VILNIUS UNIVERSITY
BUSINESS SCHOOL

SUSTAINABLE CORPORATE FINANCE AND INVESTMENTS PROGRAMME

Rokas Balčiūnas

THE FINAL MASTER'S THESIS

BUSINESS VALUATION UNDER UNCERTAINTY USING DISCOUNTED CASH FLOW METHOD	**VERSLO VERTINIMAS DISKONTUOTŲ PINIGŲ SRAUTŲ METODU NEAPIBRĖŽTUMO SĄLYGOMIS**

Student _____
(signature)

Supervisor _____
(signature)

Prof. dr. Arvydas Paškevičius

Vilnius, 2024 m.

SUMMARY

VILNIUS UNIVERSITY BUSINESS SCHOOL
SUSTAINABLE CORPORATE FINANCE AND INVESTMENTS STUDY PROGRAMME
ROKAS BALČIŪNAS

BUSINESS VALUATION UNDER UNCERTAINTY USING DISCOUNTED CASH FLOW METHOD

Supervisor - prof. dr. Arvydas Paškevičius
Master's thesis was prepared in Vilnius, in 2024
Scope of Master's thesis – 92 pages
Number of tables - 25 pcs.
Number of figures - 7 pcs.
Number of bibliography and references - 53 pcs.

The final master thesis examines the discounted cash flow business valuation method and its applicability under conditions of uncertainty.

The research problem of the thesis is how to value a business using the discounted cash flow method in an environment of uncertainty. The objective of the thesis is to estimate "Novaturas" AB intrinsic value using the discounted cash flow method taking into account the uncertainty associated with the company's business model. The tasks of the thesis include examination of scientific literature, creation of two valuation scenarios, analysis of "Novaturas" AB historical results, market research, calculation of the company's business value in the two scenarios and presentation of the valuation results.

Research methods applied in the thesis are the analysis of scientific literature, statistical methods, analysis of financial indicators, application of discounted cash flow method, capital asset pricing model, Monte Carlo simulation method and financial modelling.

The research performed concluded that the "Novaturas" AB intrinsic equity value as of December 31, 2022, amounted to 21.6 million Euro.

The main conclusion of the thesis is that the Monte Carlo simulation-based discounted cash flow valuation method allows to account for the uncertainty associated with a business and express it through the forecasted cash flows. In addition, the method helps to reduce subjectivity of an appraiser, and allows to gain additional insights in the valuation.

SANTRAUKA

VILNIAUS UNIVERSITETO VERSLO MOKYKLA
TVARŪS VERSLO FINANSAI IR INVESTICIJOS PROGRAMA
ROKAS BALČIŪNAS

VERSLO VERTINIMAS DISKONTUOTŲ PINIGŲ SRAUTŲ METODU NEAPIBRĖŽTUMO SĄLYGOMIS

Darbo vadovas - prof. dr. Arvydas Paškevičius
Darbas parengtas – 2024 m. Vilniuje
Darbo apimtis – 92 puslapių
Lentelių skaičius darbe - 25 vnt.
Paveikslų skaičius darbe - 7 vnt.
Literatūros ir šaltinių skaičius - 53 vnt.

Magistro baigiamasis darbas nagrinėja verslo vertinimą diskontuotų pinigų srautų metodu ir jo pritaikymą neapibrėžtumo sąlygomis.

Darbe keliama problema, kaip vertinti verslą diskontuotų pinigų srautų metodu esant neapibrėžtumo sąlygoms. Darbo tikslas – nustatyti bendrovės „Novaturas“ AB tikrąją vertę naudojant diskontuotų pinigų srautų metodą bei atsižvelgiant į neapibrėžtumą, susijusį su bendrovės verslo modeliu. Darbo uždaviniai yra išnagrinėti aktualią mokslinę literatūrą, sukurti du vertinimo scenarijus, išanalizuoti „Novaturas“ AB istorinius rezultatus, atlikti rinkos analizę, nustatyti bendrovės vertę dvejais scenarijais ir pristatyti vertinimo rezultatus.

Darbe panaudoti šie tyrimo metodai: mokslinės literatūros analizė, statistiniai metodai, finansinių rodiklių analizė, diskontuotų pinigų srautų metodo panaudojimas, CAPM modelis, Monte Carlo simuliacijos metodas ir finansinis modeliavimas.

Atlikto tyrimo metu nustatyta, kad bendrovės „Novaturas“ AB tikroji akcijų vertė 2022 m. gruodžio 31 d. buvo lygi 21.6 milijonams eurų.

Pagrindinės darbo išvada yra ta, jog Monte Carlo simuliacijos metodo pritaikymas atliekant diskontuotų pinigų srautų vertinimą leidžia įvertinti neapibrėžtumo įtaką vertinamam verslui ir išreikšti ją per bendrovės pinigų srautų prognozę. Taip pat, šio metodo pritaikymas padeda sumažinti vertintojo subjektyvumą ir pateikia papildomų įžvalgų atliekant vertinimą.

TABLE OF CONTENTS

List of figures

List of tables

INTRODUCTION

Relevance of the thesis. The start of the third decade in the twenty-first century can be described in different ways, however, it is most likely that such words as “stability”, “predictability” or “certainty” would be used seldom. In the recent years humankind experienced global COVID-19 pandemic, emergence of wars, frequent natural disasters, disruptions in worldwide supply chains, fear of recession, political instability, international trade wars, spikes of inflation and development of new technologies. In such an environment, trying to forecast the future became considerably more difficult, even though it was never an easy task.

On the other hand, some things did not change. Businesses remained primary drivers of economies, pioneers of innovation and the most common way of building personal wealth. Given the importance of businesses, there was always a need to value them. Reasons for that range from transactional purposes to tax implications or simply the willingness of an owner to understand how much their asset is worth. In fact, different purposes of valuation may require applying a unique definition of value and selecting an appropriate valuation method. However, in the scientific literature and among investors an intrinsic value definition is discussed the most because it represents a value of an enterprise based on its ability to generate cash flows. Accordingly, the most popular intrinsic value estimation method is the discounted cash flow method.

Since intrinsic value is not something that is objective or observable (as opposed to a market capitalization of a company) it often becomes a matter of discussions and debates. In addition to that, using the discounted cash flow method to calculate an intrinsic value requires forecasting the expected future cash flows of a business during its lifetime. This is a difficult task even during stable times.

Opposingly, as described above, current times are full of uncertainty. In such circumstances, estimation of an intrinsic value for any business is much more difficult because there are multitude of external factors which cannot be controlled, yet they have a potential to significantly impact a company’s financial performance. Consequently, creating reliable financial forecasts necessary for the discounted cash flow method becomes challenging. A common approach among practitioners when faced with such a situation is to use market value of a business or various “rules of thumb” to tailor and substantiate their intrinsic valuation by amending inputs of the discounted cash flow models. A very common way to do so is to express uncertainty associated with the forecasted business cash flows through the higher discount rate. However, such an approach is incompatible

with the definition of an intrinsic value. Naturally, a question arises if the discounted cash flow method could be applied when a business operates under uncertainty conditions to estimate its intrinsic value and how it could be done reliably.

Research problem. How to value a business using the discounted cash flow method in an environment of uncertainty.

Objective of the work. Estimate "Novaturas" AB intrinsic value using the discounted cash flow method taking into account the uncertainty associated with the company's business model.

Tasks:

1. Examine scientific literature in regard to the definition of business value, valuation approaches, application of the discounted cash flow method and identify types of uncertainty and ways to account for it in the business valuations.
2. Based on the scientific literature analysis, develop a discounted cash flow valuation model for "Novaturas" AB. Create two valuation scenarios: Base case (based on the stable performance assumptions) and one which takes into account uncertainty embedded in the business model of the company.
3. Analyze "Novaturas" AB historical results, its business environment and expected trends in the travel industry in order to develop the company's cash flow forecast.
4. Forecast "Novaturas" AB performance using the stable environment assumptions and calculate the business value in the Base case scenario using the discounted cash flow model.
5. Construct valuation model which takes into account uncertainty, forecast "Novaturas" AB financial results considering the potential impact of uncertainty to the company's results and calculate the business value using the discounted cash flow method.
6. Present results of the two valuation scenarios comparing them against each other and against the market capitalization of the company.

Hypotheses. Two hypotheses were formed in the research:

1. The estimated value of "Novaturas" AB in the Base case scenario will differ significantly from the market value of the company as of valuation date.
2. The calculated value of "Novaturas" AB taking into account uncertainty will be lower than in the Base case scenario and closer to the market value of the company as of valuation date.

Research methods. A systematic analysis of scientific literature, comparison of different views and summary of key aspects. Statistical methods (collection of data, analysis, grouping,

measuring probabilities), analysis of financial indicators, application of discounted cash flow method, capital asset pricing model, Monte Carlo simulation method and financial modelling – development of "Novaturas" AB discounted cash flow model which takes into account uncertainty using MS Office Excel software and the RiskAMP Monte Carlo add-in for the MS Office Excel.

Structure of the work. The master thesis is comprised of three parts. In the first part a definition of business value, valuation approaches and uncertainty in the business valuations are discussed. The work of other authors and applied methods when accounting for uncertainty in valuations is provided. The second part of the thesis describes the methodology of "Novaturas" AB valuation using the discounted cash flow method in two cases: Base case and when taking into account uncertainty. In the third part the analysis of "Novaturas" AB historical results is provided, the market analysis is performed and created valuation model is employed to derive the value of the research object in the two scenarios. The results are compared against the market value of "Novaturas" AB and one scenario versus another scenario, the interpretation of valuation results and insights are provided.

Novelty of the research. Even though application of the discounted cash flow method is widely examined in the scientific literature and studies, there is no clear guidance and agreement on how to use it when it is difficult to accurately forecast financial results of a business, which is the case under conditions of uncertainty.

Scientific and practical benefits of the thesis. The thesis provides a practical approach for valuators to take uncertainty into account in their discounted cash flow method valuation models. The provided method is universal and could be applied when valuing any business. Since the discounted cash flow method valuation always requires forecasting the future, exact precision is not possible, and valuations heavily depend on assumptions made by appraisers. Applying the proposed Monte Carlo simulation in a valuation serves as a good credibility check, helps to reduce subjectivity of an appraiser and also allows to gain additional insights regarding the distribution of potential values of a company being valued and the likelihood of a specific value or a selected values interval.

1. Business valuation purpose, approaches and methods, uncertainty in valuations

1.1 Value of a business

There is no surprise that businesses nowadays are the key elements of the global economic system accounting for the majority of goods and services produced, driving innovation and economic progress worldwide. It was also the case in recent history with business being responsible for breakthroughs in technological progress. In addition to that, enterprises worldwide greatly contributed to advancement in studies of economic and finance fields (Anderson, 2012).

Due to their impact on the overall economy, businesses are one of the main assets' individuals can own and benefit from. Although, it is important to note that it is not only a direct ownership of a business that creates value for a person. As noted in the book "Valuation: Measuring and managing the value of companies", there is a long ongoing debate regarding a value which business generates to its shareholders versus the value created for stakeholders in terms of employment, impact to society and environment (Koller et al., 2010). Even though the authors do not engage in further debate which value dimension created by a business is more important, they conclude that in general a business which focus on creating the value for its shareholders ultimately leads to the greater value for economies and societies. McManus agrees with such approach stating that the businesses should create value for the society as it is impossible to operate and earn profit by not affecting wider stakeholders (McManus, 2019).

Seeing the importance of businesses to economies, societies, as well as investors, it is only natural that there is a need to define and measure the value of enterprises. Value as a concept could be understood differently. For example, Anderson (2012) provides six different perceptions of value and states that in a case of a firm value, an economic value perception shall be used. Economic value is defined as a measurable attribute attached to a commodity - meaning that there are ways to assign a number to an asset that is defined by specific characteristics or conditions. Moreover, the economic value of a business should be comparable to other values, and allow to perform arithmetic operations. This paper takes interest in the measurement of the economic value of business which has the following characteristics:

- Applies to a specific business (a firm)
- Is reliably measured and expressed in monetary terms
- Is comparable to other values of businesses

- Practical arithmetical operations can be done with the value defined (for example, price of stock determined for transaction purposes).

There are multiple definitions of business, enterprise, or firm value in academic literature, professional valuation standards and legislation. Nowadays, most widely used in practice are definitions provided in the International Valuation Standards (International Valuation Standards Council, 2021)which offer five main descriptions or bases of value:

1. Fair market value – one definition is based on the Organisation for Economic Co-operation and Development and is formulated as "the price a willing buyer would pay a willing seller in a transaction on the open market". Another definition provided is based on the United States regulation for tax purposes where fair market value is defined as "the price at which the property would change hands between a willing buyer and a willing seller, neither being under any compulsion to buy or to sell and both having reasonable knowledge of relevant facts".
2. Fair value – defined in the standards as "the price that would be received to sell an asset or paid to transfer a liability in an orderly transaction between market participants at the measurement date" (based on International Financial Reporting Standards definition). The fair value terminology is mostly used for financial reporting purposes.
3. Market value – defined as "the estimated amount for which an asset or liability should exchange on the valuation date between a willing buyer and a willing seller in an arm's length transaction, after proper marketing and where the parties had each acted knowledgeably, prudently and without compulsion". According to the standards, the definition refers to a most probable price of a business reasonably expected to receive/pay in the transaction between unrelated parties assuming no additional value which could arise for specific owner or buyer, i.e., it is assumed that there is a willing buyer, not a particular willing buyer. Based on definition, market value is best measured using market approach-based valuation.
4. Investment value – defined as "the value of an asset to the owner or a prospective owner given individual investment or operational objectives (also known as worth)". The main difference from other value definitions is that investment value assumes value (through benefits received) when holding an asset, so excluding a presumed exchange of ownership in the open market in the definition. As such, investment value reflects the entity (investment) specific financial goals and circumstances and is often used to measure the performance of an investment.

5. Liquidation Value – defined as “the amount that would be realized when an asset or group of assets are sold on a piecemeal basis. The value should also take into account expenses associated with the sale of assets process or assets disposal costs”. The key difference from other basis of value is that liquidation value does not assume going concern of a business but rather opposite – end of an entity operations altogether with benefits expected to receive from a functioning business is assumed (International Valuation Standards Council, 2021).

Three out of five definitions of value provided by the International Valuation Standards Council refer to a “transaction” which implies that in order to determine a value of a business there has to be a willing buyer and a seller of the business, i.e., there has to be an active open market for it. It is not always the case, especially for private companies. Moreover, there might be a need to measure the value of a business with no intention to execute a transaction. In such case the “investment value” definition from the standard could be applied which does not refer to open market to determine the value of an enterprise. The final basis of value in the International Valuation Standards is the liquidation value which is rarely used in the practice when valuing a business because it does not assume going concern of a firm. Normally, when valuing a business where are two alternatives: either a business will continue to operate (going concern principle) or it will be liquidated. It is important to note that going concern is a most common approach, while liquidation approach shall be considered only if assets of an entity by themselves have higher value than estimated amount for which business could be sold based on its earnings (Kess & Mendlowitz, 2017).Consequently, liquidation value applies on rare occasions only as usually the value of an active business exceeds the sum of its parts (value of equipment, machinery and other assets used in operations less liabilities to acquire these assets).

In academic literature there is one more common definition of a business value (which is also widely used among asset management professionals) – an intrinsic value. Damodaran defines the intrinsic value as a function of cash flows expected to generate by a business during its lifetime, taking into account the potential growth of the cash flows as well as risk associated with the firm’s ability to generate those cash flows(Damodaran, 2013). In his other work Damodaran states that the intrinsic value could be measured by the discounted cash flow model and provides four key pieces of the intrinsic value:

- cash flows generated by current capabilities of a company;
- expected growth in cash flows from new investments and improved efficiency of a business;

- discount rates that reflect risk of cash flows;
- assessment of a firm's maturity (when it becomes a stable growth company) (Damodaran, 2011).

Koller et all. agree with Damodaran's approach by defining the intrinsic value as a value which is ultimately based on the business ability to generate future cash flows (Koller et al., 2010) Other researchers provide broader definitions of the intrinsic value. For example, Bihari and Charde state that the intrinsic value simply is the fundamental value of security which is determined by performing a fundamental analysis i.e., by examining economic, financial, and other quantitative and qualitative factors associated with a company (Bihari & Charde, 2014). Thomas and Gup state that the intrinsic value is a theoretical value of an enterprise (based on the fundamental analysis) which may differ from the price in the market (Thomas & Gup, 2010). Alibegovic states that questions regarding real worth of stocks on the stock exchange and opinions regarding over-valued or under-valued shares indicate that there is an intrinsic value of business which is different from its market value (value on stock exchange). According to author the intrinsic value should be related more closely to the value of enterprise assets or its business performance than the market value (Alibegovic, 2013).

It is evident from examples provided that the definition of intrinsic value puts less emphasis on the market value and more on fundamentals of a firm. It is believed that if the fundamentals of a business are strong, it will be reflected in the cash flows that the business is expected to generate in the future, resulting in a higher value. Even though market factor (stock price on the exchange or actual business exchange transactions) is a bit neglected in the intrinsic value definition, it does not mean that researchers try to deny an accuracy of an open market - rather the research indicates that the intrinsic business value exists, and it might be different from the market value.

Since the introduction of the intrinsic value concept there have been many attempts to measure the relationship between intrinsic values of companies and their market prices. Over time such studies focused mostly on two aspects:

1. Research by what extent market prices of businesses are determined by their intrinsic values, and;
2. Examination of degree of efficiency of the stock market assuming that strong positive correlation between stocks intrinsic values (defined by fundamental parameters) and their market values results in efficient equity markets (Alibegovic, 2013).

Koller et all. argue that the efficient markets concept has been one of the most debated and researched ideas in economics and, in fact, some inefficiencies and anomalies have been identified. Even though the debate is still unresolved, the authors suggest that despite the market being occasionally inefficient, businesses decisions shall be made assuming as if the market was efficient. Making strategic decisions that increase the intrinsic value of a business by raising its long-term cash flow eventually leads to higher shares prices and managers should not concern themselves with the fact that a business might be undervalued in the short-term (Koller et al., 2010).

The analysis of business value definition shows that basis of value provided in the International Valuation Standards concentrate mostly on market value – the value which arises from buying and selling businesses on the stock exchange or in private transactions between unrelated and willing parties. Scientific research, on the other hand, supports the idea of intrinsic value existence which correlates with the market value but not necessarily is the same. The intrinsic value depends heavily on business fundamentals and ability to generate future cash flows. It is suggested that in cases when the equity markets are not efficient, the intrinsic value of the business could differ significantly from its market price. To conclude, intrinsic value is associated with the investment value and is the one which is of the interest of an owner of a business because it provides an understanding how much their business is worth without assuming the sale of the business.

1.2 Valuation purpose and approaches

Valuation purposes set out in the International Valuation Standards are financial reporting, tax reporting, litigation support, transaction support, support to secured lending decisions. However, the standards state that the valuation purposes are not limited to only the ones provided in the list. Moreover, it is indicated in the standards that the purpose of a valuation typically will influence which basis of value is used (International Valuation Standards Council, 2021).More strategic business valuation purpose was defined by Koller et all., claiming that businesses are always valued to help guide management or investment decisions (acquisition, divesture or understanding the impact of a strategic initiative). Another aim of business valuation proposed by the authors is to help to understand the business better which is especially useful for multinational enterprises with multiple business units (Koller et al., 2010).

International Valuation Standards provide more specific / case by case purposes of a business valuation while researchers focus more on the strategic aims. This is also evident from

the earlier discussed basis of an enterprise value where academics mostly focused on the intrinsic value of business and its relationship with the market value and less on market value itself. However, researchers agree that the purpose of valuation is important and should determine the valuation method chosen (Bihari & Charde, 2014). In addition to that, the choice of the valuation method could significantly impact the result of the valuation (Jegelavičiūtė & Navickas, 2019).

According to Anderson, there are three traditional valuation methods used for taxation, accounting and professional valuation practice – market approach, income approach and asset approach (Anderson, 2012).This corresponds with the International Valuation Standards view, where the three main valuation approaches indicated are market, income and cost approaches (International Valuation Standards Council, 2021). The only difference is that Anderson mentions the asset approach, while the standards use cost approach term but in fact the same approach is meant by these two different terms as discussed further.

1.2.1 Market approach

International Valuation Standards describe the market approach as an indicator of value through comparison of the asset with identical or comparable assets with available prices information. According to the standards, market approach should be applied in three cases:

1. The asset which is valued has been recently transacted.
2. The appraised asset itself or comparable assets are actively publicly traded.
3. There are recent transactions available of comparable assets (International Valuation Standards Council, 2021).

Therefore, using the market approach the value of a firm is indicated by the actual market transactions. The rationale of the approach is that the value of business can be measured based on the prices of other similar businesses. According to Anderson, there are three methods commonly employed when using the market approach:

1. Prior sale of company's shares - when value is determined by the price of recent transactions of the company's equity.
2. Guideline transaction – value estimate is determined using available transaction data of businesses similar to the valued company. One or several ratios of the transaction price to financial variable from comparable companies are calculated and then applied to the subject enterprise's corresponding variable.

3. Guideline publicly traded company – similar to guideline transaction method but instead of the transactions (prices of comparable companies) data, comparable publicly traded companies' quoted prices are used to estimate the value (Anderson, 2012).

The market approach is very practical and commonly applied in valuations. It is based on actual prices of the assets in the open market; therefore, it is difficult to argue against its reliability – if there is a willing buyer and seller who agree on a transaction for specific price it means that at least for those two parties the asset has the value on which the transaction was made. However, there are also shortcomings of the market approach. It might not work well in cases where is a lack of comparable companies for the valuation target. According to Palaszynski, it is not clear when using the market approach what is the sufficient number of willing buyers and sellers or transactions, i.e., is one willing buyer and seller enough to reliably determine the value of an asset? Moreover, as prices change frequently in the public market, does that mean that a company's value should change accordingly even though no new significant facts or circumstances have appeared? (Palaszynski et al., 2000).The authors refer to the situation when the reliability of market data is questionable, which can be the case - as argued earlier markets might not be efficient in the short-term. One more important disadvantage is that the market approach usually is based on historical data and does not directly take into account future plans of the company – the market approach indicates the value of a company as a valuation date but does not provide information about its expected cash flows and timing of these cash flows. Accordingly, it is difficult to apply the market approach when the investment value or the intrinsic value of a firm is estimated. The best use of the market approach is when the value of a business is calculated on the basis of market value, fair value or fair market value as defined by the International Valuation Standards.

1.2.2 Cost / assets approach

International Valuation Standards describe the cost approach as an indicator of maximum value which a buyer would pay for an asset given the acquisition cost of an asset of equal utility. According to the standards, market approach should be applied in three cases:

1. The asset of the same utility could be recreated relatively quickly so that a significant premium for an existing asset would not be paid.
2. The asset valued does not directly generate income and its unique nature does not allow for reliable application of income or market approaches.

3. There basis of value used in valuation is based on replacement cost (International Valuation Standards Council, 2021).

The standards provide three main valuation methods applied under the cost approach:

1. Replacement cost – value is indicated by acquisition cost of similar asset with the same utility as the valued asset.
2. Reproduction cost – value is estimated as the cost of replication of the valued asset.
3. Summation method – the value of an asset is defined as the sum of values of its components (International Valuation Standards Council, 2021).

In case of business valuation, Anderson (2012) suggests that the assets approach should be applied by taking the balance sheet of a company as starting point, evaluating all individual assets and liabilities at their fair market value and a resulting difference would be the value of a business. This essentially is the same as summation method suggested by the International Valuation Standards. In practice the replacement cost and reproduction cost methods are not feasible when valuing a business because it would be very difficult, if not impossible, to reliably estimate the costs needed to replicate the exact business or to find a company which provides the exact same utility as a valued business.

Due to its specific nature the cost approach is applied best when calculating the liquidation value of a business. Other cases when the cost approach could be applied are:

- When valuing early-stage businesses for which future cash flows cannot be reliably estimated and comparisons with other businesses are impractical or unreliable.
- In valuation of holding or investment entities where summation method adds up the values of controlled assets.
- When there are doubts regarding going concern of a business and the value of the individual assets comprising the business may exceed the value of going concern business (International Valuation Standards Council, 2021).

Anderson (2012) states that using of assets approach goes against the economic logic of a business as normally a firm should have value because of its ability to generate future profits and not because of value of its individual assets. As such, it is advised to use assets approach in cases the valued entity is not operating, is expected to be liquidated in near future, or when separate operating units of a business are value or in case where assets of the business are key value drivers, for example, in case of passive investment units. Vochozka et al. agrees with such approach stating

that the assets approach could be applied in the situations where a business lifetime is finite (Vochozka et al., 2019).

By its definition and value estimation methods, the cost or assets approach is not practical when appraising going-concern business which generates profit through operations. It does not take into account the expected future benefits of a firm and is not suitable for intrinsic value measurement. An investor, however, might use the cost approach to check whether going-concern business is worth more than the value of its components (value of assets less liabilities).

1.2.3 Income approach

International Valuation Standards describe the income approach as a current value of future cash flow. Two key cases for application are provided:

1. The valued object's income producing ability is critical factor of its value.
2. The future income (cash flow) of an asset and its timing can be reasonably projected and there are few relevant comparables in the market.

The fundamental basis of the income approach according to the standards is that it is based on the return expected to receive from an asset in the future and the return expected should reflect the risk associated with it. It is stated in the standards that even though there are many methods of income approach, effectively they all are based on the present value of expected cash flow and only discounted cash flow method is introduced in more detail (International Valuation Standards Council, 2021)

In academic literature there are many methods suggested to use under the income approach. In general, income approach methods are categorized in two types: capitalization of historical earnings (also called income capitalization method) and discounted cash flow (Durham, 2016). Both types of methods share a common methodological basis and theoretically should bring the same result (Todorov, 2019). The main difference between the two types of methods is that income capitalization methods can be reliably applied only in cases when appraised business is matured and its income generating ability is not expected to significantly change in the future. Discounted cash flow methods on the other hand develops a multi-year detailed projection of business results (revenue, costs, investments, other cash inflows and outflows and resulting cash flows) and residual value of a business once it reaches expected maturity phase (Durham, 2016).

To sum up, income capitalization and discounted cash flow methods share very similar approaches – the expected future cash flow of a business is discounted to present value using a

discount rate which reflects the risk of projected cash flow. The key difference is that discounted cash flow method is more flexible as it allows to forecast different cash flow in each period (account for investments, changes in business environment, significant growth), while income capitalization method generally forecasts stable cash flow throughout the future.

The income approach is associated mostly with the intrinsic value of the company and investment value definitions, as by its essence it is a measure of future benefit gained from an enterprise. When using income approach, business value depends on its potential to generate income for its owners, but not on the value of its assets or value of enterprise shares in the market, as an investor or an owner is mainly interested in the future benefit expected while holding a business (Todorov, 2019).This is the main advantage of the income approach – it assesses the enterprise from an investor point of view and measures the value of tangible benefit (cash flows) available to an owner of a business. On the other hand, income approach also has some disadvantages, such as difficulty to make objective forecasts of the business results, amount of detailed analysis involved as a business valuation requires to perform an analysis of sector, market and competitors as well as analysis of risks associated with the projected cash flows (Todorov, 2019).

Despite some disadvantages of the approach, it is mostly agreed that the income approach is the best way to estimate the intrinsic value of a business as fundamentally an enterprise is judged by its ability to generate income. According to Wijayaningsih and Yulianto, a firm value is ultimately driven by its earnings thus companies with higher profitability or actions made toward higher profitability in the future usually see their value increase (Wijayaningsih & Yulianto, 2021)

In conclusion, three traditional business valuation methods address different perspectives and purposes of valuation. Market approach indicates the selling value of a business at a given moment based on market data (transactions of similar businesses, prices of shares on the open market) but fails to provide more information on value when holding a business and its potential benefits to an owner. The income approach on the other hand assumes the value when a business is not sold but kept by the owner or investor and its value is a present value of associated cash flow for a holder. Efficient market theory suggests that enterprise value derived using income approach should correlate with the value measured using market approach, as in the long-term business intrinsic value shall be reflected in its share price. The cost or assets approach is rarely used in business valuations as it does not assume going concern. It is rare that the value of assets employed

by a firm is higher than the benefit the firm creates using those assets. As such, the cost approach is used in unique cases: liquidation, when valuing a unique asset or holding companies.

Accordingly, the income approach is used when an intrinsic value (not transactional) of a business needs to be determined. The income approach is primarily based on measuring how much value will be created by a business in terms of future cash flow generated.

1.2.4 Discounted cash flow method

As discussed, the discounted cash flow method is usually applied when using the income approach valuation. There are multiple different discounted cash flow methods used to value businesses. Fernández names the ten most popular discounted cash flow methods and argues that theoretically they all should bring the same result, the difference among methods being which cash flows are used in the valuation (Fernandez, 2007).

In practice, the choice of method applied depends on a business being valued and circumstances related to a valuation. However, the two most popular methods are the free cash flow to firm discounted at weighted average cost of capital (the Enterprise discounted cash flow model) and the free cash flow to equity discounted at the required return of equity (the Equity discounted cash flow model). These two models are very similar in essence; however, the Enterprise discounted cash flow model primarily estimates the value of a company's operations (the Enterprise value) which is the value of a business attributable to all the investors (including creditors) while the Equity discounted cash flow model directly estimates the equity value of a business (value of a business to its shareholders). Koller et al. argue that the Equity discounted cash flow model is best suited for financial institutions valuation, while the Enterprise discounted cash flow model is more versatile and is the most widely used in practice. Nonetheless, the authors emphasize that the Enterprise model's result (after taking away debt and other investor claims superior to a common equity) shall be equal to the Equity model's result given that the discount rates accurately reflect a risk of each cash flow stream (Koller et al., 2010).

Since diverse discounted cash flow models theoretically result in the same value (given that assumptions used among the models are consistent) it is a choice of an appraiser to select which one to use. This paper focuses on the most commonly used and widely applicable Enterprise discounted cash flow model.

1.3 Enterprise discounted cash flow model

Beneda states that value of an equity investment in a company using the Enterprise discounted cash flow model is calculated as expected future cash flows discounted at the weighted average cost of capital (Enterprise value or value of operations) plus the value of non-operating assets minus interest-bearing liabilities and preferred stock (Beneda, 2003).

$$Eq.V = EV + na - debt - preferred\ stock$$

Where:

Eq. V = Equity Value (value of a business for shareholders)

EV = Enterprise Value (value of business operations, i.e., value for both stockholders and debt holders)

na = non-operating assets (if any are owned by a company)

debt = value of a debt business owns to its debt holders

preferred stock = value of any preferred stock issued by business (if any)

The key component of the formula above is the enterprise value which captures the value of a company's operations, i.e., the economic benefit a company creates through its business activity. Non-operating assets are the assets that a business might own, however, which do not contribute to a company's business activity, for example investments into unrelated businesses or securities. Debt of a company represents interest-bearing liability owned by a business to its creditors on the valuation date. According to Koller et al. (2010), a company's borrowing in the future could be excluded, since it is assumed that cash inflows from borrowing will equal the present value of these borrowings' repayment at the present value (discounted at the opportunity cost of debt). Preferred stock is applicable for businesses that have issued preferred equity which, according to Damodaran, is a claim for a company's operating cash flow (Damodaran, 2012). Such claim is similar to debt issued by a company since it represents an obligation to pay for an investor predefined amount of money under agreed terms and conditions.

In practice, value of debt owned by a business is usually taken from the company's balance sheet as of valuation date. Non-operating assets and preferred stock are not always applicable since not all businesses have other forms of equity (besides common equity) issued or own assets that are not required for the business activity. Accordingly, the main value when determining a company's intrinsic value is its Enterprise Value which in essence defines how much value a business creates through its operations.

Damodaran (2013), broadly expresses an intrinsic value of an asset calculated using the discounted cash flow method followingly:

$$V = \frac{E(CF)_1}{(1+r)^1} + \frac{E(CF)_2}{(1+r)^2} + \frac{E(CF)_3}{(1+r)^3} + \frac{E(CF)_4}{(1+r)^4} + \cdots\cdots\cdots + \frac{E(CF)_n}{(1+r)^n}$$

Where:

V = the value of asset

$E(CF)_t$ = the expected cash flow in year t

r = the risk adjusted required rate of return for investing in the asset

n = the lifetime of the asset

The author specifies that using the formula above either an entire business could be valued or only its equity (value of business to investors). Valuing the whole business requires using free cash flow to the firm and the discount rate which reflects the overall cost of capital of a business (cost of capital of equity investors and cost of capital of debt holders) and results in the Enterprise Value. Valuing only the equity of a business requires using free cash flow to equity (which is what is left to investors after debt payments) and discount rate representing cost of equity financing.

Following definitions of Damodaran (2013), Koller et al. (2010) and Beneda (2003) Enterprise Value could be expressed consecutively:

$$EV = \frac{FCFF_1}{WACC^1} + \frac{FCFF_2}{WACC^2} + \frac{FCFF_3}{WACC^3} + \frac{FCFF_4}{WACC^4} + \cdots\cdots\cdots + \frac{FCFF_n}{WACC^n}$$

Where:

EV = the enterprise value of a business

$FCFF_1$ = the free cash flow to firm in year 1

WACC = the weighted average cost of capital of a business

n = the lifetime of a business

Since a business might have an indefinite life, Koller et al. (2010) recognise that it is impractical to forecast long horizon performance (for example, FCFF 20 or 30 years in the future from a valuation date). The authors suggest splitting the value of a company's operations in two components:

$$EV = Present\ value\ of\ cash\ flow\ during\ explicit\ forecast\ period + Present\ value\ of\ cash\ flow\ after\ explicit\ forecast\ period$$

Here explicit forecast period represents a defined period of time during which a precise forecast of business cash flows is made, while a value after an explicit forecast is estimated using

the simplified assumptions (without the detailed forecast). Value after the explicit forecast period is called continuing or terminal value. The purpose of the terminal value is to reflect value of cash flows generated by a business during its expected lifetime after the explicit period.

However, a question for practitioners is how to define an explicit forecast period during which a business performance is projected in detail. Koller et al. (2010) suggest that the explicit forecast period in the valuation should be of such duration, during which a business being valued would reach a steady state. This is because the terminal value estimation is based on a stable performance of a company assumption. The authors define a steady state of a company as follows:

- A company's rate of return on new investments is at constant rate.
- A company's return on its base capital invested is constant.
- A company reaches a constant growth rate which requires a constant proportion of its operating profits to be reinvested each year.

Accordingly, the explicit forecast should be long enough to allow an appraiser to assume continuing value growth rate similar to an overall growth rate of economy, otherwise terminal value would assume a disproportional growth of a company relative to the economy.

Damodaran (2012) also agrees with such approach, stating that the detailed forecast of a business performance shall be made until the firm reaches a stable growth rate. However, Damodaran provides three approaches regarding terminal value:

1. Assuming going concern in perpetuity, i.e., a firm is expected to operate in indefinite period of time and generate cash flows growing at perpetual growth rate. In this case present value of continuing operations beyond explicit period is calculated as a present value of a function of excess returns and perpetual growth rate.
2. Setting a definite period of time a company is expected to continue operate after the explicit period and estimate the present value of these cashflows.
3. Assuming that a company will be liquidated after the explicit period and calculating present value of salvage value of assets owned by a business at the end of explicit period.

It is important to note that the first approach is the most common when valuing businesses that are expected to operate in a foreseeable future.

When an explicit period of forecast is defined, the two main inputs in the Enterprise Value formula should be estimated: the free cash flow to firm (FCFF) in each year of the explicit forecast and the weighted average cost of capital (WACC).

1.3.1 Free Cash Flow to Firm

Free cash flow to firm is a cash flow generated by a business which is available for its shareholders and debt holders. Diaconu defines free cash flow to firm subsequently (Diaconu, 2015):

$$FCFF = NOPAT + D\&A - CAPEX - \Delta WC$$

Where:

FCFF = free cash flow to firm

NOPAT = net operating income after taxes

D&A = depreciation and amortization

CAPEX = capital expenditure

ΔNWC = change in non-cash working capital

Other authors definition of free cash flow to firm do not differ significantly as well. Beneda (2003) provides the following calculation formula:

$$FCFF = EBIT * (1 - t) + D\&A - CAPEX - \Delta WC$$

Where:

FCFF = free cash flow to firm

EBIT = earnings before interest and taxes

t = tax rate

D&A = depreciation and amortization

CAPEX = capital expenditure

ΔWC = change in operating working capital

Since EBIT * (1 – t) represents after-tax operating income, the two formulas are effectively same. In the calculation of the FCFF, EBIT represent a business ability to earn economic profit thus other conditions being equal, greater EBIT results in larger FCFF and higher value of a business. Depreciation and amortization are added-back, since they lower the EBIT but do not represent an actual cash outflow, thus have to be added back in estimation of the free cash flow. Capital expenditure represents the outflows for investments which a business makes in order to maintain its current operating capacity or increase it. Change in operating working capital

represents cash inflow or outflow resulting from a variation in company's operating current assets and liabilities (such as accounts receivable, inventory, accounts payable and other short-term operating liabilities and assets). Usually, the cash is excluded from operating working capital and in valuation is treated as a factor which reduces debt of a company as of valuation date.

In general, there are no strict rules on how an appraiser should derive inputs for the free cash flow to firm calculation in each period, however, there are two common methods: Top-down approach and Bottom-up approach. Damodaran (2011) describes the Top-down approach as a method in which analysis starts from the total market for service or a product, estimates potential revenues and earnings of a company based on that and then takes into account how much of capacity (investment) is needed to sustain the forecasted revenues. In the Bottom-up approach, capacity constraints of a business are defined considering available investment amounts and based on those constraints number of units sold are forecasted from which revenue, earnings and ultimately cash flows are derived. Bottom-up approach is described as more suited to for businesses that have considerable restrictions in raising additional capital necessary for growth or have strong dependency on employees for their success (for example, medical practices).

In this paper, top-down approach is used to estimate the financial performance of a business. When performing a top-down approach analysis Damodaran (2011) suggests the following process:

1. Defining a potential market for product or service. This includes defining potential customers, estimating size of the market and its expected growth over time.
2. Estimating market share which will be captured by a business being valued. This will help to estimate the number of sales and top line of a company.
3. Estimating operating expenses / margins. In order to derive earnings of a business, operating expenses associated with the revenue of a company must be estimated.
4. Defining investment needed for growth. It is necessary to estimate how much investment will be required for a company to generate projected sales.

In addition to forecasting future performance of a company, it is also important to look into a historical performance of a company (if business being valued operates for significant amount of time), as emphasized by Koller et al. (2010). Such analysis provides useful information for an appraiser such as historical margins of a business, return on invested capital, level of working capital, revenue growth and key drivers of it, historical capital expenditure. This information

allows to better understand a company, its development and serves as consistency check of future performance forecast.

1.3.2 Weighted Average Cost of Capital

In determining the Enterprise Value of a firm, the forecasted Free Cash Flow to Firm is discounted to the present value (as of valuation date) using the weighted average cost of capital (WACC). According to Koller et al. (2010), WACC represents a discount rate (or time value of money) which is consistent with an overall valuation approach and accurately reflects investors and creditors required rate of return (opportunity cost) of investing in a company being valued.

Beneda (2003) defines WACC followingly:

$$WACC = \frac{D}{(D+E)} \times K_d \times (1-t) + \frac{E}{(D+E)} \times K_e$$

Where:

WACC = weighted average cost of capital

D = market value of debt

E = market value of equity

K_d = cost of debt

t = marginal tax rate

K_e = cost of equity

D + E = total funds used by a company

In essence WACC is a proportion of net cost of debt for a company (required rate of return by creditors) and cost of equity (required rate of return by shareholders) weighted by the company's capital structure (how much debt versus equity the company uses to finance its operations). When a company is publicly traded, its market value of equity is represented by market capitalization. In the same matter, in case a company's debt is traded publicly, its market value could be used. If a company's debt is not traded publicly, a common approach is to simply use balance sheet value of debt as a reliable proxy for a market value of debt. Similarly, often the balance sheet value of equity is used instead of a market value of equity (even if the company is listed on a stock exchange) to prevent short-term fluctuations in the company's market value.

According to Damodaran (2011), pre-tax cost of debt could be estimated in different ways:

1. Looking at cost of publicly traded bonds issued by a company (if there is any).

2. If a company does not have public bonds outstanding, pre-tax cost of debt could be estimated using risk-free rate and adding default risk spread associated with a business.
3. Using a cost of debt (interest rate) charged by banks when providing credit to a company.

When pre-tax cost of debt is defined, it is effectively reduced by a tax shield representing a positive effect for a company due to interest expenses on debt that reduce taxes payable for a company.

According to Koller et al. (2010), cost of equity is more difficult to estimate since it is not directly observed in the market. The most widely used approach to estimate cost of equity is the capital asset pricing model (CAPM). In general, idea behind the CAPM is that opportunity of cost of equity is a function of risk-free rate of return plus a risk associated with an investment into a company multiplied by a market price of risk, expressed consecutively:

$$K_e = r_f + (r_m - r_f) \times beta$$

Where:

K_e = cost of equity

r_f = risk-free rate

r_m = the expected rate of return on the overall market portfolio

$(r_m - r_f)$ = market risk premium

beta = systematic risk of the equity

Risk-free rate represents a hypothetical return earned on a portfolio which is assumed to have no default risk. Since in practice no investment has zero default risk, a common approach is to use long-term interest rate of low-risk country's government bonds. The goal of the market risk premium is to measure the excess return gained in investing in equity market rather than choosing virtually risk-free investment such as government bonds. Market risk premium could be calculated by subtracting risk-free rate from the expected return on the overall market portfolio, however, there is still a question on how to measure the expected return of the overall market. One approach is to use historical averages, yet it is noted that historical averages might differ significantly depending on a period use and have a high standard deviation. Damodaran (2013) suggests measuring the market risk premium by calculating an internal rate of return based on a present value of estimated collective cash flows from stocks portfolio which is equal to a current market price of the same stock portfolio. Finally, beta of a business represents additional risk associated

with the business measured versus the market. Usually, it is measured as a regression of a business stock returns against the market index (Damodaran, 2012).

It is important to mention that theoretically in the valuation WACC could differ across forecast periods. For example, Koller et al. (2010) state that distinct WACC should be used for each year cash flows since its subject to change together with risk-free securities rate of return. Damodaran (2013) uses time varying WACC in a case where debt/equity ratio of valued business is expected to change over time. Diaconu (2015) states that using a constant discount rate would require for business' debt ratio to not change. However, in practice the discount rate often is assumed to be constant for practical reasons (forecasting changes in cost of capital is complicated and heavily depends on assumptions made).

1.3.3 Terminal value

Terminal (or continuing) value represents a value of business created after the explicit forecast period, that is indefinitely or for expected period of time, depending on a business. In case of assumption that a business will reach a steady state, the continuing value is usually calculated using the infinitive life formula (Jennergren, 2013). According to Holland, many analysts when performing valuations focus mostly on the first couple years of the explicit period, while typically around 80% of discounted cash flow valuation value is derived from the terminal value (Holland, 2018). The author provides derivation of the simple growing cash flow perpetuity (Gordon's growth) formula for the terminal value expressed followingly:

$$TV = \frac{FCF_t}{(r - g)}$$

Where:

TV = terminal value of the business

$FCFF_t$ = free cash flow to firm at terminal year

r = cost of capital

g = invested capital growth rate

According to the author, invested capital growth rate is often set to the long-term inflation rate or the risk-free rate (Holland, 2018).

While there are different ways on how to approach the terminal value calculation, the traditional method with the perpetual growth rate used to lower the discount rate is still frequently

used (Dorfleitner, 2022). Even though scientific research explores additional ways to calculate the continuing value of a business, there is no concluding evidence that Gordon's growth terminal value calculation formula is unreliable or inconsistent with the discounted cash flow method.

To conclude, the Enterprise discounted cash flow model is the most widely used among the discounted cash flow methods. The model requires forecasting the free cash flow to firm which is the cash flow generated by a business and available for its investors and creditors. Since the free cash flow to firm is a benefit to be received in the future, it shall be discounted to the present value. The weighted average cost of capital is used as a discount rate because it reflects the cost of capital of both sides: investors (through the cost of equity) and creditors (through the cost of debt). Considering that it is not possible to forecast a business' results indefinitely, the value of business is split into the explicit forecast period and the terminal value which often assumes going concern of a company in perpetuity. The key input of the Enterprise discounted cash flow model is the free cash flow to firm which firmly depends on the quality of the financial results forecast of the business being valued.

1.4 Uncertainty in valuations

Uncertainty in life is associated with imperfect information. In business valuations uncertainty is very common. According to Damodaran, when valuation is performed, some estimates are made in the face of uncertainty. The magnitude of uncertainty in valuations differs. In macroeconomic crises uncertainty is evident for most of the companies, while valuation of young companies and companies operating in emerging markets always have more uncertainty embedded (Damodaran, 2013).

Other authors argue that uncertainty is very common when dealing with emerging markets where it is difficult to apply standard valuation techniques due to transparency, liquidity, governance, transaction costs, volatility and most importantly greater probability of crisis events. It is suggested that valuation models in such cases should be adjusted for greater uncertainty (García-Sánchez et al., 2010).

However, uncertainty is not only the emerging markets problem. Nishihara argues that uncertainty is inevitable when valuing R&D projects. Technological, market and rival preemption uncertainty requires to make adjustments to valuation methods to account for risk failure in development of new products or technology, lower than expected cash flows or simply the risk

that competitor would develop a competing product faster resulting in loss of potential market share (Nishihara, 2018).

Meszek (2013) argued that uncertainty in property valuations is inevitable due to market inefficiency. The degree of uncertainty will increase when the market is not active, when there is lack of available information, low transparency and market imperfections. The author states that even though the market value of assets is based on assumption that markets are efficient (according to efficient market hypothesis), it is not the case for real estate and valuation models should be adjusted to reflect that (Meszek, 2013). Meszek discussed real estate markets, however, stock market in the short-term can also be inefficient, especially during turbulent times. This makes intrinsic value, or income approach valuation, very relevant for all business owners or potential buyers.

A recent case of uncertainty which affected almost every business worldwide was related to COVID-19 pandemic. Economic effects resulting from COVID-19 made business valuators more diligent when evaluating the credibility of the firm's forecasted cash flows (Caruso, 2020). Landier and Thesmar analyzed the effect on stock market due to COVID-19 and concluded that the market fell significantly due to expectations regarding future dividends and higher discount rates in valuations associated with higher risk (Landier & Thesmar, 2020).

While the COVID-19 pandemic is an extreme example of uncertainty, it is evident that imperfect information will always exist simply because it is not possible to predict the future accurately. However, as noted by some practitioners, appraisers often fail to take uncertainty into account or have an "unhealthy" response to it. McKee argues that a typical valuation of business often has a limitation of failing to recognize uncertainty with appraisers often trying to solve uncertainty issues by applying premiums or discounts to capitalization rates or adjusting forecasts to narrow a valuation range (McKee, 2004). Damodaran agrees that analysts and investors often have unhealthy response to uncertainty in their valuations failing to properly account for it by simply ignoring it or using unjustified rules of thumb with no scientific basis behind it (Damodaran, 2013).

In conclusion, uncertainty is faced on many occasions when performing valuations. It is especially relevant for intrinsic value estimation, which requires employing the income approach and discounted cash flow method. This, in turn, requires projections of the financial results of a

business being valued. Sequentially, as it is impossible to accurately predict the future, the investors should take uncertainty into account when building valuation models.

1.4.1 Types of uncertainty

In order to deal with uncertainty better, Damodaran classified it into the most common types which are met when valuing a business:

- Estimation uncertainty – arising from lack of information accessible when performing valuation. Could be reduced by diligent data collection and more robust valuation models but cannot disappear entirely since all of the inputs in the income approach valuation are estimates.
- Economic uncertainty – arising from the fact that markets and economies might behave in unpredictable way, i.e., something unexpected always will happen and it is impossible to accurately predict how economies or particular sectors will perform in the future.
- Micro uncertainty – related to business model of the valued company. It can be assumed that mature companies with stable histories have lower micro uncertainty while young companies with high growth and / or new business models might face greater challenges and their performance is more difficult to forecast.
- Macro uncertainty – depends on where a company does business. If a firm is greatly exposed to emerging markets, macro uncertainty will be higher. That is because as mentioned earlier, emerging markets have higher risk of material crisis events.
- Discrete uncertainty – something that shows up rarely but has significant consequences. It could be risks like nationalization of a company, default on debt or any other unexpected harm to a company.
- Continuous uncertainty – it is risk that affects the fundamentals of a firm daily, for example changes in cash flow due to lower profitability or changes in discount rate because risk free rate has increased (Damodaran, 2013).

In conclusion, various types of uncertainty affect businesses constantly and might have significant effect to a company's performance. Given that the intrinsic valuation tries to capture the real value of a business for its holder in the long term, a detailed future forecast of cash flows is required. However, since any business plan will not get every assumption right due to estimation, economic, micro, macro, discrete or continuous uncertainty, this should be somehow reflected in a business valuation.

1.4.2 Accounting for uncertainty in valuations

The Enterprise discounted cash flow model requires an appraiser to estimate a company's performance for a considerable period of time as well as to derive the corresponding free cash flow to the firm during the same period. In addition, an appropriate discount rate should be selected and an expected change in it should be reflected to properly represent changes in a company's capital structure, cost of debt or equity. With so many variables included in a valuation process, a resulting single-point estimate of value is always debatable and often heavily influenced by assumptions made by a valuator.

According to Damodaran (2013), precision in valuation is practically impossible to achieve and one should expect to be wrong most of the time. However, once an appraiser accepts that valuation inputs are estimates which will not be accurate as time passes by, they can take this into account when performing a valuation. Damodaran suggests a way to confront uncertainty in the future by using a simulation approach, where inputs are not single point estimates but rather a distribution. In this approach, key inputs take a form of distribution and multiple simulations are performed to arrive at valuation result also in a form of distribution of values. The result can then be analyzed, and meaningful conclusions could be drawn taking into account median value of simulation results as well as probability intervals regarding the specific value of a business.

Damodaran's approach is tailored specifically to business valuation using the discounted cash flow method. The author agrees that uncertainty cannot be captured in discount rate alone, especially in cases where the risk faced is discrete such as default or nationalization of a company. Instead of trying to incorporate uncertainty in discount rates, Damodaran suggests coming up with going concern value of a business with reasonable discount rate and estimate the discrete failure risk separately. Moreover, the author provides a sophisticated approach to account for uncertainty in going concern valuation of an enterprise. The suggested approach employs Monte Carlo simulation technique performed on key variables affecting firm's value. Growth of revenue, profitability through operating margin and required reinvestment amounts for growth are the variables suggested to simulate. Using inputs as distribution instead of single numbers and performing multiple simulations allows to estimate the intrinsic value of a business as a distribution of values rather than a point-estimate. The resulting business value distribution enables to have more information, allows to assess a likelihood of a specific value, helps to measure if a business is undervalued on the stock exchange using probabilities. The resulting median value of

a simulation is more objective as it comes from continuous modelling of uncertainty in the valuation (Damodaran, 2013).

García-Sánchez et al. (2010) proposed an approach to evaluate corporate bonds in the emerging markets. The authors argued that common approach at the time in which all the risk associated with an asset is expressed through increased discount rate is not theoretically sound as discount rate should reflect only non-diversifiable risks, while country (or emerging market) risk could easily be diversified by an investor. The authors proposed a discounted cash flow approach in which expected cash flow from an asset is adjusted for a potential crisis event through Monte Carlo simulation method. In essence, the method simulates multitude scenarios incorporating a probability of financial distress in potential cash flows. It is claimed that the method produces unconditional expected cash flows which can be discounted by discount rate that does not include country risk premium (García-Sánchez et al., 2010). In their research authors specifically analyzed crisis versus no crisis scenarios, thus a distribution was discrete with binomial outcomes. However, in general, the principle on how to approach uncertainty in the valuation was the same as proposed by Damodaran.

Even before authors mentioned above, Ochoa proposed that Monte Carlo method allows to build more flexible models for financials assets valuation because it enables an appraiser to use different distributions (for example, empirical distributions of the underlying variables) which are useful when the environment for business operations is volatile (Ochoa, 2004).

Most recent global event that created a lot of uncertainty for all businesses was COVID-19 pandemic. It has raised questions on how to adjust valuations to reflect greater uncertainty for cash flows of businesses. Some authors expressed concern that traditional valuation methods could lack reliability and credibility during the pandemic (Van Vleet et al., 2020). However, the response in terms of research implemented and suggestions proposed was somewhat disappointing. Some authors came back to discount rate topic and argued that due to COVID-19 expectations regarding change of discount rate resulted in lower valuations of businesses (Landier & Thesmar, 2020). Caruso (2020) put efforts to adapt market approach for the turbulent environment using very conservative discounted cash flows just for sanity check of value derived by the market approach. Seigneur outlined key economic risks associated with COVID-19 and indicated where appraisers should put most focus the performing a valuation, however, no practical model was suggested to account for greater uncertainty (Seigneur, 2020). Butler suggested that Covid-19 discount

premium should be applied in the valuations, however, it should be based on scientific calculations, not just chosen by an appraiser (Butler, 2020). Finally, Kaiser suggested to use different scenarios when trying to estimate financial projections during the coronavirus (Kaiser, 2021).

While the COVID-19 raised a lot of challenges for business appraisers, it did not result in new innovative methods to deal with greater uncertainty, especially in terms of the intrinsic value estimation using the discounted cash flow method. If anything, it seems that previous work by Damodaran (2013), García-Sánchez (2010) or Ochoa (2004) in this field was somewhat neglected by not trying to estimate intrinsic values of businesses using the proposed practical Monte Carlo simulation method but rather applying shortcuts such as higher discount rates, marketability discounts, or simplified scenarios of more conservative cash flows to account for uncertainty.

On the other hand, a recent study by Simsek analyzed the simulation approach applicability in financial modelling (Simsek, 2023). The author describes the Monte Carlo simulation as a method which assesses outcomes under uncertainty while using random generated variables. Simsek states that the method helps to incorporate uncertainty into financial modelling and outlays typical setup of the process:

1. Inputs for which random value will be generated are selected and for these inputs a specified distribution of random values is assigned. When random values for selected inputs are generated based on the distribution selected.
2. Using the generated random values, the inputs are converted into output variables (using mathematical model or a formula).
3. First two steps are repeated desired number of times resulting in multitude of outputs with the different sets of inputs. Each output with its corresponding random inputs is called a trial or a scenario.
4. Distribution of outcomes for each trial is summarized.

Simsek (2023) argues that although there is no limit on how many variables can be used as probabilistic for which random values are assigned, it is best to work with only the most impactful variables. Damodaran (2013) agrees with such an approach stating that less is more and suggests minimizing the number of inputs in the valuation. The author then performs simulation converting three key inputs into probability distributions.

While Simsek (2023) discusses Monte Carlo method application when pricing options, defining portfolio insurance strategies, and measuring portfolio risk, work by Damodaran (2013),

García-Sánchez et al. (2010) and Ochoa (2004) demonstrate that such approach can also be applied when performing a business valuation using the discounted cash flow method. However, the authors do not provide a clear framework on how to employ such an approach in practice.

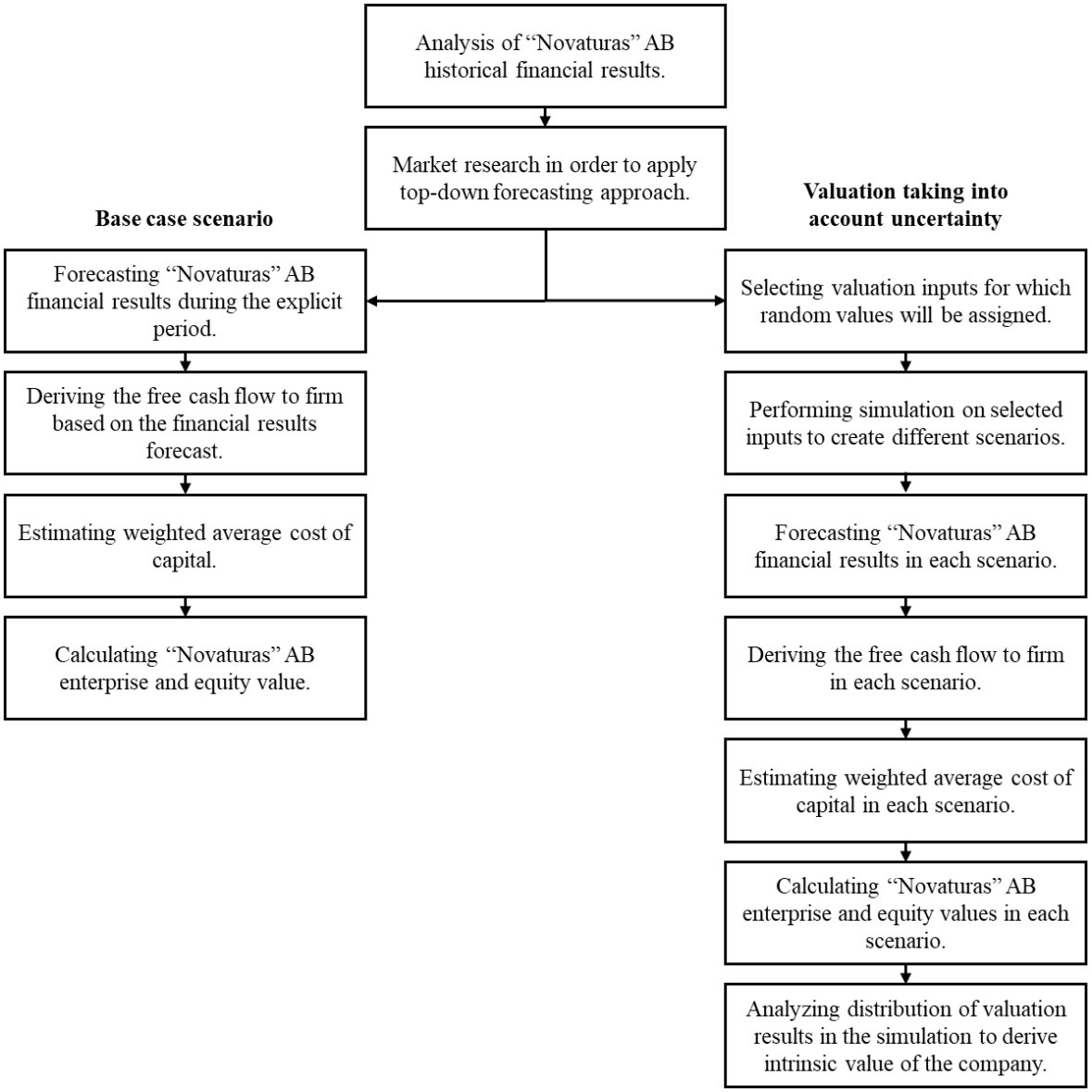
In conclusion, scientific literature shows that uncertainty affects intrinsic valuations which employ discounted cash flow valuation method (under the income approach). Hower, different types of uncertainty are identified, and solutions are proposed on how to tackle it. Even though the recent research on business valuations during the COVID-19 crisis did not yield significant proposals in terms of the intrinsic value estimation, the research before the pandemic offers some practical solutions. Given that there is still a gap of the new research in intrinsic value estimation when facing great uncertainty (such as COVID-19, global disruptions of supply chains or emergence of wars) this paper will try to review, apply and improve the intrinsic valuation models proposed by other researchers. The focus will be on the Baltic states market which was greatly affected by the COVID-19, supply chain issues and the recently emerged active war between neighboring countries.

2 Methodology of estimating Novaturas AB intrinsic value using the Enterprise discounted cash flow model and Monte Carlo simulation approach

2.1 Research plan

As mentioned in the introduction, the objective of the research is to perform "Novaturas" AB valuation using the discounted cash flow model while taking into account uncertainty associated with the business. The research is performed based on the plan provided below.

Figure 1. Research plan



Source: compiled by the author

As can be seen in the figure above, the first two steps of the research are related to the historical analysis of the company as well as the external environment. From the third step two different scenarios emerge. First (as displayed on the left side of the figure) Base case scenario valuation of "Novaturas" AB is performed which provides an example of valuation based on stable business operations assumptions. In the second scenario (depicted on the right side of the figure), the valuation considering uncertainty is performed which indicates the intrinsic value of the company.

The Base case financial model was constructed using MS Office Excel software while for the valuation taking into account uncertainty additionally the RiskAMP Monte Carlo add-in for MS Office Excel was used.

2.1.1 Analysis of "Novaturas" AB historical results

In order to understand the business of "Novaturas" AB, the analysis of its historical performance was made. Important profitability factors were taken into consideration including dynamics of sales, cost of sales, gross profit, other operating expenses, operating profit (earnings before interest and tax "EBIT"), number of clients served. Key performance indicators associated with profitability were calculated as provided in the table below.

Table 1. Calculation of key performance indicators

Item	Calculation
Revenue per passenger	Annual revenue / Number of clients served in a year
Percentage change in revenue per passenger	(Revenue per passenger Y2 / Revenue per passenger Y1) - 1
EBIT margin	Annual operating profit (EBIT) / Annual revenue
EBITDA	EBIT + Depreciation and amortization
EBITDA margin	EBITDA / Annual revenue
Return on equity (ROE)	Net profit Y1 / (Average equity of Y0 and Y1)
Return on assets (ROA)	Net profit Y1 / (Average assets of Y0 and Y1)
Capital employed	Debt + Equity
Return on capital employed (ROCE)	EBIT Y1 / (Average capital employed of Y0 and Y1)

Source: compiled by the author

In addition to that, the analysis of the company's balance sheet and its dynamics was performed as well as key cash flow items. The balance sheet was split into six main categories: long-term assets, working capital, equity, debt, cash and other assets and liabilities. Important indicators associated with the balance sheet and cash flow of "Novaturas" AB were calculated as displayed in the table below.

Table 2. Calculation of key balance sheet and cash flow statement indicators

Item	Calculation
Debt to equity ratio	Debt / Equity
Debt in total capital	Debt / (Debt + Equity)
Equity in total capital	Equity / (Debt + Equity)
Net debt	Debt - cash
Working capital	Working capital assets - working capital liabilities
Working capital to sales ratio	Working capital / Annual revenue
Capital expenditure (CAPEX) to sales ratio	CAPEX / Annual revenue
Dividend payout ratio	Dividends paid in a year / Net profit in a year

Source: compiled by the author

Detailed analysis of the balance sheet and cash flow items allowed to better understand the business of the company and derive realistic assumptions in the forecast of business performance.

2.1.2 Market research

The market in which the business operates was studied to better understand external environment, future trends and to apply top-down forecasting approach. The following indicators were extracted from the external sources:

- Historical population of Lithuania, Latvia and Estonia and forecast until 2032
- Share of population participating in foreign tourism in Lithuania, Latvia and Estonia during 2015-2022
- Average expenditure per non-domestic trip in Lithuania, Latvia and Estonia during 2015-2022
- Gross domestic product (GDP) per capita growth forecast in Lithuania, Latvia, Estonia and European Union during 2023-2028

This data was used to calculate and forecast the total market size for the company, estimate its market share, forecast potential amount of clients and changes in revenue per passenger. These indicators were calculated as indicated in the table below.

Table 3. Calculation of key indicators from market research

Item	Calculation
Market size	Population in a country × corresponding country' s share of population participating in foreign tourism
Market share	“Novaturas” AB number of clients / Market size
Forecasted number of clients	Expected market share of “Novaturas” AB × forecasted market size
Expected revenue per client	Average “Novaturas” AB revenue per client in the beginning of year × (1 + forecasted percentage of GDP per capita growth)

Source: compiled by the author

Market research allowed to define a potential market size for a business which was used to estimate revenue dynamics for the business.

2.1.3 Financial results forecast

The simplified profit and loss statement, balance sheet and cash flow statements were constructed in order to derive inputs necessary for the free cash flow forecasted during the explicit period. The table below illustrates calculation of the key items of profit and loss statement.

Table 4. Calculation of key items of profit and loss statement

Item	Calculation
Sales	Number of passengers × revenue per passenger
Cost of sales and operating expenses	Sales × (1 - EBIT margin)
EBIT	Sales - cost of sales and operating expenses
Taxable EBIT	EBIT - accumulated tax losses available
Taxes	Taxable EBIT × effective tax rate
EBIT after tax	**EBIT- taxes**
Depreciation and amortization (D&A)	D&A previous year × (1 + revenue growth rate)
Interest expenses	Debt × weighted average cost of debt
Net profit	EBIT after tax – interest expenses

Source: compiled by the author

The table below illustrates calculation of the key items in the balance sheet and cash flow statements which are necessary inputs of the free cash flow to firm calculation or serve as important performance indicators.

Table 5. Calculation of cash flow and balance sheet key items

Item	Calculation
Working capital	Sales × working capital to sales ratio
Debt	Debt at beginning of year ± forecasted change in debt
Long term assets	Long term assets at beginning of year – D&A + CAPEX
Equity	Retained earnings at beginning of year + net profit – dividends paid in
Other assets	No change forecasted
Change in working capital	Working capital at end of year – working capital at beginning of year
Dividends paid out	Net profit × dividend payout ratio
Cash inflow / outflow	Net profit + D&A – CAPEX – change in working capital – dividends paid out ± forecasted change in debt
Cash	Cash balance at beginning of year ± cash inflow / outflow during a year

Source: compiled by the author

2.1.4 Free cash flow to firm forecast

The free cash flow to firm ("FCFF") was calculated using the following formula which contains inputs described above in this section.

$$FCFF = EBIT * (1 - t) + D\&A - CAPEX - \Delta WC$$

Where:

EBIT = earnings before interest and taxes

t = tax rate

D&A = depreciation and amortization

CAPEX = capital expenditure

ΔWC = change in working capital

2.1.5 Weighted average cost of capital

The weighted average cost of capital ("WACC") was calculated using the following formula.

$$WACC = \frac{D}{(D+E)} \times K_d \times (1 - t) + \frac{E}{(D+E)} \times K_e$$

Where:

D = balance sheet value of company's debt

E = balance sheet value of company's equity

K_d = cost of debt

t = marginal tax rate

K_e = cost of equity

D + E = total funds used by a company

The cost of debt was estimated based on the company's borrowing margin from banks and expected change in base interest rates.

The cost of equity was estimated using the capital asset pricing model (CAPM) expressed followingly:

$$K_e = r_f + (r_m - r_f) \times beta$$

Where:

r_f = risk-free rate

r_m = the expected rate of return on the overall market portfolio

(r_m - r_f) = market risk premium

beta = systematic risk of the equity

2.1.6 Calculation of enterprise value and equity value

The enterprise value was calculated using a 10-year explicit period and terminal value assuming operation in perpetuity. Given the characteristics of the business, there is no reason to expect finite life of the company, accordingly, going concern is assumed in perpetuity. Terminal value was calculated using cash flow perpetuity growing at a constant rate formula:

$$TV = \frac{FCF_t}{(WACC - g)}$$

Where:

TV = terminal value of the business

$FCFF_t$ = free cash flow to firm at terminal year

WACC = weighted average cost of capital

g = constant growth rate

Accordingly, the enterprise value of "Novaturas" AB was calculated using the formula provided below.

$$EV = \frac{FCFF_1}{WACC^1} + \frac{FCFF_2}{WACC^2} + \cdots\cdots\cdots + \frac{FCFF_{10}}{WACC^{10}} + \frac{FCFF_T}{WACC - g}$$

Where:

EV = the enterprise value of a business

$FCFF_1$ = the free cash flow to firm in year 1

WACC = the weighted average cost of capital of a business

$FCFF_t$ = free cash flow to firm at terminal year

g = constant growth rate

Finally, equity value of the business was calculated by subtracting the net debt of the company as of valuation date from the enterprise value.

2.1.7 Valuation taking into account uncertainty

The same financial model was applied to measure "Novaturas" AB value considering uncertainty. However, the process was repeated 100,000 times using the Monte Carlo simulation method, in which the key valuation inputs changed based on the assigned probability distribution. First, an analysis was performed in regard to which inputs are the most influential to a valuation and are most likely to fluctuate over time. Based on the analysis, four inputs for which probabilistic distributions will be applied were selected. When, 100,000 valuations were performed with varying values of inputs. Finally, the output of the simulation was analyzed by defining a median

value of equity as a most probable single point estimate of the business value. In addition to that, probability intervals which provide meaningful information to an appraiser were constructed.

2.2 Research hypotheses

As outlined in the research plan, two different scenarios were estimated: “Novaturas” AB value in the Base case scenario (which assumes stable performance of the company) and the business value taking into account uncertainty. The Base case scenario was constructed for illustrational purposes while the result of valuation which considers uncertainty provides the intrinsic value of “Novaturas” AB. Two hypotheses were formed regarding the valuation results:

1. The value calculated using the Enterprise discounted cash flow model in the Base case scenario will differ significantly from the market value of a company as of valuation date. This is a likely result due to the fact that the Base case valuation will assume steady and consistent performance of a business while not accounting for uncertainty factor in the performance of the business results.
2. The median value of “Novaturas” AB equity value in the Monte Carlo simulation (valuation which takes uncertainty into account) which represents the intrinsic value of the company will be significantly lower than in the Base case scenario and closer to the market value of the company.

3 Estimation of Novaturas AB intrinsic value using the Enterprise discounted cash flow model and Monte Carlo simulation approach

3.1 Analysis of "Novaturas" AB historical results

"Novaturas" AB is a public limited liability company operating in Lithuania, Latvia and Estonia. The core activity of the company is the organization of tours primarily outside of the domestic countries for its Baltic customers. According to "Novaturas" AB consolidated annual report for 2022, the company is the largest tour operator in the Baltic States with a wide product range which includes various tours in more than 30 destinations worldwide. The company has three active subsidiaries: "Novatours" SIA, "Novatours" OU, "Aviaturas ir Partneriai" UAB and the fourth inactive subsidiary "Novatours Holidays" SRL. Subsidiaries are fully controlled by the company (100% shareholding in each) and are consolidated in "Novaturas" AB consolidated financial results.

Since March 2018, the company has been traded on the Nasdaq Vilnius stock exchange and on Warsaw stock exchange. The company's share price dynamic on the Nasdaq Vilnius stock exchange is provided in the figure below.

Figure 2. "Novaturas" AB share price on the Nasdaq Vilnius stock exchange

Source: compiled by the author based on Nasdaq Vilnius stock exchange data

The company went public in March 2018 at 10.5 euro per share price which corresponded to 81.9 million Euro market capitalization. By the end of December 2022, the company's share price on the Nasdaq Vilnius stock exchange was 2.9 euro, representing 22.6 million euro market capitalization and 72.4% decrease from its initial public offering price. The downward trajectory of the stock price was influenced by several factors. Initial drop in Q4 of 2018, as explained by the management of the company ("Novaturas" AB presentation of Q4 2018 financial results), was due to abnormally hot summer temperature in the Baltics which significantly affected travel demand and profitability of the company since prices had to be lowered to stimulate demand. Moreover, by the end of 2018 a key partner of the company "Small Planet Airlines" ceased its operations, which according to the management of the company considerably affected "Novaturas" AB operations. The second sharp decline in the company's share price was in November 2019 due to emergence of the COVID-19 virus which had a substantial effect on the market expectations regarding performance of tourism sector businesses during the potential pandemic.

The factors that significantly affected "Novaturas" AB were external and out of the company's control. In fact, in the initial public offering prospectus of "Novaturas" AB (2018) it was stated that the main risk factors for the company's business model are the following:

1. Adverse macroeconomic situation in the Baltic states.
2. Epidemics and natural disasters.
3. Political instability, terrorist attacks and military conflicts.
4. Aviation and other transport disasters.

Factors like emergence of epidemics, military conflicts or transport disasters are impossible to predict, however, they could have a significant effect on the company's profitability due to sharp decline in demand for international travelling. The COVID-19 pandemic was an example of such an external event which completely paralyzed the entire tourism industry worldwide and resulted in the sharp decline in the company's financial results.

Given that "Novaturas" AB performance is strongly affected by the external factors which are difficult to forecast and are completely outside of the company's control, the enterprise itself is an ideal candidate for a valuation method which takes into account uncertainty.

The table below illustrates "Novaturas" AB profit and loss statement during 2015-2022 including key performance indicators.

Table 6. "Novaturas" AB consolidated Income Statement, 2015 – 2022

Consolidated Income Statement, thous. Euro	**2015**	**2016**	**2017**	**2018**	**2019**	**2020**	**2021**	**2022**
Sales	99,091	101,525	141,147	182,032	179,723	32,894	108,995	196,676
Cost of sales	-81,895	-83,762	-114,345	-155,753	-157,839	-29,299	-95,506	-177,588
Gross profit	**17,196**	**17,763**	**26,802**	**26,279**	**21,884**	**3,595**	**13,489**	**19,088**
Selling expenses	-4,859	-4,973	-11,017	-13,792	-13,751	-4,112	-8,967	-15,804
General and administrative expenses	-6,962	-7,234	-5,278	-4,856	-4,501	-3,234	-2,228	-3,532
Other operating income	45	21	1	14	112	189	111	469
Other operating expenses	-101	-221	-29	-2	-3	-2	-2	1
EBIT	**5,319**	**5,356**	**10,479**	**7,643**	**3,741**	**-3,564**	**2,403**	**222**
Finance income	193	494	564	820	481	737	70	1,193
Finance expenses	-2,636	-750	-1,730	-1,873	-1,132	-3,723	-1,535	-2,170
Profit before tax	**2,876**	**5,100**	**9,313**	**6,590**	**3,090**	**-6,550**	**938**	**-755**
Income tax	-631	-638	-984	-1175	1124	800	-29	-63
Net profit	**2,245**	**4,462**	**8,329**	**5,415**	**4,214**	**-5,750**	**909**	**-818**
Key performance indicators:								
Number of passengers served	165,900	180,200	233,500	305,600	293,500	48,500	172,000	266,900
YoY change in number of passengers, %		8.6%	29.6%	30.9%	-4.0%	-83.5%	254.6%	55.2%
Revenue per passenger, EUR	597	563	604	596	612	678	634	737
YoY change in revenue per passenger, %		-5.7%	7.3%	-1.5%	2.8%	10.8%	-6.6%	16.3%
YoY sales growth, %		2.5%	39.0%	29.0%	-1.3%	-81.7%	231.4%	80.4%
Gross margin, %	17.4%	17.5%	19.0%	14.4%	12.2%	10.9%	12.4%	9.7%
EBIT margin, %	5.4%	5.3%	7.4%	4.2%	2.1%	-10.8%	2.2%	0.1%
YoY EBIT growth, %		0.7%	95.6%	-27.1%	-51.1%	-195.3%	-167.4%	-90.8%
Depreciation and amortization	222	278	310	265	522	441	321	259
EBITDA	5,541	5,634	10,789	7,908	4,263	-3,123	2,724	481
EBITDA margin, %	5.6%	5.5%	7.6%	4.3%	2.4%	-9.5%	2.5%	0.2%
ROE	14.9%	28.9%	54.3%	37.1%	24.4%	-33.9%	6.3%	-5.6%
ROA	5.4%	10.4%	17.6%	11.0%	8.7%	-12.1%	2.0%	-1.6%
ROCE	19.6%	18.8%	35.7%	29.8%	15.2%	-12.4%	7.9%	0.8%

Source: compiled by the author based on "Novaturas" AB initial public offering prospectus (2018), "Novaturas" AB consolidated annual financial reports in 2018-2022

Throughout 2015 – 2018 the company was able to consistently increase its revenue mostly due to the growing number of customers. In 2019, revenues of the company declined on year-on-year basis due to fall in passengers served which according to the management of the company was due to intensified competition in the market and start of the COVID-19 ("Novaturas" AB 2019 annual report). In 2020, during the COVID-19 pandemic, the number of passengers served sharply declined due to worldwide international travel restrictions. During 2021, once travel restrictions were lifted, the company saw a recovery in customer numbers and revenues while in 2022 the company reached a record number of sales and served almost a pre-pandemic number of customers. However, growth in revenue in 2022 was also significantly influenced by overall increase in prices (as depicted by average revenue per passenger).

The company's profitability depends on its operational efficiency such as ability to fully load its chartered flights, negotiation in dealing with suppliers, pricing and marketing effectiveness, size of commissions paid to travel agencies. In addition, a very important factor to

“Novaturas” AB operating margin is price of aviation fuel. Since it is a commodity, the company is exposed to risk associated with the fluctuations in its price and often hedges against it.

The company’s operating profitability is expressed by EBIT margin, which was highest prior initial public offering in 2018, reaching 5.4%, 5.3% and 7.4% in 2015, 2016 and 2017 respectively. During 2018 the company’s operating margin declined to 4.2% due to hot weather in the Baltic states in the summer (which reduced international travel demand) and because of key partner “Small Planet Airlines” going out of business which resulted in unexpected one-off costs for the company. In 2019 “Novaturas” AB operating margin declined further to 2.1% which according to the management of the company was due to increased cost base associated with replacing a key aviation partner (“Small Planet Airlines” to “GetJet Airlines”), intensified competition as well as warmer temperatures in the Baltic states. During 2020, the company was severely impacted by the COVID-19 outbreak and was operating at loss with EBIT margin of -10.8%. In 2021 the company saw a steep recovery both in terms of number of passengers and profitability (2.2% operating margin), however, during 2022 company’s operating result was close to zero (0.1% EBIT margin) even though the company reached its record revenue. This was due to emerged war in Ukraine and drastic increase in fuel prices (“Novaturas” AB consolidated annual report 2022).

It can be seen that the company’s results are highly affected by external factors. However, in the absence of an unexpected increase in the cost base or decline in travel demand, the company is capable of generating solid returns. Moreover, the business does not require significant investment to achieve profit as demonstrated by the return on equity, return on assets and return on capital employed indicators. During 2016-2019, the company reached a return on equity of above 24% each year and return on assets of above 8.7%. Return on capital employed was positive throughout 2015 – 2022 with the exception of 2020 which was due to Covid-19.

Due to asset-light operating model, the company is able to rapidly increase its customer base and revenues because almost no additional investments are required for the supplementary capacity. Such business model has a potential for considerable returns and positive cash flows generated if travel demand is high and no unexpected circumstances decrease the company’s operating margin as illustrated by significant returns on capital and assets during pre-pandemic years.

The table below displays “Novaturas” AB balance sheet during 2015-2022 with the section below providing analysis and breakdown of the balance sheet items. Classification of all balance sheet items is provided in Annex 1.

Table 7. "Novaturas" AB consolidated Balance Sheet, 2015 - 2022

Consolidated Balance Sheet, thous. Euro	**2015-12-31**	**2016-12-31**	**2017-12-31**	**2018-12-31**	**2019-12-31**	**2020-12-31**	**2021-12-31**	**2022-12-31**
Goodwill	30,327	30,327	30,327	30,327	30,327	30,327	30,327	30,327
Intangible assets	291	442	448	427	248	115	127	627
Property, plant and equipment	339	324	297	292	770	341	418	421
Non-current receivables	43	342	56	65	220	23	47	128
Deferred income tax asset	13	10	6	6	30	954	851	872
Total non-current assets	**31,013**	**31,445**	**31,134**	**31,117**	**31,595**	**31,760**	**31,770**	**32,375**
Inventory	1	1	1	3	4	2	0	0
Prepayments and deferred expenses	3,825	2,748	5,940	8,861	8,973	7,837	6,244	18,534
Trade receivables	542	433	700	697	652	144	167	518
Other receivables	493	2,993	2,872	2,459	1,310	254	541	1,698
Cash and equivalents	5,861	6,646	9,984	4,703	6,854	5,365	5,919	2,770
Total current assets	**10,722**	**12,821**	**19,497**	**16,723**	**17,793**	**13,602**	**12,871**	**23,520**
Total assets	**41,735**	**44,266**	**50,631**	**47,840**	**49,388**	**45,362**	**44,641**	**55,895**
Issued capital	226	226	226	234	234	234	234	234
Reserves	153	473	658	-1,177	396	-247	171	174
Retained earnings	14,672	15,134	13,963	15,310	19,524	13,774	14,683	13,865
Total equity	**15,051**	**15,833**	**14,847**	**14,367**	**20,154**	**13,761**	**15,088**	**14,273**
Long-term borrowings	8,917	10,842	0	6,000	4,000	11,055	12,232	6,865
Lease liabilities	0	0	0	0	360	83	207	179
Deferred income tax liabilities	1,533	2,033	2,606	2,781	0	0	0	0
Total non-current liabilities	**10,450**	**12,875**	**2,606**	**8,781**	**4,360**	**11,138**	**12,439**	**7,044**
Current portion of long-term loans	3,158	3,158	14,000	2,000	2,000	5,798	2,094	1,975
Trade payables	5,548	3,130	3,882	4,611	4,173	1,961	4,896	14,272
Advances received	6,405	7,988	12,102	14,259	14,997	10,876	8,615	14,392
Other current liabilities and accrued expenses	1,123	1,282	3,194	3,822	3,488	1,680	1,338	3,751
Lease liabilities					216	148	171	188
Total current liabilities	**16,234**	**15,558**	**33,178**	**24,692**	**24,874**	**20,463**	**17,114**	**34,578**
Total equity and liabilities	**41,735**	**44,266**	**50,631**	**47,840**	**49,388**	**45,362**	**44,641**	**55,895**

Source: compiled by the author based on “Novaturas” AB initial public offering prospectus (2018), “Novaturas” AB consolidated annual financial reports in 2018-2022

The significant part of the company’s assets is represented by goodwill which was formed in 2008 after a merger of “Central European Tour Operator” UAB into “Novaturas” UAB (“Novaturas” AB consolidated annual report 2022). In fact, in each year throughout 2015-2022 goodwill represented at least 50% of the company’s total assets. Such high proportion of goodwill indicates that a value of business is embedded in intangible things such as the brand and reputation of the company, relationships with customers and suppliers as well as value of its workforce.

Another balance sheet item crucial for the company is working capital which is composed of inventory, prepayments and deferred expenses, trade receivables and other short-term receivables (on current assets side) as well as trade payables, advances received and other short-term liabilities (on current liabilities side). The table below displays the company’s working capital balance throughout 2015-2022.

Table 8. "Novaturas" AB consolidated Working Capital, 2015 - 2022

Thous. Euro	**2015-12-31**	**2016-12-31**	**2017-12-31**	**2018-12-31**	**2019-12-31**	**2020-12-31**	**2021-12-31**	**2022-12-31**
Inventory	1	1	1	3	4	2	0	0
Prepayments and deferred expenses	3,825	2,748	5,940	8,861	8,973	7,837	6,244	18,534
Trade receivables	542	433	700	697	652	144	167	518
Other receivables	493	2,993	2,872	2,459	1,310	254	541	1,698
WC+	**4,861**	**6,175**	**9,513**	**12,020**	**10,939**	**8,237**	**6,952**	**20,750**
Trade payables	5,548	3,130	3,882	4,611	4,173	1,961	4,896	14,272
Advances received	6,405	7,988	12,102	14,259	14,997	10,876	8,615	14,392
Other current liabilities and accrued	1,123	1,282	3,194	3,822	3,488	1,680	1,338	3,751
WC-	**13,076**	**12,400**	**19,178**	**22,692**	**22,658**	**14,517**	**14,849**	**32,415**
Working Capital	**-8,215**	**-6,225**	**-9,665**	**-10,672**	**-11,719**	**-6,280**	**-7,897**	**-11,665**
Annual sales	*99,091*	*101,525*	*141,147*	*182,032*	*179,723*	*32,894*	*108,995*	*196,676*
NWC to sales	***-8.3%***	***-6.1%***	***-6.8%***	***-5.9%***	***-6.5%***	***-19.1%***	***-7.2%***	***-5.9%***

Source: compiled by the author based on "Novaturas" AB initial public offering prospectus (2018), "Novaturas" AB consolidated annual financial reports in 2018-2022

It can be observed that in all periods working capital was negative, amounting between -5.9% and -8.3% (excluding 2020 outlier result) of annual sales. According to the company's management, such situation is typical for the travel industry ("Novaturas" AB initial public offering prospectus, 2018). Although working capital of the company is seasonal and is highest in March and April (when prepayments to hotels and other suppliers are made while the amount of advances paid from customers is still moderate), however the working capital usually remains negative. Due to specifics of its business model, "Novaturas" AB is partly financed by its customers who purchase trips in advance providing cash for the company to settle with the suppliers. Such operational model reduces the need for the company to borrow funds from banks since the business is partly financed by prepayments made by customers. The table below displays "Novaturas" AB debt to equity dynamics and selected cash flow indicators.

Table 9. "Novaturas" AB consolidated debt to equity ratio and cash flow items, 2015 - 2022

Thous. Euro	**2015-12-31**	**2016-12-31**	**2017-12-31**	**2018-12-31**	**2019-12-31**	**2020-12-31**	**2021-12-31**	**2022-12-31**
Cash	5,861	6,646	9,984	4,703	6,854	5,365	5,919	2,770
Debt	12,075	14,000	14,000	8,000	6,576	17,084	14,704	9,207
Equity	15,051	15,833	14,847	14,367	20,154	13,761	15,088	14,273
Debt to equity ratio	***80.2%***	***88.4%***	***94.3%***	***55.7%***	***32.6%***	***124.1%***	***97.5%***	***64.5%***
Net debt	**6,214**	**7,354**	**4,016**	**3,297**	**-278**	**11,719**	**8,785**	**6,437**
Dividends paid	**17,072**	**6,928**	**9,500**	**4,060**	**0**	**0**	**0**	**0**
Net profit	**2,245**	**4,462**	**8,329**	**5,415**	**4,214**	**-5,750**	**909**	**-818**
Dividend pay-out ratio	*760.4%*	*155.3%*	*114.1%*	*75.0%*	*0.0%*	*0.0%*	*0.0%*	*0.0%*
CAPEX	**435**	**409**	**285**	**239**	**35**	**24**	**112**	**500**
CAPEX to sales	*0.44%*	*0.40%*	*0.20%*	*0.13%*	*0.02%*	*0.07%*	*0.10%*	*0.25%*
Debt in total capital	*44.5%*	*46.9%*	*48.5%*	*35.8%*	*24.6%*	*55.4%*	*49.4%*	*39.2%*
Equity in total capital	*55.5%*	*53.1%*	*51.5%*	*64.2%*	*75.4%*	*44.6%*	*50.6%*	*60.8%*

Source: compiled by the author based on "Novaturas" AB initial public offering prospectus (2018), "Novaturas" AB consolidated annual financial reports in 2018-2022

As it can be seen from the table above, the company has a fluctuating debt to equity ratio which is usually below one with the exception in 2020 when the company had to take on additional debt due to Covid-19. As of valuation date, December 31st, 2022, "Novaturas" AB debt to equity

ratio was 64.5% which results in the weight of the company's equity in the total capital of 60.8%, while 39.2% of the capital is formed by debt. Net debt of the company by the end of December 2022 was 6.4 million Euro (9.2 million Euro of debt liabilities and 2.7 million Euro of cash). The table above also illustrates low capital expenditure need by the company, with annual capital expenditure amounting maximum to 0.5 million Euro and relevant to sales not exceeding 0.5% throughout the period between 2015 and 2022. Low capital expenditure need is defined by the company's management as one of the reasons why "Novaturas" AB can pay regular dividends to shareholders in addition to large cash flows from operations ("Novaturas" AB consolidated annual report 2018). In the annual report of the company in 2018, it is stated that the Board of the company intends to pay out between 70% and 80% of net profit as dividends. During 2015-2017 the company paid out even larger amounts than the annual net profit as dividends, while in 2018 exactly 75% of net profit was distributed as dividends. In 2019, due to emergence of the COVID-19 pandemic, the decision was made not to pay dividends, while during 2020-2022 dividends were not paid because of low net profit generated by the company.

To summarize, "Novaturas" AB is capable of generating significant cash flows with minimal investment. However, its business model is very sensitive to external factors which are difficult to foresee. Due to this, 10-year explicit period was chosen in the company's valuation, to allow to factor in and model different scenarios that affect the company's performance. Shorter explicit period would require assigning more value to the Terminal value of the business which is usually calculated based on stable performance assumptions.

In a stable environment, the company is able to generate high returns on its assets and capital and in case of increased demand it can relatively easily serve more clients because it does not rely on investment to expand the capacity. Due to these characteristics of the company, further in the paper the top-down approach is used to evaluate its market size, define the potential market share, estimate revenues and investment needed to achieve these revenues. These inputs are then used to forecast free cash flow to firm during the explicit period, to estimate terminal value of the business and finally to calculate the enterprise value which helps to define the intrinsic value of the business.

3.2 Market research

In order to estimate potential revenue of the company, market size should be defined. Since "Novaturas" AB primarily focuses on international travelling and serves clients in the Baltic states,

people from Lithuania, Latvia and Estonia engaged in the foreign tourism are considered as market size available for the company. In its initial public offering prospectus, the company defined its potential customer base as people who travel internationally for personal purposes and the duration of the trip is at least four days ("Novaturas" AB initial public offering prospectus, 2018). The table below provides a share of population in each of the Baltic states engaged in this type of tourism.

Table 10. Share of population travelling internationally for personal purposes, duration 4 nights or longer

% of population	2015	2016	2017	2018	2019	2020	2021	2022	Average*
Lithuania	21.1%	20.7%	21.5%	20.7%	21.5%	4.6%	5.4%	16.3%	**21.1%**
Latvia	18.2%	20.1%	34.3%	22.9%	22.2%	8.8%	12.5%	24.2%	**23.5%**
Estonia	24.7%	26.6%	21.0%	31.9%	32.4%	12.9%	13.7%	25.9%	**27.3%**

Source: compiled by the author based on Eurostat data, 2023
**represents the average share excluding COVID-19 pandemic years (2020 and 2021)*

Taking into account the total population of the Baltic states' countries in the respective years, the total market size was defined (size of the population times share of population engaged in international travelling).

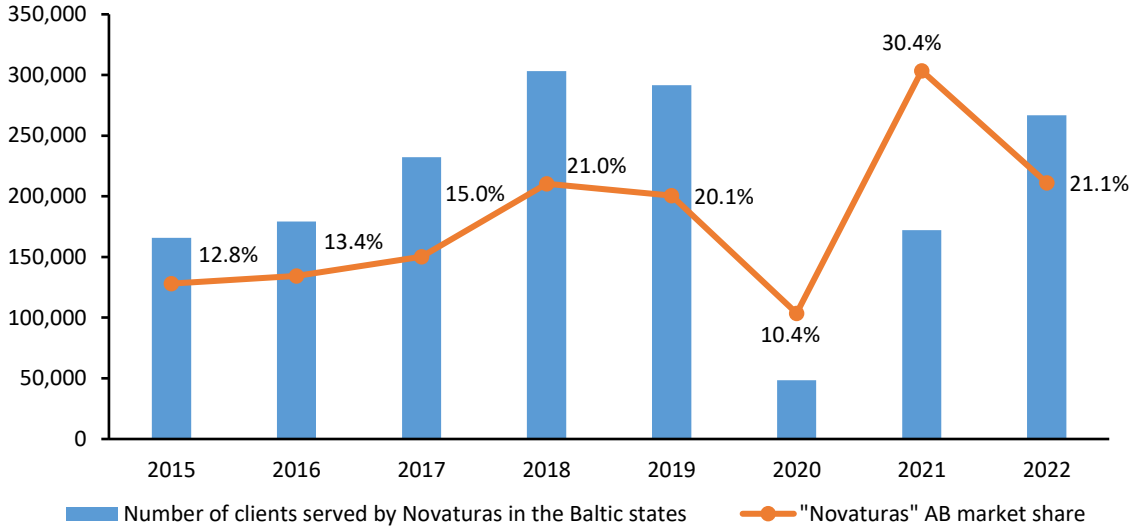
Table 11. Estimated number of people travelling internationally for at least 4 days for personal purposes

Individuals	2015	2016	2017	2018	2019	2020	2021	2022
Lithuania	611,774	593,437	606,692	581,039	599,343	128,285	150,248	462,124
Latvia	357,791	391,692	663,046	440,385	423,383	167,007	234,731	457,397
Estonia	324,122	349,371	275,881	420,143	429,507	171,693	181,688	344,936
Total	**1,293,687**	**1,334,500**	**1,545,619**	**1,441,567**	**1,452,233**	**466,985**	**566,667**	**1,264,457**

Source: compiled by the author based on Eurostat data, 2023

As can be seen from the table above, approximate market size in the Baltic states was between 1.3 and 1.5 million people in the pre-pandemic years. During the Covid-19, market size shrank significantly simply due to travel restrictions. From 2022, the addressable market started growing again and most likely will reach pre-pandemic years level in the near future. Based on the estimated size of the market and number of passengers "Novaturas" AB served in the respective years, the market share of the company was calculated and is provided in the graph below.

Figure 3. Number of clients served by "Novaturas" AB and estimated market share



Source: compiled by the author based on "Novaturas" AB and Eurostat data

The market share of the company increased from approximately 13% to 20% during 2015 – 2019. Looking at 2020 – 2022 it seems that the company was efficient rebounding from the pandemic and was aggressively taking market share in 2021, however, data during COVID-19 might be skewed due to extraordinary circumstances. In 2022 the company's estimated market share amounted to approximately 21% which is at the same level as in 2018 when the company served record number of customers. Based on the Eurostat demographic projections and using the average pre-pandemic share of internationally travelling population (as indicated in the Table 10 last column), the market size for the next ten years was estimated and is provided in the table below. The inputs for forecasting market size are provided in Annex 2.

Table 12. Forecasted market size in the Baltic states

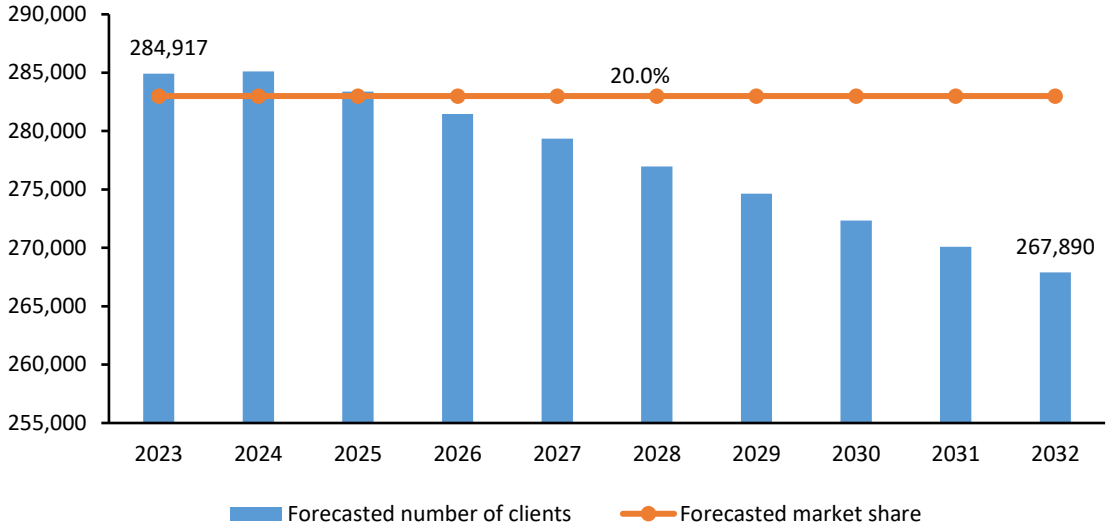
Individuals	**2023**	**2024**	**2025**	**2026**	**2027**	**2028**	**2029**	**2030**
Lithuania	604,811	606,038	602,930	599,054	594,393	588,842	583,363	577,943
Latvia	445,352	442,826	438,049	433,187	428,198	423,033	417,949	412,949
Estonia	374,424	376,700	375,980	375,116	374,115	372,969	371,864	370,819
Total	**1,424,587**	**1,425,565**	**1,416,960**	**1,407,357**	**1,396,707**	**1,384,844**	**1,373,177**	**1,361,712**

Individuals	**2031**	**2032**
Lithuania	572,567	567,280
Latvia	408,049	403,304
Estonia	369,812	368,869
Total	**1,350,428**	**1,339,452**

Source: compiled by the author based on Eurostat data

It can be seen that based on these assumptions market size is expected to increase in 2023 as full recovery of travel industry after the COVID-19 is expected, However, during the ten-year period the addressable market gradually declines which is due to forecasted decrease in the population of the Baltic states. The company's management expects to serve between 270 – 290 thousand of passengers in 2023 (AB "Novaturas" 2022 12 months results presentation). Assuming an average of 280 thousand passengers served it results in expected 19.7% market share. Taking into account previous results of the company, an approximate 20% market share in the Baltic states market seems reasonable and achievable. Accordingly, for the Base case scenario, an assumption of constant 20% market share of "Novaturas" AB for the next ten years is made. The resulting number of clients served is demonstrated in the graph below.

Figure 4. Forecasted number of clients served by "Novaturas" AB and assumed market share



Source: compiled by the author

Based on the forecast above, the number of clients served by the company would decrease by 6% from 2023 to 2032 which is the same rate as the decline of market size. Moreover, with these assumptions "Novaturas" AB would serve a maximum of 285 thousand passengers per year which is below levels achieved by the company in 2018 and 2019 (303 and 291 thousand respectively).

In order to derive the forecasted revenue of the company the income per trip should be taken into account. The table below demonstrates average expenditure per trip in the company's main markets, European Union and the actual historical average revenue per trip for the company.

Table 13. Average expenditure per trip in the Baltic states, European Union and the company's average revenue per passenger

EUR	**2015**	**2016**	**2017**	**2018**	**2019**	**2020**	**2021**	**2022**
Lithuania	538	562	553	549	547	625	554	547
Latvia	435	472	562	465	636	666	787	772
Estonia	759	738	879	1,040	1,157	1,310	1,032	1,395
EU	865	887	1,031	1,080	1,030	863	954	1,092
Company	**597**	**563**	**604**	**596**	**612**	**678**	**634**	**737**

Source: compiled by the author based on Eurostat data, "Novaturas" AB initial public offering prospectus (2018), "Novaturas" AB consolidated annual financial reports in 2018, 2020 and 2022

In order to forecast how the revenue per passenger will change in the future, the expected growth in GDP per capita was used. The table below demonstrates the forecast.

Table 14. "Novaturas" AB revenue per passenger forecast

GDP per capita growth, %	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032
Lithuania	4.5%	6.0%	5.6%	5.5%	4.9%	4.9%	n.d.	n.d.	n.d.	n.d.
Latvia	4.4%	5.1%	5.5%	5.5%	5.3%	5.4%	n.d.	n.d.	n.d.	n.d.
Estonia	1.4%	4.7%	4.8%	5.0%	5.0%	4.9%	n.d.	n.d.	n.d.	n.d.
EU	4.2%	3.6%	4.1%	3.9%	3.6%	3.5%	3.5%	3.5%	3.5%	3.5%
Average revenue per passenger, EUR										
"Novaturas" AB	**762**	**803**	**845**	**890**	**935**	**983**	**1,017**	**1,053**	**1,090**	**1,129**

Source: compiled by the author based on International Monetary Fund data

Based on these assumptions revenue per passenger would grow at the rate of the economy and would reach European Union average expenditure per trip of 2022 in 2032 only.

The performed market research helped to define the market size available for the company. It was estimated that the market size in the Baltic states will amount to approximately 1.42 million travelers in 2023. Given the demographic trends, market size is expected to shrink gradually during the forecast period and amount to approximately 1.34 million by the end of 2032. The assumption was made that "Novaturas" AB will maintain steady market share of 20% which would result in 285 thousand clients in 2023 which will gradually decrease to 268 thousand by the end of 2032. Finally, the expectations regarding GDP per capita growth was used to forecast revenue per client for the company. These assumptions were employed further to project "Novaturas" AB financial results and free cash flow to firm.

3.3 Financial results and free cash flow to firm forecast

Historical analysis of the company's results and market research created a basis for financial results forecast. Having an estimate of the number of passengers and revenue per passenger allowed to forecast the top line of the company. In order to estimate an operating profit, EBIT margin was used. Since most of "Novaturas" AB expenses are variable, cost of goods sold and operating expenses were not distinguished, instead operating margin was used to estimate operating performance. The management of the company expected an EBIT margin between 1.3% and 2.1% for the financial year 2023. Considering historical operating margins of the business which ranged between 2.1% and 7.4% (pre-pandemic levels) and more recently between -10.8% and 2.2.% (2020-2022), such level seems reasonable, subject to no unexpected events that could alter the operating performance. Accordingly, for the Base case scenario, a constant EBIT margin of 1.7% was used in the forecast.

In order to derive the expected free cash flow to the firm, expenses on taxes shall be estimated, non-cash items such as depreciation and amortization shall be eliminated from operating profit and investment into long-term assets as well as for working capital needs shall be taken into account. For taxes, a marginal tax rate in Lithuania of 15% was applied on forecasted EBIT in the first year of the forecast which was gradually increased to 17.4% by the end of the ten-year period. The increase was applied to take into account the potential tax effect on activities in Latvia and Estonia where tax is applied only when distributing dividends with 20% tax rate. Accordingly, the assumption is that the subsidiaries eventually will have to distribute dividends which will be taxed and 17.4% effective tax rate is weighted tax rate of three countries, weighted by amount of revenue generated by the company in each country. The table below illustrates the calculation of the effective tax rate.

Table 15. Calculation of the effective tax rate for the company

%	**Tax Rate**	**Weight**
Lithuania	15%	51.9%
Latvia	20%	18.7%
Estonia	20%	29.4%
Effective tax rate	**17.4%**	

Source: compiled by the author

Additionally, accumulated tax losses of 4.5 million Euro as of valuation date were taken into account and reduced the tax payable until fully utilized. Since non-cash expenses and capital expenditures are not significant for the company due to assets-light operating model, a simplified approach was used to forecast it. Depreciation and amortization were assumed to growth at the same rate as revenues, while for capital expenditure 0.24% from sales was assumed in each year (the company's average for 2015 – 2022 excluding 2020-2021 to eliminate the COVID-19 effect).

Finally, working capital was forecasted using the average working capital to sales ratio during 2015-2022, excluding the years 2020 and 2021. Accordingly, -6.6% working capital to revenue ratio was applied in the forecast. As described in the historical results analysis section, the working capital of the company is negative and as such, growth in revenue results in growing cash inflows for the business.

Based on the described assumptions the simplified income statement, balance sheet and cash flow statement for the company were forecasted. The projected financials statements and assumptions used in the forecast are provided in Annexes 3-6.

The assumptions described in this section were used to estimate the free cash flow to firm during the explicit period (the forecast is provided further in the section 3.5). However, to estimate the Enterprise value and equity value of the business these cash flows should be discounted to present value with the weighted average cost of capital as well as Terminal value of the business has to be measured.

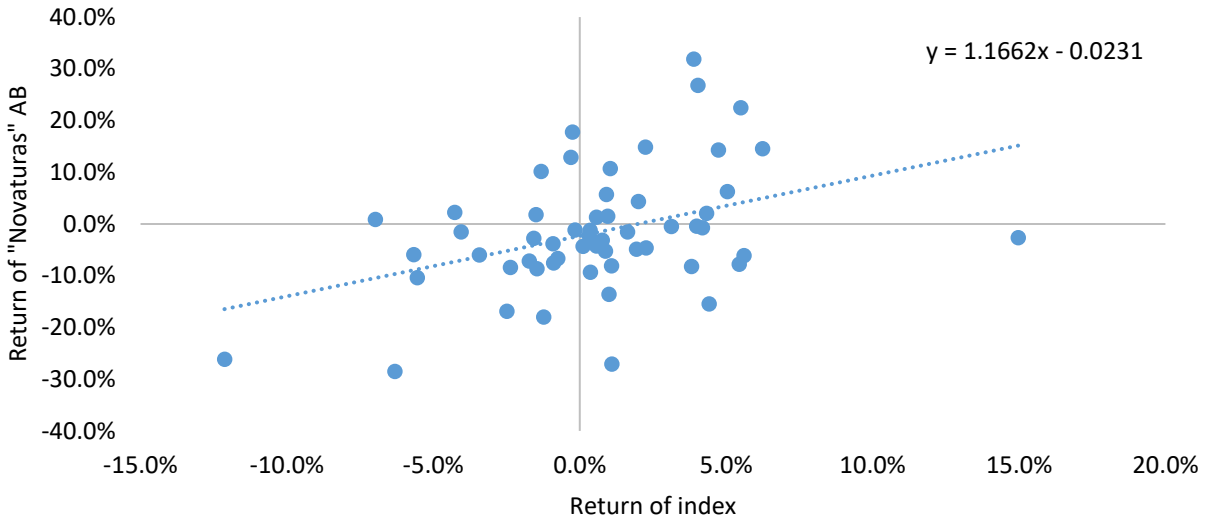
3.4 Estimation of weighted average cost of capital for "Novaturas" AB

The weighted average cost of capital for the company was estimated using actual cost of debt of "Novaturas" AB as of valuation date and adjusting it for expected changes as well as taking into account effect of the tax shield, while cost of equity was calculated using the capital asset pricing model.

For cost of equity estimation, risk-free rate was assumed to be Lithuania's 10-year government bond yield by the end of December 2022 which was 4.65% (Trading Economics, 2023). As a market risk premium (additional return from investing into stocks above the risk-free rate) for Lithuania 7.53% was used based on Damodaran's calculation which estimates the implied risk premium of the mature market and adjusts for the specific country's risk premium (Damodaran, 2023).

The beta coefficient for "Novaturas" AB was estimated using monthly company's returns since its listing on Nasdaq Vilnius stock exchange and its variance versus local Nasdaq Vilnius index returns (OMXVGI). The monthly returns of the stock and the index are provided in Annex 7. The result of covariance is depicted in the graph below.

Figure 5. Estimation of "Novaturas" AB beta coefficient



Source: compiled by the author based on Nasdaq Vilnius data

Using the inputs described above, total cost of equity of 13.44% was computed for the company. Since the company's cost of debt as of valuation date was only 4.2%, which was due to the fact that the company had state granted support loans granted during the COVID-19 with favorable interest rate, the actual cost of debt for the company was calculated using its average margin on loans from banks (3.6%) plus 3-month Euribor forecast (projected by the European Central Bank). This resulted in estimated cost of debt of 6.5% by the end of 2023 which declined to 6.1% by the end of 2025 due to expected decrease in the Euribor rate. To estimate the after-tax cost of debt the expected effective tax rate was used.

Finally, to calculate the cost of capital debt-to equity ratio of the company as of December 31, 2022, was used, which implies 60.8% of the capital constituted by equity and 39.2% by debt. The table below displays the weighted average cost of capital forecast during the explicit period.

Table 16. Weighted average cost of capital estimation

	2023	2024	2025	2026	2027
Risk-free rate	4.65%	4.65%	4.65%	4.65%	4.65%
Market risk premium	7.53%	7.53%	7.53%	7.53%	7.53%
Beta	1.17	1.17	1.17	1.17	1.17
Cost of equity	13.44%	13.44%	13.44%	13.44%	13.44%
Pre-tax cost of debt	6.50%	6.30%	6.10%	6.10%	6.10%
Assumed tax rate	15.0%	15.3%	15.5%	15.8%	16.1%
Cost of debt	5.53%	5.34%	5.15%	5.14%	5.12%
Debt to equity ratio	64.5%	64.5%	64.5%	64.5%	64.5%
Equity in total capital	60.8%	60.8%	60.8%	60.8%	60.8%
Debt in total capital	39.2%	39.2%	39.2%	39.2%	39.2%
WACC	**10.33%**	**10.26%**	**10.19%**	**10.18%**	**10.18%**

	2028	2029	2030	2031	2032
Risk-free rate	4.65%	4.65%	4.65%	4.65%	4.65%
Market risk premium	7.53%	7.53%	7.53%	7.53%	7.53%
Beta	1.17	1.17	1.17	1.17	1.17
Cost of equity	13.44%	13.44%	13.44%	13.44%	13.44%
Pre-tax cost of debt	6.10%	6.10%	6.10%	6.10%	6.10%
Assumed tax rate	16.3%	16.6%	16.9%	17.1%	17.4%
Cost of debt	5.10%	5.09%	5.07%	5.05%	5.04%
Debt to equity ratio	64.5%	64.5%	64.5%	64.5%	64.5%
Equity in total capital	60.8%	60.8%	60.8%	60.8%	60.8%
Debt in total capital	39.2%	39.2%	39.2%	39.2%	39.2%
WACC	**10.17%**	**10.16%**	**10.16%**	**10.15%**	**10.14%**

Source: compiled by the author based on European central Bank, Damodaran, "Novaturas" AB financial statements data

The calculated weighted average cost of capital in the Base case scenario was used to discount forecasted free cash flow to firm to present value and derive enterprise value and equity value of the company.

3.5 Estimation of "Novaturas" AB enterprise and equity value

The enterprise value of the company was calculated by discounting forecasted free cash flow to firm at the estimated discount rates. The free cash flow to firm at the terminal year was assumed keeping the number of clients served constant as in the last year of explicit period and accounting only for an increase in average price per passenger. Constant growth rate was assumed at 2% which is an annual long-term inflation target in the Euro zone.

The table below displays "Novaturas" AB forecasted free cash flow to firm and the discounted cash flow valuation in the Base case scenario.

Table 17. "Novaturas" AB Enterprise value estimation, Base case scenario

Thousand Euro	**2023**	**2024**	**2025**	**2026**	**2027**	**2028**
Sales	217,160	228,826	239,536	250,524	261,263	272,123
Growth rate	*10.4%*	*5.4%*	*4.7%*	*4.6%*	*4.3%*	*4.2%*
Cost of sales, selling, administrative and other operating expenses	-213,464	-224,932	-235,459	-246,260	-256,816	-267,492
Growth rate	*8.7%*	*5.4%*	*4.7%*	*4.6%*	*4.3%*	*4.2%*
EBIT	**3,696**	**3,895**	**4,077**	**4,264**	**4,447**	**4,632**
EBIT margin	*1.70%*	*1.70%*	*1.70%*	*1.70%*	*1.70%*	*1.70%*
Taxes	-166	-308	-633	-674	-715	-757
EBIT *(1-t)	**3,530**	**3,587**	**3,444**	**3,590**	**3,732**	**3,875**
D&A (+)	268	282	297	313	329	345
CAPEX (-)	524	553	578	605	631	657
Change in WC (-)	-2,662	-770	-707	-725	-708	-717
FCFF	**5,935**	**4,086**	**3,869**	**4,023**	**4,139**	**4,280**
WACC	**10.33%**	**10.26%**	**10.19%**	**10.18%**	**10.18%**	**10.17%**
Discount factor	1.10	1.22	1.34	1.48	1.63	1.79
Present value	**5,379**	**3,359**	**2,886**	**2,724**	**2,543**	**2,387**

Thousand Euro	**2029**	**2030**	**2031**	**2032**	**TY**	**TV**
Sales	279,348	286,785	294,440	302,347	308,394	
Growth rate	*2.7%*	*2.7%*	*2.7%*	*2.7%*	*2.0%*	
Cost of sales, selling, administrative and other operating expenses	-274,593	-281,904	-289,428	-297,201	-303,145	
Growth rate	*2.7%*	*2.7%*	*2.7%*	*2.7%*	*2.0%*	
EBIT	**4,755**	**4,881**	**5,012**	**5,146**	**5,249**	
EBIT margin	*1.70%*	*1.70%*	*1.70%*	*1.70%*	*1.70%*	
Taxes	-789	-824	-859	-896	-914	
EBIT *(1-t)	**3,965**	**4,058**	**4,153**	**4,250**	**4,335**	
D&A (+)	358	370	383	397	411	
CAPEX (-)	675	692	711	730	745	
Change in WC (-)	-477	-491	-505	-522	-399	
FCFF	**4,125**	**4,226**	**4,330**	**4,439**	**4,400**	**54,038**
WACC	**10.16%**	**10.16%**	**10.15%**	**10.14%**	**10.14%**	
Discount factor	1.97	2.18	2.40	2.64	2.64	
Present value	**2,089**	**1,943**	**1,807**	**1,682**		**20,474**

Source: compiled by the author

The table below summarizes the valuation as of December 31, 2022.

Table 18. Valuation summary, Base case scenario

Valuation date	**2022-12-31**
Present value of explicit period	26,799
Present value of Terminal value	20,474
Enterprise value	**47,273**
Net debt as of valuation date	6,437
Equity value	**40,836**

Source: compiled by the author

In the Base case scenario, the value of business operations was estimated at 47.2 million euro. Taking away net debt as of valuation date, the value of equity of "Novaturas" AB equals to 40.8 million Euro, or 5.23 Euro per share, which is 80% more than the company's market capitalization at the same date (22.6 million Euro or 2.90 Euro per share). This confirms the first hypothesis of the thesis which stated that the value calculated using the Enterprise discounted cash flow model in the Base case scenario will differ significantly from the market value of the company as of valuation date because it assumes steady and consistent performance of the business while not accounting for uncertainty factor in the performance of the business results.

Naturally, the question arises whether the Base case valuation makes sense because the market clearly values the company significantly lower. Looking at the forecast of cash flows and assumptions made, there is no clear indication that it is too conservative. Revenues growth at the modest rates given the overall inflation, operating margin of 1.7% is significantly lower than in pre-pandemic years and even in 2021. The forecasted indicators of return are also below the historical performance of the company, as displayed in the table below.

Table 19. Forecasted indicators of return, Base case scenario

%	**2023**	**2024**	**2025**	**2026**	**2027**	**2028**	**2029**	**2030**	**2031**	**2032**	**TY**
ROE	19.9%	19.3%	17.5%	17.4%	17.3%	17.2%	16.8%	16.4%	16.0%	15.7%	15.3%
ROA	4.9%	4.6%	4.2%	4.2%	4.3%	4.3%	4.3%	4.2%	4.2%	4.2%	4.2%
ROCE	14.8%	14.5%	13.4%	13.5%	13.6%	13.6%	13.4%	13.3%	13.1%	13.0%	12.8%

Source: compiled by the author

Given that during 2015 – 2019 the company generated on average 31.9% return on equity, 10.6% return on assets and 23.8% return on capital employed, the expected returns do not look too optimistic. Even when including years during the pandemic, the company's average return indicators during 2015 – 2022 were 15.8%, 5.2% and 14.4% on equity, assets and invested capital respectively. Accordingly, the conclusion could be made that the market does not believe that the company could operate steadily and profitably for an extended period of time and generate

consistent cash flow for investors. Probably the potential investor in the company would use a considerably higher discount rate than estimated in the valuation just to account for the riskiness of forecasted cash flows to arrive at the value which is closer to the market value of the business. However, such an approach, even though often used in practice, is not correct because it raises the question of how to define a correct discount rate and how to avoid subjectivity in selecting the discount rate. For this reason, a valuation model which takes into account the uncertainty associated with the forecast was constructed.

To conclude, the calculated value of "Novaturas" AB in the Base case scenario amounts to 40.8 million Euro and is significantly higher than the market price of the company. Although the assumptions made in the valuation do not seem to be too optimistic, however, they are based on the premise that the business will operate in a steady environment with growing revenue and constant profitability margin. The market price of the company indicates that stock buyers do not believe that the company could operate in such conditions and price in a potential decline in the business cashflows. When performing a discounted cash flow valuation, such situation could be tempting to artificially inflate the discount rate in order to reduce the enterprise value and make it closer to the market value, main argument being that discount rate is increased due to high risk associated with the company's forecasted cashflows. However, this approach lacks scientific justification and exposes the valuation to subjectivity of an appraiser, because modifications in the discount rate allows to virtually reach any value of an appraiser's choice. Due to this reason, the preferred approach is to adjust the forecasted cashflows, taking into account the potential impact of uncertainty associated with the business model.

3.6 Valuation of "Novaturas" AB taking into account uncertainty

The types of uncertainty which affects "Novaturas" AB and its valuation the most are economic uncertainty and discrete uncertainty because economic shocks or unexpected events in the world might have considerable impact to the company. However, the enterprise is also exposed to estimation uncertainty (due to difficulty in accurately forecasting key performance drivers) as well as micro and continuous uncertainty due to the fact that the business model of the company is relatively easy to replicate which could result in more competition and lower profitability margins for "Novaturas" AB.

In order to perform the valuation which considers potential uncertainty impact for the company, Monte Carlo simulation was performed. The inputs for which random values will be assigned were selected. In the case of the company, four input types were chosen:

1. The number of clients served which is primary driver of the revenue of "Novaturas" AB.
2. Operating (EBIT) margin which defines profitability and company's ability to generate operating cash flow.
3. Working capital level which affects investment required for the working capital needs.
4. Debt to equity ratio which influences the company's capital structure and the cost of capital.

To simulate the number of clients, a uniform distribution was chosen with a minimum value of 48 thousand and maximum of 335 thousand. The minimum value selected represents a number of clients which was served by the company in 2020, during the global pandemic which greatly limited international travelling, while the maximum value represents 25% market share for the company by the end of the explicit period (as opposed to 20% market share used in the Base case scenario). The uniform distribution allows the forecasted number of clients to change randomly within the set interval with all outcomes being equally likely. Such distribution type was selected to account for uncertainty in the international travelling which might be caused by pandemics, wars, natural or climate disasters. Since there is no way to foresee these events, each value of the variable might be considered as equally plausible. For terminal value calculation the uniform distribution was also applied, however, the minimum value was changed to 166 thousand passengers which is the lowest number of customers served by the company during 2015 – 2022 excluding the pandemic years of 2020 and 2021. The differentiation was made because the terminal value should reflect business value in maturity phase for the infinite period of time and it is not likely that the business would operate in the stress conditions for an extended period of time.

In order to test scenarios in which the profitability of the company fluctuates due to unexpected circumstances, the simulation on operating margin (EBIT) was performed. A normal distribution was used with the mean value of 2% (which represents the company's average operating margin during 2015 – 2022) and standard deviation of 2.5% (calculated taking the company's operating profitability variation from mean during 2015 – 2022 but excluding 2021 as an outlier). Minimum value of -10.8% was set ("Novaturas" AB operating profitability in 2021) and maximum of 7.4% (the largest operating margin achieved by the company during 2015 – 2022. For the terminal value a uniform distribution with minimum value of 0% and maximum value of

2.0% was selected because terminal value calculation is very sensitive to fluctuations in margin and because that it is unlikely that the business would operate above its average margin for a long period of time or opposingly that it would keep operating if the EBIT margin was negative.

Since working capital is an important factor for "Novaturas" AB business, it was also assigned variable value. For this purpose, a normal distribution was chosen with a mean value of -6.6% of working capital to sales ratio, which represents the company's average working capital to sales ratio during 2015 – 2022 (but excluding 2020 and 2021). Standard deviation of 0.9% was calculated using the same assumptions as for the mean value. A minimum value allowed was set at -19.1%, considering the level which the company had in 2020. A maximum value was set as 0% of sales, acknowledging that it is possible that in the future the company will not be able to finance its activities using its suppliers' and clients' funds at the extent it did historically. Due to sensitivity of a change in the working capital at the terminal year for the company's continuing value, working capital at the terminal year was set to be equal to the working capital at the year 10 of explicit forecast in order to prevent inflated terminal value due to effect of change in the working capital.

Considering that the company's debt to equity ratio tends to fluctuate frequently and given that it might be increased or decreased depending on the shareholder's and management's risk appetite, the simulation was performed on it as well. The uniform distribution was chosen with minimal value of 33% and maximum value of 124% representing the lowest and the highest values of the ratio for the company during 2015 – 2022. The management of the company is very likely to change the company's capital structure by adopting decisions to either borrow funds or pay out dividends or simply by adapting to the business situation. Such decisions would change the business' capital structure (making the share of equity or debt in the total capital higher). This in turn, would affect the weighted average cost of capital and the value of the company. Due to the reason that changes in the company's capital structure are difficult to predict, uniform distribution was chosen. For the terminal value the simulation was not performed and debt to equity ratio of 69% was used (the average for the company during 2015 – 2022, excluding outliers in 2020 and 2021) considering that in the long-term the company would operate with the capital structure close to its average.

The table below summarizes key assumptions which were used for the simulation.

Table 20. Summary of simulation assumptions

	Distribution	Minimum value	Mean	Maximum value	Standard deviation
Number of clients, individuals	Uniform	48,400	n.a.	334,863	n.a.
Operating margin, %	Normal	-10.8%	2.0%	7.4%	2.5%
Working capital to sales level, %	Normal	-19.1%	-6.6%	0.0%	0.9%
Debt to equity ratio, %	Uniform	32.6%	n.a.	124.1%	n.a.

Source: compiled by the author

Using the assumptions described above, 100 thousand trials were performed to measure the value of the company in the various scenarios. Below one of 100 thousand trial discounted cash flow valuation results are displayed. Assumption values and consolidated forecasted financial statements in this trial are provided in the Annexes 8-11.

Table 21. Weighted average cost of capital estimation in one trial of Monte Carlo simulation

	2023	2024	2025	2026	2027
Risk-free rate	4.65%	4.65%	4.65%	4.65%	4.65%
Market risk premium	7.53%	7.53%	7.53%	7.53%	7.53%
Beta	1.17	1.17	1.17	1.17	1.17
Cost of equity	13.44%	13.44%	13.44%	13.44%	13.44%
Pre-tax cost of debt	6.50%	6.30%	6.10%	6.10%	6.10%
Assumed tax rate	15.0%	15.3%	15.5%	15.8%	16.1%
Cost of debt	5.53%	5.34%	5.15%	5.14%	5.12%
Debt to equity ratio	78.5%	40.6%	106.3%	67.6%	40.6%
Equity in total capital	56.0%	71.1%	48.5%	59.7%	71.1%
Debt in total capital	44.0%	28.9%	51.5%	40.3%	28.9%
WACC	**9.96%**	**11.10%**	**9.17%**	**10.09%**	**11.04%**

	2028	2029	2030	2031	2032
Risk-free rate	4.65%	4.65%	4.65%	4.65%	4.65%
Market risk premium	7.53%	7.53%	7.53%	7.53%	7.53%
Beta	1.17	1.17	1.17	1.17	1.17
Cost of equity	13.44%	13.44%	13.44%	13.44%	13.44%
Pre-tax cost of debt	6.10%	6.10%	6.10%	6.10%	6.10%
Assumed tax rate	16.3%	16.6%	16.9%	17.1%	17.4%
Cost of debt	5.10%	5.09%	5.07%	5.05%	5.04%
Debt to equity ratio	48.9%	87.9%	83.5%	50.1%	69.3%
Equity in total capital	67.2%	53.2%	54.5%	66.6%	59.1%
Debt in total capital	32.8%	46.8%	45.5%	33.4%	40.9%
WACC	**10.70%**	**9.53%**	**9.63%**	**10.64%**	**10.00%**

Source: compiled by the author based on European central Bank, Damodaran, "Novaturas" AB financial statements data

**Blue color of cells indicates variable assumptions*

Table 22. "Novaturas" AB Enterprise value estimation in one trial of Monte Carlo simulation

Thousand Euro	**2023**	**2024**	**2025**	**2026**	**2027**	**2028**
Sales	168,061	85,450	43,369	116,166	121,379	146,189
Growth rate	*-14.5%*	*-49.2%*	*-49.2%*	*167.9%*	*4.5%*	*20.4%*
Cost of sales, selling, administrative and other operating expenses	-161,227	-82,013	-43,214	-109,594	-118,928	-141,565
Growth rate	*-17.9%*	*-49.1%*	*-47.3%*	*153.6%*	*8.5%*	*19.0%*
EBIT	**6,834**	**3,437**	**155**	**6,572**	**2,450**	**4,624**
EBIT margin	*4.07%*	*4.02%*	*0.36%*	*5.66%*	*2.02%*	*3.16%*
Taxes	-355	-525	-24	-1,038	-394	-755
EBIT *(1-t)	**6,479**	**2,913**	**131**	**5,533**	**2,057**	**3,869**
D&A (+)	268	282	297	313	329	345
CAPEX (-)	406	206	105	280	293	353
Change in WC (-)	-114	4,703	4,608	-6,659	653	-2,351
FCFF	**6,455**	**-1,714**	**-4,285**	**12,224**	**1,439**	**6,213**
WACC	**9.96%**	**11.10%**	**9.17%**	**10.09%**	**11.04%**	**10.70%**
Discount factor	1.10	1.22	1.33	1.47	1.63	1.80
Present value	**5,870**	**-1,403**	**-3,213**	**8,326**	**883**	**3,443**

Thousand Euro	**2029**	**2030**	**2031**	**2032**	**TY**	**TV**
Sales	293,837	240,752	283,262	94,797	259,538	
Growth rate	*101.0%*	*-18.1%*	*17.7%*	*-66.5%*	*173.8%*	
Cost of sales, selling, administrative and other operating expenses	-289,741	-241,028	-286,981	-94,838	-257,437	
Growth rate	*104.7%*	*-16.8%*	*19.1%*	*-67.0%*	*171.4%*	
EBIT	**4,096**	**-276**	**-3,719**	**-41**	**2,101**	
EBIT margin	*1.39%*	*-0.11%*	*-1.31%*	*-0.04%*	*0.81%*	
Taxes	-680	0	0	0	-110	
EBIT *(1-t)	**3,416**	**-276**	**-3,719**	**-41**	**1,992**	
D&A (+)	358	370	383	397	411	
CAPEX (-)	709	581	684	229	627	
Change in WC (-)	-10,109	2,442	-2,206	14,606	0	
FCFF	**13,173**	**-2,930**	**-1,814**	**-14,479**	**1,776**	**22,198**
WACC	**9.53%**	**9.63%**	**10.64%**	**10.00%**	**10.00%**	
Discount factor	1.98	2.17	2.40	2.64	2.64	
Present value	**6,665**	**-1,352**	**-757**	**-5,491**		**8,418**

Source: compiled by the author

The table below summarizes the one trial valuation result as of December 31, 2022.

Table 23. Valuation summary, in one trial of Monte Carlo simulation

Valuation date	**2022-12-31**
Present value of explicit period	12,972
Present value of Terminal value	8,418
Enterprise value	**21,389**
Net debt as of valuation date	6,437
Equity value	**14,952**

Source: compiled by the author

The tables above provided only one illustrative example of the performed simulation trial. It can be seen that in this specific case the equity value of "Novaturas" AB amounts to approximately 15 million Euro which is significantly lower than the value derived in the Base case scenario (40.8 million Euro). However, such value could be just an outlier and the simulation is constituted of multiple trials to derive most likely value of the business. The table below provides summarized results of the Monte Carlo simulation.

Table 24. Summary of the simulation results

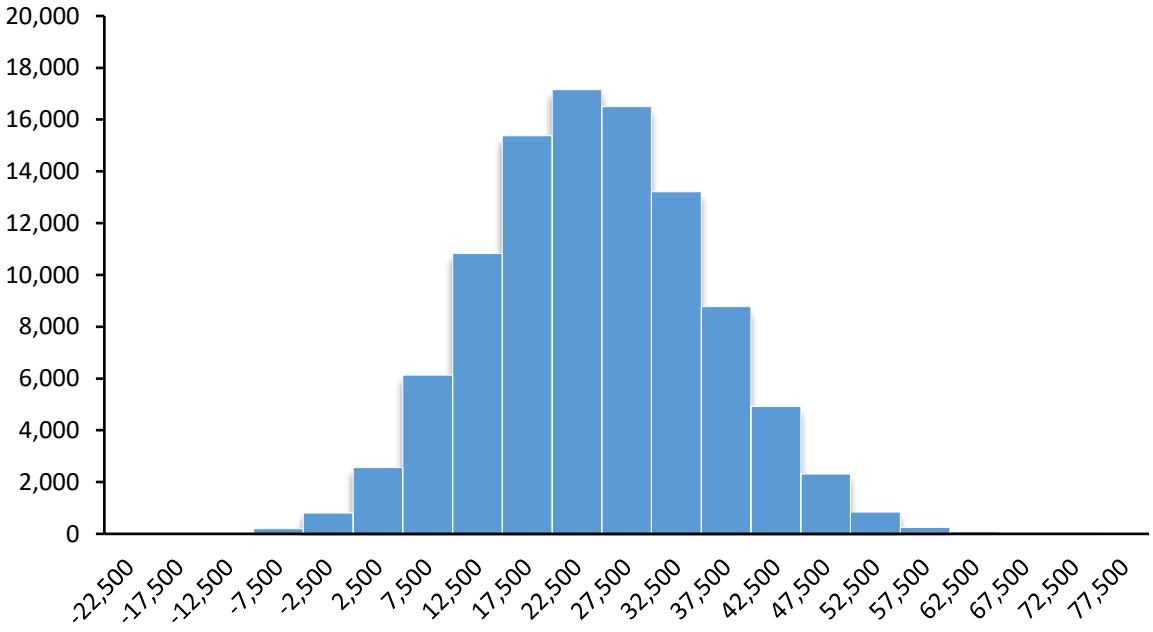
Mean	**21,835**
Number of Trials	100,000
Minimum	-23,468
Maximum	71,767
Median	**21,601**
Range	95,234
Standard Deviation	11,133

Source: compiled by the author

The range of results generated by simulation is between -23.5 million and 71.7 million with the median value of 21.6 million. The median value of the simulation represents the intrinsic value of "Novaturas" AB and is 47% lower than the value derived in the Base case scenario. Even though in the simulation there are values below zero, which is counter-intuitive, there are only few with 98% of trial results being positive. Values below zero display a situation in which the company's value of operations is less than its value of debt as of valuation day, resulting in the negative value of equity. The detailed results of the simulation are provided in the Annex 12.

The figure below provides a histogram of the simulation results distribution.

Figure 6. Histogram of the simulation results



Source: compiled by the author

The median value of the simulation represents a most likely single point estimate of value of the business. The fact that the median value of the simulation is close to the market value of the company (21.6 million Euro versus 22.6 million Euro) indicates that the market takes into account the uncertainty associated with "Novaturas" AB potential cash flows in its pricing. However, the simulation's results indicate that as of December 31, 2022, the company was still approximately 4.6% overvalued by the market.

In addition to the median value, the simulation approach allows to estimate probability intervals and probabilities for specific values. For example, based on the simulation results' market value of "Novaturas" AB represents percentile value of 53.5% meaning that there is 46.5% probability that the intrinsic value of the business exceeds its market value. An investor could also estimate a probability that the intrinsic value of the company is below its market value by x%. For example, 20% lower value than the market capitalization equals to 18.1 million Euro and according to the simulation, there is 37.9% chance that the intrinsic value is below that. The table below illustrates few examples of percentiles of specific values and provides a likelihood that the intrinsic value of "Novaturas" AB is at least the same or higher than the selected value.

Table 25. Percentiles and probabilities of selected equity values of "Novaturas" AB based on the simulation results

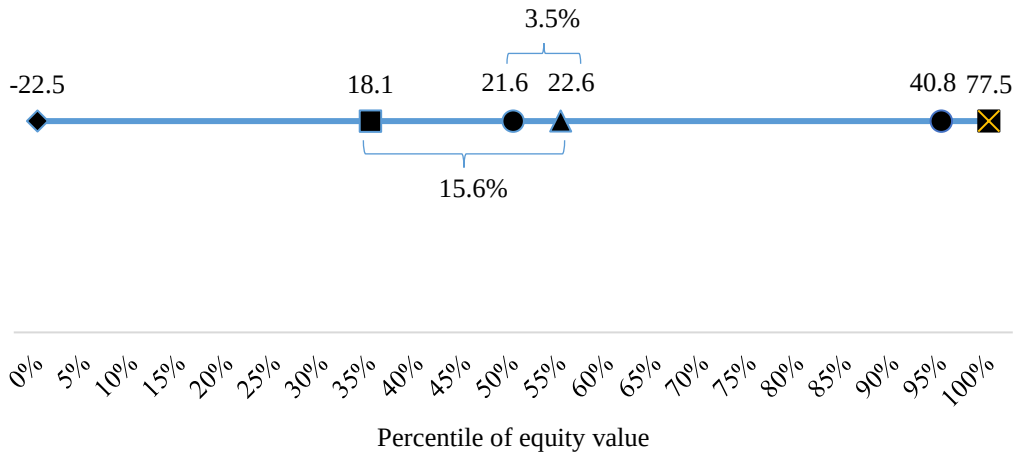
	Value, thous. Eur	Percentile	Probability that intrinsic value exceeds
Market value	**22,640**	**53.5%**	**46.5%**
Median value of simulation	21,601	50.0%	50.0%
Base case scenario	**40,836**	**95.2%**	**4.8%**
20% above market value	27,168	68.5%	31.5%
20% below market value	18,112	37.9%	62.1%
Zero value	0	2.0%	98.0%
Initial public offering value	**81,900**	**n.a.**	**0.0%**

Source: compiled by the author

As mentioned above, the table shows that the likelihood of the intrinsic value of "Novaturas" AB being at least equal to its market value is 46.5%. Based on the simulation results, the value derived in the Base case scenario is unlikely to be the intrinsic value of the company with only 4.8% probability of being higher or equal to it, while the initial public offering (IPO) price of the company was not even reached in any of the simulation trials and accordingly has 0% probability assigned to amount to it.

Moreover, based on the simulation results the probability ranges of selected values can be constructed. For example, the probability that the business value falls exactly between the median value of the simulation (21.6 million Euro) and the market value (22.6 million Euro) is 3.5%, while the probability that the business value is between 18.1 million Euro (20% discount from market value) and 22.6 million Euro (market value) is 15.6%. The graph below illustrates these probability intervals based on the simulation results and corresponding percentiles.

Figure 7. Probability intervals of selected values



Source: compiled by the author

Overall, the Monte Carlo simulation approach resulted in a more conservative valuation than the Base case scenario which is due to accounting for the impact of uncertainty embedded in the business model of "Novaturas" AB. The second hypothesis of the thesis stating that the median value of "Novaturas" AB equity value in the Monte Carlo simulation will be significantly lower than in the Base case scenario and closer to the market value of the company was confirmed. The median value of the simulation is 21.6 million Euro, only 4.6% lower than the market value of "Novaturas" AB equity (22.6 million Euro), while the Base case scenario estimated value of the company's equity was 40.8 million Euro.

To conclude, the discounted cash flow valuation taking into account uncertainty was performed using the Monte Carlo simulation approach. The simulation accounted for economic, discrete, estimation, micro and continuous uncertainty types by assigning random values to the four important valuation inputs: number of clients served, operating margin, working capital level and the company's capital structure. The simulation resulted in 21.6 million Euro intrinsic value of the business (median value of the simulation) which is significantly lower compared to the Base case scenario which assumed stable performance and did not account for potential impact of uncertainty. The simulation approach not only suggests that "Novaturas" AB might be overvalued in the market, but also provides means for an investor to estimate values and probabilities intervals in order to make more informed decisions.

CONCLUSIONS AND RECOMMENDATIONS

1. While the International Valuation Standards concentrate mostly on market value of a business (the value which arises from buying and selling companies in the open market), scientific literature supports the idea of an intrinsic value existence which correlates with the market value but is not necessarily the same. The intrinsic value depends heavily on a business fundamentals and ability to generate future cash flows for its owner. It is suggested that in cases when the equity markets are not efficient, the intrinsic value of a business could differ significantly from its market price. Intrinsic value is associated with the investment value and provides an understanding of how much a business is worth without assuming the sale of it.
2. Three traditional business valuation methods address different perspectives and purposes of valuation. The income approach assumes the value when a business is not sold but kept by the owner or investor and the value of a business is a present value of its cash flows generated over time. Accordingly, the income approach is used when an intrinsic value of a business needs to be determined. The income approach is primarily based on measuring how much value will be created by a business in terms of future cash flow generated.
3. The discounted cash flow method is usually applied within the income approach valuation. While there are different methods within the discounted cash flow method, the Enterprise discounted cash flow model is the most universal and widely used. The model requires forecasting the free cash flow to firm which is the cash flow generated by a business and available for its investors and creditors. The weighted average cost of capital is used to discount forecasted cash flows to the present value because it reflects the cost of capital of both sides: investors (through the cost of equity) and creditors (through the cost of debt). However, the key input of the Enterprise discounted cash flow model is the free cash flow to firm which firmly depends on the quality of the financial results forecast of the business being valued.
4. Uncertainty is faced on many occasions when performing valuations. It is especially relevant for the intrinsic value estimation, which requires employing the income approach and discounted cash flow method as it requires projections of the financial results of a business being valued. As it is impossible to accurately predict the future, the investors should take uncertainty into account when building valuation models. Scientific literature identifies different types of uncertainty and proposes some solutions on how to tackle it in the discounted cash flow valuations. However, there is still a gap of the new research in the intrinsic value

estimation when facing great uncertainty (such as COVID-19, global disruptions of supply chains or emergence of wars).

5. In order to illustrate the discounted cash flow valuation which takes into account uncertainty, the research plan was proposed. Two valuation scenarios were constructed: Base case which forecasts business performance assuming stable operating conditions and the second scenario which takes into account uncertainty by employing the Monte Carlo simulation approach within the discounted cash flow model. Travel tours organization company "Novaturas" AB was selected as a research object because its business model significantly depends on the external circumstances outside of the company's control.
6. "Novaturas" AB historical results were analyzed as well as the market in which the company operates. The analysis allowed to better understand the key drivers of the business, define market trends and size, estimate the company's historical and expected market share.
7. Based on the market research, historical analysis of the company and the plans indicated by "Novaturas" AB management, the business financial results forecast was performed which assumed stable performance of the company. This forecast was used to derive the free cash flow to firm, estimate weighted average cost of capital and perform a Base case scenario valuation using the Enterprise discounted cash flow model. The valuation resulted in the 47.3 million Euro Enterprise value (value for both shareholders and creditors) and 40.8 million equity value of the company which is 80% more than the company's market capitalization (22.6 million Euro). Although the assumptions made in the valuation do not seem to be too optimistic, they are based on the premise that the business will operate in a steady environment with growing revenue and constant profitability margin. The market price of the company indicates that stock buyers do not believe that the business could achieve such conditions and price in a potential decline in the business cashflows.
8. The Base case scenario valuation confirmed the first hypothesis of the paper which stated that the value calculated using the Enterprise discounted cash flow model in the Base case scenario will differ significantly from the market value of the company as of valuation date because it assumes steady and consistent performance of the business while not accounting for uncertainty factor in the performance of the business results.
9. In order to account for uncertainty associated with the "Novaturas" AB business, the Monte Carlo simulation method was applied. The simulation accounted for economic, discrete,

estimation, micro and continuous uncertainty types by assigning random values (based on selected probability distributions) to the four important valuation inputs: number of clients served, operating margin, working capital level and the company's capital structure. By performing multitude trials, 100 thousand different financial forecasts of the business were made followed by the same number of the Enterprise discounted cash flow model results. The analysis of the simulation results implied 21.6 million Euro intrinsic value of the business (median value of the simulation) which is significantly lower than in the Base case scenario which assumed stable performance of the company and did not account for potential impact of uncertainty.

10. The performed simulation approach Enterprise discounted cash flow valuation confirmed the second hypothesis of the thesis stating that the median value of "Novaturas" AB equity value in the Monte Carlo simulation will be significantly lower than in the Base case scenario and closer to the market value of the company. The median value of the simulation resulted in 21.6 million Euro, only 4.6% lower than the market value of "Novaturas" AB equity (22.6 million Euro), while the Base case scenario estimated value of the company's equity was 40.8 million Euro.
11. The simulation approach not only suggests that "Novaturas" AB might be overvalued in the market, but also provides means for an investor to estimate values and probabilities intervals in order to make more informed decisions. For example, the results of the simulation imply that the likelihood of the intrinsic value of "Novaturas" AB being at least equal to its market value is 46.5%, while the probability that the company's intrinsic value is 20% higher than its market value is equal to 31.5%. The probability that the business value falls exactly between the median value of the simulation (21.6 million Euro) and the market value (22.6 million Euro) is 3.5%, while the probability that the business value is between 18.1 million Euro (20% discount from market value) and 22.6 million Euro (market value) is 15.6%.
12. Since uncertainty is not avoidable when making predictions about the future, it is recommended to employ the framework of Monte Carlo simulation within the discounted cash flow model not only in the cases where uncertainty embedded in the business model is substantial but also in every discounted cash flow valuation. The simulation method serves as a good credibility check of the valuation, helps to reduce subjectivity of an appraiser, and also

allows to gain additional insights regarding the distribution of potential values of a company being valued and the likelihood of a specific value or a selected values interval.

13. Future research on the uncertainty in the discounted cash flow valuation topic could focus more on a process on how to select the most important inputs in a Monte Carlo simulation-based valuation for which the random values (based on probability distributions) would be assigned. Also, the relationship between selected simulation variables could be studied in order to propose a way to account for potential correlation impact when assigning random values for valuation inputs in the simulation.

REFERENCES

1. Alibegovic, D. (2013). Relation of the Intrinsic Value of Companies and Share Prices on the Stock Exchanges of Central and Eastern European Transition Countries. *Nase Gospodarstvo/Our Economy*, *59*(3–4), 3–13. https://search.ebscohost.com/login.aspx?direct=true&db=eoh&AN=1526326&site=ehost-live
2. Anderson, P. (2012). *The Economics of Business Valuation : Towards a Value Functional Approach*. Stanford Economics and Finance. https://search.ebscohost.com/login.aspx?direct=true&db=e000xww&AN=713557&site=ehost-live
3. Beneda, N. L. (2003). Estimating free cash flows and valuing a growth company. *Journal of Asset Management*, *4*(4), 247–257. https://doi.org/10.1057/palgrave.jam.2240106
4. Bihari, S. C., & Charde, S. K. (2014). INTRINSIC VALUE OF STOCKS: DOES MARKET APPRECIATE IT? A STUDY ON THREE MAJOR PRIVATE BANKS IN INDIA. *Economics, Management & Financial Markets*, *9*(1), 53–74. https://search.ebscohost.com/login.aspx?direct=true&db=bsu&AN=95505236&site=ehost-live
5. Butler, P. J. (2020). Cost of Equity and COVID-19: What to Do? (Update). *Business Valuation Update*, *26*(8), 1–3. https://search.ebscohost.com/login.aspx?direct=true&db=bsu&AN=144508821&site=ehost-live
6. Caruso, G. R. (2020). Estimating a COVID-19 Marketability Discount for Small Businesses. *Business Valuation Update*, *26*(11), 1–8. https://search.ebscohost.com/login.aspx?direct=true&db=bsu&AN=146375236&site=ehost-live
7. Damodaran, A. (2011). Valuing Young, Start-Up and Growth Companies: Estimation Issues and Valuation Challenges. *SSRN Electronic Journal*. https://doi.org/10.2139/ssrn.1418687
8. Damodaran, A. (2012). Investment Valuation: Tools and Techniques for Determining the Value of any Asset, University Edition. In *John Wiley & Sons*.
9. Damodaran, A. (2013). Living with Noise: Valuation in the Face of Uncertainty. *Journal of Applied Finance*, *23*(2), 6–22.

https://search.ebscohost.com/login.aspx?direct=true&db=eoh&AN=1417378&site=ehost-live

10. Damodaran, A. (2023). *Risk Premiums for Other Markets*. https://pages.stern.nyu.edu/~adamodar/New_Home_Page/dataarchived.html
11. Diaconu, M. (2015). MEASURINGG THE FIRM VALUE BY DISCOUNTED CASH FLOWS: PRINCIPLES AND ISSUES OF VARIOUS MODELS. *Annals of the University of Craiova, Economic Sciences Series*, *2*, 345–355. https://search.ebscohost.com/login.aspx?direct=true&db=e5h&AN=110006088&site=ehost-live
12. Dorfleitner, G. (2022). On the use of the terminal-value approach in risk-value models. *Annals of Operations Research*, *313*(2), 877–897. https://doi.org/10.1007/s10479-020-03644-2
13. Durham, C. J. (2016). Understanding the basic business valuation methods. *Control Engineering*, *63*(12), 24. https://search.ebscohost.com/login.aspx?direct=true&db=bsu&AN=120328988&site=ehost-live
14. European Central Bank. (2022). *Eurosystem staff macroeconomic projections for the euro area, December 2022*. https://www.ecb.europa.eu/pub/projections/html/ecb.projections202212_eurosystemstaff~6c1855c75b.en.html
15. Eurostat. (2023a). *Demographic balances and indicators by type of projection*. https://ec.europa.eu/eurostat/databrowser/view/proj_23ndbi__custom_8816830/default/table?lang=en&page=time:2032
16. Eurostat. (2023b). *Expenditure by detailed country/world region of the main destination of the trip*. https://ec.europa.eu/eurostat/databrowser/view/tour_dem_extotw/default/table?lang=en
17. Eurostat. (2023c). *Persons participating in tourism for personal purposes by duration of the stay and destination*. https://ec.europa.eu/eurostat/databrowser/view/tour_dem_totot/default/table?lang=en
18. Eurostat. (2023d). *Population and employment*. https://ec.europa.eu/eurostat/databrowser/view/namq_10_pe__custom_8816468/default/table?lang=en

19. Fernandez, P. (2007). Valuing Companies by Cash Flow Discounting: Ten Methods and Nine Theories. *Journal of Management Science*, *1*(1), 80–100. https://search.ebscohost.com/login.aspx?direct=true&db=bsu&AN=24978960&site=ehost-live
20. García-Sánchez, J., Preve, L., & Sarria-Allende, V. (2010). Valuation in Emerging Markets: A Simulation Approach. *Journal of Applied Corporate Finance*, *22*(2), 100–108. https://doi.org/10.1111/j.1745-6622.2010.00279.x
21. Holland, D. A. (2018). An Improved Method for Valuing Mature Companies and Estimating Terminal Value. *Journal of Applied Corporate Finance*, *30*(1), 70–77. https://doi.org/10.1111/jacf.12279
22. International Monetary Fund. (2023). *Real GDP growth* . https://www.imf.org/external/datamapper/NGDP_RPCH@WEO/EU/LTU/EST/LVA?year=2023
23. International Valuation Standards Council. (2021). *International Valuation Standards*. https://www.rics.org/profession-standards/rics-standards-and-guidance/sector-standards/valuation-standards/red-book/international-valuation-standards
24. Jegelavičiūtė, R., & Navickas, V. (2019). CHOOSING OPTIMAL BUSINESS VALUATION METHOD: LITHUANIAN CASE. *Social & Economic Revue*, *17*(1), 24–36. https://search.ebscohost.com/login.aspx?direct=true&db=bsu&AN=136655166&site=ehost-live
25. Jennergren, L. P. (2013). Technical Note: Value Driver Formulas for Continuing Value in Firm Valuation by the Discounted Cash Flow Model. *Engineering Economist*, *58*(1), 59–70. https://doi.org/10.1080/0013791X.2012.729876
26. Kaiser, D. (2021). The Impact of COVID-19 on Business Valuations. *New Jersey CPA*, *86*, 19. https://search.ebscohost.com/login.aspx?direct=true&db=bsu&AN=149427920&site=ehost-live
27. Kess, S., & Mendlowitz, E. (2017). Helping Business Owners Understand Valuation Approaches. *CPA Journal*, *87*(11), 64–66. https://search.ebscohost.com/login.aspx?direct=true&db=bsu&AN=126630846&site=ehost-live

28. Koller, T., Goedhart, M., & Wessels, D. (2010). *Valuation: Measuring and Managing the Value of Companies*. Fifth edition. https://search.ebscohost.com/login.aspx?direct=true&db=eoh&AN=1154632&site=ehost-live
29. Landier, A., & Thesmar, D. (2020). Earnings Expectations during the COVID-19 Crisis. *Review of Asset Pricing Studies*, *10*(4), 598–617. https://doi.org/10.1093/rapstu/raaa016
30. McKee, T. E. (2004). A New Approach to Uncertainty in Business Valuations. *CPA Journal*, *74*(4), 46–48. https://search.ebscohost.com/login.aspx?direct=true&db=bsu&AN=12753318&site=ehost-live
31. McManus, J. (2019). The creation of shared value: Reconnecting business and society: An overview. *Strategic Change*, *28*(2), 113–114. https://doi.org/10.1002/jsc.2251
32. Meszek, W. (2013). PROPERTY VALUATION UNDER UNCERTAINTY. SIMULATION VS STRATEGIC MODEL. *International Journal of Strategic Property Management*, *17*(1), 79–92. https://doi.org/10.3846/1648715X.2013.782165
33. Nasdaq Baltic. (2023a). *Novaturas AB share price*. https://nasdaqbaltic.com/statistics/lt/charts
34. Nasdaq Baltic. (2023b). *OMX Vilnius index returns*. https://nasdaqbaltic.com/statistics/lt/charts
35. Nishihara, M. (2018). Valuation of R&D investment under technological, market, and rival preemption uncertainty. *Managerial & Decision Economics*, *39*(2), 200–212. https://doi.org/10.1002/mde.2896
36. Novaturas AB. (2018). *Initial public offering prospectus*. https://www.novaturasgroup.com/initial-public-offering/
37. Novaturas AB. (2019a). *Novaturas AB Consolidated Annual Report 2018*. https://www.novaturasgroup.com/financial-reports/
38. Novaturas AB. (2019b). *Presentation addressing Q4/FY 2018 financial results*. https://www.novaturasgroup.com/financial-reports/
39. Novaturas AB. (2020). *Novaturas AB Consolidated Annual Report 2019*. https://www.novaturasgroup.com/financial-reports/

40. Novaturas AB. (2021). *Novaturas AB Consolidated Annual Report 2020*. https://www.novaturasgroup.com/financial-reports/
41. Novaturas AB. (2022). *Novaturas AB Consolidated Annual Report 2021*. https://www.novaturasgroup.com/financial-reports/
42. Novaturas AB. (2023a). *Novaturas AB Consolidated Annual Report 2022*. https://www.novaturasgroup.com/financial-reports/
43. Novaturas AB. (2023b). *Presentation of 12M 2022*. https://www.novaturasgroup.com/financial-reports/
44. Ochoa, C. M. (2004). VALUATION OF FINANCIAL ASSETS USING MONTE CARLO: WHEN THE WORLD IS NOT SO NORMAL. *Revista de Economía Del Rosario*, *7*(1), 1–18. https://search.ebscohost.com/login.aspx?direct=true&db=bsu&AN=21615070&site=ehost-live
45. Palaszynski, L. W., Lipoff, L. M., Kahn, A. D., Landau, J., Simon, D. M., Sonet, R. H., Brizard, P., & Gordon, E. G. (2000). FAIR MARKET VALUE FOR BUSINESS VALUATIONS. *CPA Journal*, *70*(5), 74. https://search.ebscohost.com/login.aspx?direct=true&db=bsu&AN=3125429&site=ehost-live
46. Seigneur, R. L. (2020). Assessing Additional Economic Risk Due to COVID-19. *Business Valuation Update*, *26*(6), 1–4. https://search.ebscohost.com/login.aspx?direct=true&db=bsu&AN=143325709&site=ehost-live
47. Simsek, K. D. (2023). Monte Carlo Simulation in Financial Modeling. *Journal of Portfolio Management*, *49*(9), 178–188. https://doi.org/10.3905/jpm.2023.1.521
48. Thomas, R., & Gup, B. E. (2010). *The valuation handbook: valuation techniques from today's top practitioners* (Vol. 480). John Wiley & Sons.
49. Todorov, L. (2019). PRACTICAL APPLICATION OF INCOME CAPITALIZATION METHOD IN BUSINESS VALUATION - SOME HIGHLIGHTS. *Knowledge: International Journal*, *34*(1), 25–30. https://search.ebscohost.com/login.aspx?direct=true&db=e5h&AN=141392729&site=ehost-live

50. Trading Economics. (2023). *Lithuania 10-Year Government Bond Yield*. https://tradingeconomics.com/lithuania/government-bond-yield
51. Van Vleet, D. R., Thompson, J. W., McInerney, W. P., & Neuzil, D. J. (2020). Alternate Valuation Methods in the Era of COVID-19. *Business Valuation Update*, *26*(6), 1–7. https://search.ebscohost.com/login.aspx?direct=true&db=bsu&AN=143325707&site=ehost-live
52. Vochozka, M., Rowland, Z., & Šuler, P. (2019). THE SPECIFICS OF VALUATING A BUSINESS WITH A LIMITED LIFESPAN. *Ad Alta: Journal of Interdisciplinary Research*, *9*(2), 339–345. https://search.ebscohost.com/login.aspx?direct=true&db=asn&AN=141142533&site=ehost-live
53. Wijayaningsih, S., & Yulianto, A. (2021). The Effect of Capital Structure, Firm Size, and Profitability on Firm Value with Investment Decisions as Moderating. *Accounting Analysis Journal (AAJ)*, *10*(3), 150–157. https://doi.org/10.15294/aaj.v10i3.50744

Annex 1. "Novaturas" AB balance sheet items breakdown

Consolidated Balance Sheet, thous. Euro	**2015-12-31**	**2016-12-31**	**2017-12-31**	**2018-12-31**	**2019-12-31**	**2020-12-31**	**2021-12-31**	**2022-12-31**	*Classification*
Goodwill	30,327	30,327	30,327	30,327	30,327	30,327	30,327	30,327	LA
Intangible assets	291	442	448	427	248	115	127	627	LA
Property, plant and equipment	339	324	297	292	770	341	418	421	LA
Non-current receivables	43	342	56	65	220	23	47	128	LA
Deferred income tax asset	13	10	6	6	30	954	851	872	Other+
Total non-current assets	**31,013**	**31,445**	**31,134**	**31,117**	**31,595**	**31,760**	**31,770**	**32,375**	
Inventory	1	1	1	3	4	2	0	0	WC+
Prepayments and deferred expenses	3,825	2,748	5,940	8,861	8,973	7,837	6,244	18,534	WC+
Trade receivables	542	433	700	697	652	144	167	518	WC+
Other receivables	493	2,993	2,872	2,459	1,310	254	541	1,698	WC+
Cash and equivalents	5,861	6,646	9,984	4,703	6,854	5,365	5,919	2,770	Cash
Total current assets	**10,722**	**12,821**	**19,497**	**16,723**	**17,793**	**13,602**	**12,871**	**23,520**	
Total assets	**41,735**	**44,266**	**50,631**	**47,840**	**49,388**	**45,362**	**44,641**	**55,895**	
Issued capital	226	226	226	234	234	234	234	234	EQ
Reserves	153	473	658	-1,177	396	-247	171	174	EQ
Retained earnings	14,672	15,134	13,963	15,310	19,524	13,774	14,683	13,865	EQ
Total equity	**15,051**	**15,833**	**14,847**	**14,367**	**20,154**	**13,761**	**15,088**	**14,273**	
Long-term borrowings	8,917	10,842	0	6,000	4,000	11,055	12,232	6,865	Debt
Lease liabilities	0	0	0	0	360	83	207	179	Debt
Deferred income tax liabilities	1,533	2,033	2,606	2,781	0	0	0	0	Other-
Total non-current liabilities	**10,450**	**12,875**	**2,606**	**8,781**	**4,360**	**11,138**	**12,439**	**7,044**	
Current portion of long-term loans	3,158	3,158	14,000	2,000	2,000	5,798	2,094	1,975	Debt
Trade payables	5,548	3,130	3,882	4,611	4,173	1,961	4,896	14,272	WC-
Advances received	6,405	7,988	12,102	14,259	14,997	10,876	8,615	14,392	WC-
Other current liabilities and accrued expenses	1,123	1,282	3,194	3,822	3,488	1,680	1,338	3,751	WC-
Lease liabilities					216	148	171	188	Debt
Total current liabilities	**16,234**	**15,558**	**33,178**	**24,692**	**24,874**	**20,463**	**17,114**	**34,578**	
Total equity and liabilities	**41,735**	**44,266**	**50,631**	**47,840**	**49,388**	**45,362**	**44,641**	**55,895**	

Source: compiled by the author based on "Novaturas" AB initial public offering prospectus (2018), "Novaturas" AB consolidated annual financial reports in 2018-2022

Classification:

- LA (long term assets)
- Other+ (other assets)
- WC+ (working capital assets)
- Cash (cash and equivalents)
- EQ (equity)
- Debt (debt liabilities)
- Other- (other liabilities)
- WC- (working capital liabilities)

Annex 2. Population in the Baltic states, share of population participating in foreign tourism, estimated market size (historical and forecast)

	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032
Population, thous.																		
Lithuania	2,905	2,868	2,828	2,802	2,794	2,795	2,808	2,832	2,869	2,875	2,860	2,842	2,820	2,794	2,768	2,742	2,716	2,691
Latvia	1,971	1,953	1,936	1,921	1,909	1,896	1,876	1,893	1,894	1,883	1,863	1,842	1,821	1,799	1,778	1,756	1,735	1,715
Estonia	1,313	1,316	1,316	1,319	1,325	1,329	1,330	1,332	1,372	1,380	1,378	1,374	1,371	1,366	1,362	1,359	1,355	1,351
Total Baltics	**6,190**	**6,137**	**6,080**	**6,042**	**6,028**	**6,019**	**6,015**	**6,057**	**6,135**	**6,139**	**6,101**	**6,059**	**6,012**	**5,959**	**5,908**	**5,857**	**5,807**	**5,758**
Share of population participating in foreign tourism, %	**2015**	**2016**	**2017**	**2018**	**2019**	**2020**	**2021**	**2022**	**Average***	**2024**	**2025**	**2026**	**2027**	**2028**	**2029**	**2030**	**2031**	**2032**
Lithuania	21.1%	20.7%	21.5%	20.7%	21.5%	4.6%	5.4%	16.3%	**21.1%**	21.1%	21.1%	21.1%	21.1%	21.1%	21.1%	21.1%	21.1%	21.1%
Latvia	18.2%	20.1%	34.3%	22.9%	22.2%	8.8%	12.5%	24.2%	**23.5%**	23.5%	23.5%	23.5%	23.5%	23.5%	23.5%	23.5%	23.5%	23.5%
Estonia	24.7%	26.6%	21.0%	31.9%	32.4%	12.9%	13.7%	25.9%	**27.3%**	27.3%	27.3%	27.3%	27.3%	27.3%	27.3%	27.3%	27.3%	27.3%
Market size	**2015**	**2016**	**2017**	**2018**	**2019**	**2020**	**2021**	**2022**	**2023**	**2024**	**2025**	**2026**	**2027**	**2028**	**2029**	**2030**	**2031**	**2032**
Lithuania	611,774	593,437	606,692	581,039	599,343	128,285	150,248	462,124	604,811	606,038	602,930	599,054	594,393	588,842	583,363	577,943	572,567	567,280
Latvia	357,791	391,692	663,046	440,385	423,383	167,007	234,731	457,397	445,352	442,826	438,049	433,187	428,198	423,033	417,949	412,949	408,049	403,304
Estonia	324,122	349,371	275,881	420,143	429,507	171,693	181,688	344,936	374,424	376,700	375,980	375,116	374,115	372,969	371,864	370,819	369,812	368,869
Total Baltics	**1,293,687**	**1,334,500**	**1,545,619**	**1,441,567**	**1,452,233**	**466,985**	**566,667**	**1,264,457**	**1,424,587**	**1,425,565**	**1,416,960**	**1,407,357**	**1,396,707**	**1,384,844**	**1,373,177**	**1,361,712**	**1,350,428**	**1,339,452**

Source: compiled by the author based on Eurostat data

Annex 3. Assumptions in the Base case scenario

Assumptions	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	Terminal Year
Number of passengers	284,917	285,113	283,392	281,471	279,341	276,969	274,635	272,342	270,086	267,890	267,890
Growth rate in passenger number	*6.8%*	*0.1%*	*-0.6%*	*-0.7%*	*-0.8%*	*-0.8%*	*-0.8%*	*-0.8%*	*-0.8%*	*-0.8%*	*0.0%*
Revenue per passenger, EUR	762	803	845	890	935	983	1,017	1,053	1,090	1,129	1,151
Growth rate in revenue per passenger	*3.4%*	*5.3%*	*5.3%*	*5.3%*	*5.1%*	*5.0%*	*3.5%*	*3.5%*	*3.5%*	*3.5%*	2.0%
Operating margin	1.70%	1.70%	1.70%	1.70%	1.70%	1.70%	1.70%	1.70%	1.70%	1.70%	1.70%
Tax loss carried forward	1,880	0	0	0	0	0	0	0	0	0	0
Tas loss used / accumulated	-2,587	-1,880	0	0	0	0	0	0	0	0	0
Taxable EBIT	1,109	2,015	4,077	4,264	4,447	4,632	4,755	4,881	5,012	5,146	5,249
Effective tax rate	15.0%	15.3%	15.5%	15.8%	16.1%	16.3%	16.6%	16.9%	17.1%	17.4%	17.4%
D&A growth rate	3.4%	5.3%	5.3%	5.3%	5.1%	5.0%	3.5%	3.5%	3.5%	3.5%	3.5%
CAPEX to sales	0.24%	0.24%	0.24%	0.24%	0.24%	0.24%	0.24%	0.24%	0.24%	0.24%	0.24%
Working capital to sales	-6.60%	-6.60%	-6.60%	-6.60%	-6.60%	-6.60%	-6.60%	-6.60%	-6.60%	-6.60%	-6.60%
Working capital	-14,327	-15,096	-15,803	-16,528	-17,236	-17,953	-18,429	-18,920	-19,425	-19,947	-20,346
Dividend payout ratio	70%	70%	70%	70%	70%	70%	70%	70%	70%	70%	70%

Source: compiled by the author

Annex 4. Consolidated Income Statement forecast in the Base case scenario

Consolidated Income Statement, thous. EUR	**2023**	**2024**	**2025**	**2026**	**2027**	**2028**	**2029**	**2030**	**2031**	**2032**	**Terminal Year**
Sales	217,160	228,826	239,536	250,524	261,263	272,123	279,348	286,785	294,440	302,347	308,394
Growth rate	*10.4%*	*5.4%*	*4.7%*	*4.6%*	*4.3%*	*4.2%*	*2.7%*	*2.7%*	*2.7%*	*2.7%*	*2.0%*
Cost of sales, selling, administrative and other operating expenses	-213,464	-224,932	-235,459	-246,260	-256,816	-267,492	-274,593	-281,904	-289,428	-297,201	-303,145
Growth rate	*8.7%*	*5.4%*	*4.7%*	*4.6%*	*4.3%*	*4.2%*	*2.7%*	*2.7%*	*2.7%*	*2.7%*	*2.0%*
EBIT	**3,696**	**3,895**	**4,077**	**4,264**	**4,447**	**4,632**	**4,755**	**4,881**	**5,012**	**5,146**	**5,249**
EBIT margin	*1.70%*	*1.70%*	*1.70%*	*1.70%*	*1.70%*	*1.70%*	*1.70%*	*1.70%*	*1.70%*	*1.70%*	*1.70%*
Taxes	-166	-308	-633	-674	-715	-757	-789	-824	-859	-896	-914
EBIT *(1-t)	**3,530**	**3,587**	**3,444**	**3,590**	**3,732**	**3,875**	**3,965**	**4,058**	**4,153**	**4,250**	**4,335**
Interest expenses	-598	-580	-562	-562	-562	-562	-562	-562	-562	-562	-562
Net profit	**2,931**	**3,007**	**2,882**	**3,029**	**3,171**	**3,313**	**3,404**	**3,496**	**3,591**	**3,689**	**3,774**

Source: compiled by the author

Annex 5. Consolidated Cash flow statement forecast in the Base case scenario

Cash flow forecast, thous. EUR	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	Terminal Year
EBIT after tax	3,530	3,587	3,444	3,590	3,732	3,875	3,965	4,058	4,153	4,250	4,335
Interest expenses	-598	-580	-562	-562	-562	-562	-562	-562	-562	-562	-562
Net profit	**2,931**	**3,007**	**2,882**	**3,029**	**3,171**	**3,313**	**3,404**	**3,496**	**3,591**	**3,689**	**3,774**
D&A	268	282	297	313	329	345	358	370	383	397	411
CAPEX	-524	-553	-578	-605	-631	-657	-675	-692	-711	-730	-745
Change in NWC	2,662	770	707	725	708	717	477	491	505	522	399
Dividends paid-out	-2,052	-2,105	-2,017	-2,120	-2,219	-2,319	-2,383	-2,447	-2,514	-2,582	-2,642
Change in debt	0	0	0	0	0	0	0	0	0	0	0
Cash inflow / outflow	**3,285**	**1,401**	**1,290**	**1,341**	**1,358**	**1,399**	**1,181**	**1,217**	**1,255**	**1,295**	**1,197**
Cash balance end period	**6,055**	**7,456**	**8,746**	**10,087**	**11,445**	**12,844**	**14,024**	**15,242**	**16,496**	**17,791**	**18,988**

Source: compiled by the author

Annex 6. Consolidated Balance sheet forecast in the Base case scenario

Balance sheet forecast, thous. EUR	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	Terminal Year
Working capital assets	25,485	26,854	28,111	29,400	30,660	31,935	32,783	33,655	34,554	35,482	36,191
Working capital liabilities	-39,811	-41,950	-43,913	-45,928	-47,897	-49,888	-51,212	-52,576	-53,979	-55,428	-56,537
Working capital	**-14,327**	**-15,096**	**-15,803**	**-16,528**	**-17,236**	**-17,953**	**-18,429**	**-18,920**	**-19,425**	**-19,947**	**-20,346**
Cash	6,055	7,456	8,746	10,087	11,445	12,844	14,024	15,242	16,496	17,791	18,988
Debt	-9,207	-9,207	-9,207	-9,207	-9,207	-9,207	-9,207	-9,207	-9,207	-9,207	-9,207
Net debt	**-3,152**	**-1,751**	**-461**	**880**	**2,238**	**3,637**	**4,817**	**6,035**	**7,289**	**8,584**	**9,781**
Long-term assets	**31,759**	**32,030**	**32,311**	**32,603**	**32,905**	**33,217**	**33,534**	**33,856**	**34,184**	**34,518**	**34,852**
Other assets and liabilities	**872**	**872**	**872**	**872**	**872**	**872**	**872**	**872**	**872**	**872**	**872**
Equity	**-15,152**	**-16,055**	**-16,919**	**-17,828**	**-18,779**	**-19,773**	**-20,794**	**-21,843**	**-22,920**	**-24,027**	**-25,159**

Source: compiled by the author

Annex 7. Monthly returns of "Novaturas" AB stock and OMX Vilnius index

	"Novaturas" AB price	Index value	Monthly return "Novaturas" AB	Monthly return index	Beta
2022-12-31	2.90	947.14	-4.3%	0.1%	**1.17**
2022-11-30	3.03	946.12	14.3%	4.7%	
2022-10-31	2.65	903.35	1.5%	1.0%	
2022-09-30	2.61	894.83	-16.9%	-2.5%	
2022-08-31	3.14	917.68	-4.9%	1.9%	
2022-07-31	3.30	900.27	-8.1%	1.1%	
2022-06-30	3.59	890.60	-5.9%	-3.4%	
2022-05-31	3.82	922.24	-3.1%	0.8%	
2022-04-30	3.94	915.25	-4.6%	2.3%	
2022-03-31	4.13	894.98	12.9%	-0.3%	
2022-02-28	3.66	897.74	-5.9%	-5.7%	
2022-01-31	3.89	951.68	1.8%	-1.5%	
2021-12-31	3.82	966.13	-4.2%	0.6%	
2021-11-30	3.99	960.68	-5.2%	0.9%	
2021-10-31	4.21	952.39	4.3%	2.0%	
2021-09-30	4.04	933.72	0.9%	-7.0%	
2021-08-31	4.00	1003.85	-0.4%	4.0%	
2021-07-31	4.02	965.31	-15.4%	4.4%	
2021-06-30	4.75	924.50	-8.7%	-1.5%	
2021-05-31	5.20	938.24	14.5%	6.2%	
2021-04-30	4.54	883.16	26.8%	4.0%	
2021-03-31	3.58	848.89	17.8%	-0.2%	
2021-02-28	3.04	850.99	10.1%	-1.3%	
2021-01-31	2.76	862.43	-6.1%	5.6%	
2020-12-31	2.94	816.64	22.5%	5.5%	
2020-11-30	2.40	774.12	31.9%	3.9%	
2020-10-31	1.82	745.15	2.2%	-4.3%	
2020-09-30	1.78	778.37	-3.8%	-0.9%	
2020-08-31	1.85	785.56	-13.6%	1.0%	
2020-07-31	2.14	777.85	-7.8%	5.4%	
2020-06-30	2.32	737.71	14.9%	2.2%	
2020-05-31	2.02	721.57	-8.2%	3.8%	
2020-04-30	2.20	695.05	-2.7%	15.0%	
2020-03-31	2.26	604.56	-26.1%	-12.1%	
2020-02-29	3.06	688.05	-28.5%	-6.3%	
2020-01-31	4.28	734.41	-0.5%	3.1%	
2019-12-31	4.30	712.14	-9.3%	0.4%	
2019-11-30	4.74	709.59	-27.1%	1.1%	
2019-10-31	6.50	701.90	-1.5%	1.6%	
2019-09-30	6.60	690.62	-2.2%	0.3%	
2019-08-31	6.75	688.44	-7.5%	-0.9%	
2019-07-31	7.30	694.67	2.1%	4.3%	
2019-06-30	7.15	665.87	-7.1%	-1.7%	
2019-05-31	7.70	677.58	-6.7%	-0.8%	
2019-04-30	8.25	682.71	-0.7%	4.2%	
2019-03-31	8.31	655.28	1.3%	0.6%	
2019-02-28	8.20	651.60	-3.5%	0.6%	
2019-01-31	8.50	647.96	6.3%	5.0%	
2018-12-31	8.00	616.90	-1.5%	-4.1%	
2018-11-30	8.12	642.98	-18.0%	-1.2%	
2018-10-31	9.91	651.02	-10.4%	-5.5%	
2018-09-30	11.05	689.27	-2.7%	-1.6%	
2018-08-31	11.36	700.30	-8.4%	-2.4%	
2018-07-31	12.40	717.33	10.7%	1.0%	
2018-06-30	11.20	709.95	-1.1%	-0.2%	
2018-05-31	11.33	711.11	5.7%	0.9%	
2018-04-30	10.72	704.70	-1.2%	0.3%	
2018-03-31	10.85	702.25			

Source: compiled by the author based on Nasdaq Vilnius data

Annex 8. Assumptions in one trial of Monte Carlo simulation

Assumptions	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	Terminal Year
Number of passengers	220,499	106,469	51,309	130,516	129,778	148,792	288,880	228,627	259,832	83,993	225,451
Growth rate in passenger number	*-17.4%*	*-51.7%*	*-51.8%*	*154.4%*	*-0.6%*	*14.7%*	*94.2%*	*-20.9%*	*13.6%*	*-67.7%*	*168.4%*
Revenue per passenger, EUR	762	803	845	890	935	983	1,017	1,053	1,090	1,129	1,151
Growth rate in revenue per passenger	*3.4%*	*5.3%*	*5.3%*	*5.3%*	*5.1%*	*5.0%*	*3.5%*	*3.5%*	*3.5%*	*3.5%*	2.0%
Operating margin	4.07%	4.02%	0.36%	5.66%	2.02%	3.16%	1.39%	-0.11%	-1.31%	-0.04%	0.81%
Tax loss carried forward	0	0	0	0	0	0	0	276	3,995	4,037	2,566
Tas loss used / accumulated	-4,467	0	0	0	0	0	0	276	3,719	41	-1,471
Taxable EBIT	2,367	3,437	155	6,572	2,450	4,624	4,096	0	0	0	630
Effective tax rate	15.0%	15.3%	15.5%	15.8%	16.1%	16.3%	16.6%	16.9%	17.1%	17.4%	17.4%
D&A growth rate	3.4%	5.3%	5.3%	5.3%	5.1%	5.0%	3.5%	3.5%	3.5%	3.5%	3.5%
CAPEX to sales	0.24%	0.24%	0.24%	0.24%	0.24%	0.24%	0.24%	0.24%	0.24%	0.24%	0.24%
Working capital to sales	-7.01%	-8.28%	-5.69%	-7.86%	-6.98%	-7.41%	-7.12%	-7.68%	-7.31%	-6.43%	
Working capital	-11,779	-7,076	-2,468	-9,127	-8,474	-10,825	-20,935	-18,492	-20,698	-6,093	-6,093
Dividen payout ratio	70%	70%	70%	70%	70%	70%	70%	70%	70%	70%	70%

Source: compiled by the author

**Blue color of cells indicates variable assumptions*

Annex 9. Consolidated Income Statement forecast in one trial of Monte Carlo simulation

Consolidated Income Statement, thous. EUR	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	Terminal Year
Sales	168,061	85,450	43,369	116,166	121,379	146,189	293,837	240,752	283,262	94,797	259,538
Growth rate	*-14.5%*	*-49.2%*	*-49.2%*	*167.9%*	*4.5%*	*20.4%*	*101.0%*	*-18.1%*	*17.7%*	*-66.5%*	*173.8%*
other operating expenses	-161,227	-82,013	-43,214	-109,594	-118,928	-141,565	-289,741	-241,028	-286,981	-94,838	-257,437
Growth rate	*-17.9%*	*-49.1%*	*-47.3%*	*153.6%*	*8.5%*	*19.0%*	*104.7%*	*-16.8%*	*19.1%*	*-67.0%*	*171.4%*
EBIT	**6,834**	**3,437**	**155**	**6,572**	**2,450**	**4,624**	**4,096**	**-276**	**-3,719**	**-41**	**2,101**
EBIT margin	*4.07%*	*4.02%*	*0.36%*	*5.66%*	*2.02%*	*3.16%*	*1.39%*	*-0.11%*	*-1.31%*	*-0.04%*	*0.81%*
Taxes	-355	-525	-24	-1,038	-394	-755	-680	0	0	0	-110
EBIT *(1-t)	**6,479**	**2,913**	**131**	**5,533**	**2,057**	**3,869**	**3,416**	**-276**	**-3,719**	**-41**	**1,992**
Interest expenses	-598	-580	-562	-562	-562	-562	-562	-562	-562	-562	-562
Net profit	**5,880**	**2,333**	**-431**	**4,972**	**1,495**	**3,307**	**2,855**	**-838**	**-4,281**	**-603**	**1,430**

Source: compiled by the author

Annex 10. Consolidated Cash flow statement forecast in one trial of Monte Carlo simulation

Cash flow forecast	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	Terminal Year
EBIT after tax	6,479	2,913	131	5,533	2,057	3,869	3,416	-276	-3,719	-41	1,992
Interest expenses	-598	-580	-562	-562	-562	-562	-562	-562	-562	-562	-562
Net profit	**5,880**	**2,333**	**-431**	**4,972**	**1,495**	**3,307**	**2,855**	**-838**	**-4,281**	**-603**	**1,430**
D&A	268	282	297	313	329	345	358	370	383	397	411
CAPEX	-406	-206	-105	-280	-293	-353	-709	-581	-684	-229	-627
Change in NWC	114	-4,703	-4,608	6,659	-653	2,351	10,109	-2,442	2,206	-14,606	0
Dividends paid-out	-4,116	-1,633	0	-3,480	-1,047	-2,315	-1,998	0	0	0	-1,001
Change in debt	0	0	0	0	0	0	0	0	0	0	0
Cash inflow / outflow	**1,740**	**-3,927**	**-4,846**	**8,183**	**-169**	**3,336**	**10,614**	**-3,491**	**-2,375**	**-15,041**	**213**
Cash balance end period	**4,510**	**583**	**-4,264**	**3,919**	**3,750**	**7,086**	**17,700**	**14,208**	**11,833**	**-3,208**	**-2,995**

Source: compiled by the author

**Even though in some years cash balance is negative, assumption is made that in such year the company would borrow/use its credit line facilities to satisfy the cash requirement*

Annex 11. Consolidated Balance sheet forecast in one trial of Monte Carlo simulation

Balance sheet forecast	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	Terminal Year
Working capital assets	20,952	12,587	4,391	16,236	15,074	19,256	37,239	32,895	36,819	10,838	10,838
Working capital liabilities	-32,731	-19,663	-6,859	-25,363	-23,548	-30,082	-58,173	-51,387	-57,517	-16,930	-16,930
Working capital	**-11,779**	**-7,076**	**-2,468**	**-9,127**	**-8,474**	**-10,825**	**-20,935**	**-18,492**	**-20,698**	**-6,093**	**-6,093**
Cash	4,510	583	-4,264	3,919	3,750	7,086	17,700	14,208	11,833	-3,208	-2,995
Debt	-9,207	-9,207	-9,207	-9,207	-9,207	-9,207	-9,207	-9,207	-9,207	-9,207	-9,207
Net debt	**-4,697**	**-8,624**	**-13,471**	**-5,288**	**-5,457**	**-2,121**	**8,493**	**5,001**	**2,626**	**-12,415**	**-12,202**
Long-term assets	**31,641**	**31,565**	**31,373**	**31,340**	**31,305**	**31,312**	**31,664**	**31,876**	**32,176**	**32,009**	**32,225**
Other assets and liabilities	**872**	**872**	**872**	**872**	**872**	**872**	**872**	**872**	**872**	**872**	**872**
Equity	**-16,037**	**-16,737**	**-16,306**	**-17,797**	**-18,246**	**-19,238**	**-20,095**	**-19,257**	**-14,976**	**-14,373**	**-14,802**

Source: compiled by the author

**Even though in some years cash balance is negative, assumption is made that in such year the company would borrow/use its credit line facilities to satisfy the cash requirement*

Annex 12. Results of the simulation

Percentile	Value	Bin	Frequency	Value	Probability	Cumulative probability
0%	-23,468	-22,500	1	-22,500	0.00%	0.00%
5%	4,033	-17,500	11	-17,500	0.01%	0.01%
10%	7,650	-12,500	51	-12,500	0.05%	0.06%
15%	10,210	-7,500	197	-7,500	0.20%	0.26%
20%	12,280	-2,500	801	-2,500	0.80%	1.06%
25%	14,044	2,500	2,559	2,500	2.56%	3.62%
30%	15,710	7,500	6,137	7,500	6.14%	9.76%
35%	17,218	12,500	10,822	12,500	10.82%	20.58%
40%	18,696	17,500	15,378	17,500	15.38%	35.96%
45%	20,180	22,500	17,151	22,500	17.15%	53.11%
50%	21,601	27,500	16,504	27,500	16.50%	69.61%
55%	23,044	32,500	13,209	32,500	13.21%	82.82%
60%	24,513	37,500	8,781	37,500	8.78%	91.60%
65%	26,050	42,500	4,921	42,500	4.92%	96.52%
70%	27,632	47,500	2,309	47,500	2.31%	98.83%
75%	29,358	52,500	842	52,500	0.84%	99.67%
80%	31,265	57,500	246	57,500	0.25%	99.92%
85%	33,539	62,500	71	62,500	0.07%	99.99%
90%	36,379	67,500	7	67,500	0.01%	100.00%
95%	40,538	72,500	2	72,500	0.00%	100.00%
100%	71,767	77,500	0	77,500	0.00%	100.00%

Source: compiled by the author