2014 for SaaS and 0,1955 for Pharma. This showcases that, based on the sample, the average free cash flow in both industries is approximately responding to 20% of the revenue. However, the

variance for the SaaS companies is almost double as for the pharma companies, meaning that the relation between free cash flow and revenue tend to differ more in the SaaS industry. The first cash flow t-test, where the variable FCF1 was used, is presented in table 5.

Table 5, *summarization of the results of the unpaired t-test for FCF1.*
Source: own elaboration based on JMP 15 Pro.

FCF1	Mean	Variance	Observations	Pooled Variance	t Critical	t-Stat
SaaS	0,2014	0,0143	50	0,0108	1,6606	0,2832
Pharma	0,1955	0,0073	50			

The free cash flow in relation to the operating cash flow yields other results. However, yet again the t-value does not exceed the critical value, it is slightly lower. This means that the hypothesis H3 cannot be rejected nor accepted. Thereby, the findings are inconclusive. On the other hand, the mean difference in FCF2 is of notable character, as it is 0,5936 for the SaaS companies and 0,7826 for the pharma companies, see Table 6. Indicating a difference in almost 19 percentage points, where the pharma companies have a favorable conversion from the operating cash flow to free cash flow. Furthermore, the variance is notably greater for the SaaS companies than the pharma companies, where it is 0,6379 for the SaaS companies and 0,1194 for the pharma companies. This means that the internal spread for FCF2 is substantially larger for the SaaS companies than the pharma companies, which based on the sample indicates a more stable relationship between the free cash flow and the operating cash flow for the pharma industry.

Table 6, *summarization of the results of the unpaired t-test for FCF2.*
Source: own elaboration based on JMP 15 Pro.

FCF2	Mean	Variance	Observations	Pooled Variance	t Critical	t-Stat
SaaS	0,5935	0,6379	50	0,3787	1,6606	1,5360
Pharma	0,7826	0,1194	50			

4.3 Profitability

The profitability is considered in the sense of both return on assets as well as profit marginal. The ROA between the SaaS and pharma companies showcases a statistical significance as the t-value, exceeds the critical t-value. This means that the hypothesis H4 is rejected and thereby there is a significant difference between the SaaS and pharma companies. Whereas the pharma companies have an average ROA just under 7%, in contrast to the SaaS companies which have an average slightly over 0%, see Table 7. Therefore, based on the sample, it is concluded that the pharma industry yields a greater return on the assets than the SaaS industry. Furthermore, the variance is to some extent greater for the SaaS companies. This might be explained by the fact that the sample has both positive and negative ROA, in contrast to the pharma companies, which solely have positive ROA.

Table 7, *summarization of the results of the unpaired t-test for ROA.*
Source: own elaboration based on JMP 15 Pro.

ROA	Mean	Variance	Observations	Pooled Variance	t Critical	t-Stat
SaaS	0,0034	0,0185	50	0,0101	1,6606	3,3098
Pharma	0,0698	0,0016	50			

The t-test for profit margin also indicates a statistical significance between the SaaS companies and the pharma companies, implying that there is a difference in means and that the hypothesis H5 can be rejected. This is showcased by the fact that the average profit margin is close to 0 for SaaS, whilst it is 0,1572 for the pharma companies, see Table 8. Therefore, the sample showcases that the pharma companies are far more profitable in a sense of profit margin. Furthermore, the variation is yet again substantially higher for the SaaS, which can be explained by the fact that the SaaS companies both had positive and negative profit margins. In contradiction to the pharma companies which solely have positive profit margins.

Table 8, *summarization of the results of the unpaired t-test for PM.*
Source: own elaboration based on JMP 15 Pro.

PM	Mean	Variance	Observations	Pooled Variance	t Critical	t-Stat
SaaS	0,0190	0,0645	50	0,0357	1,6606	-3,655
Pharma	0,1572	0,0069	50			

5. Discussion

As presented in the background by Ma (2007), SaaS is a new phenomenon, compared to more traditional business models such as pharma, and has gained a lot of publicity for its increased and hyped usage in new software business enterprises. Lacy (2006) mentions that the growth of SaaS has gradually refined in terms of operation cost of services while maintaining service efficiency. In addition to that, SaaS premises economy of scale, low entry barriers to traditional firms, high return on capital as well as advantages in scaling up the business rapidly as the services are digital and has almost no marginal cost (Hall, 2008; Choudhary, 2007). However, as Eng Lieh & Jarzabek (2016) puts it, the advantages of SaaS are hard to replicate outside the software context and it may not even be applicable for all software. Based on this, a central issue in this thesis is whether the SaaS business model trend is justified compared to a more traditional business model, such as pharma, in terms of financial measures. Based on the findings in chapter 4, that seems to be disputable when comparing the financial results from the empirical study. But in order to assess the justifications, the findings must be discussed in a more detailed manner.

Addressing research questions 1.1, regarding capital structure, there is a statistical significant difference between the two industries based on the sample. The debt-ratio of SaaS is lower at 55,56% and a variance of 4,87% whereas the pharma companies' ratio is higher at 65,10% at a lower variance of 3,19%. Putting this in relation to the research question 1, this can according to Yiadom et al. (2020) justify the SaaS business model trend, as debt has a negative relation with organisational performance. However, linking this to the more validated modified Modigliani and Miller (1958) theorem to answer research question 1, there is weak justification, as the theorem advocates debt and thus favour the more traditional pharma business model. Looking at what this difference means, by linkings this to Myers (2001) definition of capital structure, this indicates a significant difference in the mix of securities and financing sources the different industries use to finance their real investments. Linkage to Khan and Ghayas (2020) work also means that the differences in the capital structure decision implies that the overall cost of capital and market value of the firm is affected in different ways for the industries. However, it should be known that the SaaS industry, nor the pharma industry, follows the modified Modigliani and Miller (1958) theorem, which is similar as for Maçãs Nunes and Serrasqueiro (2007) study. But this might be explained by the fact that the theorem is relying on perfect capital markets, which is not

the case for the sample.

Looking at cash flows and addressing research question 1.2 however, the result is statistically inconclusive and therefore not valid for conclusions exceeding the sample. However, within the samples there are some interesting differences between the two industries. Firstly, the Free-Cash-Flow to Revenue ratio (FCF1) does not differ notably at 0,2014 and 0,1995 respectively, both being approximately 20% relative to its revenue. However, the variation of FCF1 in SaaS (1,43%) is the double of Pharma (0,73%) meaning that Pharma's cash flow is more stable relative to its revenue in the sample. The second cash flow metric (FCF2), i.e. the free cash flow to operating cash flow ratio, is 0,5936 for SaaS and 0,7826 for pharma. This indicates that more free cash flow is left from the operating cash flow in pharma than SaaS. From the empirical study, it is also noted that pharma has a more stable FCF2 (11,94%) compared to SaaS (63,79%), indicating that the companies in the SaaS sample has had a more unstable cash generation from its operations in the recent years than the pharma sample. Considering the research question 1 in the context of these empirical results, there is weak justification to say that SaaS in this research has a favourable cash flow relative to the more traditional business model of pharma, as the result is statistically inconclusive. Even though the free cash flow of SaaS, relative to its sales and operating margin, are impressive at 20% and 59,36% variation, it is evident that the pharma sample has slightly better cash yield at considerably lower variation. In the context of Simanjuntak & Tjandrawinata (2011), this would mean that the pharma companies would generate the funds necessary to finance its future R&D endeavours and maintain market position.

Considering the empirical result regarding profitability and addressing research questions 1.3, it was measured in terms of profit margin and ROA. As previously presented in chapter 4, there is a statistical significant difference between SaaS and pharma in both measures. The ROA is lower in SaaS at 0,34% with 1,85% variation relative to pharma which boosted a profitability of 6,98% at a lower variation of 0,16%. Relating this to the research question 1, this indicates weak justification for the SaaS business model compared to pharma business model, due to the substantially lower ROA, but also due to the higher variation, as this indicates negative ROA metrics within the sampled SaaS companies. This findings is further of interest, as it is in contradiction to Yiadom et al. (2020) findings, where they states that the debt has a negative relation to organizational performance, in terms of ROA, but in this case pharma had a higher level of debt and simoustanly a higher ROA. Based on their study, this

means that the SaaS companies should have a higher ROA than the pharma companies. This phenomena can however be justified by Mohammadzadeh et al. (2013) findings, which state that the profit margin has a negative relationship to the capital structure. However, this justification might not be reliable as the study was conducted in a pharmaceutical setting . It is similar regarding profit margin where SaaS performs at a profit margin of 0,19% at 6,45% variation compared to pharma which has a margin of 15,72% at 0,69% variance. This yet again indicates weak justification for the SaaS business model trend. Furthermore, as Simanjuntak and Tjandrawinata (2011) states, there is statistically concluded that larger pharmaceutical companies must reach a critical profitability in order to reach long-term sustainable profitability, and seems to also be the case here in this sample. As Rehan et al. (2020) states that there is positive correlation between high leverage pharma and high profitability, which evidently is displayed in the sample results.

When evaluating these empirical results and further addressing research question 1, it is a compelling financial difference considering these measures. SaaS has less debt relative to its assets and a negligible profitability relative to both turnover and assets. Pharma, on the other hand, generally being more leveraged, is substantially more profitable, considering both profit margin and ROA. Linking this to Agarwal (2013), the capital structure is central in a company and can absorb failure and aid success. This can potentially explain why the pharma companies are more successful in the sense of profitability and cash flow in relation to operating cash flow, as their capital structure might be more optimized for their business conduct. But this is not certain as there are multiple internal factors that influence these metrics, exemplified by the factors by Khan and Ghayas (2020). On the other hand, none of the elven factors proposed by Shil et al. (2019) were significant. Furthermore, although there are some differences in cash flow regarding yield and variation in the sample premiering pharma, no general conclusion can be made as the results are statistically inconclusive.

Even though there are weak justifications for the SaaS business model based on the financial findings of this report, other justifications should be discussed to elaborate research question 1. One justification for the SaaS model is the ease of scaling, as the software offering can easily be distributed globally and larger volumes without necessarily affecting the costs, due to low marginal cost. This is supported by Gill et al. (2009) and Hall (2008) who explains that the demand for tangible assets is significantly lower in the service industry. This compared to the pharma business model where scaling requires substantially larger

investments, for instance, new facilities and machinery to increase the production capacity. This justification can however be considered to be based on the characteristics of software services, rather than being specific to the SaaS business model.

Another justification is the ease of entering the industry, where the SaaS industry requires low investments compared to traditional industries and does thus not require a vast amount of funding (Choudhary, 2007). For instance, the development of an application that is based on recurrent payment, in the sense of monthly subscriptions, can be developed and distributed at low cost. This compared to the pharma industry which does not solely require investments for discovery and development for pharmaceutical drugs, i.e., R&D, but also investments to e.g. build up production capacity. This was showcased by DiMasi (1991) who presented the vast amount spent in R&D for US pharmaceutical companies, where approximately half of cost was financed with debt. This can explain the lower degree of debt for the SaaS companies and is in line with Hogan and Hutson (2005) findings that SaaS companies prefer to use internally financing and equity, before debt.

It is also notable that the SaaS business model provides smaller recurrent payments from an initial phase, which is a vital justification for the choice of this model. This creates opportunities to receive recurrent revenue streams, where the offering can be developed, whilst they are deployed to the customers. This conduct has effects of higher software service quality and customer adaptation which lead to higher willingness to pay for the customers (Choudhary, 2007). In contradiction, the pharma business model relies on development of finalized offerings to create revenue streams, where the product receives incremental development on its peak, after release. However, once released the pharma product can be used to bring revenue for an extended time period. This indicates a significant difference, as the SaaS business model is more reliant on shorter iteration, whilst the pharma business model relies on project based cycles.

The chosen methodology in this research relies on an external and objective perspective, which means that the capital structure, cash flow and profitability cannot fully be derived from an internal perspective. This is a weakness of the paper as the financial metrics are highly dependent on the internal factors, for instance profitability is strongly related to e.g., efficiency in operations and effectiveness in marketing. This can further be linked to Biermann (2003) that states the capital structure is dependent on the environmental setting

and made assumptions. Therefore, as there is no optimal capital structure, the capital structure decision is highly dependent on the specific organization. This means that by not investigating the internal factors the understanding of the differences between the groups is limited. On the other hand, by taking an external and objective perspective, with emphasis on a quantitative collection and analysis of data, it was feasible to research a larger number of companies, which is essential to enhance an understanding of the two industries.

Regarding the collection of data, one of the major strengths that the thesis has, is the multiple considerations into account to ensure credibility. The fact that solely mature companies were chosen is crucial as companies in start-up and early phases often have different objectives, e.g., investments are done to enhance growth, rather than achieving profitability and stable finances. This factor however limited the data availability. Because as the SaaS business model is relatively new it means that a large proportion of the companies are not yet mature. Therefore, the sample of ten companies is considerably small and the time period is nor that extensive compared to other econometric research. Therefore, the sample would preferably be expanded to have a more accurate representation of the industries. However, this is not a direct weakness, as the data was sufficient to calculate the test statistic.

Regarding the analysis of data, the unpaired t-test is not recurrent in econometric research. Therefore, one could argue that this is not the most validated method and that other options should have been considered. However, the paper aims to identify the differences for different variables between two groups based on companies in the SaaS and the pharma industry, rather than understanding dependencies between the variables within one industry. Based on this given purpose the t-test can be considered as highly suitable, which lies in line with Amemiya (1985) statement that the t-test is ideal when there is a single constraint.

6. Conclusion

From the financial perspectives in terms of capital structure, cash flow and profitability, there is weak justification for the SaaS business model trend compared to the more traditional pharmaceutical business model, answering the research question. Looking at the capital structure there is a significant difference between the two industries, where pharma has a higher degree of debt. Even though there is research showing a negative relation between operational performance and debt, the validated M&M theory advocates debt and thus the justification for the SaaS business model is weak in the matter of capital structure. Regarding cash flow, the findings of this report are inconclusive and thus general conclusions representing differences between the two industries cannot be made. However, the sample shows that the SaaS business model has weak justification compared to pharma in terms of cash flow as it indicated slightly less cash yield at a higher volatility. Lastly, regarding the profitability both the ROA and profit margin indicates weak justification for the SaaS business model. The difference is significant, where the pharma companies showcase healthy values in both measures, combined with a low variance. This compared to the SaaS companies, which are slightly over the zero limit, at greater variance.

However, even though the justifications in terms of capital structure, cash flow and profitability is weak, other factors justifying the SaaS business model were discussed. First of all, is the excellent possibilities for scaling, as this can be done with little effect on the costs, in contrast to the pharma industry. Furthermore, is the ease of entering the industry, which is considerably favourable for the SaaS business model, as the required initial funding is lower. Lastly, is recurrent payment obtained from the SaaS business model, where the offering can be developed concurrently, whilst they are deployed to the customers.

The managerial implications for this paper is that the SaaS business model may be neglected if the capital structure, cash flow and profitability is of highest importance. If this is the case, then other traditional business models as the pharma business model should instead be considered. However, if the goal is to achieve scaling, decrease initial costs and obtain recurrent payment, during concurrent development and continuous deployment to customers, then the SaaS business model can be justified and should be considered.

6.1 Further research

For further research it is first of all recommended to expand the sample of this study, in order to validate the findings. This could be done by adding companies, e.g. with other maturity levels and expanding the time period. By also expanding the time period, external shocks such as financial crises could be considered in the research. Secondly, it is recommended to further investigate the dependencies between the chosen variables, as this research is based on independent t-tests, which limits the understanding of the industries. Lastly, it is recommended to further research the more subjective justifications for the SaaS business model trend, as this research was conducted through an objective and external approach and thus the internal factors affecting the findings and their magnitude could not be identified.

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